HOME SCIENCE

HIGHER SECONDARY - SECOND YEAR

Untouchability is a sin

Untouchability is a crime

Untouchability is inhuman

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CONTENTS

1. CONCEPT OF HOME SCIENCE

Home Science Education prepares youth for the greatest of all vocation – Home Making. In the earlier text, we had an over view of the concept and role of Home Science. In this chapter an attempt has been made to review some of the important concepts (hints) from all the chapters and also highlight measures that students can remember through out their life time.

Let us start with first aid and then move on to good health, hints from food and nutrition and other areas of importance.

1.1. FIRST AID

Learning first aid is the civic responsibility of each citizen. Even though methods of first-aid have been practiced perhaps ever since a man desired to help another man in sickness or after injury, an organised worldwide effort at giving first-aid came only in the year 1877 with the formation of St. John Ambulance Association England after the great apostle of St. John.

PRINCIPLES AND PRACTICE OF FIRST AID

First-aid is the first assistance or treatment given to a casualty for an injury or sudden illness before the arrival of an ambulance or qualified medical expert. It may involve improvising with facilities and materials available at the time.

The aims of First Aid

- to preserve life,
- to prevent worsening of the condition
- to promote recovery

The responsibility of the first aider

Because of the frequency and serious nature of many accidents, the role of the first aider is very important.

In the management of a casualty, your immediate responsibility as a first aider is to

1. Assess the situation without endangering your own life.
2. Identify the disease or condition from which the casualty is suffering (diagnosis)
3. Give immediate, appropriate and adequate treatment, bearing in mind that a casualty may have more than one injury and that some casualties will require more urgent attention than others.
4. Arrange, without delay, for the disposal of a casualty to a doctor, hospital or home, according to the seriousness of the casualty's condition.

Your responsibility ends when the casualty is handed over to the care of a doctor, a nurse or other appropriate person. You should not leave the incident until you have made your report to whoever takes charge and have ascertained whether you could be of any further help.

DEFINITION

Medical Aid indicates treatment by a qualified doctor at a hospital or clinic or at the scene.

First Aider is the term, which describes any person who has received a certificate from an authorized training body indicating that he or she is qualified to render first aid. First Aid certificates issued by St. John Ambulance Association are awarded to candidates who have attended a course of theoretical and practical work and who have passed a professionally supervised examination.

The Certificate awarded is valid only for three years thus ensuring first aiders are:

- highly trained
- regularly examined
- kept up-to-date in knowledge and skill.

The three emergency situations where a casualty is especially at risk because of interference with vital needs are :

- lack of breathing and / or heart beat,
- severe bleeding,
- a state of unconsciousness

Skilled first aiders can save lives by maintaining a casualty's vital needs :

ABC rule will help you to identify these needs;

A. An open Airway

B. Breathing

C. Circulation

The best advice to the first aider is ***Make Haste Slowly and Carefully.***

1.2. RESPIRATION AND ASPHYXIA

Respiration

Respiration means breathing in and breathing out of air. This function is necessary to supply oxygen (of the air) to all the organs in the body. Stoppage of oxygen supply to the organs may result in death.

Asphyxia (Suffocation)

Asphyxia is a condition in which the lungs do not get sufficient supply of air for breathing. If this continues for a minute, breathing and heart action stops and death occurs.

Causes

I. Conditions affecting the air passage.

A. Spasm

1. Water getting into air passage as in drowning.
2. Irritant gases (coal gas, motor exhaust fumes, smoke, sewerage and closed granary gas and gas in deep unused well etc.) getting into the air passages.
3. Bronchial Asthma.

B. Obstruction

1. Mass of food or foreign body like artificial teeth etc. in the air passage.
2. Tongue falling back in an unconscious patient.
3. Swelling of tissues of the throat as a result of scalding (boiling water) or injury burns and corrosives.
4. Sea weeds or mud in case of drowning.

C. Compression

1. Tying a rope or scarf tightly around the neck causing strangulation.
2. Hanging or throttling (applying pressure with fingers on the windpipe)
3. Smothering like overlaying an infant, and unconscious person lying face downwards on a pillow or plastic bags covering face completely for some time.

II. Conditions affecting the respiratory mechanism

1. Epilepsy, Tetanus, Rabies etc.
2. Nerve diseases causing paralysis of chestwall or diaphragm.
3. Poisonous snake bite (e.g. Cobra)

III. Conditions affecting respiratory centre

1. Morphia, Barbiturates (Sleeping tablets)
2. Electric Shock
3. Stroke

IV. Compression of the chests

1. Fall of earth or sand in mines, quarries, pits or compression by grain in a silo or big beam and/ or pillars in house-collapse.
2. Crushing against a wall or other barrier or pressure in a crowd (stampede)

V. Lack of oxygen at high altitudes with low atmospheric pressure: Acclimatisation (gradual ascent) is necessary.

Signs and symptoms of asphyxia

1. Patient shows signs of restlessness.
2. Rate of breathing increases.
3. Breath gets shorter.
4. Veins of the neck become swollen.
5. Face, lips, nails, finger and toes turn blue,
6. Pulse gets faster and feebler.

Note : Even after breathing has stopped the heart may continue to beat for ten to twelve minutes. In such cases artificial respiration must be undertaken immediately, which can prevent death.

Management

1. Remove the cause, if possible or remove the casualty.
2. Loose the tight clothing e.g. collar belt etc. and expose the chest and neck.
3. Resuscitations

1. Opening the Airway

2. Checking the breathing

3. Clearing the Airways

4. Artificial Respiration – mouth to mouth respiration.

5. Circulation – External chest compressions

Recovery position

All unconscious casualties who are breathing or those who have been resuscitated must be placed in the recovery position. The aim of this position is to ensure the jaw and tongue fall forwards, keeping the airway open allowing vomit or secretions to drain freely.

Procedure

i. Kneel facing the casualty's chest and remove any spectacles or bulky objects from their pockets.

ii. Ensure the airway open by lifting their chin, straighten his legs

iii. Position the arm, which is nearest to you at right angles to the casualty's body. With the elbow bent and palm facing out.

iv. Bring the casualty's other arm across their chest placing the back of their hand against the cheek which is nearest to you and holding it there.

v. With your other hand grasp the leg which is farthest from you at the thigh, pulling the casualty's knee up with their foot flat on the ground

vi. Still with your hand keeping the back of their hand against their cheek, gently press down on the lower thigh or pull with your other hand, thus rolling the casualty towards you on their side.

vii. Again ensure that air way is open by tilting the casualty's head back. Adjust the upper most leg so that the hip and knee are bent at Right angles for stability.

viii. Check pulse and breathing.

1.2.1. Different kinds of Asphyxia

1. Drowning

Drowning causes asphyxia by water weeds and mud entering the lungs or by causing the throat to go into spasm so constricting the air passage:

Management

1. Quickly remove any obstructions such as weed from the casualty's mouth and begin artificial respiration immediately. If he is still in the water, it may be possible to begin artificial respiration there.

   If possible use one arm to support the casualty's body and use your other hand to support his head and seal his nose while you perform mouth-to-mouth respiration.

   If in deeper water give the occasional breath of air while towing the casualty ashore.

2. When you can place him on a firm surface, check breathing and pulse and continue resuscitation if necessary.

3. As soon as the casualty begins breathing, place him in the recovery position.

4. Keep him warm. If possible remove wet clothing and dry him off. Cover with spare clothes and / or towels and if necessary treat for hypothermia.

5. Arrange removal to hospital. Transport as a stretcher case maintaining the treatment position.

2. Strangulation and hanging

a. Strangulation is usually the result of throttling by hands or a rope or scarf being tied round the neck

b. In hanging, the fracture of spine causing compression of tear of the spinal cord is more important.

Management

1. Cut or remove the band constricting the throat.
2. If suspended raise the body and loosen or cut the rope.
3. Give artificial respiration.
4. To do above do not wait for the policeman.

3. Choking (Asphyxia due to obstruction in windpipe)

This is most common with children. A marble, a seed or button may get struck in the air passage. In adults too, food may go down the wrong way and choke him.

The aim of first aid is to remove the foreign body or obstruction.

Management in the case of an Adult

When victim is standing, the first aider should stand behind the victim and wrap his arms around the waist. Grasp the fist with your other hand and place the thumb of the fist against the abdomen (belly) slightly above the navel and below the rib cage.

Press your fist into the victim's abdomen with a quick upward thrust. Repeat several times if necessary till the foreign body is expelled out of the windpipe. When the victim is sitting the first aider stands behind the chair and performs the same method. Tell the casualty to bend forward so that her head is lower than her chest. If she cannot cough, give upto five sharp blows (slaps) between the shoulder blades with the heel of your hand. Repeat these back slaps upto four times if

necessary. If the victim is lying turn him supine (face up). Facing the victim kneel astride the victim's legs. With your hands one on top of another place the heel of your bottom hand over the abdomen (belly) between the navel and rib cage. Press into the victim's abdomen with a quick upward thrust, repeat; Place him on his side and wipe to prevent asphyxia. Following the expulsion of food particle / foreign body it may be necessary to give artificial respiration.

Management in the case of an Infant

1. Hold him upside down by the legs and smack his back hard three or four times.
2. If breathing continues normal or is restored to normal give ice to suck, or cold water to sip.
3. Butter, olive oil or medical paraffin may also be given in small quantity.
4. Apply cloth wrung out of hot water to the front of the neck.
5. If breathing has stopped, give artificial respiration.

4. Suffocation by poisonous gases

Carbon-monoxide (Lighter than Air)

This gas is present in car-exhaust fumes, in house hold coal gas during incomplete combustion, charcoal stoves and in coal mines.

Management

The First Aid treatment consists in removing the person from the area applying artificial respiration and giving pure oxygen, if available.

1. Ensure circulation of fresh air before entering the room by opening the doors and windows.
2. Before entering the enclosed space take two or three deep breaths and hold your breath as long as you can.

3. Crawl along the floor (as the gas is Lighter than air).
4. Remove-the casualty as quickly as possible to fresh air.
5. Loosen his clothes at neck and waist and give artificial respiration, if asphyxiated.

Carbondioxide and other gases (Heavier than Air)

This gas is found in coal mines, deep unused wells and sewerages. Various other gases such as leaking refrigerator gases, compressed gases used for cooking and lighting may also cause suffocations.

Management

1. Observe all the precaution mentioned above.
2. Enter in upright position (as the gas is heavier than air and collects near the floor).
4. Remove the casualty as quickly as possible to fresh air.
5. Wherever ventilation is not possible and deadly poisonous gas is suspected, use a gas mask to protect yourself.

1.3. ELECTRICAL INJURIES / SHOCK

If any part of the body comes in contact with a 'live' wire, which is exposed and not covered by insulator, or with a cable or rail in which current is leaking, a person gets an electric shock. In houses the blowing out of switches or fuses of faulty electrical connections can cause much injury. The injury may be quite mild or so severe as to cause immediate death. Electrical shock is produced only when an electric current passes through the human body, which is in contact with earth. It passes even more quickly if the part is wet.

In wet conditions even lower voltage may be dangerous. A very strong current passing to earth through lower limbs may be less dangerous than a weaker current passing through the chest, especially so, when it enters the hands and arms.

High voltage industrial (power) current can jump 16-18 meters and kill the rescuer. Therefore, do not approach the casualty till the switch has been turned off. These currents not only cause local damage but affect the respiratory and cardiac centers. They produce, therefore, superficial or deep burns including charring, but also cause stoppage of breathing and heart beat.

The effect of Electric Shock

1. There may be fatal paralysis of heart.
2. There may be sudden stoppage of breathing due to paralysis of muscles used in breathing:
3. Heart may continue to beat, while breathing has stopped. In this condition the face appears blue.
4. There may be burns, either superficial or deep. They depend on the strength of the electric current causing the injuries.

Management

Intelligent and prompt action is required if the first aider is not cautious. He may also receive severe electric shock or even die along with the casualty.

If the casualty is still in contact with the source, switch off the current. If the switch is not to be found, remove the plug or cut off the current by breaking the wire. Before cutting off the current, ensure that you stand on a dry piece of wooden board. Do not use scissors or knife.

1.4. WOUND AND BLEEDING

A wound is a break in the continuity of skin of the body. There will be bleeding from the injured part and it also forms an opening through which germs can get into the body. The depth of a wound is often more important than its area, small deep wounds caused by knives, bullets etc. are often more dangerous.

Types of Wounds

1. **Abrasions (Graze) –** a superficial wound on which the top layers of skin are scraped off – by a sliding fall or a friction – contains embedded foreign particles.

2. **Incised Wounds** are caused by sharp instrument like knife, razor etc. The blood vessels are clean cut and so these wounds bleed very much.

3. **Contused Wounds** are caused by blows by blunt instruments or by crushing. The tissues are bruised.

4. **Lacerated Wounds** are caused by machinery, falls on rough surfaces, pieces of shells, claw of animals etc. These wounds have torn and irregular edges and they bleed less.

5. **Punctured Wounds** are caused by sharp instrument such as a knife or a dagger. They have small openings, but may be very deep.

6. **Gun Shot Wounds:** A small entry may be associated with extensive internal injuries and with a large exit wound.

Complications of wounds

Wounds cause two great dangers

1. Bleeding and

2. Infection

1. Bleeding – when the blood comes out of a blood vessel it is called bleeding. Bleeding is the immediate complication of wound and must be treated promptly.

2. Infection – is caused by germs getting into the body through the broken skin. The germs multiply in wound and make it infected or septic. They may then get into the blood stream and cause blood-poisoning (Septicemia).

Management

1. Stop bleeding

   Apply direct pressure to the wound with a sterile dressing or a clean cloth piece. If necessary press the relevant arterial pressure point.

2. Handle the injured part as gently as possible.

3. Make the patient sit or let him lie down. If the wound is in a limb, and there are no broken bones, raise the limb. This will lessen the bleeding.

4. Wash your hands thoroughly or clean them with an antiseptic lotion.

5. Remove any foreign objects like glass, stones, etc. if you can easily get at them. This should not open up the wound again which will cause more bleeding. Do not disturb any blood clot already formed.

6. Place a clean dressing over the wound and bandage firmly.

7. Get a doctor.

If you cannot get a doctor or nurse, you will have to transport him as early as possible to the hospital.

Bleeding

Bleeding (Haemorrhage) is a common cause of death in accidents. It is caused by the rupture of blood vessels due to severity of the injury.

External and Internal Bleeding

If the bleeding is from the surface of the body it is called external bleeding.

If the bleeding is within chest, skull or abdomen etc. it is called internal bleeding. This cannot be seen immediately but later the blood

may ooze out through the nose or ear or coughed up from the lungs, or vomited from the stomach.

Types of Bleeding

Bleeding may occur from

a. Bleeding from Arteries

The blood comes out in jets because it corresponds to the beats of the heart in action. The blood will be bright red. This kind of bleeding may cause death very quickly.

b. Bleeding from Veins

Blood flows out in a continuous stream and is dark red in colour.

c. Bleeding from Capillaries

Blood oozes out slowly, if it is on the surface of the body. It is not at all serious.

Signs and symptoms of bleeding

1. The casualty feels faint and may even collapse.
2. Skin becomes pale, cold and clammy.
3. Pulse gets rapid but very weak.
4. Breathing becomes shallow, casualty gasps for breath and sighs deeply.
5. There is profuse sweating
6. The casualty feels thirsty.

Management

a. Minor Bleeding

Minor Bleeding is usual at work and play. It results from injured capillaries. There is no need to get frightened. The bleeding will stop by itself or by firm pressure and bandaging, keeping the limb elevated.

b. Major Bleeding

Major bleeding is the result of an injury to a large blood vessel or when persons suffer from some blood disease.

The Aims of the first aid are

1. To stop the bleeding quickly.
2. To get immediate medical aid, if necessary take the casualty to a hospital for blood transfusion etc.

In the case of severe external bleeding

1. Bring the sides of the wound together and press firmly.
2. Place the casualty in a comfortable position and raise the injured part (if no bone fracture is suspected).
3. Press on the pressure point firmly for 10 to 15 minutes,
4. Apply a clean pad larger than the wound and press it firmly with the palm until bleeding becomes less and finally stops.
5. If bleeding continues, do not take off the original dressing, but add more pads.
6. Finally, bandage firmly but not too tightly.
7. Keep the part elevated and immobilized.
8. Treat for shock
9. Get the casualty to hospital as soon as possible.

Note : Embedded objects or protruding bone in a bleeding wound.

In the case of internal bleeding

The aim of first aid is to prevent the condition from getting worse.

1. Lay the casualty down with head low, raise his legs by use of pillows etc.
2. Keep him calm and relaxed. Reassure him. Do not allow him to move.

3. Keep up the body heat with thin blankets, rugs or coats.
4. Do not give anything to eat or drink because he may have to be given an aneasthetic later.
5. Do not apply hot water bottles or ice-bags to chest or abdomen. This might only make things worse.
6. Take him to a hospital as quickly as possible. Transport gently.

1.5. PRESSURE POINT TO STOP EXTERNAL BLEEDING

The second method of indirect stopping of heamorrhage is the use of pressure points. This is adopted when direct pressure becomes a failure. There are quite a large number of pressure points which must be remembered by the first aider so that he can use the method in emergencies. Broad guideline is to press the artery before the injury so that blood does not flow to the injured site. Pressure point is an area where an artery along its course can be pressed against an underlying bone so as to prevent the flow of blood beyond that point. Generally, you can feel pulsation at such points.

1. Carotid pressure point

i. Two in number one on either side, these arteries arise from the aorta and pass up the neck on either side of the trachea of windpipe to supply blood to the head area.

ii. Pressure is applied by the thumb placed in the hollow between the voice box and the prominent sternomastoid muscle nearby. It is pressed against the vertebral column behind it.

iii. In cut-throat cases, in addition to the digital pressure to be applied as described at (ii) above, the First Aider has to apply digital pressure on the jugular vein (large vein) above the wound from which blood will be oozing out. In the event of bleeding not stopping even then digital pressure has to be applied below the wounds, also over the wound. Also cover the wound, treat for shock and

take the casualty immediate to a doctor.

2. Subclavian pressure point

i. As the name indicates these (two) arteries run behind the clavicles on either side.

ii. These are branches of the aorta, which run from behind the inner end of the clavicle across the first ribs on to the armpits.

iii. Pressure is applied by pressing one thumb on top of the other in the hollow above and behind the middle of the collar bone, so that the artery is pressed against the first rib.

iv. Before applying pressure bare the neck and upper part of chest; depress the shoulder and bend his head to the injured side. These make it easy to see the area and get the muscles relaxed making the work easy.

3. Facial pressure point

i. The palm is placed across the upper part of the neck in such a way that the thumb is on the lower portion of the lower jaw and the fingers on the back of the head and neck.

ii. Pressure is applied on the artery at a point which is the junction between the mid-third of jaw and posterior third under the line of the lower jaw.

4. Temporal pressure point

i. The palm is placed so that the thumb is in a line with upper margin of the ear and the rest of palm over the back of the head.

ii. Pressure is applied about an inch in front of the upper part of the ear backwards against the temporal bone. The temporal artery runs at this place before it gives off branches.

5. Brachial pressure point

i. The brachial arteries run along the innerborder of the biceps and branches out to supply the upper limb.

ii. Apply pressure on the middle of the arm by passing the fingers.

iii. It is compressed against the humerus.

6. Radial or ulnar pressure point

i. As their names indicate these lower parts of the radial/ulnar arteries pass over the wrist into palm to form the palmar arch.

ii. Each of them should be compressed simultaneously by pressing the thumb against the bone just above the wrist.

7. Palmar arch pressure point

i. As noted above, the arch is formed by anastomosis of the terminal points of the Radial and Ulnar arteries beyond the middle of the palm.

ii. Pressure is applied by a single thumb which is placed flat across whilst the rest of the palm and fingers are on injured palm.

8. Femoral pressure point

i. Femoral arteries are of the thighs. They are a continuation of the abdominal aorta, they help to supply the lower limbs with blood.

ii. The artery enters the thigh about midway in the groinfold and runs a little inwards upto the upper two thirds of the thigh and then passes to the back of the knee.

iii. To apply pressure lay the patient, bend the knees slightly grasp the thigh with both hands so that each of the thumb is at about the centre of the groin. Place the left thumb over the right and apply pressure directly backwards against the pelvic bone.

1.6. BURNS AND SCALDS

Burns are injuries that result from dry heat like fire, flame, a piece of hot metal, the sun, contact with wire carrying high tension electric current or by lighting or friction. **Scalds are caused by moist**

heat due to boiling water, steam, oil, hot tar, etc.

Chemical burns are caused by strong acids (sulphuric acid, nitric acid) or by strong Alkalies (caustic soda, caustic potash, quick lime or strong ammonia)

A Nuclear burn is caused by the instantaneous flash of intense heat given off by a nuclear explosion. It is capable of causing superficial burns on the exposed skin of person several miles away.

Radiation burns are caused by over-exposure to X-ray of Radiation Therapy.

This casualty is to be referred to hospital immediately.

Degrees of burns

The degree of burns indicate the degree of damage to the tissues. There are three degrees of burns.

First Degree: when the skin is only reddened.

Second Degree : When there are blisters on the skin. And there is destruction of deeper tissues and charring.

Third Degree : The danger from burns depends on the area of the burns rather than the degree. Superficial burns over a large area of the body are more dangerous than the complete charring of a part of the limb. It must be noted that in the same person, different parts of the body may show different degree of burns.

The first two degrees are seen in scalds also.

When the chemical fall on skin or cloth worn by the person any of the three degrees of burn may be produced. When swallowed, the chemicals if strong, will damage the tissues with which they come into contact while swallowing viz, lips, tongue, throat, food passages, stomach. There may be damage to the skin around the mouth.

Note : The severity of a burn depends upon both the area it covers

and its depth.

Helping a person whose clothes have caught fire

The first aider should know how to deal with a person whose clothes have caught fire.

1. Put out the flames by whatever means available. Most of the causes of burns occur in homes where water is readily available to quench the flames water also cools the burnt area causing less damage to occur.

2. Do not allow the person to run about. This only fans the fire and makes the flame spread.

3. Hold a rug, blanket, coat or table cover in front of you, while approaching a man whose clothing have caught fire.

4. Lay him down quickly on the ground and wrap tightly with any thick piece of cloth, rug or coat. Smother the flame by gentle pats over the covering but do not roll the casualty.

5. If the clothes in front of the body have caught fire, lay him on his back and vice versa, till suitable material is brought to smother the flame.

Results of burns

Immediate	**Later**
1. Intense pain	1. There may be infection in the damaged area
2. Shock	2. After healing, it will leave Scars causing disfigurement and / or restriction of movements.

Management of serious burns and scalds

Immediate attention that is required in serious burns are :

1. Keep the casualty quiet and reassure him.
2. Wrap him in clean cloth.
3. Do not remove adhering particles of charred clothing.
4. Cover burnt area with sterile or clean dressing and bandages. In case of burns covering a large part of the body, it is sufficient to cover the area with a clean sheet or towel.
5. Keep him warm but do not overheat him.
6. If the hands are involved, keep them above the level of the victim's heart.
7. Keep burnt feet or legs elevated.
8. If victim's face is burnt, sit up or prop him up and keep/under continuous observation for breathing difficulty. If respiration problems develop, an open airway must be maintained.
9. Do not immerse the extensive burnt area or apply ice water over it because cold may intensify the shock reaction. However a cold pack may be applied to the face or to the hands or feet.
10. Shift the casualty to the nearest hospital, if he is fit to be moved.
11. If you cannot take him to hospital, wait for the doctor to arrive.
12. Do not open blisters.
13. Keep him wrapped up in clean cloth.
14. Treat for shock.
15. Remove quickly from the body anything of a constricting nature like rings, bangles, belts and boots. If this is not done early, it

would be difficult to remove them later as the limb begins to swell.

16. If medical help or trained ambulance personnel cannot reach the scene for an hour or more and the victim is conscious and not vomiting, give him a weak solution of salt and soda at home and enroute; (one level teaspoonful of salt and half level teaspoonful of baking soda to each glass of water, neither hot nor cold). Allow the casualty to sip slowly. Discontinue fluid if vomiting occurs. Do not apply ointment of any form, or grease or other home remedy.

Management of chemical burns

1. Wash off the chemical with a large quantity of water by using a shower or hose if available as quickly as possible. This flooding with water will wash away most of the irritant.
2. Cut out contaminated clothing.
3. Do not touch the burnt area with bare fingers.
4. Treat as for burns.

1.7. EMERGENCY AID IN SCHOOLS

Children are highly vulnerable to injuries/accidents usually we find minor grazes and bruises, but some time child may face severe accident resulting in fracture, bleeding, suffocation, fainting, acid burns or drowning and electric shock etc. Even a staff member may suffer a heart attack or respiratory disorder which first aiders have cope. Under these circumstances he should be able to rise to the occasion instead of getting nervous as there are few simple procedures that any one can learn and if correctly applied immediately could mean the difference between life and death.

The procedure of attending to an emergency is the same.

1. Assess
2. Make Safe
3. Give Fist – Aid
4. Inform – Get help

Management

should ensure that there is proper:-

i. Well equipped first aid room/station

ii. Trained First Aider available in the First Aid room, or on call.

iii. At least one child (preferably more) trained in First Aid in each class.

These trained first aider will be great assets to the other children/ school at the time of emergency. It is again emphasized that there is no substitute for proper training**.** The students, therefore, should be encouraged to take training in first aid procedures.

FIRST AID BOX – SMALL CONTENTS

	Articles	**Quantity**
1.	Silver Sulfadiazine ointment	1 Tube
2.	Band Aid	10 Strips
3.	Roller bandages – 5 cm x 5 mtrs.	1 No.
4.	Sterilized cotton wool (absorbent) 15 gms	1 pkt.
5.	Scissor s/s 7 cm (sharp/blunt)	1 No

6. Sterilized dressings (assorted size) 2 Nos.

7. Paracetamol / Disprin Tab. 10 x 1 1 Strip

8. Mouth to Mouth resuscitator (Plastic) 1 No

After an elaborate reading on first aid, let us now look at some of the other hints on health, food and others.

1.8. YOU AND YOUR HEALTH

'Prevention is better than cure'.

If you can understand how your body works, you stand a better chance of maintaining it sensibly and so avoiding many diseases by following a few simple rules and using 'common sense.' You will be in a good position to prevent the onset of disease and your body will be better equipped to resist any infection that you come in contact. These rules relate to five main areas namely diet, exercise, abuse of the body, stress factors and safeguards against diseases.

Diet

Avoid sugar and excessive amounts of animal fat. Try and eat more vegetables, cereals and pulses, include bran and roughage, consume enough milk and milk products thus forming a balanced diet. Food substances that are not burnt up as energy are stored as fat. Lack of certain foods will lead to deficiency signs and symptoms. One needs to understand and work out the calorie requirements and plan out one's diet to meet the nutritional requirements so as to maintain good health. Good dietary habits are essential to every one.

Exercise

Human body does need regular exercise to keep it in good working order. Lack of physical activity increases the likelihood of coronary artery disease and reduces the efficiency of the muscles of the chest, thus decreasing the amount of oxygen that can enter the body. Regular

exercise improves both these factors.

Exercise can be in the form of regular walks, exercising in the gym, skipping or playing games regularly. Whatever type of exercise you take, it should be done regularly and will be a preventive measure against disease.

Abuses of the Body

There is not much point in eating a sensible, balanced diet, keeping your weight in check and taking regular exercise if you abuse your body. The most common abuses are use of tobacco and excessive use of alcohol. Tobacco in the form of cigarettes kills. It causes lung cancer, bronchitis and coronary artery diseases. In moderation alcohol is okay. But becomes a problem when too much of it is taken too regularly.

Drugs like heroin, opium and cocaine are taken for pleasure by some, but they are highly addictive and dangerous to health.

It is essential to avoid indulging in these harmful abuses which sometimes are related to life styles of individuals or families.

Stress

The pace of life in the over crowded, demanding century produces stress, which in turn cause psychological problems and physical diseases.

Hypertension, peptic ulcers can be associated with stress. Psychologically it causes depression and anxiety and even lead to neurosis. The best way to treat stress is to remove its cause and try to lead a stress less life.

Safeguards Against Diseases

No matter how deligently you look after yourself there is always the possibility of disease. This can be considerably reduced if you use common sense and take advantage of all the available safeguards against disease. The most common are those that confess a degree of immunity against specific diseases - vaccination, or immunization.

Also take care of some specific illnesses called occupational diseases that are associated with your type of job. Disease can be contracted from food, faeces, flies, insects, rodents. Take care from all these by practicing hygienic ways where ever you go.

If you follow the simple rules relating to diet, exercise, abuses of the body, stress and safeguards against diseases, you can lead a better and healthier life.

SIMPLE HEALTH PROBLEMS

Ulcers

Ulcers occur when there is excessive production of acid, particularly when the stomach is empty of food, due to irregular meals, excessive smoking and drinking, or lack of sleep or result of nervous tension.

Main symptoms are

- Pain just below the ribs, appears in the late morning and gets worse towards evening.
- An increase in the production of saliva.

These can be eased by antacids. Drugs can be given, which inhibit acid secretion. Rest is important. The most important being diet – small meals at regular intervals, less spicy, less fibre and highly nutritious.

Veneral Disease

Veneral disease are endemic that is, they are always present in the community. They are usually contracted through sexual intercourse with an infected partner. They include gonorrhoea and non-specific urethritis which are very common but easy to treat. Syphilis, is rare and extremely serious if left untreated.

The first hand evidence of syphilitic exposure comes between nine

and ninety days after exposure to the disease. It consists of a hard, painless sore, with enlarged, painless lymph glands in the groin. This can lead to rashes or lumps in the skin, fever and finally damage any system or organ in the body. This condition has to be medically treated and abstinence from sex until cured.

Ear Disorders

Common medical problems that can affect the ear are excess wax in the ear and perforation of the ear drum. The other is injury to the ear drum. When the ear drum has a lump of wax against it or the ear passage is blocked, this causes conductive deafness. One or both ears may be affected. In infection there is discomfort, irritation and discharge.

Hard lumps of wax can be removed with a special instrument or syringed out with warm water. In infection, drops can be prescribed with antibiotics.

Eye Disorders

Most of the focussing is carried out by the cornea but its focus is fixed. The lens is flexible and makes fine adjustments to the focus. ***Myopia*** or short sight occurs when the lens is too strong, so that it focuses distant objects some where in front of the retina. In long sight or ***hypermetropia*** near objects are focused behind the retina.

Cataract is an eye disorder, in which the lens of the eye becomes progressively more and more opaque, blocking the passage of light to the retina and making it difficult to see. In this the lens is replaced through surgery.

Conjunctivitis is an inflammation of the conjunctiva. This is common among children due to rubbing of eyes and can lead to infection. Simple washing of eyes and use of drops can help. ***Glaucoma*** is an eye disease in which fluid accumulates in the forward part of the

eye ball. Pressure builds up and can result in blindness. This can be treated easily by specialists.

Anorexia Nervosa

Anorexia nervosa is a neurotic disorder in which the victim, usually female, (as twenty women to one man are affected) deliberately reduces weight to the point of emaciation. Primary anorexia nervosa are normally closely linked to slimming in an attempt to look fashionable. Secondary anorexia are more likely to achieve their loss of weight by sometimes enormously and then vomiting immediately.

Best would be to eat well and put your weight back on. This is an area where psychotherapy has proved extremely successful.

Depression

Depression is a psychiatric illness, in which your vitality is reduced and your emotional state is low. The chief feeling in acute depression is that life is simply not worth living. It can strike at any age. Women are three times as often affected as men.

Depression is caused by a shortage of the chemicals within the body which are essential to the smooth running of the nervous system. In ***reactive depression*** you feel unhappy and unable to cope with your work, feel exhausted. In ***endogenous depression,*** you will slow down both mentally and physically. You cannot make a decision, read or do anything efficiently.

Depression is like being in a locked room without a key. Medical help is the only answer with various form of anti-depressive drugs.

Acne

Acne is a disorder of the sebaceous (oil) glands and ducts which produce a substance called ***sebum*** to lubricate the skin and hair. In acne, too much sebum is produced and consequently the ducts through

which it is conveyed to the surface become blocked. The fatty sebum then accumulates to produce blackheads, pimples and whiteheads.

Almost all adolescents suffer from acne. The acne bacillus can be controlled by tetracycline taken four times a day. Cleanliness is obviously vital.

Anaemia

Anaemia is a term used to describe blood disorders in which the concentration of haemoglobin in the blood is abnormally lowered. Anyone of any age can develop anaemia and the possible causes are numerous - diet deficient in iron, folate, vitamin B_{12} and protein, loss of blood etc.,

You may be pale, mental fatigue, irritability, headache, dizziness and fainting. Treatment depends on the type and cause of the anaemia. Dietary modification, tablets and injections of deficient nutrient is best sorted.

MEDICINAL VALUE OF CERTAIN FOOD ITEMS

Apple – has mild antibacterial, anti-viral, anti-inflamatory, oestrogenic activity - lowers cholesterol and risk of cancer.

Asparagus – a super source of antioxidant glutathione to lower cancer risk.

Broccoli – a unique package of versatile disease fighter.

Cinnamon – a strong stimulator of insulin activity.

Clove – anti inflammatory, anticoagulant effect.

Cucumber – the most cooling food.

Date – has natural asprin, laxative effect and good iron source.

Fenugreek seeds – anti-diabetic power, anti-diarrheal, anti-ulcer, anti-cancer, lowers blood pressure, prevent intestinal gas.

Fish oil – the omega 3 oil in fish is an all cure. It's anti every thing.

Garlic – broad spectrum anti-biotic, eat garlic both raw and cooked for all round insurance.

Ginger – used to treat nausea, headache, cholera, diarrhea, rheumatism, nervous disease. This is old anti-everything.

Honey – strong anti-biotic properties, sleep inducing.

Lemon juice – natural antiseptic.

Mushroom – a longevity tonic, heart medicine, cancer remedy, anti-lipid, anti-tumor, anti-viral, high protein.

Mustard – decongestant and expectorant, anti-bacterial, increases metabolism.

Onion – an exceptionally strong anti-oxidant.

Pumpkin – extremely high in beta carotene.

Tea – acts as an anticoagulant, artery protector.

Turmeric – marvelous medicinal spice of the world.

MENSTRUAL CYCLE

Puberty is the age when the internal organs of reproduction begin to function. The ovaries are stimulated at this time by hormones from the anterior lobe of the pituitary gland. There are two of these hormones which together are called ***gonadotrophins.*** They are follicle stimulating and lutenising hormones.

The time of puberty varies. Physical changes take place at this time.

Mena pause is the term applied to the time when the child bearing period ends and the organs of reproduction cease to function. The child bearing period lasts on an average for approximately thirty years.

During this period the ovaries produce ova at regular intervals of about 28 days and changes take place in the uterus in preparation for possible pregnancy. This period of events is known as the menstrual cycle.

The extra secretions plus lining cells, blood from the broken down capillaries and the unfertilized ovum constitute the menstrual flow.

During this time some girls have abdominal cramps or excessive bleeding. It is advised that they treat this normal and if necessary consult a physician for pain relieving medicine and exercise. Regular exercise will give them relief from pain due to muscular cramps, for a longer period of time. Personal hygiene is very important.

TEXTURED VEGETABLE PROTEINS (TVP)

Soyabeans are specially processed to resemble meat. They are textured, shaped, coloured and flavoured to look like meat. The TVP forms a cheaper substitute for fleshy foods. They blend well with meat and mince preparations and are cost effective. TVP is a boon for an average householder for it combines quality with economy.

Cutlets, kabab, stew, nugget curry, soya granule mince pie are some popular preparations made with TVP.

Germination

It is the process in which small new shoots come out of pulses or cereals under certain controlled conditions thereby improving their nutrient content.

The pulse to be germinated/ sprouted is cleaned, washed and soaked in an equal amount of water over night. In the morning it will be noticed that most of the water is absorbed and the grains are swollen in size and are softer in texture. The grains are now tied up in a wet muslin cloth and put in an airy place having sufficient amount of defused sunlight for another eight to ten hours. New shoots will appear. Some times the shoots grow up to 1 cm in size. The shoots may take longer to appear when the atmospheric temperature is low. They now have a new vitality

and can be incorporated in different dishes.

The shoots that have recently sprouted are very rich in vitamin C that was totally lacking in the dry cereals and pulses. Niacin content increases by 60-100% in 48-72 hours, while thiamine content remains almost the same as in dry seed. Iron (which is generally found in bond form and not easily available) gets loosened and becomes easily available to the body.

Fermentation

It is a process in which the naturally present micro-organisms are allowed to bring about desirable physical and chemical changes by converting them into simpler and better forms having increased nutrient availability.

The conversion of milk to curd is brought about by adding a little 'starter' (curd) to warm milk. The slightly sour taste brought about by the microbial activity of lactobacilli, that converts the milk lactose into lactic acid.

Rice and dal are fermented to make idli, dosa and adais. Refined flour is fermented with yeast or curds to make bhaturas, naan and bread. Dhokla is made by fermenting channa dal.

As the fermentation proceeds the mixture becomes more porous, bubbly and sour. Fermentation should be controlled upto the desirable state. The production of carbon dioxide makes the mixture spongy and light. Fermented food is easy to digest and add variety in texture and flavour.

The fermentation brings about an increase in ascorbic acid content. Thiamine, riboflavin and niacin contents are doubled. There is increase in folic acid and methionine contents. Iron is released from its bond forms and is thus easily available.

ORAL REHYDRATION FORMULA

Home Made Preparation

In one litre boiled and later cooled water add 20 g of glucose or 40 g sugar. Or in one litre of water add 30 g (2 heaped tablespoons) rice powder and boil for 4-5 minutes and add 7 - 8 pinches of salt.

The rice formula can be kept at room temperature for 5-6 hours and in the refrigerator for 24 hours.

Artificial Preparation

Sodium Chloride (Common Salt) 3.5 g (1/2 teaspoon)
Sodium Bicarbonate (Soda bicarb) 2.5 g (1/2 teaspoon)
Potassium Chloride (or a little lemon juice) 1.5 g
H_2O - 1 litre
Give atleast 4-6 glasses per day.

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Beverage are potable drinks which have thirst quenching refreshing, stimulating and nourishing qualities. Most of the beverage supply energy in the form of sugar or alcohol. They also provide other nutrients like mineral salts and vitamins. Alcoholic beverage affect the central nervous system and transqualises it.

Beverages are classified into alcoholic and non-alcoholic beverages. Alcoholic beverage contain less than 76% alcohol by volume. They include wine, beer, brandy, liquor, gin etc., Non alcoholic beverage do not contain any alcohol content and they are classified as hot and cold. Hot beverages are tea, coffee, hot chocolate and cold beverages are natural spring water or mineral waters, colas, ginger ale, cold coffee, squashes, juices and syrups. Alcoholic drink being a concentrated source of energy provides instant energy. Non alcoholic drink refreshes, and is a means of replenishment of fluid loss from body due to perspiration, they also provide vitamins and minerals. Fruit beverages are rich source of vitamin C. Hot beverages like coffee, tea act as stimulants.

FOOD SAFETY

- Many people today are uncertain about the safety of the food available or supplied.
- Safety is freedom from the occurrence or risk of injury, change or loss.
- Benefit is anything that is advantageous to the good of a person or thing.
- Risk is the exposure to the chance of injury or loss.
- The list of factors to be considered for food safety are

1. Food borne infection – These are the most important problems related to food safety.
2. Nutrition – with new products replacing other foods in the diet, are the essential nutrients being provided for dietary adequacy.
3. Environmental contamination – what are the problems of water and soil pollution relating to the food supply?
4. Natural toxicants – foods that contain them and the level of tolerance.
5. Pesticides – used and the presence of these in the foods and how much is removed in washing.
6. Intentional additions, colours and preservatives – how much of these is tolerated and excess of which affects normal functioning of the human organs.

FOOD ADDITIVES

An additive is any substance added directly or indirectly to any food product for technological purposes.

1. Improve the nutritional quality by the addition of minerals and / or vitamins.
2. Maintain or improve the keeping quality of a product – molding and rancidity.
3. Improve texture – yeast in bread making.
4. Make food more appealing in appearance and taste – colours.

FOOD COLOURS

The visual appearance of a food is an important factor for acceptance by the consumer. Food producers are especially concerned with colours of their products and hence colouring agents are a very widely used group of additives.

The colours used include synthetic organic dyes and the natural pigments extracted from foods. In all about 30 colours are permitted in current use. The synthetic colours, usually harmful to health, have all undergone extensive safety evaluation.

YEAST IN OUR DIET

Yeasts are simple single cell fungi used in food industry. Fermented foods are those that are produced by the modification of a raw material of either animal or vegetable origin by the activities of micro-organisms. Yeast can produce a diverse range of products that differ in flavors, texture and stability. Yeast are important in food fermentation because of their ability to produce Co_2 and ethanol.

Co_2 is important in the manufacture of leavened bread and ethanol is metabolized in the production of beer, wine and spirits. Yeast fermentation contributes to flavour and aroma in baking industry. The leavening or raising of dough in naan or batter is due to incorporation

of air which may be accomplished by addition of yeast.

EDIBLE MUSHROOM AND ITS IMPORTANCE

It is a fruiting body of a ***basidiomycetous fungus*** and is a good source of protein and can be easily cultivated at home in a small scale to meet the family requirements. This does not need much space and care.

All that you need for the cultuvation are

1. spawn – consisting of mycelium of the fungus or otherwise the seeds of the fungus (edible mushroom)
2. straw
3. polythene bags
4. space to hang these bags
5. gunny bags.

Step

1. Chop straw. Soak in cold water for a few hours or over night and squeeze out excess water.
2. Immerse in boiling water for a few minutes.
3. Shade dry in a clean base until all the excess water is removed (but it should be moist).
4. Place spawn and straw in layers in a polythene bag
5. Hang them in a convenient place, surround the bags with wet gunny bags or provide the necessary humidity.
6. In 10-15 days the mushroom is ready for harvest.
7. Three to four crops can be got from each bag.
8. While packing the straw, care should be taken to see that the

straw is moist and not damp, no water dripping from it.

9. Spawn can be got from FIPPAT, Padappai, Kilpauk. Make sure it is fresh and viable.
10. Maintenance of bags in humid conditions is important.

Mushroom – nutritive vaule of fresh mushroom (100 gms)

Nutrients	Nutritive value / 100 gms
Protein	3.1 gms
Fat	0.8 gms
Fibre	0.4 gms
Carbohydrates	4.3 gms
Energy	43 k.cals
Calcium	6.0 mg
Phosphorus	110.00 mg
Iron	1.5 mg

Comparison of Protein content of some foods with mushroom (g/100 g)

Food items	Protein / 100 gms
Mushroom (dried)	35.0 gms
Peas (dried)	24.2 gms
Milk	3.2 gms
Egg	12.8 gms
Fish	18-19 gms

Chicken	19 gms

COOKING HINTS

- Put the foods in boiling water.
- Use just sufficient water for cooking.
- Use excess water after cooking for some other food preparation. Or cook in just sufficient quantity of water.
- Make use of leaves of green vegetables.
- Do not use baking soda for cooking.
- Don't over cook the foods.
- Serve hot food immediately after cooking.
- Store vegetables and fruits in a cool place.
- Wash before cutting.
- Wash rice and dal in less water.
- Peel thinly.
- Cover to avoid oxidation.

1.9. CONSUMER AWARENESS

Helpful tips for consumers

- Analyse the advertisement.
- An advertisement which appeals to the emotions, impulse or vanity of an individual must be left alone.
- Advertisement can be taken lightly, just as a source of providing information regarding the existence of the product.
- Nothing is really 'free'. A consumer has to pay in one form or other.

- It is important to 'Go By Your Needs' only.

THE DETERGENT IN YOUR DIET

Detergents get rid of grease and food residues from your utensils, but they leave behind injurious residues.

The liquid detergents consist of soluble detergent in water. The detergent used is a sulphonate (generally Alpha Olefin Sulphonate – AOS). The active agent in a liquid detergent makes up 15 to 20 per cent of the product.

The scouring powders contain less than 1 to 3 per cent of AOS. The scouring powders generally contain soda ash which enhances the cleaning action.

It is not easy to rid utensils of residual detergent. Since the abrasive is soluble in water, it is retained on the utensil surface along with the active detergent. Studies carried out at the Industrial Toxicology Research Centre at Lucknow have shown that more than 10 rinses may be needed to completely remove all traces of the detergent.

A study of liquid detergent in UK suggests than 50-60 mg of the active detergent may be 'eaten' by an adult each day. Babies also ingest it through feeding bottles cleaned with detergents.

Scouring powders contain proportionately less of the active ingredient. While no studies have been done on these powders – an informed estimate by experts is that the average daily consumption from them would be around 10 mg.

THE VALUE OF MAKING LISTS

1. Writing down activities makes them more concrete.
2. Lists enable you to consider items carefully and give them their proper priorities.
3. Writing down activities prevents you from forgetting them, on the other hand, once they are written down you don't have to continue

relying upon your memory.

4. It feels good to cross items off a list once they have been accomplished.

STAIN REMOVAL

Clothing can get stained with curry, grease, blood, tea/coffee and ink spills. It is very important that you remove the stain while fresh. Most stains will be totally removed because they would not have penetrated into the fabric. The stain removal should be systematic and methodical.

It should be well-remembered that many dilute applications are better than one concentrated treatment. Strong chemicals can damage the fabric.

The stains can be removed by the following methods:

RESOURCES

Human	Non Human
Types	**Type**
Time	Money
Energy	Material goods
Knowledge	Property
Skills or abilities, Attitudes	Community Resources

Dipping : The stained material is dipped into the reagent. It is then scrubbed to remove the stain and finally rinsed with water.

Sponging : The part of material from which the stain has to be removed is placed on blotting paper and the reagent is applied with a sponge on the stained area and scrubbed gently.

Drop Method : The reagent is put on the stained cloth stretched over a bowl with a dropper.

Steaming : The stained area is exposed to steam from boiling hot water.

READING OF LABELS WITH STANDARD MARKS

Label is a consumer aid providing information about the product. A label is expected to give genuine product information. The information provided on the label should be clear and precise. It should be given in simple language that can be read and understood by the consumer. The manufacturers are generally giving the product information in two languages to reach a larger section of consumers. The name of the product should be bold and clear to be immediately noticed.

The labels for medicines and drugs also carry warning and caution. Have you ever noticed the 'caution' sign on the label? Look for expiry date, manufacturing date and always buy standard products with labels. Buy well sealed and well packed products.

STANDARD WIDTHS OF FABRICS

Cottons : The usual width of cotton dress fabrics is 92 cms (36") although some are wider (handlooms).

Silks : The standard width of silk fabrics is 100 cms (39"). However some are saree width fabrics – 110 cms to 115 cms (43 to 45") or wider. There might be some handwoven silks as narrow as 70 cms (27")

Woolen fabrics : Most common widths are 140 cms to 150 cms (54" to 60"). Some worsteds might come in the width of 190 cms (72").

Manmade fibres : They vary from 92 cms to 190 cms (35"-72") wide. When they are blended with wool they might be 140 to 150 cms (150" to 60") wide.

- - -

PRACTICALS

1. Identify simple first aid and demonstrate in class.
2. Look for advertisements and analyse them.

QUESTIONS

Section A

I. Fill in the blanks

1. First aid is the _____ _____ given to a casuality for an injury.
2. _____ is asphyxia due to obstruction in wind pipe.
3. In _____ fracture of spine causing compression of tear of the spinal cord is more important.
4. _____ _____ gas is present in car-exhaust fumes, household gas, coal mines etc.,
5. If the bleeding is from the _____ of the wound it is called external bleeding.
6. ORS consists of _____ gms of sugar and _____ gms of salt in _____ litre of water.
7. _____ is a psychiatric illness.
8. _____ _____ is a neurotic disorder found more among women.
9. _____ _____ is term used to describe blood disorders.
10. _____ _____ is a natural antiseptic.

II. Match the following

1. Asphyxia	lighter than air
2. Bleeding	heavier than air
3. Femoral pressure point	suffocation
4. Carbon – monoxide	haemorrhage

5. Carbondioxide	beta carotene
6. Kesari dhal	Good protein
7. Pumpkin	arteries of the thigh
8. Mushroom	adulterant
9. Fruit beverages	Vitamin C
10. Cucumber	cooling food

III. True or false

1. Garlic is considered to be a broad spectrum antibiotic
2. Gun-shot wounds are superficial wounds.
3. Strangulation and hanging are the same.
4. Money is an important human resource.
5. Sprouting improves the quality of pulses
6. Ulcers occur when there is less production of acid in the stomach.
7. In asphyxia the pulse rate gets slower.
8. Use of baking soda in cooking enhances the flavour.
9. The degree of burns do not indicate the damage to the tissues.
10. One of the indirect means of stopping heamorrhage is use of pressure point.

Section B

Explain the following terms

1. First aid
2. Asphyxia
3. Wound
4. ORS
5. Burns
6. Diarrhoea
7. Scald
8. ABC rule
9. Stains

Section C

1. What are the aims of first-aid?
2. Write on the types of wounds.
3. What are the signs and symptoms of asphyxia?
4. Explain the types of bleeding.
5. What is the procedure of attending to an emergency?
6. Explain the signs and symptoms of bleeding.
7. Describe the degree of burns.
8. What should a first aid box contain?
9. How will you handle iron deficiency anemia?
10. Write one simple stain removal procedure followed at home.

Section D

1. What are the common food adulterants that can be detected at home?
2. Write on the important rules to follow in first aid.
3. What are the pressure points to stop external bleeding?
4. Write on the alcoholic and non-alcoholic beverages.
5. How will you manage severe burns and scalds?
6. Write on Yeast.
7. Explain mushroom cultivation.
8. What are the five areas you will follow to protect your health?
9. How will you handle a person with severe diarrhoea?
10. What are the causes for asphyxia?

2. PHYSIOLOGY

2.1. SENSE ORGANS

We are continuously bombarded with sensory information about the internal environment and the world outside. Any change in environment whether internal or external is called a stimulus. We can detect it through sensory receptors. These make up the sense organs such as the eyes, ears, nose and taste buds. In the present chapter we will study the eye and the ear as sense organs.

2.1.1. The eye

2.1.1.1. Structure of the eye

The eye is the organ of the sense of sight situated in the orbital cavity. It is almost spherical in shape and is about 2.5 cm in diameter. It is possible to see with only one eye but three – dimensional vision is impaired when only one eye is used. There are 3 layers of tissue in the wall of the eye.

They are:

1. The outer fibrous layer : sclera & cornea
2. The middle vascular layer : choroid, ciliary body and iris.
3. The inner nervous tissue layer : retina.

Structures inside the eye ball are the lens, aqueous fluid (humour) and vitreous body.

Sclera and Cornea

The **sclera** is the white of the eye and forms the outermost layer of the eyeball and anteriorly is continuous with the cornea. The sclera maintains the shape of the eyeball.

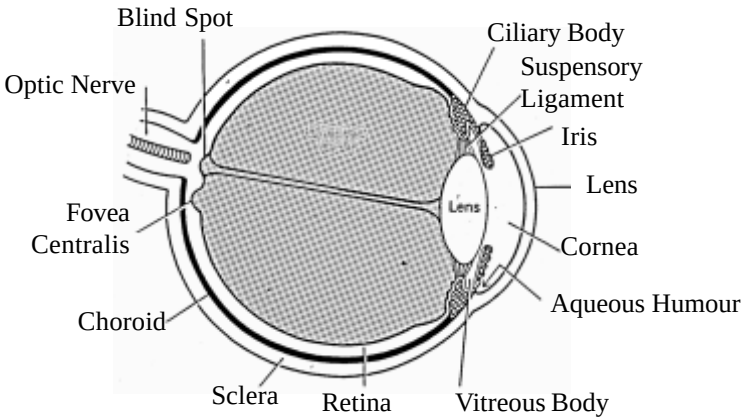


Fig. 1 : Structure of the Eye

The **cornea** is a clear transparent membrane. Light rays pass through the cornea to reach the retina. The cornea is convex anteriorly and refracts or bends light rays to focus them on to the retina.

Choroid

The choroid is the middle layer and rich in blood vessels and is a deep chocolate brown in colour.

Ciliary body

This consists of muscle fibres and epithelial cells. It is located anterior to the choroid. It is attached to the suspensory ligament which in turn is attached to the capsule enclosing the lens.

Contraction and relaxation of the ciliary muscle changes the thickness of the lens which refracts light rays entering the eye to focus them on the retina. The epithelial cells secrete aqueous fluid into the anterior segment of the eye. i.e. the space between the lens and the cornea.

Iris

The iris extends anteriorly from the ciliary body and lies behind the cornea and in front of the lens. It is a circular body composed of pigment cells that gives the eye its black, brown, grey or green colour. In the centre there is an opening called the **pupil**.

Pupil varies in size depending upon the intensity of light. In bright light the pupil constricts. In dim light the pupil dilates.

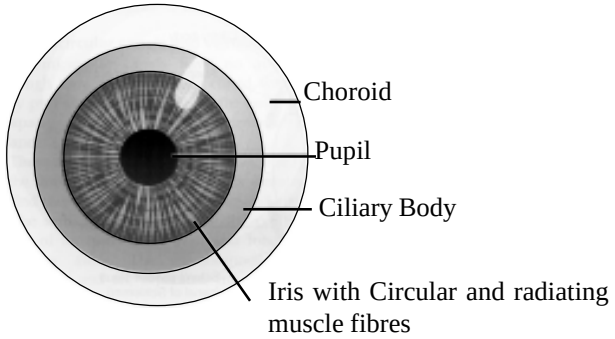


Fig. 2 : The Eye view from front

Lens

The lens is a highly elastic, circular, biconvex, transparent body, lying immediately behind the pupil. The thickness of the lens is controlled by the ciliary muscle through the suspensory ligament. It is enclosed within a transparent capsule.

The lens bends light rays reflected by objects.

Retina

The retina is the innermost layer of the wall of the eye. It is extremely delicate. It is composed of several layers of nerve cells and nerve fibres. The retina has a layer highly sensitive to light, containing cells called **rods** and **cones**.

The rods and cones contain photosensitive pigments that convert light rays into nerve impulses. The rods are for light vision. The cones are for colour vision.

The rods contain **rhodopsin** (visual purple) a pigment which is bleached in dim light. Vitamin A is needed for its synthesis.

Near the centre of the posterior part there is an area which appears yellow in colour called **macula lutea.** In the centre of this area there is a little depression called **fovea centralis** which consists of only cone-shaped cells.

About 0.5 cm away from the macula lutea, all the nerve fibres of the retina converge to form the **optic nerve.** The small area of the retina where the optic nerve leaves the eye is the **optic disc** or **blind spot.**

Chambers of the eye

In the anterior segment of the eye, the space between the cornea and the lens is incompletely divided into anterior and posterior chambers by the iris. Both chambers contain a clear **aqueous fluid (humour)** secreted into the chambers by the ciliary glands.

Behind the lens and filling the cavity of the eyeball is the **vitreous body (humour).** This is a soft, colourless, transparent, jelly-like substance composed of 99% water and some salts.

The fluid in both the chambers help to maintain the shape of the eyeball.

2.1.1.2. Physiology of Vision

In order to achieve clear vision, light reflected from objects is focused onto the retina of both eyes. The processes involved in producing a clear image are:

1. Refraction of the light rays
2. Changing size of the pupils and
3. Accommodation of the eyes.

A co-ordination of these three processes is necessary for effective vision.

1. Refraction of the light rays

When light rays pass from a medium of one density to a medium of a different density they are refracted or bent. This principle is used to focus light on the retina. Before reaching the retina light rays pass successively through the conjunctiva, cornea, aqueous fluid, lens and vitreous body.

The lens is the only structure in the eye that can change its refractive power. Light rays entering the eye need to be bent to focus them on the retina. To focus light rays coming from near objects onto the retina the lens changes itself to a more convex shape with the aid of suspensory ligament and ciliary muscle. The relaxing of the ciliary muscle makes the lens thinner and thereby focuses light rays from distant objects on the retina.

2. Size of the pupils

The size of the pupil controls the amount of light entering the eye. In bright light pupils are constricted. In dim light they are dilated.

The iris consists of one layer of circular and one layer of radiating muscle fibres. Contraction of the circular fibre constricts the pupil. Contraction of the radiating fibres dilates it.

3. Accommodation of the eyes to light

Accommodation is the process whereby light emerging from distant as well as near sources is brought to focus on the retina. In

order to focus on near objects within 6 metres, the eye should make the following adjustments.

They are:

1. Constriction of the pupils
2. Convergence of the eyeballs
3. Changing the power of the lens

Objects more than 6 metres away from the eyes are focused on the retina without adjustment of the lens or convergence of the eyes.

Functions of the Retina

Light rays falling on the retina causes chemical changes in the photosensitive pigments in the rods and cones. This generates nerve impulses which are conducted to the cerebrum via the optic nerves. The rods are stimulated by dim light and are necessary for night vision.

The cones are sensitive to bright light and colour. Visual purple (rhodopsin) is a photosensitive pigment present only in the rods. It is bleached (degraded) by bright light and is quickly regenerated when an adequate supply of vitamin A is available. This is the **visual cycle**.

Dark adaptation : When an individual moves into a darkened area where the light intensity is insufficient to stimulate the cones, temporary visual impairment results while the rhodopsin is being regenerated within the rods. When regeneration of rhodopsin occurs, normal sight returns.

Refractive errors of the eye

In the normal eye (emetropic) light from near and distant objects is focused on the retina.

Hypermetropia (Farsightedness) : A near image is focused behind the retina because the eyeball is too short. A biconvex lens is used to correct this.

Myopia (nearsightedness) : The eyeball is too long and distant objects are focused in front of the retina. A biconcave lens is used to correct this.

Astigmatism : This results in blurred vision when there is abnormal curvature of part of the cornea or lens that prevents focusing on the retina. Cylindrical lenses are used to correct this.

2.1.2. The Ear

The ear is the organ of hearing. It is supplied by the eighth **cranial nerve,** i.e., the **cochlear part** of the **vestibulocochlear** nerve which is stimulated by vibrations caused by sound waves.

With the exception of the auricle (pinna), the structures that form the ear are encased within the temporal bone.

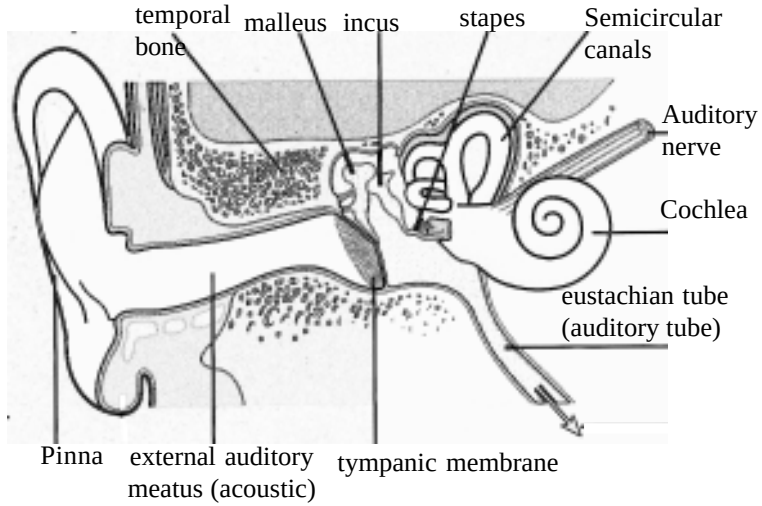


Fig. 3 : Structure of the Ear

2.1.2.1. Structure

The ear is divided into three distinct parts.

1. External ear

2. Middle ear (tympanic cavity)

3. Internal ear

External Ear

The external ear consists of the auricle (pinna) and the external acoustic meatus.

The auricle

The auricle is the expanded portion projecting from the side of the head. It is composed of **fibroelastic cartilage** covered with skin. It is deeply grooved and ridged and the most prominent outer ridge is the **helix.**

The **lobule** is the soft pliable part at the lower extreme composed of fibrous and adipose tissue richly supported with blood capillaries.

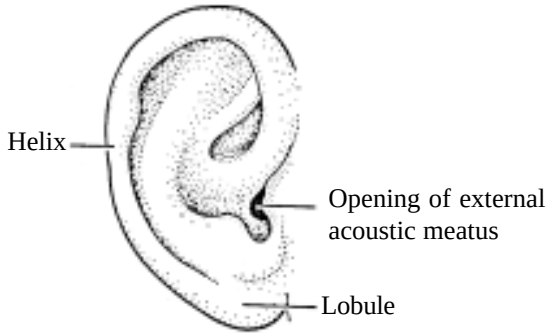


Fig. 4 : The auricle of the ear

External acoustic meatus

This is a slightly 'S'-shaped tube about 2.5 cm long extending from the auricle to the **tympanic membranes** (ear drum). The lateral third is cartilaginous and the remainder is a canal in the temporal bone. The meatus is lined with a thin layer of skin, continuous with that of the auricle. There are numerous **ceruminous glands** in the skin of the lateral third. These are modified sweat glands that secretes **cerumin** (wax), a sticky material. Foreign materials, e.g., dust, insects and microbes, are prevented from reaching the tympanic membrane by wax, hairs and the curvature of the meatus. Movements of the temporomandibular joint during chewing and speaking 'massage' the cartilaginous meatus, moving the wax towards the exterior.

The **tympanic membrane** completely separates the external acoustic meatus from the middle ear. It is oval-shaped with the slightly broader edge upwards and is formed by three types of tissue:

1. The outer covering of **hairless skin**
2. The middle layer of **fibrous tissue**
3. The inner lining of **mucous membrane** which is continuous with that of middle ear.

Tympanic Cavity or Middle Ear

This is an irregular – shaped cavity within the temporal bone. The cavity, its contents and the air sacs which open out of it are lined with mucous membrane. Air fills the cavity, reaching it through the **eustachian (auditory) tube** which extends from the nasopharynx. It is about 4 cm long and is lined with ciliated epithelium. The presence of air at atmospheric pressure on both sides of the tympanic membrane enables it to vibrate when sound waves strike it.

The lateral wall of the middle ear is formed by the tympanic membrane.

The roof and floor are formed by the temporal bone.

The medial wall is a thin layer of temporal bone in which there are two openings:

Oval window (fenestra vestibule)

Round window (fenestra cochleae)

The oval window is occluded by part of a small bone called the stapes and the round window, by a fine sheet of fibrous tissue.

Auditory ossicles

These are three very small bones that extend across the cavity from the tympanic membrane to the oval window. They form a series of movable joints with each other and with the medial wall of the cavity at the oval window.

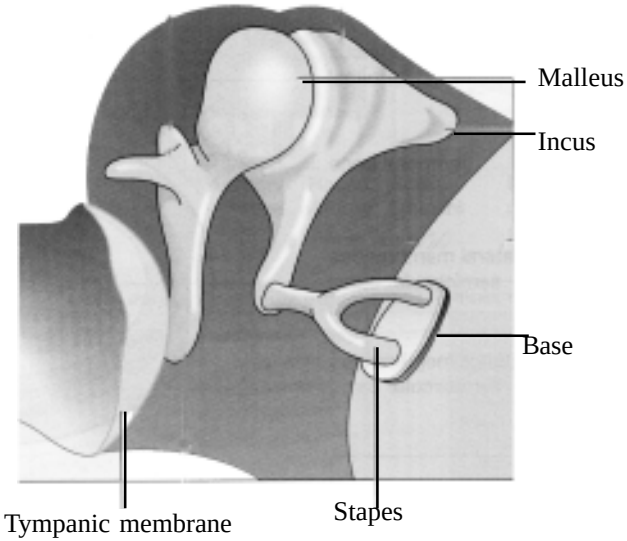


Fig. 5 : The auditory ossicles

They are the malleus, incus and stapes.

The **malleus** is the lateral hammer – shaped bone. The handle is in contact with the tympanic membrane and the head forms a movable joint with the incus.

The **incus** is the middle anvil-shaped bone. Its body articulates with the malleus, the long process with the stapes, and it is stabilized by the short process, fixed by fibrous tissue to the posterior wall of the cavity.

The **stapes** is the medial stirrup-shaped bone. Its head articulates with the incus and its base fits into the oval window.

The three ossicles are held in position by fine ligaments.

Internal Ear

The internal ear contains the organs of hearing and balance and is generally described in two parts, the bony labyrinth and the membranous labyrinth.

a. Bony labyrinth

This is a cavity within the temporal bone lined with periosteum. It is larger than the membranous labyrinth of the same shape which fits into it, like a tube within a tube. The space between the bony walls and the membranous tube is occupied by **perilymph**. The membranous labyrinth also contains fluid, the **endolymph**.

The bony labyrinth consists of:

1 vestibule

1 cochlea

3 semicircular canals

The **vestibule** is the expanded part nearest to the middle ear. It contains the oval and round windows.

The **cochlea** resembles a snail's shell. It has a broad base where it is continuous with the vestibule and a narrow apex, and it spirals round a central bony column. The cochlea is divided by a septum called basilar membrane.

The **semicircular canals** are three tubes arranged so that one is situated in each of the three planes of space. They are continuous with the vestibule. One end of each canal is dilated to form ampulla. The semicircular canals are the organs of equilibrium.

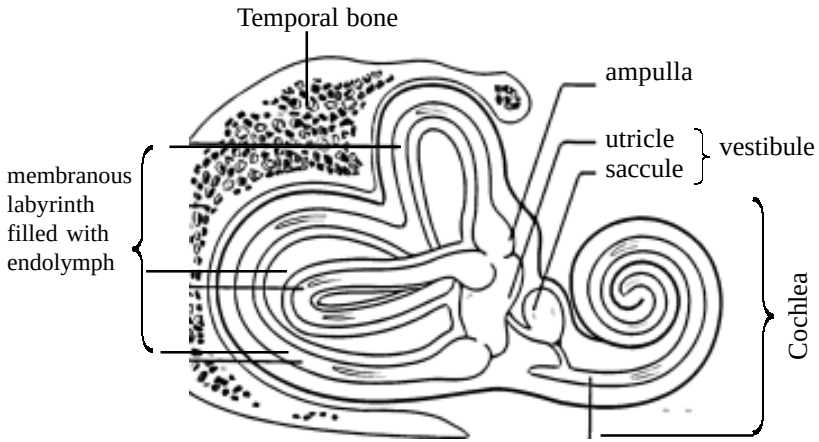


Fig. 6 : The Internal ear

b. Membranous labyrinth

The membranous labyrinth is the same shape as its bony counterpart and is separated from it by perilymph. It contains endolymph. It is divided into the same parts: the vestibule which contains the utricle and saccule, the cochlea and three semicircular canals. The utricle and saccule are oval membranous sacs.

A cross-section (Fig. 7) shows the triangular shape of the membranous cochlea. Neuroepithelial cells and nerve fibres lie on the basilar membrane or base of the triangle. Many of the neuroepithelial cells are long and narrow and are arranged side by

side. These cells are called hair cells and their nerve fibres from the true organ of hearing, the **organ of Corti**. The hair cells are attached to a thin membrane called **tectorial membrane**. The nerve fibres combine to form the auditory part of the vestibulocochlear nerve (eighth cranial nerve), which passes through a foramen in the temporal bone to reach the hearing area in the temporal lobe of the cerebrum.

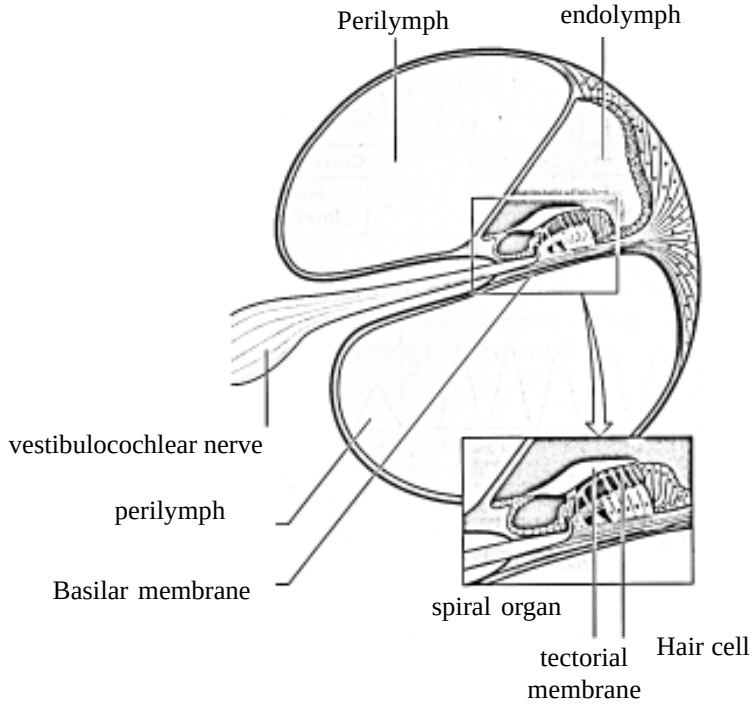
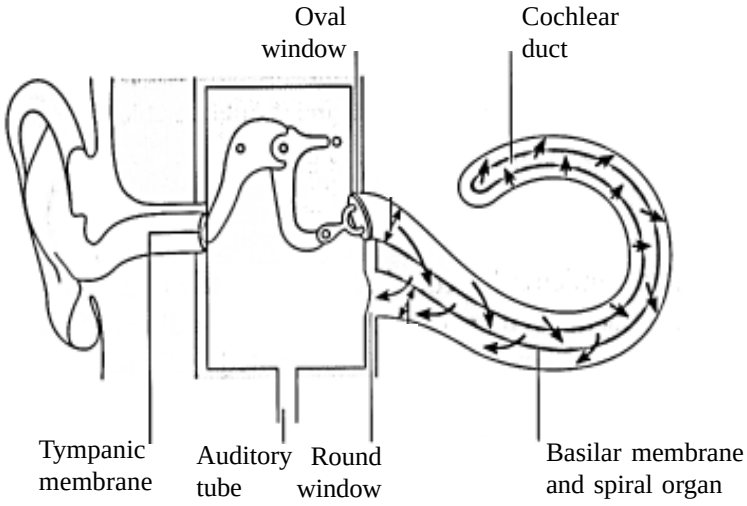


Fig. 7 : Section of Cochlea

2.1.2.2. Physiology of Hearing

Every sound produces sound waves or disturbances in the air, which travel at about 332 metres (1088) feet per second. The auricle, because of its shape, concentrates the waves and directs them along the auditory meatus causing the tympanic membrane to vibrate.

Tympanic membrane vibrations are transmitted through the middle ear by movement of the ossicles. At their medial end the footplate of the stapes rock to and fro in the oval window, setting up fluid waves in the perilymph. These indent the membranous labyrinth and the wave motion in the endolymph stimulates the neuroepithelial cells of the organ of Corti. The nerve impulses produced pass to



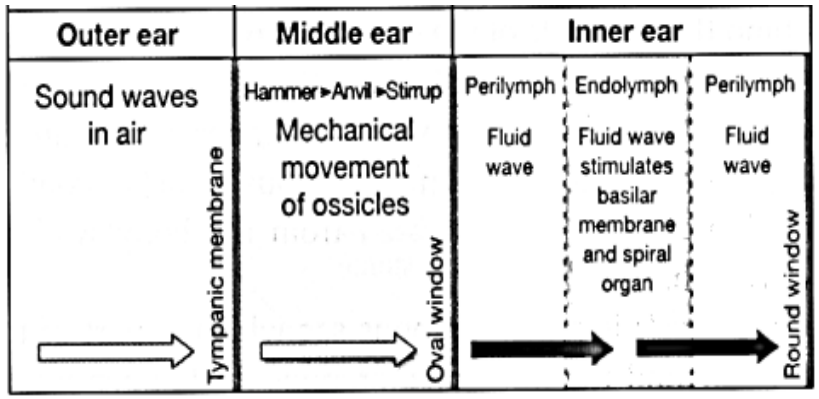


Fig. 8 : Passage of sound waves

the brain in the cochlear portion of the eighth cranial nerve (VIII). The fluid wave is finally expended into the middle ear by vibration of the membrane of the round window. This nerve, the vestibulocochlear nerve, transmits the impulse to various nuclei in the pons varolii and midbrain. Some of the nerve fibres pass to the hearing area in the cerebral cortex where sound is perceived.

2.1.2.3. Semicircular Canals

The semicircular canals have no auditory function although they are closely associated with the cochlea. They provide information about the position of the head in space, contributing to maintenance of equilibrium and balance.

There are three semicircular canals, one lying in each of the three planes of space. They are situated above and behind the vestibule of the inner ear and open into it.

Structure of the semircular canals

The semicircular canals, like the cochlea are composed of an outer bony wall and inner membranous tubes or ducts. The membranous ducts contain endolymph and are separated from the bony wall by perilymph.

The **utricle** is a membranous sac which is part of the vestibule and the three membranous ducts open into it at their dilated ends, the **ampullae**. The **saccule** is a part of the vestibule and communicates with the utricle and the cochlea.

In the walls of the utricle, saccule and ampullae there are fine specialized epithelial cells with minute projections, called **hair cells**. Amongst the hair cells there are the minute nerve endings of the vestibular part of the **vestibulocochlear** nerve.

Functions of the semicircular canal

The semicircular canals, utricle and saccule are concerned with balance. Any change of position of the head causes movement in the perilymph and endolymph which stimulates the nerve endings and the hair cells in the utricle, saccule and ampullae. The resultant nerve impulses are transmitted by the vestibular nerve to the cerebellum.

The cerebellum also receives nerve impulses from the eyes and the muscles and joints. Impulses from these three sources are coordinated and efferent nerve impulses pass to the cerebrum where position in space is perceived, and to muscles to maintain posture and balance.

2.2. DIGESTIVE SYSTEM

Digestion is the process by which the complex form of food materials are broken down into simpler form of food materials suitable for absorption. Once the food is digested, it must be transferred to the blood stream and the process by which this transfer occurs is called absorption. Digestion and absorption are the two chief functions of the digestive system.

Functions of Digestive System

1. Break down the food substances into small particles.
2. Digestion of food substances.
3. Absorption of food substances.
4. Excretion of undigested food and toxic substances.

The digestive system may be divided into two groups of organs:

1. The alimentary canal which is a continuous passage way beginning at the mouth, where the food is taken in and terminating at the anus, where the solid products of digestion which are not absorbed are expelled from the body.
2. The accessory organs such as salivary glands, pancreas, liver and biliary tract which are vitally necessary for the digestive process, do not happen to be the part of the alimentary canal.

The Alimentary Canal

The alimentary canal is a long muscular digestive tube extending through the body. It is about 750 cm in length. It consists of the following parts.

1. The mouth
2. Oesophagus
3. Stomach
4. Small intestine
5. Large intestine
6. Rectum
7. Anal Canal

The **gastrointestinal** tract consists of a tube composed of four principal layers. From outside onwards:

1. Tunica Adventitia or serous coat – in the abdomen the organs are covered by a serous membrane called **peritoneum**.
2. The muscular coat.
3. The submucous coat.
4. The Mucous coat.

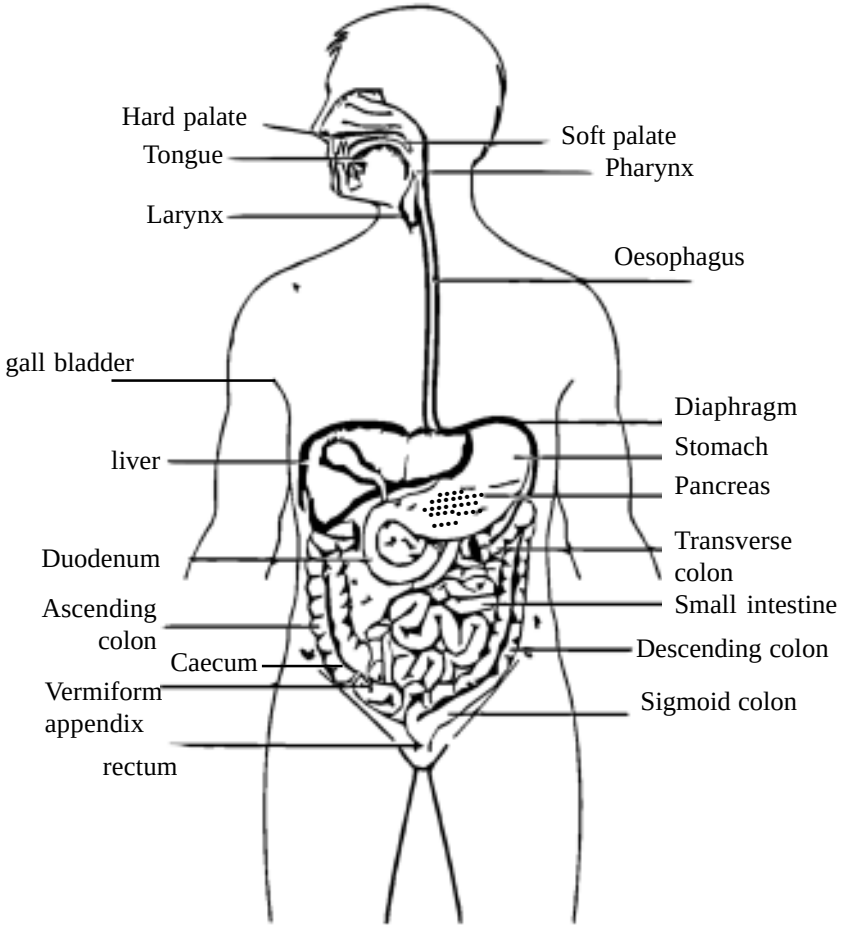


Fig. 9 : The organs of the digestive system

Mouth

The mouth is also called the oral cavity. In the mouth there are about 32 teeth. They are:

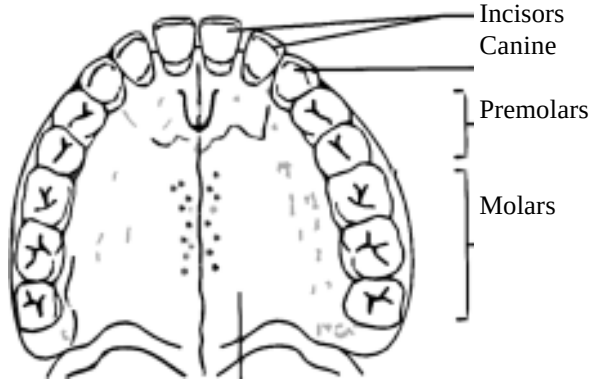


Fig. 10 : The roof of the mouth and permanent teeth

Molars	12	Pre molars	8
Canines	4	Incisors	8

The teeth helps to break down the food substances into small particles. Into this space there projects a muscular organ called the tongue. It helps in chewing and swallowing and is one of the principal organs of speech. The tongue has on its surface a number of taste buds by means of which we can differentiate sensation of taste (bitter, sweet, sour and salty).

In chewing, the teeth grind the food into pieces while the secretion of saliva moistens and lubricates the food.

Saliva is a juice secreted by three pairs of salivary glands in the mouth. They are (a) the parotid (b) the sub-mandibular and (c) sub-lingual gland.

a. Parotid - located in front and below each external ear.

b. Sub-mandibular - located between the mandible and the muscle of the floor of the mouth.

c. Sublingual - located in the floor of the mouth.

Salivary secretion is a reflex process, both conditioned and unconditioned reflexes are involved. A new born infant salivates when food is placed in its mouth. But the sight and smell of food does not produce any reaction. Later by associating the sight and smell of food with its taste, the child learns that the food has certain qualities and these very qualities are afterward capable of eliciting salivary secretion.

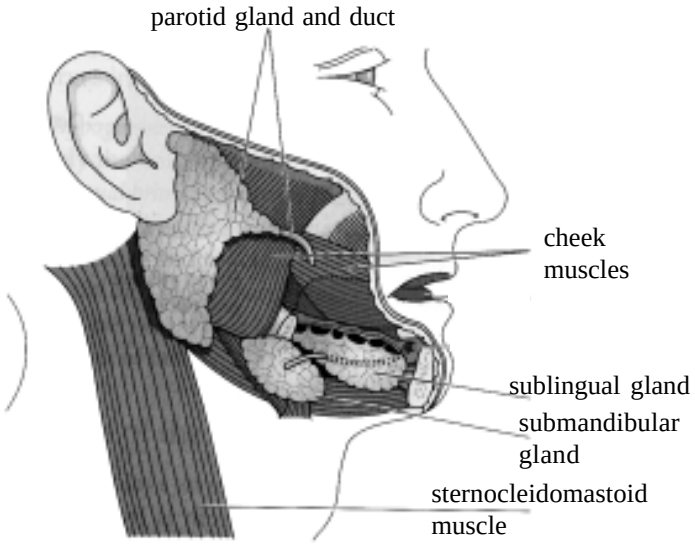


Fig. 11 : The salivary glands

Functions of Saliva

1. It keeps the mouth moist and helps in speech.
2. It helps in the process of mastication of the food stuff and in preparing it into a bolus suitable for digestion.
3. It dilutes hot, irritant substances and thus prevents injury to the mucous membrane.

4. Saliva contains two enzymes. Ptyalin and Maltase which converts starchy foods into sugars.
5. Saliva helps in the sensation of taste.
6. It helps heat loss. This is mainly found in animals. When they become hot, more saliva is secreted causing greater heat loss.
7. It helps in the excretion of certain substances like drugs containing mercury, lead and iodine.

Oesophagus

The Oesophagus is a tube connecting the pharynx and the stomach. It conveys the food from the mouth to the stomach.

Stomach

The stomach is an enlarged section of the alimentary tube. The stomach is divided into three regions: the fundus, the body and the antrum. Both ends of the stomach are guarded by valves which normally permit the passage of substances in only one direction.

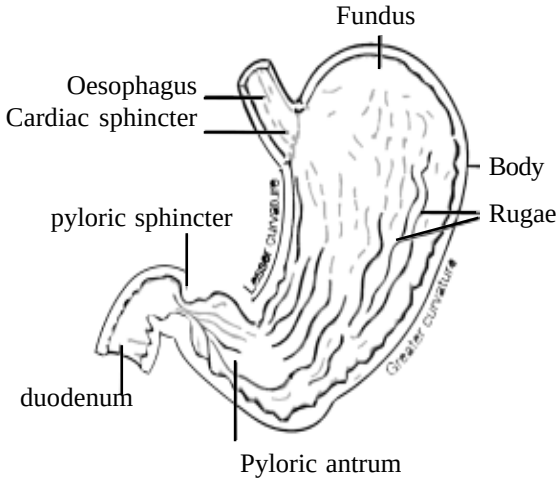


Fig. 12 : Structure of Stomach

The proximal end is guarded by **cardiac sphincter** and the distal end of the stomach is guarded by **pyloric sphincter**. Stomach acts as a pouch for holding large quantities of food so that frequent feeding can be avoided. The stomach mixes up the food thoroughly by its movements. It also destroys bacteria by high acidity.

Small Intestine

The small intestine is about 600 cm long in the adult extending from the pyloric sphincter of the stomach to large intestine. The first 25 cm or 30 cm of the small intestine is called the duodenum, followed by the jejunum and the remainder is the ileum.

Large Intestine

The large intestine is as the name implies has the larger diameter than the small intestine. It is about 150 cm. in length. The small intestine opens into the large intestine. There is a small pouch at the beginning part of the large intestine. This pouch is called the **caecum**. To the caecum is attached a small tube called the **vermiform appendix**. Large intestine consists of ascending colon, transverse colon, descending colon and the sigmoid colon.

Rectum and Anal Canal

The descending colon of large intestine opens into the last part. The rectum and anal canal. It is about 15 cm to 20 cm long. The rectum serves as a temporary storage area for the undigestible and nonabsorbable substances. The narrow portion of the distal part of the large intestine is called the anal canal which leads to the outside through an opening called the anus.

2.2.1. Physiology of Digestion

Digestion takes place in three parts of the alimentary canal. They are:

1. Mouth – with the help of saliva from three pairs of salivary glands.
2. Stomach – with the help of gastric juice from the stomach wall and
3. Small intestine – with the help of pancreatic juice from the pancreas, bile juice from the liver and the intestinal juice from the small intestine.

Most of the digestive juices contain chemicals known as enzymes which do the work of breaking down foods chemically.

Digestion in the Mouth

The food that is ingested is broken down mechanically by the help of teeth present. This is known as **mastication** or chewing. This chewing action is aided by saliva that moistens and lubricates the food, before it can be made into a bolus ready for swallowing. The saliva helps in chemical digestion of the food. Saliva contains the enzyme **amylase** or **ptyalin**. Salivary amylase acts on starch which is a complex polysaccharide, breaking it to maltose, a disaccharide.

$$\text{Starch} \xrightarrow{\text{Salivary amylase}} \text{Maltose}$$

Digestion in the Stomach

The food material after being broken down by mechanical grinding and having been converted into a bolus with the saliva reaches the stomach, which pours a large quantity of gastric juice everyday. The mechanism of production of gastric juice is chemical or hormonal in nature. When the digested food is in contact with the gastric mucosa, the duodenum secretes **gastrin** a hormone that belongs to the group of **gastrointestinal** hormones. This causes the discharge of gastric juice.

The gastric juice contain mainly Hydrochloric acid secreted by parietal cells in the gastric glands and enzymes – 1) Pepsin 2) Renin.

Functions of Hydrochloric acid

1. Kills bacteria present in the food.
2. Acidifies the food and stops the action of salivary amylase.
3. Converts inactive form of pepsinogen into active form of pepsin.

Functions of Enzymes

1. Pepsin - Converts protein into peptones, proteases and polypeptides.
2. Renin - Converts the undigestible protein of milk into easily digestible one.

The smooth muscle layers of the stomach enable the gastric contents to be liquefied to chyme. When the chyme is sufficiently acidified and liquefied, the pyloric antrum forces small jets of gastric contents through the pyloric sphincter into the duodenum.

Digestion in the Small Intestine

The small intestine is the organ where completion of chemical digestion of carbohydrates, proteins and fats occur. The small intestine secretes the intestinal juice called **succus entericus**. This consists of water, mucus, and enzyme enterokinase. Digestion in the small intestine is aided by secretions from the accessory glands such as liver and pancreas.

2.2.2. Liver

The liver is the largest gland in the body. The liver has four lobes. They are the large right lobe, smaller left lobe and caudate and quadrate lobes. Bile juice is secreted by the liver.

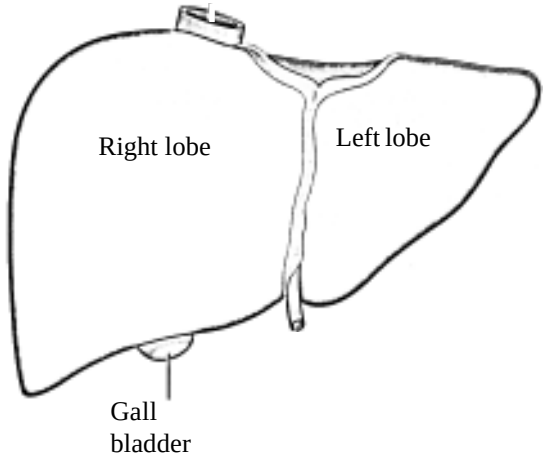


Fig. 13 : Structure of the Liver

Functions of Liver

1. The production of bile from the pigment of broken down red blood cells.
2. The removal of toxins that have been absorbed from the intestine.
3. The storage of simple sugar in the form of glycogen, which is released as needed in the form of glucose.
4. The storage of certain Vitamins including A,D,E and K.
5. The manufacture of heparin, which prevents clotting of the blood in the blood vessels.
6. The formation of antibodies which acts against disease producing organisms.
7. The production of certain blood plasma proteins such as fibrinogen and albumin.
8. The removal of a waste product called urea from amino acids.

Bile juice

In the absence of bile, fats are not digested properly which results in fatty diarrhoea. Thus bile is essential for digestion though it does not contain any digestive enzymes. The bile is taken by the hepatic duct and is stored in the gall bladder which is situated on the lower surface of the liver. The bile is concentrated and sent to the duodenum through the cystic duct when chyme from the stomach enters the duodenum. Bile contains bile salt, bile pigment, mucin and water. The two pigments present in the bile are called **Bilirubin** and **Biliverdin**. These pigments give colour to the faeces and urine. Due to liver damage or obstruction of the bile duct, bilirubin collects in excess quantities in blood and change the colour of the skin and the eyes. There may be changes in the colour of the urine also. This is called **Jaundice**.

Functions of Bile Juice

1. It stimulates the functions of the proteolytic enzymes and Amylase.
2. It dissolves fatty acid, and glycerol.
3. It coordinates with lipase to convert the fat into fatty acids.
4. It helps in the absorption of the fatty acids and glycerol.
5. With the help of other digestive juices it neutralises the acidic nature of food.

Pancreas

Pancreas is an elongated structure lying across the posterior wall of the abdomen. It is an exocrine as well as an endocrine gland. The pancreas not only produces the pancreatic juice but also secretes hormones e.g. insulin and glucagon. It is released directly in the blood which regulates the blood glucose level. The pancreatic juice contains three enzymes. They are (1) Trypsin (2)

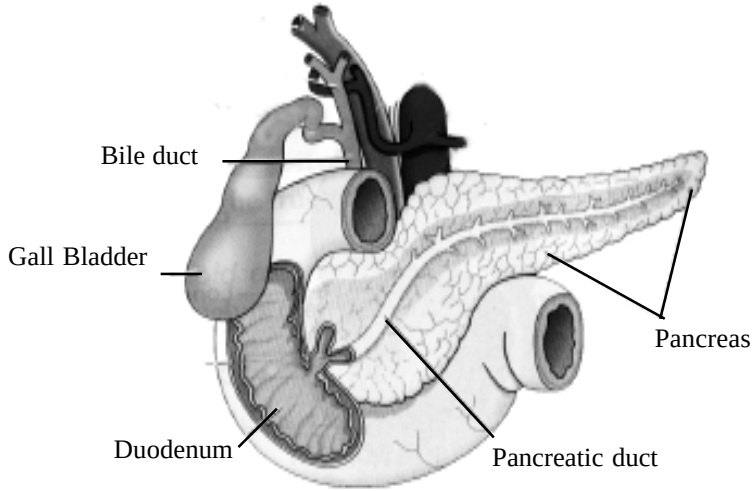


Fig. 14 : Pancreas and associated structures

Amylase and (3) Lipase. Besides these enzymes pancreatic juice contains large quantities of sodium bicarbonate which neutralizes the hydrochloric acid present in the gastric juice secreted by the stomach.

Chemical digestion in the small Intestine

When acid chyme passes into the small intestine, it is mixed with pancreatic juice, bile and intestinal juice.

Bile is not primarily a digestive juice because it contains no enzyme but it helps in the digestion of fats. The bile salts emulsifies fats and helps the pancreatic lipase to act and digest it easily. The pancreatic juice contains 3 powerful enzymes. They are:

1. Pancreatic amylase - Converts carbohydrates - amylase into simple sugars like glucose, fructose and galactose.

2. Trypsin & Chymotrypsin - Converts peptones into Polypeptides. In the beginning trypsin is present in the form of inactive trypsinogen and Chymotrypsinogen. This trypsinogen is converted into active trypsin by the action of enterokinase which is secreted in the small intestine.

3. Pancreatic lipase - Converts fats into fattyacids and glycerol.

After pancreatic digestion, the food which is now called chyme proceeds further in the intestine. Here it comes in contact with Succus entericus which is a juice produced by the small intestine. Succus entericus contains three enzymes. They are:

1. Erepsin - It converts polypeptides into amino acids.
2. Nucleotidases - Converts nucleotide, into nucleosides.
3. Nucleosidases - Converts nucleosides into pentose, purine and pyrimidine.

It also contains three sugar splitting enzymes called lactase, maltase and sucrase converting the respective sugars into simple sugars, mostly glucose. It also has lipase which acts on fats and converts them into fatty acids and glycerol.

The final products of digestion of the carbohydrates is glucose, for the proteins are amino acids and fats are fatty acids, and glycerol.

Absorption of Food

Absorption is the process by which water, minerals, vitamins and end products of digestion are absorbed through the mucosa of alimentary canal (especially the small intestines) into blood stream either directly or via lymphatic vessels.

In the stomach there is little absorption. Water, alcohol, glucose, and simple salts are absorbed to a certain degree. The main absorption occurs in small intestine especially in the lower (ileum) part, the upper part of the small intestine is mainly associated with the process of digestion.

The mucous membrane of small intestine is covered with minute fingerlike projections known as **villi**. About 50 lakhs of villi are found in small intestine. Each **villus** contains an arteriole, a venule, a capillary network and a lacteal (lymphatic vessel). Nutrients that diffuse through the epithelial cells which cover the villus are able to pass through the capillary walls and the lacteal and enters the blood.

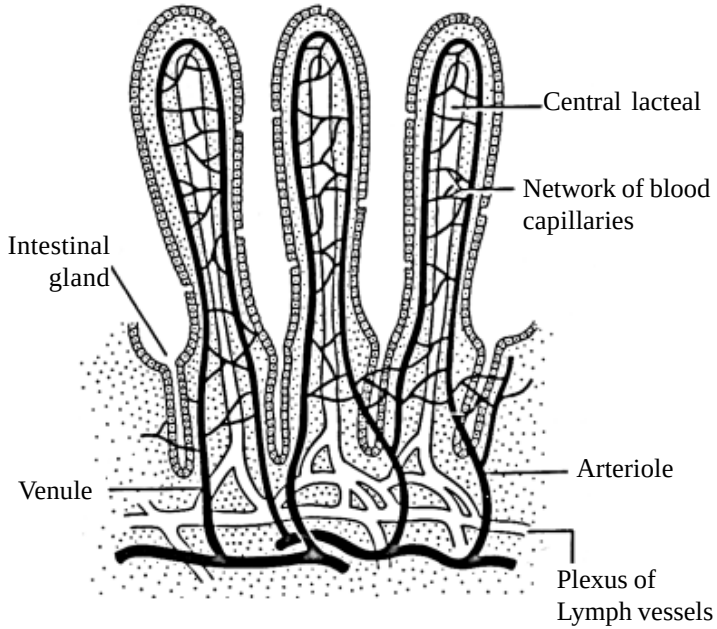


Fig. 15 : Structure of Villus

About 90% of all absorption takes place throughout the length of the small intestine. The other 10% occurs in the stomach and large intestine. Both monosaccharides and amino acids are absorbed by a positive pressure gradient between the intestinal content and the blood as well as by an active process involving enzymatic reactions and transported in the blood stream to the liver via the hepatic portal system. The excess amount of glucose is converted into glycogen and stored in the liver, when need arises glycogen is converted into glucose and is utilized by the body.

Fatty acids and glycerol do not enter the blood stream immediately. They are absorbed by the lacteals. So these lymph ducts are seen as white and milky in appearance after a meal of fat. The mineral salts and water soluble vitamin B Complex and C are absorbed via portal blood.

Functions of the Large Intestine

In the large intestine the absorption of water continues until semisolid consistency of faeces is achieved. Mineral salts, vitamins and some drugs are also absorbed into the blood capillaries from the large intestine. The large intestine is heavily colonized by certain types of bacteria which synthesize vitamin K and Folic acid. Unabsorbed carbohydrate undergoes bacterial fermentation and produces gas. These gases pass out of the bowel as flatus. The large intestine exhibits mass movements.

Defaecation

This is the process of emptying the bowels or the passage of faeces. When a mass movement forces the contents of the sigmoid colon into the rectum the nerve endings in the anal walls are stimulated resulting in defaecation.

2.2.3 Movements of the Gastro Intestinal Tract

Deglutition is the process by which the masticated food is transported across the pharynx and reaches the stomach. Due to

contractile movements of the stomach, the food is well mixed up with gastric juice. After being in the stomach for 3 or 4 hours the pyloric sphincter opens pushing the food into the duodenum.

The small intestine shows three important types of movements, they are -

1. Pendular Movement

These movements are induced by contraction of the circular and longitudinal muscles of the intestine. This movement contributes to the thorough mixing of chyme with the digestive juice.

2. Segmenting Movement

This movement occurs by the contraction of the circular muscles which produces transverse folds, dividing the intestine into short segments.

3. Peristaltic Movement

It is the wavelike contraction of the alimentary canal which propels the food through the gastro intestinal tract.

2.2.4. Diseases of the Stomach

Peptic Ulcer

When there is disruption of the normal balance of the corrosive effect of gastric juice and the protective mucus on the stomach lining it results in ulcer formation. This can be caused by stress, excessive cigarette smoking and ingestion of some drugs.

Diseases of the liver

Viral Hepatitis

Virus infections are the commonest causes of acute liver injury. It includes Type A, Type B and Type C. Type A virus spread through food, water and contaminated faeces. Type B & C viruses spread

by blood and blood products, body fluids such as saliva, semen, vaginal secretions and from mother to fetus. Type B virus causes massive liver necrosis and death. Intravenous drug addicts and male homosexuals are at a greater risk.

Cirrhosis

This is inflammation of liver due to alcohol abuse, hepatitis B & C virus infections etc. The liver tissue that is destroyed is replaced by fibrous tissue, leading to liver failure.

Jaundice

This is not a disease but a symptom of liver disorder. It is due to abnormal bilirubin metabolism and excretion. There is an obstruction in the flow of bile from the liver to the duodenum, resulting in bilirubin accumulation giving rise to the yellow colouration of skin and conjunctiva.

2.3. EXCRETORY SYSTEM

During the vital activity of the human and animal body, significant amounts of organic degradation products are produced, a proportion of which is not being utilized by cells. These degradation products must be eliminated from the body. The end products of metabolism which have to be removed from the body are called **excreta**, and the organs that remove them are called excretory organs.

The lungs eliminate carbon-di-oxide and water vapour into the environment. The gastro-intestinal tract excretes a small amount of water, bile acids, pigments, cholesterol, certain drugs (when administered into the body) salts of heavy metals (Cadmium, iron, manganese) and indigestible food residues (faeces).

The skin performs its excretory function by sweat and sebaceous glands. Sweat glands excrete sweat which contains water, salts, urea, uric acid, creatinine and other compounds.

The main excretory organs are the kidneys, which eliminate in the urine most of the metabolites, primarily those containing nitrogen (Urea, Ammonia, Creatinine).

2.3.1. Structure of the Kidney

The kidney is a bean-shaped organ about 5 cms long, 3 cms wide and 2 cms thick. There are two kidneys which are situated at both sides of the lumbar area. The weight of a kidney is about 200-250 gms. On the inner or medial border there is a notch called the **hilum** at which region the artery, the vein and the ureter connect with the kidney.

Each kidney has a ***pelvis,*** where the urine collects. The urine is drained off from the pelvis by the ***ureters.*** The ureters end in the urinary bladder which can hold about 800 ml of urine. The urethra carries the urine from the bladder and voids it at convenient intervals.

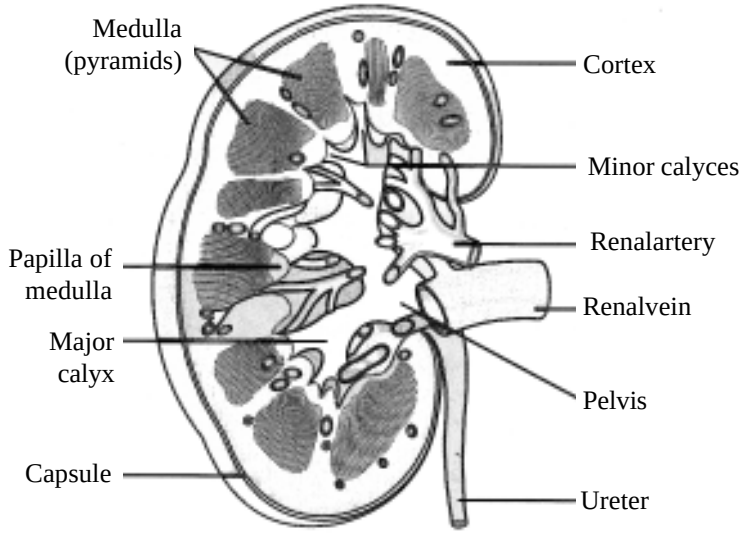


Fig. 16 : Structure of Kidney

In a longitudinal section, the kidney is seen to consist of outer **cortex** and inner **medulla**. The medulla consists of 10-18 conical or pyramidal shaped structures, known as the **renal pyramids**. The base of a renal pyramid faces towards, the cortex. The **pelvis** is the funnel-shaped upper end of the ureter.

Structure of the Nephron

The kidney substance is composed of about 1 million functional units, the **nephrons**, and a smaller number of **collecting tubules**. The uriniferous tubules are supported by a small amount of connective tissue, containing blood vessels, nerves and lymph vessels.

The nephron

The nephron consists of a tubule closed at one end, the other end opening into a collecting tubule. The closed or blind end is indented to form the cup-shaped **glomerular capsule** (Bowman's capsule) which almost completely encloses a network of arterial capillaries, the **glomerulus**. Continuing from the glomerular capsule the remainder of the nephron is described in three parts: the ***proximal convoluted tubule,*** the ***loop of Henle*** and the **distal convoluted tubule,** leading into a **collecting tubule**.

After entering the kidney at the hilus the renal artery divides into smaller arteries and arterioles. In the cortex an arteriole, the **afferent arteriole,** enters each glomerular capsule then subdivides into a cluster of capillaries, forming the glomerulus. The blood vessel leading away from the glomerulus is the **efferent arteriole;** it breaks up into a second capillary network to supply oxygen and nutritional materials to the remainder of the nephron. The blood pressure in the glomerulus is higher than in other capillaries because the calibre of the afferent arteriole is greater than that of the efferent arteriole.

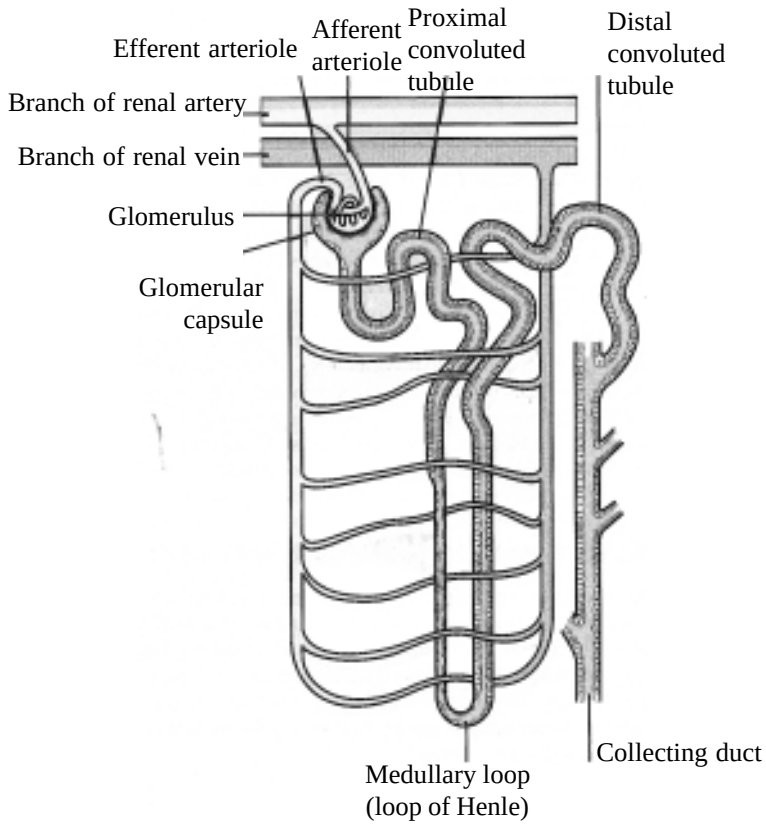


Fig. 17 : Structure of nephron

Functions of the Kidney

- Urine formation
- Maintenance of fluid and electrolyte balance
- Disposal of waste material from the body

2.3.2. Formation of Urine

There are 3 phases to urine formation:

1. Simple filtration
2. Selective reabsorption
3. Secretion

Simple Filtration

Filtration takes place through the semipermeable walls of the glomerulus and glomerular capsule. Water and a large number of small molecules pass through. Blood cells, and plasma proteins are unable to filter through and remain in the capillaries. Difference between the blood pressure in the glomerulus and the pressure of the filtrate in the glomerular capsule helps in filtration. The volume of filtrate formed by both the kidneys each minute is called **glomerular filtration rate (GFR)**. In a healthy adult the GFR is about 125 ml / min. Each day 180 litres of dilute filtrate is formed by the two kidneys. Most of this is reabsorbed and only 1 to 1.5 litres is excreted as urine.

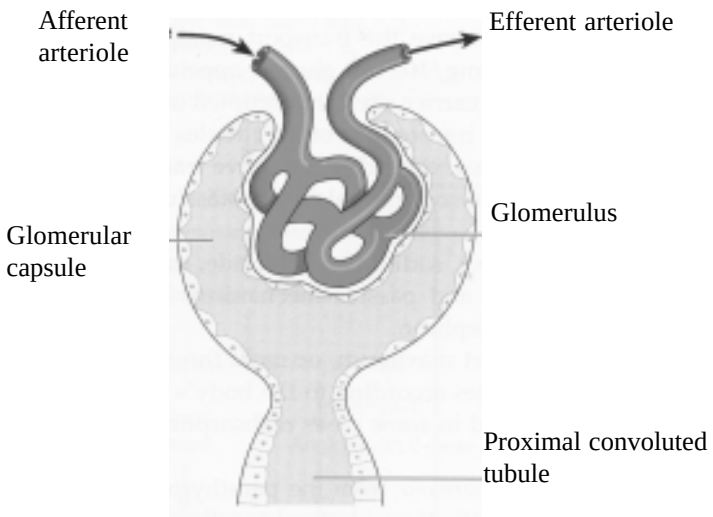


Fig. 18 : Glomerulus and Glomerular capsule

Selective reabsorption

The glomerular filtrate passes further to the proximal convoluted tubule, loop of Henle, the distal convoluted tubule and the collecting tubules. Selective reabsorption is the process by which substances such as glucose, amino acids, sodium, calcium, potassium, phosphate and chloride are reabsorbed. This is mainly done to maintain the fluid and electrolyte balance of the blood. About 80% of reabsorption takes place in the proximal tubules and the rest is absorbed in the distal tubules, and sent back to the blood stream. Reabsorption of water is done with the help of **anti diuretic hormone (ADH)** which is secreted by the posterior pituitary gland. It acts by increasing the permeability of the distal convoluted tubules and collecting tubules. Substances that are not normal blood constituents are not reabsorbed. The final urine is devoid of glucose, amino acids, certain salts (phosphates and sodium) and has a very high urea concentration.

Secretion

Substances not required and foreign materials, for example drugs such as pencillin and aspirin are not cleared by filtration due to the short time it remains in the glomerulus. Such substances are cleared by secretion into the convoluted tubules and excreted from the body in the urine. Tubular secretion of H^+ ions is important in maintaining homeostasis of blood pH.

The urine thus formed collects into the bladder through the ureters which are long, slender, muscular tubes that extend from the kidney to the lower part of the urinary bladder.

Micturition

The bladder is a muscular bag which collects the urine and voids it at intervals through the urethra. When the bladder is empty, the muscular wall becomes thick and the entire organ feels firm.

As the organ fills, the muscular wall becomes thinner and the organ may increase from a length of 2 or 3 inches to 5 inches or more inches. A moderately full bladder holds about 800 ml of urine. When 400 ml of urine is collected in the bladder, the normal desire for micturition is felt. The process of expelling urine through the urethra is called urination or **micturition**. The act of micturition is a reflex action. It is controlled by the action of circular muscles, continuous with those in the walls of the bladder and in the urethra.

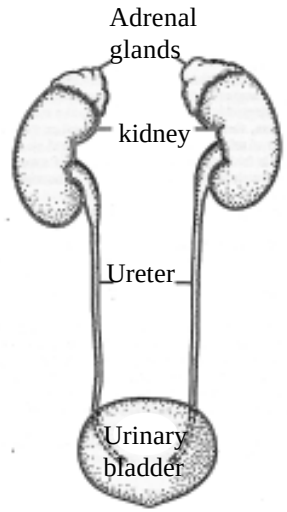


Fig. 19 : Urinary system

2.3.3. Body Fluids

The human body is about 60% water by weight. Body fluids are blood plasma, lymph, interstitial fluid (tissue fluid) which consist mainly water. They contain many different substances including nutrients, gases, water, hormones, and inorganic salts, acids and bases. All the chemical reactions in the body take place in a watery medium.

The body fluid is distributed in two principal compartments. The intracellular compartment and the extracellular compartments. Two-thirds of the body fluid is found within cells called **intracellular fluid**. The remaining is outside the cells in the extracullar compartment called the **extracellular fluid (ECF)**.

The movement of fluid from one compartment to another depends on blood pressure and osmotic concentration, decided by plasma proteins.

Water Balance

Fluid intake must equal fluid output, so that the total amount of fluid in the body remains constant. Water is taken in through the alimentary tract and a small amount is formed by the metabolic processes. Water is excreted in expired air and in faeces, through the skin as sweat and mainly as urine.

The balance between fluid intake and output is controlled by the kidneys. Dehydration occurs when fluid output is greater than the intake. e.g. through vomiting, sweating, diarrhea. The Anti-diuretic Hormone released into the blood by the posterior pituitary gland regulates the kidneys to reabsorb more water.

Electrolyte balance and fluid balance are interdependent. Electrolytes are compounds such as inorganic salts, acids and bases that form ions in solution. The electrolyte composition varies among body fluids in different compartments. The ECF contains high levels of sodium ion. Potassium ion concentration is higher in the ECF. Sodium ion concentration is adjusted mainly by regulating the amount of water in the body, as well as, by the hormone **aldosterone** secreted by adrenal cortex. Potassium ions are also important in maintaining fluid volume and helps to regulate acid-base levels.

2.3.4. Acid-Base balance

Acid-base balance depends on the concentration of hydrogen ions and its regulations is critical to health. pH is a measurement of

the H^+ ion concentration of a solution. A neutral pH is 7. Lower pH indicates acidity. Higher pH indicates alkalinity.

Blood is slightly alkaline at pH 7.4. Change in pH can affect rate of chemical reactions and structure and function of proteins.

The term **acidosis** refers to any condition in which the hydrogen ion concentration of plasma is elevated above normal. There are 2 types of acidosis:

1. **Metabolic acidosis :** This can be due to excessive loss of bicarbonate ion as in diarrhea or large accumulation of lactic acid as in exercise.
2. **Respiratory acidosis :** This develops when CO_2 is produced more rapidly than it is excreted by the lungs. This occurs during respiratory diseases.

The term **alkalosis** is any condition where the hydrogen ion concentration is below the normal range. There are 2 types of alkalosis.

1. **Metabolic alkalosis :** When there is loss of hydrochloric acid from stomach as in excessive vomiting it can result in muscle twitches and convulsions.
2. **Respiratory alkalosis :** This occurs when the respiratory system excretes CO_2 more quickly than it is produced. Hyperventilation of lungs due to high altitude or stress can cause this. The kidneys help regulate the pH by excreting or conserving certain ions.

Renal failure : This can be acute renal failure / chronic renal failure.

- **Acute Renal failure :** There is a sudden and severe reduction in the glomerular filtration rate and function of the kidney due to traumatic injury to normal kidneys, such as loss of blood, loss of fluid as in burns, diarrhoea etc.

- **Chronic renal failure :** This occurs when the nephrons are progressively and irreversibly damaged and can be the end result of kidney stones or high BP or Diabetes mellitus.

Kidney (Renal Calculi) : Calculi form in the kidneys and bladder when urinary constituents normally in solution are precipitated. The solutes involved are oxalates, phosphates, urates and uric acid. They are more common in males and after 30 years of age. Dehydration, Infection, hyperparathyroidism etc can lead to stone formation.

2.3.5. Structure and Functions of the Skin

The skin forms a protective outer covering around the entire body. It consists of an outer thin layer called the **epidermis** and an inner thick layer called the **dermis**. Numerous structures such as glands, sense organs and appendages such as hair nails are embedded in the skin.

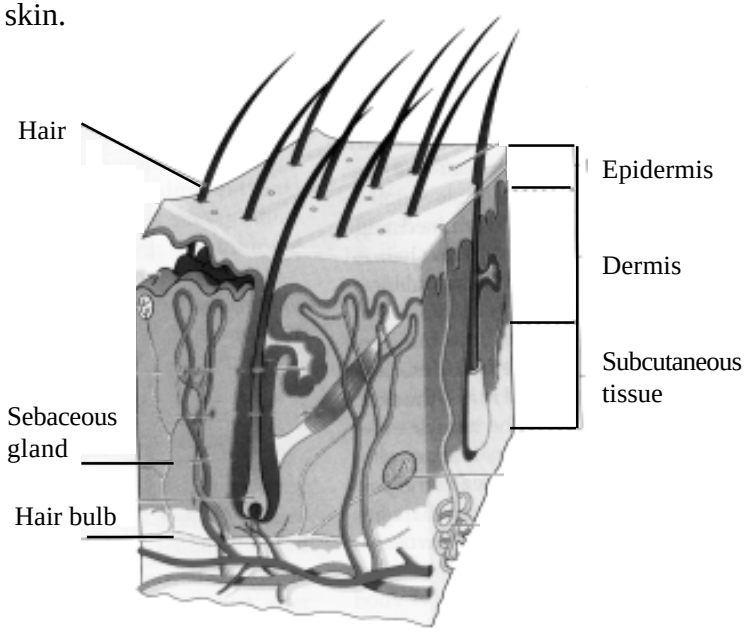


Fig. 20 : Diagrammatic Section of the skin

Epidermis

This is the outermost thin portion of the skin. No blood vessels are found in this layer. It derives its nutrition from lymph. Nerves are found in this layer.

The Epidermis consists of four layers of cells. They are:

1. The stratum corneum
2. The stratum lucidum
3. Stratum granulosum and
4. The stratum malpighi

i) The Stratum Corneum

The cells in this layer are thin, scale-like, dead, and cornified. The corneous layer is thickened in those parts of the body such as the palm and sole of the foot.

ii) The Stratum Lucidum

This is a thin more or less transparent layer, in which the cells are indistinct.

iii) The Stratum Granulosum

It consists of three to five layers of flattened cells containing dark granules of irregular shape.

(iv) The Stratum Malpighi

This layer is the lowermost and broadest layer of the epidermis. It is capable of active multiplication. This layer is made up of polyhedral cells. These cells are called ***prickle cells***. The innermost cells of this layer contains pigment granules called ***melanin*** which give the skin its colour.

Dermis

Situated below the epidermis is the most thicker dermis formed mostly of connective tissue which is richly supplied with blood vessels and nerves. The boundary line between the dermis and epidermis is neither smooth nor straight; it is rather zigzag because of the conical projection of the dermis into the epidermis. These projections are called ***dermal papillae***. This layer is tough, flexible and highly elastic. It contains the following structures:

1. Fine elastic fibres.
2. Capillary blood vessels and lymphatics.
3. Sensory nerve endings of various types.
4. Hair roots or hair follicles.
5. Sweat glands.
6. Sebaceous glands and
7. Involuntary muscle fibres. These muscle fibres, called **arrectores pilorum** are attached to the hair follicle and when these muscles contract, the hairs become vertical and ‘goose - skin’ is brought about.

There are two sets of glands in the skin. They are (1) the sweat glands and (2) the sebaceous glands. Each sweat gland consists of a long tube which at one end opens on to the surface through the sweat pore. At the other end, in the deeper part of the dermis, the tube forms a coiled mass with a blind end. In the coiled portion of the sweat gland, there are glandular cells, which separate water and small quantities of metabolic waste products from the blood that circulates through the capillary network associated with the gland. The sweat passes through the sweat pore and evaporates from the surface by taking heat from the skin. The sweat glands are present in large amounts on the palms, soles, forehead and in the armpits.

The sebaceous glands are irregularly shaped sac - like glands that open into the hair follicles. The oily secretions (Sebum) of these glands make the hair waterproof and protect the skin from drying effects of the atmosphere due to high temperatures and low humidity.

Sensory Nerve Endings

Numerous sensory nerves specialized to pick up stimuli that cause sensations of touch, pressure, pain, heat and cold that are scattered in the skin. They are connected to the brain by nerve fibres. Stimuli picked up by the sense organs are transmitted to the brain where they are interpreted to give the correct information.

Appendages

Hair and nails are appendages of the skin formed as a result of the outgrowth or thickening of the epidermis.

Functions of the skin

The skin is not merely an outer covering for the body but it serves a variety of functions.

1. **Protection:** The skin protects the inner parts of the body from mechanical injuries. A healthy skin also protects the body from the invasion of disease-causing germs. The nails, hoofs, and horns are also defensive appendages of the skin.
2. **Excretion:** Like kidneys, the skin through its sweat glands, eliminates salts, and metabolic waste products in the form of sweat.
3. **Sensory Function :** The numerous sense organs and nerve endings hidden in the skin make it an important sensory structure that picks up different stimuli and inform the brain of such changes in environment.

4. **Production of Vitamin D :** The skin contains a substance called 7-de-hydro cholesterol which is converted into vitamin D by ultra – violet rays of the sun.
5. **Regulation of Body Temperature :** By conduction, convection and radiation – a large amount of heat is lost from the body. The subcutaneous fat and hairs act as non-conductors of heat. Evaporation of sweat takes away a large amount of heat from the body.
6. **Water Balance :** Formation and evaporation of sweat is an important factor in the regulation of water balance of the body.
7. **Acid Base Equilibrium :** Sweat being acid in reaction, a good amount of acid is excreted through it. In acidosis, it becomes more acid and in this way helps to maintain a constant reaction in the body.
8. **Secretion :** Sebum which is secreted by the Sebaceous glands helps to keep the skin greasy and prevents drying. Sweat is secreted by sweat gland. Milk is secreted by mammary gland. The mammary glands are the skin structures. They are the modified sebaceous glands.
9. **Storage Function :** The subcutaneous tissue can store – (a) fat (b) water (c) salts (d) glucose and such other substances.

2.4. ENDOCRINES

The glands of the body may be divided into those with an external secretion (exocrine glands) and those with an internal secretion (endocrine glands). Example of exocrine glands are the sweat, Lachrymal and mammary glands which pass their secretion along the ducts to the external surface of the body and the glands of the mouth, stomach, and intestine which pass their secretions along ducts into the alimentary tract. The endocrine or ductless gland on the other hand have no ducts or openings to the exterior.

The secretions are passed directly into the blood stream and transmitted to the tissues.

A ***hormone*** is a chemical substance produced by the endocrine glands and their overall function is to regulate the activities of various body organs and their functions. The first hormone was discovered by Bayliss in 1903.

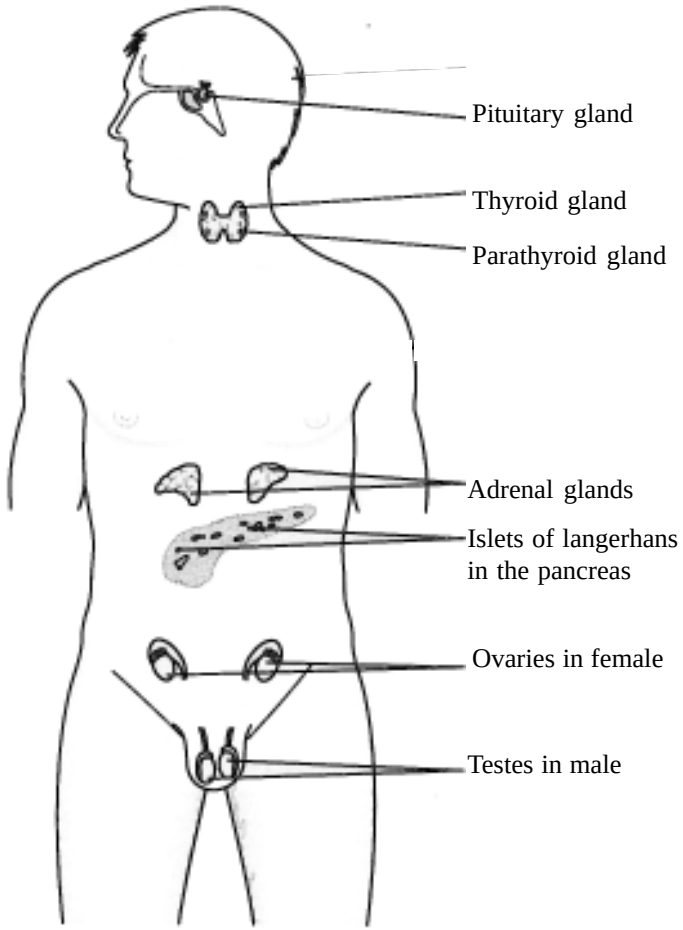


Fig. 21 : Location of various endocrine glands in the body

The main endocrine glands in the body are :

1. Thyroid
2. Parathyroid
3. Islets of Langerhans
4. Adrenal gland
5. Pituitary and
6. Sex glands

2.4.1. Thyroid Gland

The largest of the endocrine glands is the thyroid, which is located in the neck region. The thyroid gland weighs 25 gms in a healthy adult. It has two oval parts called the lateral lobes on either side of the trachea. These two lobes are connected by a narrow band called ***isthumus***. The entire gland is enclosed by a connective tissue capsule. This gland produces hormone, **thyroxine** rich in iodine.

Thyroid gets iodine from the blood stream. Iodine is formed by the reduction of iodide. It is then fixed with the amino acid tyrosine to form mono and di-iodo-tyrosine compounds. Two molecules of di-iodo-tyrosine combine to form thyroxine. By eating vegetables grown in iodine-containing soils or by eating sea-foods and iodised salt our diet will have enough iodine necessary for the production of thyroxine.

Thyroid stimulating hormone (TSH) produced by the anterior pituitary lobe increases the activity of thyroid gland. Whenever the thyroxine level falls below a particular level TSH is stimulated,

Functions of Thyroxine

1. Helps to regulate tissue growth and development.
2. Increases the B M R and thus raises the body temperature.

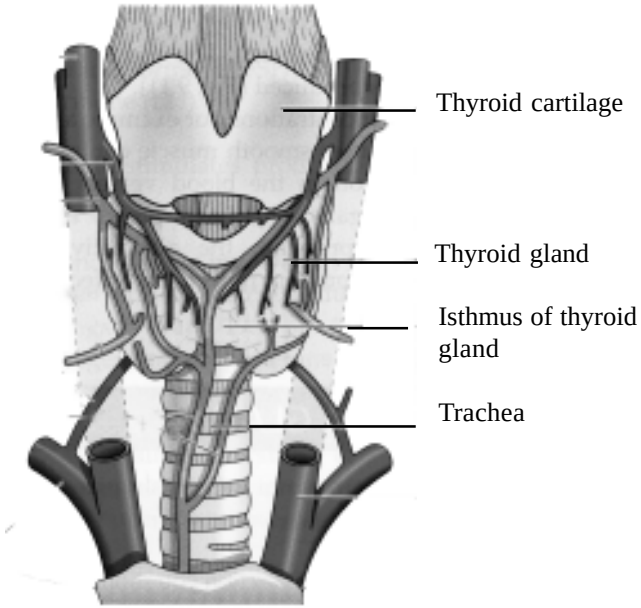


Fig. 22 : The thyroid gland

3. It controls the metabolism by regulating the anabolic and catabolic process.
4. Stimulates the cells to break down proteins for energy.
5. Decreases the breakdown of fats.
6. Increases the breakdown of body glucose and enhances the glucose absorption.
7. Calcium and phosphorus are removed from the bones and excreted in increased amounts.
8. Helps in the conversion of Beta-carotene into vitamin A.

Thyroid Disorders

It is of 3 types. They are:

1. Hypothyroidism
2. Hyperthyroidism
3. Simple goitre.

Hypothyroidism

It results due to lack of thyroid hormone secretion. It results in **cretinism** in children and **myxoedema** in adults.

Cause of Hypothyroidism

1. Failure or arrest of normal development of thyroid gland.
2. Failure to form genetic enzymes normally.
3. Deficiency of iodine in the body.
4. Administration of antithyroid drugs in excess.
5. After surgical removal of thyroid gland.

The Chief Features of Cretinism are as follows

1. Stunted growth
2. Broad nose
3. Thick lips
4. Lobling tongue
5. Muddy dry skin

Fig. 23 : Cretinism

6. Milestones of development in children get delayed e.g., Holding up the head, sitting, standing, walking gets delayed.
7. BMR is depressed.

This disease can be cured if thyroxine or iodine is administered sufficiently.

In adults hypothyrodism causes myxodema which is more common among females than in males.

The Chief features of hypothyrodism in adults (Myxoedema)

1. Decreased BMR
2. Sexual dysfunction
3. Lack of energy
4. Lack of memory
5. Loss of hair
6. Dullness
7. Loss of appetite
8. Slow heart rate
9. Gain in weight
10. Puffy face due to tissue fluid retention.

Fig. 24 : Features of Myxoedema puffy face

Hyperthyroidism

Occurs due to the excessive secretion or over action of thyroxine.

Symptoms of Hyperthyroidism

1. Enlargement of thyroid gland results in the protrusion of eye ball from the orbit.

2. Flushed skin and high temperature
3. Increased O_2 consumption and CO_2 output
4. Tendency to lose weight
5. The pulse and heart rate are high
6. Nervousness and irritability
7. Low resistance to withstand stress and strain
8. High blood pressure
9. Mild diabetes
10. Emotional restlessness

The clinical condition of hyperthyroidism is **exophthalmic goitre** in which the thyroid gland is usually enlarged and there is characteristic protrusion of eye balls from the orbit.

Fig. 25 : Exophthalmic goitre

Simple Goiter

A lack of dietary iodine may cause endemic goiter. Thyroid gland is enlarged and has increased number of follicles. This leads to low level of thyroid hormone in the blood, and derangement of body functions.

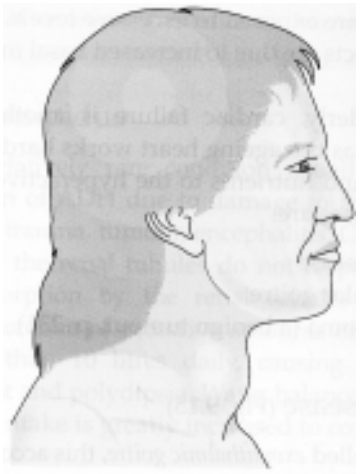


Fig. 26 : Simple goitre

2.4.2. Parathyroid Gland

These are two tiny oval pairs (6mm x 2m) of glands situated at upper and lower poles of lateral lobes of thyroid gland. It secretes the hormone, **parathyroxine.**

Functions of Parathyroxine

1. Increases the concentration of organic acid in the bone.
2. Increases the calcium and phosphorus solubility
3. Increases the reabsorption of calcium from the bones resulting in increased serum calcium level.
4. Increases phosphate excretion in the urine.
5. Increases the reabsorption of calcium from the renal tubules.

6. Promotes the absorption of calcium and phosphorus from the intestine.
7. Stimulates the process of lactation in mammary gland.

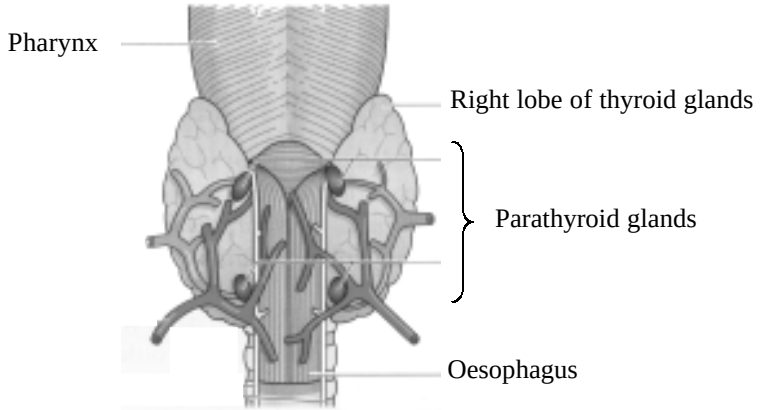


Fig. 27 : Location of parathyroid glands

Deficiency of Parathyroxine

1. Serum calcium level falls.
2. Blood reaction is more alkaline owing to excessive loss of CO_2.
3. Decalcification of bones.
4. Increase in the heart and respiration rate.
5. Rise in body temperature.
6. General mental depression.
7. Tendency to cataract formation.
8. Under development of teeth.
9. Brittleness of nails.
10. Dryness of skin.

11. Lowered general resistance.

12. Nervous irritability.

13. Twitching of muscles causing Tetany.

Tetany is a condition, in which there is **hyperexcitability** of nervous system with intermittent tonic spasms of muscles chiefly of the limbs, face, and back of the neck. When the small muscles of hands are affected, the hand is held in the same position. It is known as **Carpo - Pedal spasms**. When the laryngeal muscle are affected laryngeal spasm is seen. If tetany is not treated it may lead to paralysis of respiratory muscle and cardiac arrest. Finally death may occur.

Fig. 28 : Tetany

2.4.3. Islets of Langerhans in the Pancreas

The Pancreas is both an exocrine gland secreting digestive juice through a duct into the duodenum and an endocrine gland secreting hormone into the blood stream. It consists of head, body and tail. The head fits into the curve of duodenum The body and tail are directed towards the left. The pancreatic islets represents the endocrine part of the pancreas. Most of the islets are located in the tail and only a small number in the head of the pancreas. There are two different types of cells in the islets of langerhans. The alpha cells and beta cells are very important. The alpha cells secrete a hormone Glucagon whereas the beta cells secrete insulin.

Functions of Glucagon

1. Increases the blood glucose level

2. Breaks down the liver glycogen into glucose.

3. Stimulates the break down of lipid in adipose tissue.

Functions of Insulin

1. Converts glucose into glycogen and accelerates the transport of glucose from the blood into the cells.

2. Decreases the blood sugar level.

3. Builds up the glycogen store in the liver.

Deficiency of Insulin

Hyposecretion of insulin results in Diabetes mellitus. It is caused due to elevated blood sugar level. This condition is known as **hyperglycemia**. This condition leads to the condition **'glycosuria'** in which sugar is excreted in the urine. Carbohydrates as well as protein and fat metabolism are affected in the diabetics.

Symptoms of diabetes are:

1. Excessive thirst, hunger and urination

2. Loss of weight.

3. Weakness, restlessness and fatigue.

4. Decreased resistance to infection.

5. Itching of the genitals.

Diabetes can be kept under check by taking a high protein and low carbohydrate diet. If Diabetes cannot be controlled by diet alone, insulin must be administered by injection.

2.4.4. Adrenal Gland

The adrenal or supra renals are two small glands each one situated above a kidney. Adrenal gland consists of two different parts each of which acts as a separate gland. The inner area is called the **medulla** which is brown in colour while the outer area is called the **cortex** which is lighter in colour.

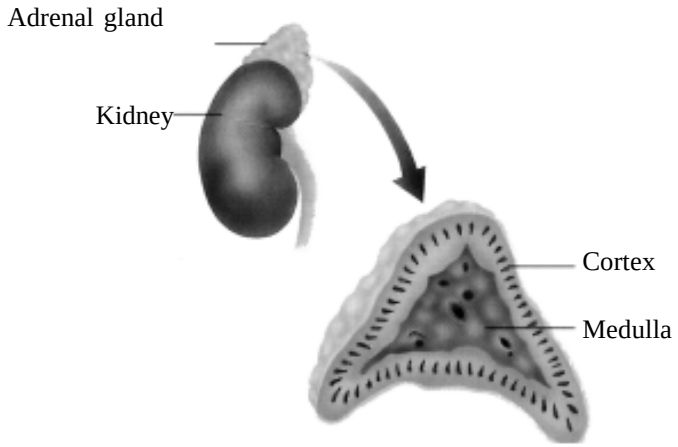


Fig. 29 : Adrenal Gland

Adrenal Cortex

It is composed of three layers. They are (a) Zona glomerulosa (outer layer) (b) Zona fasciculata (middle layer) and (c) Zona reticularis (inner layer).

The adrenal cortex secretes three hormones. They are:

1. **Glucocorticoids :** Acts as antagonists to insulin and cause increase in blood sugar.
2. **Mineralocorticoids:** Acts on sodium and potassium and help in the conservation of sodium in the body.

3. **Sexsteroids :** Stimulates the development of the reproductive organs in childhood. It is responsible for development of secondary sex characteristics and reproductive function.

Functional insufficiency of the adrenal cortex and tuberculosis of the adrenal gland gives rise to **Addison's disease.** Its early signs are dark pigmentation of the skin, especially of the hands, neck and face, anemia, loss of energy, weakness, decreased appetite, nausea, and vomiting. Patients are very sensitive to cold and pain and susceptible to infections. This can be treated by administering the hormone in combination with a diet high in sodium and low in potassium.

Over activity of adrenal cortex increases the secretion of this hormone, and sexsteroids, this results in an acute change of secondary sex characteristics. For example, female may develop male secondary characteristics like growth of beard, low pitch of the voice, lack of menstruation and male may develop female secondary sex characteristics.

Adrenal Medulla

Adrenal medulla secretes two hormones. They are Adrenalin and Nor-adrenaline.

Functions of Medullary Hormones

1. Dilation of the pupils and improves visual acuity.
2. Increases both rate and amplitude of contraction of heart and raises the cardiac output.
3. Increases both rate and amplitude of respiratory movements and causes dilation of the bronchioles.
4. Raises the blood sugar level by means of glycogenolysis.
5. Increases the Basal Metabolic Rate and thus raises the body temperature.

6. Dilation of the walls of intestine and the urinary bladder.

The functions of adrenalin are similar to that of Nor-adrenalin except in a few instances. For example, adrenalin increases the heart rate whereas Nor-adrenalin decreases heart rate.

2.4.5. Pituitary Gland

The pituitary is a small gland about the size of a cherry. It is situated at the base of the brain. It plays a peculiar role in the system of endocrine glands. It is referred to as the 'master' gland of internal secretion because it controls the activities of other endocrine glands.

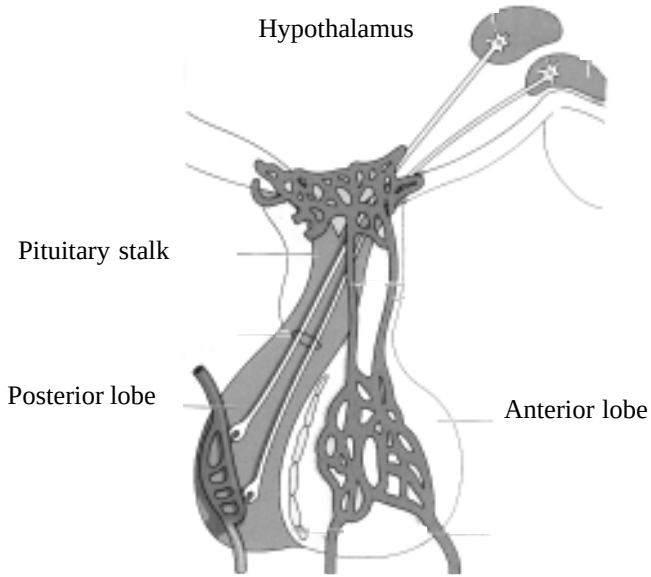


Fig. 30 : Structure of pituitary gland

The pituitary gland is divided into two main parts (1) Anterior pituitary and (2) Posterior pituitary.

The Anterior Pituitary

This part secretes a large number of hormones. Many of them stimulate other glands. Its main hormones are:

1. **Growth Hormone:** It facilitates the growth of the bone and cartilage tissue. Over activity of the anterior pituitary lobe in childhood results in excessive growth and height. This condition is known an **gigantism**. A decreased activity of the anterior pituitary causes a severe growth retardation leading to **dwarfism**.

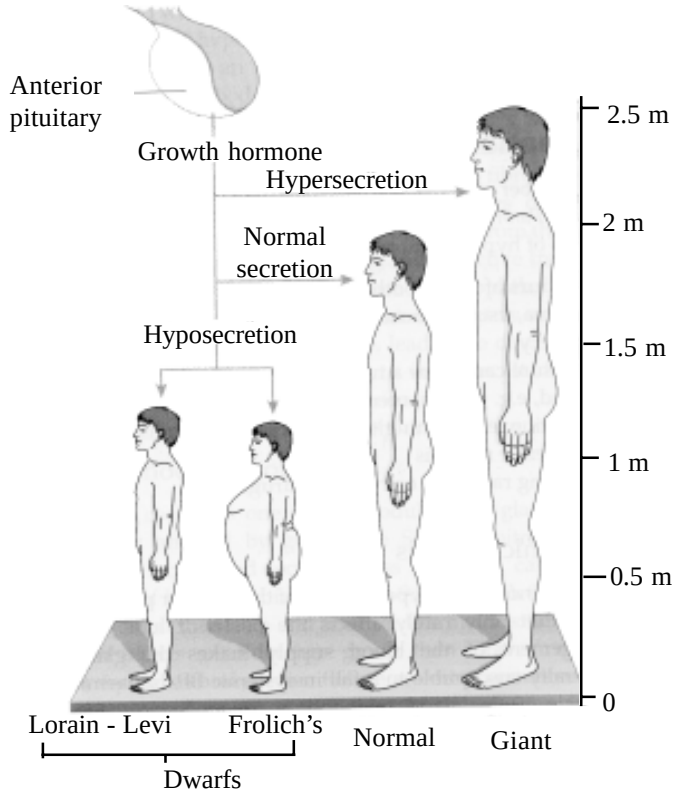


Fig. 31 : Effects of abnormal growth hormone secretion

Excessive production of growth hormone in an adult leads to excessive development of certain regions such as fingers and toes, feet, hands, nose, lower jaw, tongue, thoracic and abdominal organs. This condition is known as **acromegaly**.

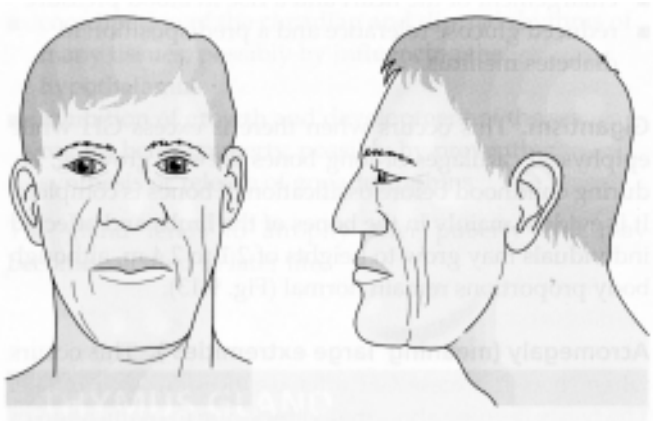


Fig. 32 : Facial features in acromegaly

2. **Thyrotropic Hormone (TSH):** This hormone stimulates the activity of the thyroid gland. Administration of this hormone causes overgrowth of thyroid tissue.

3. **Adreno Cortico Tropic Hormone: (ACTH):** This hormone stimulates the cortex of the adrenal gland and increases the production of the hormones of adrenal cortex.

4. **Follicle Stimulating Hormone (FSH):** This hormone influences the growth, development and maturation of the vesicular follicles in the ovary. In males, the hormone stimulates the formation of sperm in the testes.

5. **Lactogenic Hormone:** It acts on the mammary gland and helps in the formation and flow of milk during lactation.

6. **Luteinising Hormone:** It is required for the growth of follicle in the ovary and stimulates ovulation. In the absence of the hormone,

no ovulation and production of the corpus luteum can occur. In males it stimulates the interstitial cells of testes to secrete testosterone.

Posterior Lobe of the Pituitary

This lobe is just behind the anterior lobe, it produces two hormones-Oxytocin and Vasopressin.

Oxytocin acts on the smooth muscles especially that of the uterus and produces powerful contractions of the uterus and helps in parturition.

Vasopressin acts on the smooth muscle of the arterial system and increases the blood pressure. This hormone helps in the reabsorption of water from the distal convoluted tubule. Vasopressin deficiency is the cause of **diabetes insipidus** in which water is not reabsorbed. So great amounts of urine are excreted with no sugar in it. Such patients feel constantly thirsty.

The Sex Glands

The sex glands including the ovaries of the female and the testis of the male are important endocrine structures. The secretion of these glands play an important part in the development of the sexual characteristics. The male sex gland secretes hormone called **testosterone** and is responsible for secondary sex characteristics. The female sex gland secretes a hormone called **estrogen** and it stimulates the development and functioning of the female reproductive organs.

There is one other hormone produced by the female sex glands and it is called **progesterone**. This hormone assists in normal development of pregnancy.

2.5. REPRODUCTIVE SYSTEM

The Reproductive System consists of those organs whose function is to produce a new individual.

Male And Female Sexual Reproductive Organs

The sex organs in the male and female can be divided as:

1. Primary sex organs, i.e. those producing male and female gametes.
2. Secondary (or accessory) sex organs, i.e. those concerned with carriage of gamete and other functions.

Primary Sex Organs in Male and Female

They are a pair of testes producing spermatozoa (male gametes) while in females are a pair of ovaries producing ovum (female gamete). These primary sex organs in addition to producing male and female gametes secrete male and female sex hormones as well.

Accessory Sex Organs in the Male

1. Epididymis
2. Vas deferens
3. Seminal vesicles
4. Prostate gland
5. Ejaculatory ducts
6. Urethra
7. Penis

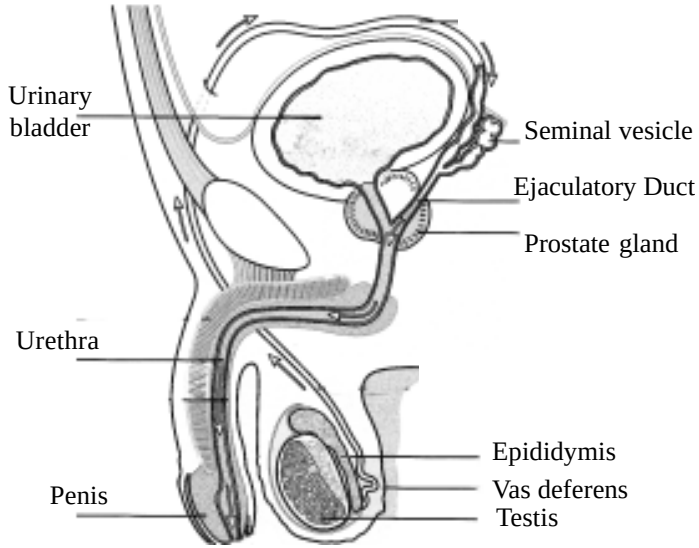


Fig. 33 : Male reproductive organs

Accessory Sex Organs in the Female

1. Fallopian tubes
2. Uterus
3. Vagina
4. Clitoris

2.5.1. Male Reproductive System

There is one pair of testes lying one in each scrotal sac. The scrotum is a bag of skin having two separate compartments, one for each testis lying at the root of the penis. Each testis is oval shaped, measures 5 x 3 x 2 cm and weighs about 15 gm.

Each **testis** is covered with a layer of fibrous tissue called **tunica albuginea**. Many septa from this layer divide the testes into pyramidal lobules in which lie seminiferous tubules and the interstitial cells. The

seminiferous tubules are concerned with process of **spermatogenesis**. The interstitial cells called **leydig cells** lie between the tubules and secrete the testosterone (male sex hormone). From the lining of these tubules spermatozoa are produced by the process of cell division.

The **epididymis** is a very fine convoluted tube, being 4-6 meters long and joins the posterior part of the testes and vas deferens. It stores the spermatozoa. The spermatozoa remain inactive in epididymis and are capable of surviving for months.

Vas deferens is a fibro-elastic duct 30-40 cm in length and extends

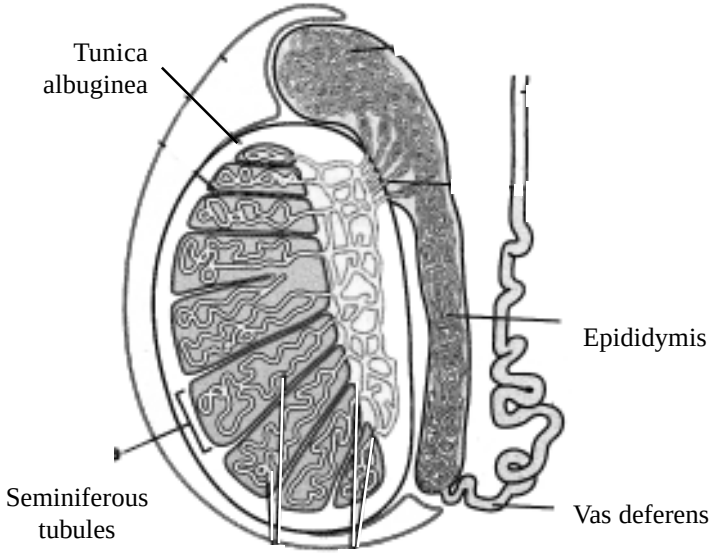


Fig. 34 : Section of the testis

from epididymis to end in ejaculatory duct which is joined by seminal duct and opens in prostatic urethra.

The **seminal vesicles** are two small pouches lying at the back of the urinary bladder. They secrete a fluid called **semen**.

The **prostate gland** lies at the base of the urinary bladder and is covered with fibrous capsule which by a number of septa divides into many follicles. The ejaculatory ducts lead from the seminal vesicle through the prostate gland to the urethra.

In males the urethra is about 20-22 cm in length and serves the purpose of urination as well as ejaculation of semen.

Functions of the Testes

1. They produce and mature the male reproductive cells called **spermatozoa.**
2. Secrete seminal fluid.
3. Secrete hormone testosterone directly into the blood.

The testes normally do not begin to function till the onset of puberty, which is usually at about 14 to 15 years. At this age they begin to secrete hormones and produce the sperms. Before puberty, mature sperms are not formed. It ceases in old age.

Each sperm is about 1 mm long consists of a head piece, middle piece and a tail piece. The head is the nucleus. The nucleus is covered

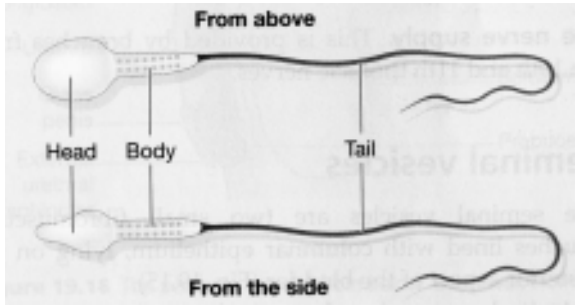


Fig. 35 : Spermatozoan

by a cap the ***'acrosome'.*** The neck piece contains ***'centrioles'***. The tail piece consists of a spiral mitochondrial sheath surrounding a group of fibres. The FSH secreted from the anterior pituitary gland controls spermatogenesis.

Functions of Hormone

Testosterone

1. Stimulates the development of the secondary sexual characteristics of the male such as the growth of beard, the deepening of the voice, the growth and the distribution of hair on the body, the growth and development of the accessory sex organs.
2. Stimulates the production of sperms at puberty.

2.5.2. Female Reproductive system

Ovary

The gonads of the female are called ovaries and the cells that they produce are known as ova or egg-cells. Each female has a pair of oval-shaped structure, about the size of an almond. Each ovary measures 3.5 x 2.5 x 11.5 cms and weighs about 8-10 gms. They are situated at the back of the abdominal cavity at the hip level. An ovary consists of the following:

1. **The Germinal Epithelium:** It is the outer part of the ovaries from which the primitive graafian follicles develop.
2. **Tunica Albugina:** This is made up of connective tissues found under the germinal epithelium.
3. **Stroma:** It is a connective tissue network continuous with Tunica albugina and containing involuntary muscle fibres. It supports the ovarian tissues and carries blood vessels, lymphatics and nerves.

4. **Graafian Follicles :** These, are small islands of cells found at the peripheral part of the ovary. The female gametes called ova are produced in the graafian follicles. When an ovum matures, the follicle in which it develops bursts. The follicle usually takes 10-14 days. This process of rupture of graafian follicle is called the 'ovulation'. Female gamete (ovum) produced, during ovulation is secreted.
5. **Corpus luteum:** When the follicle ruptures Corpus luteum develops. In the absence of pregnancy, it persists upto 27th day and degenerates on the 28th day. If pregnancy occurs it persists to about 4 to 5 months. It secretes progesterone which is essential for the maintenance of pregnancy.
6. **Interstitial Cells:** These are polyhedral cells found in between follicles. These cells secrete oestrogen.

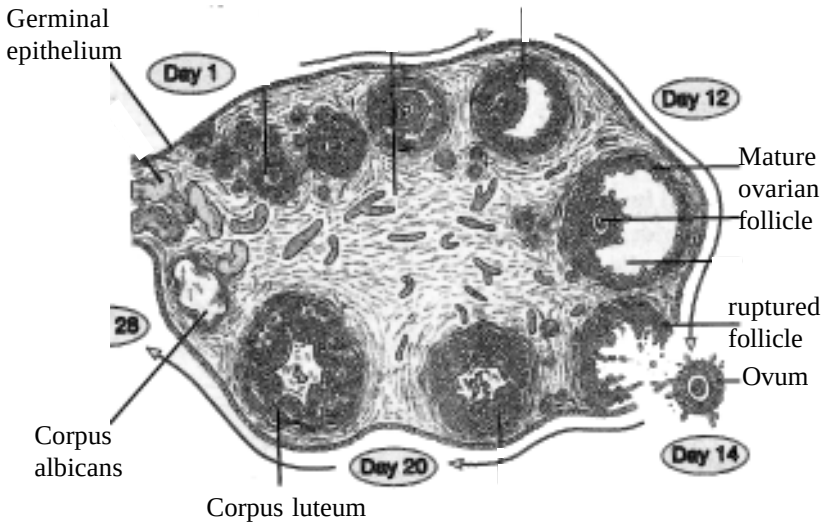


Fig. 36 : Section of ovary

Functions

1. Produce ova and expel one at approximately 28 days interval during the reproductive life.
2. Secretes hormones (Oestrogen and progesterone). **Oestrogen** influences secondary sex characteristics and is responsible for the changes in the accessory organs of reproduction. **Progesterone** prepares the uterus for the reception of the fertilized ovum - implantation, the development of the placenta, development of the mammary glands, and inducing multiplication of the uterine muscle fibres.

Fallopian Tubes

Close to each ovary there is a narrow tube about 10 cm long with an open end which looks like a fringe of petals. These tubes are called the fallopian tubes. These are attached to the uterus at its upper outer angles.

Functions

These tubes act as ducts for the female gametes although they are not connected to the ovaries. Fertilization of the male and female gametes normally occurs in the tubes.

Uterus

Uterus is a pear-shaped muscular organ the inside of which is hollow. It measures about 7.5 x 5 x 2.5 cms. consists of an upper portion called the body and a lower portion called the cervix. The uterus is lined by a mucous membrane, known as **endometrium.**

Functions

The uterus plays an important role in maintaining growth and development of the embryo. The ovum is discharged from the ovary. It is then transported to the uterus through the fallopian tubes. The

fertilized ovum is embedded in the endometrium of the uterus. Placenta is then formed from the embryonic and endometrium tissues. This maintains the nutrition, respiration and excretion of embryo until parturition.

Vagina

It is a muscular membranous tube situated between the rectum and the urethra.

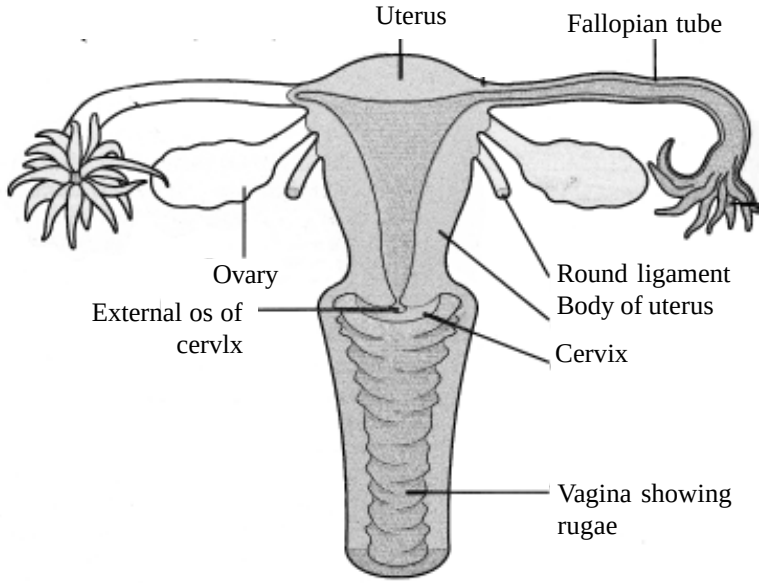


Fig. 37 : Organs of the female reproductive system

It is estimated that, at birth, there are about 30000 ova or eggs in a female child. No fresh ova are formed after birth but during the reproductive female life that is commencing between 10 and 16 years of age and concluding between 45 and 55 years of age, these Ova develop within the follicles or sacs in which they are embedded. They come progressively nearer to the surface of the ovary where they mature and increase in size. About every

28 days one of these follicles burst open from the ovum together with the fluid surrounding it, and is expelled into the fallopian tubes; into uterus where it may or may not be fertilized. If the ovum is fertilised by a male reproductive cell or spermatozoa it then attaches itself to the uterine wall and develops there. If the ovum does not become fertilised within a few days, it is cast off and the process termed menstruation is initiated.

2.5.3. Menstrual cycle

The phases of the menstrual cycle that denote changes in the uterine wall are:

Proliferative phase	10 days
Secretory phase	14 days
Menstrual phase	4 days

Proliferative phase

At this stage an ovarian follicle, stimulated by FSH, grows towards maturity and produces *oestrogen.* Oestrogen stimulates the proliferation of the endometrium in preparation for the reception of a fertilised ovum. The endometrium becomes thicker by rapid cell multiplication accompanied by an increase in the numbers of mucous secreting glands and blood capillaries. This phase ends when *ovulation* occurs and oestrogen production stops.

Secretory phase

Immediately after ovulation, the lining cells of the ovarian follicle are stimulated by LH to develop the corpus luteum which produces progesterone. Under the influence of progesterone the endometrium becomes oedematous and the secretory glands produce increased amounts of watery mucous. This is believed to assist the passage of the spermatozoa through the uterus to the uterine tubes where the ovum is

usually fertilised. There is a similar increase in the secretion of watery mucous by the glands of the tubes and into the vagina by cervical glands.

If the ovum is not fertilized menstruation occurs.

Menstrual Phase

When the ovum is not fertilized the corpus luteum begins to degenerate. Progesterone and oestrogen levels fall. The menstrual flow consists of secretions from the endometrial glands, endometrial cells, blood and the unfertilized ovum.

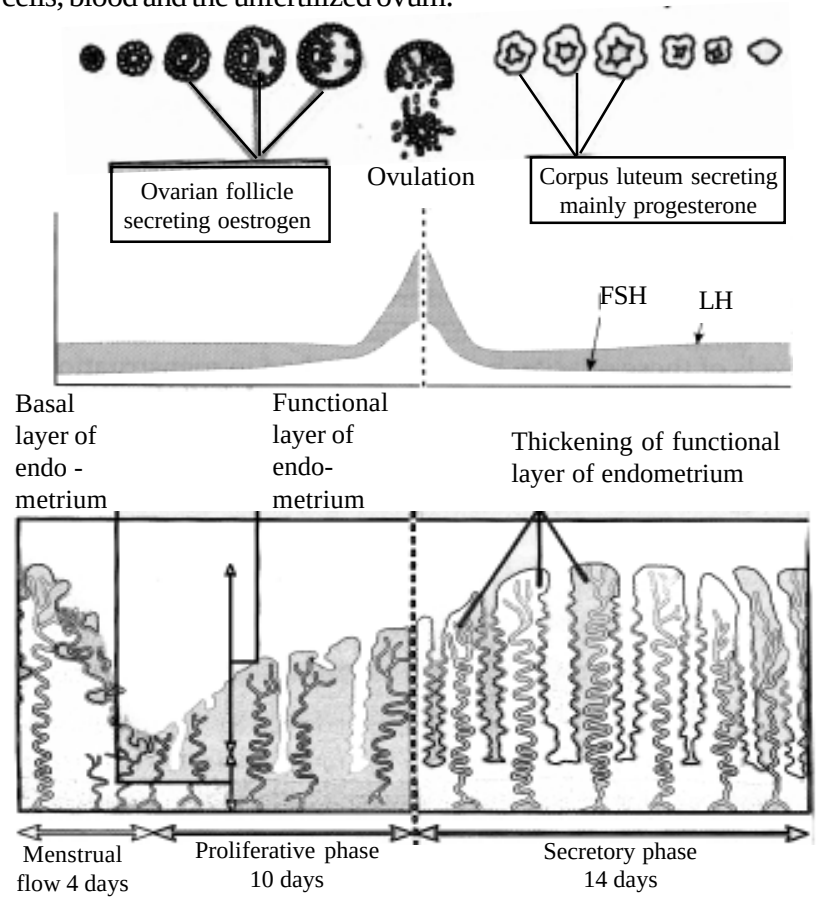


Fig. 38 : Menstrual Cycle

Menopause

At about the age of 50 years a woman enters menopause – the time when ova are no longer produced and the woman is longer fertile. The amount of estrogen and progesterone decreases.

Fertilisation

This is the fusion of the sperm and the egg. Fertilisation and the establishment of pregnancy together are referred to as **conception.** The fusion of sperm and ovum nuclei together form a **Zygote.** This zygote gives rise to a new individual.

Pregnancy

The embryo after two months of fertilization comes to resemble the human being and from then to birth is referred to as the **foetus.** The development of the foetus continues until it is ready to be born after 280 days or 9 months. The period of intra-uterine development of the foetus is known as the **gestation period**. This is followed by **birth or parturition**. During the seventh week of gestation, the embryo has both male and female primordial genital ducts. The gonad develops a cortex and a medulla. Until the sixth week of development, the structures are identical in both sexes. In genetic male, the medulla develops during the seventh, eighth weeks into a testes, and the cortex regresses. Leydig cells appear and androgen is secreted. In genetic females, the cortex develops into an ovary and the medulla regresses.

During the foetal growth fetal membranes such as the amnion and chorion help protect, nourish and support the foetus. The amnion forms a sac around the foetus that is filled with amniotic fluid. The placenta is the organ of exchange of nutrients between the mother and the embryo. During pregnancy the corpus luteum and placenta secrete progesterone.

Lactation

High levels of estrogen and progesterone during pregnancy cause an increase in the size of the breasts. The hormone prolactin secreted

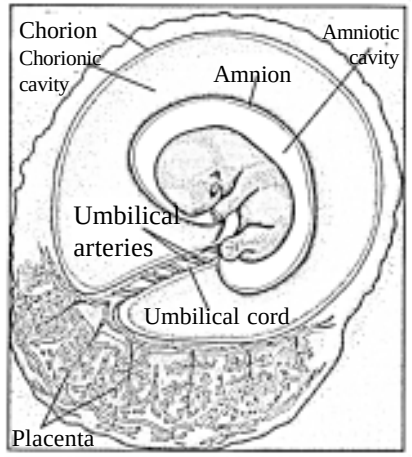


Fig. 39 : Developing embryo

PRACTICALS

Draw the structure of the eye and explain.

Draw the structure of the ear and explain.

Draw the structure of the kidney.

Draw the structure of the nephron.

Prepare a model on any one of the sense organ.

Identify the following specimen: Human kidney and liver.

QUESTIONS

Section – A

I. Fill in the Blanks

1. _____ is the white of the eye.
2. _____ is known as visual purple.
3. _____ is the organ of balance.
4. _____ resembles a snail's shell.
5. Saliva contains the enzyme_____
6. Succus entericus is secreted by_____
7. The functional unit of the kidney is_____
8. The process of expelling urine is called_____
9. Thyroid gland produces the hormone_____
10. _____and _____hormone levels are high during pregnancy.

II. Match the Following

A	B
1. Rods	Wax
2. Myopia	Salivary gland
3. Cerumin	nearsightedness
4. Parotid	Bile
5. Liver	Ovary
6. ADH	Salivary gland
7. Tetany	Growth hormone
8. Gigantism	parathyroxine
9. Epididymis	reabsorption of H_2O
10. Graafian follicle	Testis

III. Answer the following in one word

1. Name the pigment that acts during visual cycle.
2. Name the tympanic membrane commonly known as.
3. Name the fluid that fills the membranous labyrinth in the ear.
4. Name the cells that secrete hydrochloric acid in the stomach.
5. Name the gland that is exocrine as well as endocrine in nature.
6. Name the organ that stores vitamins.
7. What does GFR stand for?
8. Which is the hormone that plays a role in diabetes mellitus?
9. Name the fluid secreted by the testis
10. Name the hormone that causes ejection of milk from mammary glands.

Section B

1. Define accommodation of the eye.
2. What is astigmatism?
3. What are auditory ossicles?
4. What are the enzymes secreted by pancreas?
5. What is cirrhosis?
6. What is metabolic acidosis?
7. Name the different layers of skin
8. What is simple goiter?

9. What are interstitial cells?
10. What is parturition?

Section C

1. What are the functions of the retina?
2. Describe the internal ear
3. Give the functions of liver.
4. How is food absorbed in the small intestine?
5. Explain structure of kidney.
6. What are the functions of skin?
7. Write about the adrenal cortex?
8. Give the functions of adrenal medullary hormones.
9. What are the functions of the testes?
10. What are the functions of the uterus?

Section D

1. Draw the structure of eye & explain the various parts.
2. Explain physiology of hearing.
3. Explain digestion and absorption of food in the small intestine.
4. Write about the diseases of the liver.
5. Write on formation of Urine with structure of nephron.
6. Explain water balance by kidney.
7. Explain acid-base balance.
8. Explain the various hormones secreted by pituitary gland.
9. Explain the male reproductive system in detail.
10. Explain menstrual cycle in detail.

3. FOOD, NUTRITION AND HEALTH

Nutrients are the constituents in food that must be supplied to the body in suitable amounts to carry out the body functions and to maintain optimum health. These include carbohydrates, fats, proteins, vitamins, minerals and water. The functions and sources of the different nutrients was dealt in class XI. The deficiency diseases related to the different nutrients will be dealt in this chapter.

3.1 DEFICIENCY DISEASES

3.1.1. Protein Energy Malnutrition (PEM)

The term protein energy malnutrition covers a wide spectrum of clinical stages ranging from the severe forms like ***kwashiorkar*** and ***marasmus*** to the milder forces in which the main detectable manifestation is growth retardation. It is widely prevalent among weaned infants and pre-school children in India and other developing countries.

CAUSES

1. Social and Economic Factors

Poverty that results in low food availability, overcrowded and unsanitary living conditions and improper child care are frequent causes of PEM. A decline in the practice and duration of breast feeding combined with inadequate weaning practices are the important causes of PEM.

2. Biological factors

Maternal malnutrition prior to and or during pregnancy is more likely to produce an underweight new born baby. Infectious diseases are major contributing and precipitating factors of PEM. Diarrhoea,

measles and respiratory and other infections result in negative protein and energy balance.

3. Environmental factors

Overcrowded and or unsanitary conditions lead to frequent infections like diarrhoea. Agricultural patterns, droughts, floods, earthquakes, wars and forced migrations lead to cyclic, sudden or prolonged food scarcities. Post harvest losses of food can occur due to bad storage conditions and inadequate food distribution.

4. Age

It mostly affects infants and young children whose rapid growth increases nutritional requirement. The long term intake of insufficient food can result in marasmus before one year. Kwashiorkar is common after 18 months.

The five forms of PEM are as follows :

i. Kwashiorkor

The important Clinical ***signs*** and ***symptoms*** of kwashiorkor are:

- Growth failure due to general lack of proteins and calories.
- Mental changes such as apathy and irritability.
- Muscle wasting.
- Oedema occurs at first in the feet and lower leg and then may involve the hands, thigh and face.
- Moon face.
- Fatty and enlarged liver
- Loss of appetite, vomiting and diarrhoea
- Characteristic skin changes which include dark pigmented brownish black areas of skin on buttocks and back of thighs called as crazy pavement dermatosis.

- Hair changes
- Anaemia
- Vitamin A deficiency.

The following picture shows a child suffering from kwashiorkor showing oedema of legs, hands and crazy pavement dermatosis

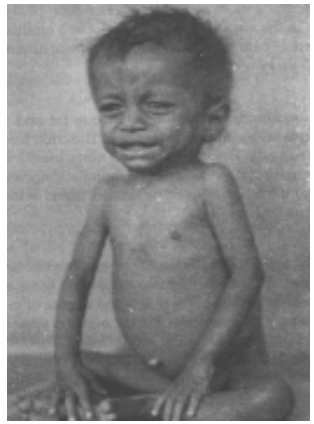


Fig. 1 : Kwashiorkar Child

ii. Marasmus

The ***signs*** and ***symptoms*** of marasmus are:

- severe growth retardation
- loss of subcutaneous fat
- severe muscle wasting
- The child looks appallingly thin with shrivelled body, wrinkled skin and bony prominence. A child suffering from marasmus is shown in the picture.

Fig. 2 : Marasmic Child

iii. Marasmic Kwashiorkar

The child shows a mixture of some of the features of marasmus and kwashiorkar.

iv. Nutritional Dwarfing or Stunting

Some children adapt to prolonged insufficiency of food-energy and protein by a marked retardation of growth. Weight and height are both reduced and in the same proportion, so they appear superficially normal.

v. Under Weight Child

Children with sub-clinical PEM can be detected by their weight for age or weight for height, which are significantly below normal. They may have reduced plasma albumin. They are at risk for respiratory and gastric infections.

Treatment

Treatment strategy can be divided into three stages.

- Resolving life threatening conditions
- Restoring nutritional status
- Ensuring nutritional rehabilitation.

There are three stages of treatment.

1. Hospital Treatment

The following conditions should be corrected. Hypothermia, hypoglycemia, infection, dehydration, electrolyte imbalance, anaemia and other vitamin and mineral deficiencies.

2. Dietary Management

The diet should be from locally available staple foods - inexpensive, easily digestible, evenly distributed throughout the day and increased number of feedings to increase the quantity of food.

3. Rehabilitation

The concept of nutritional rehabilitation is based on practical nutritional training for mothers in which they learn by feeding their children back to health under supervision and using local foods.

Prevention

- Promotion of breast feeding
- Development of low cost weaning
- Nutrition education and promotion of correct feeding practices
- Family planning and spacing of births
- Immunisation
- Food fortification
- Early diagnosis and treatment

3.1.2. Deficiency of Vitamins

1. Vitamin A: (Retinol)

The important deficiency states due to lack of vitamin A in the diet are:

i. **Night Blindness:** In the early stages of vitamin A deficiency, the individual cannot see well in dim light. In advanced deficiency, the subject cannot see objects in dim light.

ii. **Xerosis Conjunctiva:** The conjunctiva is dry, thickened, wrinkled and pigmented. The pigmentation gives conjunctiva a smoky appearance.

iii. **Xerosis Cornea:** When dryness spreads to cornea, it takes on a hazy, lusterless appearance.

iv. Bitot's Spots:

Greyish glistening white plaques, formed of desquamated thickened conjuctival epithelium, usually triangular in shape and firmly adhering to the conjuctiva.

Fig. 3 : Bitot's Spots

v. Keratomalacia

When xerosis of the conjuctiva and cornea is not treated, it may develop into a condition known as **keratomalacia**.

Fig. 4 : Keratomalacia

Fig. 5 : Blindness due to Keratomalacia

vi. Follicullar Hyperkeratosis: The skin becomes rough and dry.

Under the national prophylaxis programme against nutritional blindness 2,00,000 IU of vitamin A in oil is administered every six months to preschool children to eliminate vitamin A deficiency.

2. Vitamin D (7 - dehydro cholestrol)

Fig. 6 : Rickets

i. Rickets

The chief signs in fully developed active rickets are found in the chest wall (beading), waists and ankles (thickening) and various deformities (knock - knees and bow legs). The child is restless, fretful and pale with flabby and toneless muscles, which allow the limbs to assume unnatural postures. Development is delayed so that

the teeth often erupt late and there is failure to sit up, stand, crawl and walk at the normal ages. There is usually a protuberant abdomen so called potbelly.

ii. Osteomalacia

It may be called as **adult rickets**. It occurs generally in pregnant women. The changes in bone are similar to rickets. Skeletal pain is usually present and persistent and ranges from a dull ache to severe pain. Muscular weakness is often present and the patient may find difficulty in climbing stairs or getting out of a chair.

3. Vitamin E (Tocopherol)

Vitamin E deficiency in animals causes several disorders such as reproduction failure, liver necrosis, etc,

4. Vitamin K

Vitamin K deficiency leads to haemorrhagic conditions.

5. Vitamin C (Ascorbic Acid)

Severe Vitamin C deficiency results in the development of the disease **scurvy**. The disease is characterized by

a) General weakness followed by shortness of breath, pain in bones, joints and muscles of the extremities.

b) Swollen and tender joints, haemorrhages in various tissues and pain in joints.

c) Bleeding gums and loose teeth.

In infantile scurvy, the infant screams if picked up or moved or handled. There is pain and tenderness of the limbs.

6. Vitamin B_1 (Thiamine)

Thiamine deficiency causes the disease, beriberi, in human beings. Two forms of beriberi namely ***wet beriberi*** and ***dry beriberi*** occurs in adults. The first symptoms are anorexia (loss of appetite)

with heaviness and weakness of the legs. There is pain and numbness in the legs. The subjects feel weak and get easily exhausted. Oedema is the important feature of wet beriberi. The calf muscles are swollen. The pulse is fast and bouncing. The heart becomes weak and death occurs due to heart failure. In infantile beriberi, the first symptoms are restlessness, sleeplessness and cardiac failure.

7. Vitamin B_2 or Riboflavin

Riboflavin deficiency is characterized by

Fig. 7 : Angular Stomatitis

a) Angular stomatitis:

The lesions at the angles of the mouth are termed as **angular stomatitis**.

b) Glossitis

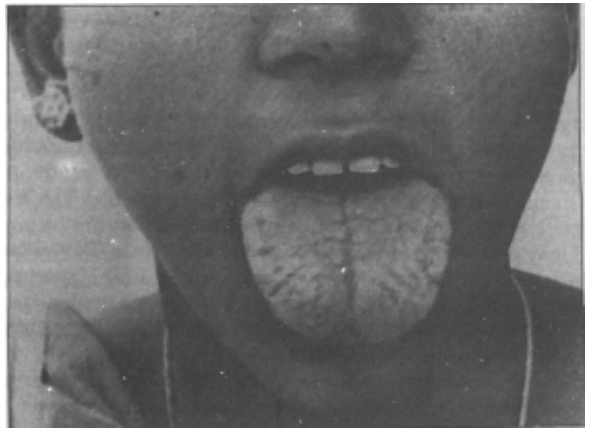


Fig. 8 : Glossitis

The tongue in general is acutely inflamed called as **glossitis.**

c) Skin lesions occur on the nasolabial folds and on the ears as shown in the picture below.

Fig. 9 : Seborrheic Dermatitis

d) Cheilosis which is the dry chapped appearance of the lips.

e) Behavioural abnormalities occur in riboflavin deficient children.

8. Vitamin B_3 (Niacin)

Niacin deficiency causes the disease ***pellagra*** in humans. Pellagra is also called ***Disease of 3D's.*** Because the disease has the symptoms of diarrhoea, dermatitis and depression. The disease is characterized by the following.

a) **Glossitis and diarrhoea -** These are the two outstanding symptoms. Nausea and vomiting are seen in most cases.

b) The ***dermatitis*** is the most characteristic symptom of the disease. The commonest sites are the back of the fingers and hands, the forearms, and the neck. The following pictures show dermatitis on hands and neck.

Fig. 10 : Dermal lesions of Pellagra

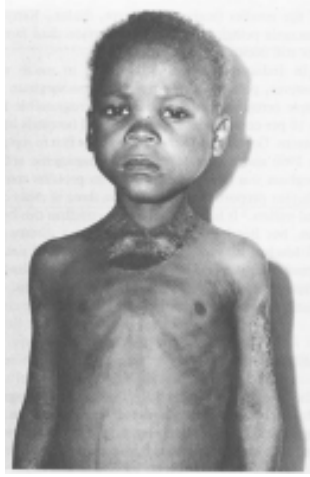


Fig. 11 : Pellagara in Child showing Dermal lesions of Neck and Arms

c) **Milder mental disturbances** consisting of irritability, depression, inability to concentrate and poor memory are common in niacin deficiency.

9. Vitamin B_6 or Pyridoxine

Pyridoxine deficiency results in the following

a) Hypochromic microcytic anaemia.

b) Sleep disturbances, irritability and depression

c) Angular stomatitis, glossitis and cheilosis in pregnant and lactating mothers.

10. Pantothenic Acid

The visible signs of deficiency include nausea, vomiting, tremor of the outstretched hands, irritability and burning feet syndrome.

11. Folic Acid

Folic acid deficiency causes ***megaloblastic anaemia*** mainly in pregnant women of low income groups.

12. Vitamin B_{12}

Vitamin B_{12} deficiency causes ***perinicious anemia*** in humans. Soreness and inflammation of the tongue are commonly observed. Parasthesia (numbness and tingling) occurs in fingers and toes. Persons living exclusively on vegetarian diets develop vitamin B_{12} deficiency.

3.1.3. Deficiency of Minerals

1. Calcium

Calcium deficiency may lead to ***osteoporosis,*** which is a condition associated with a loss in bone density and bone mass and is primarily found in middle age and elderly women. Its major symptoms are increased vulnerability to bone fractures. Episodes of severe bone pain are usually due to fractures of the brittle bones and may occur after minimal trauma.

2. Magnesium

The principal clinical features are depression, muscular weakness, vertigo and liability to convulsions.

3. Iron

Iron deficiency anemia is widely prevalent among children, adolescent girls, and expectant and nursing mothers in all developing countries. The clinical features are the results of diminished oxygen carrying power of the blood due to low haemoglobin content. The symptoms are as follows - the skin may appear pale, fingernails can become thin and flat and spoon shaped nails called ***koilonychia*** may develop which is shown in the following picture.

Fig. 12 : Koilonychia

Other symptoms include fatigue, breathlessness on exertion, dizziness, headache, dimness of vision, sleeplessness, parasthesia, (tingling sensation in arms and legs) and chest pain. In severe cases there may be some oedema of the ankles. There is tendency for children below 3 years with iron deficiency anemia to eat mud (Pica).

Recent World Health organization (WHO) statistics indicate a worldwide anemia prevalence of about 30% with higher rates in developing countries. In India, its incidence varies from 20-70% more among females than male affecting people from all walks of life. According to National Institute of Nutrition (NIN), anemia is most common in all the groups of adolescent girls to the tune of 20-25% irrespective of the social class.

As part of the National Nutritional anemia prophylaxis programme, iron and folate tablets are distributed to pregnant women and pre school children.

4. Iodine

If sufficient iodine is not taken in the diet, enlargement of the thyroid takes place, resulting in the disease called ***goitre***, which *is* shown in the following picture.

Fig. 13 : Goitre

In children severe iodine deficiency may result in serious retardation of growth called ***cretinism***. Iodine deficiency can be treated with administration of iodised salt in the diet. In India, the endemic belt of goiter and cretinism mainly lies along the slopes, foothills, and plains adjascent to Himalayas. Several pockets of endemic goitre are being identified in the Aravalli hills in Rajasthan, Subvindhya hills of Madhya Pradesh, Narmada valley in Gujarat, hilly areas of Orissa, Andhra Pradesh and tea estates of Karnataka and Kerala.

5. Zinc

One form of severe zinc deficiency is ***Acrodermatitis Enteropathica*** in which severe dermatitis usually appear in the first few months of an infants life.

Hypoguesia (impaired taste) and Hyposmia (impaired smell) appear in moderate zinc deficiency, which can be cured with zinc supplementation.

3.2 THERAPEUTIC DIETS

Therapeutic nutrition is concerned with the nutritional requirements of patients suffering from different diseases and prescribing the right type of diets for them. The objectives of diet therapy are as follows:

i. The correction of the existing dietary deficiencies and to maintain the patient in good nutritional state.

ii. Formulation of the diet to meet the needs of the patient taking into consideration his food habits.

iii. Education of the patient regarding the need for adherence to the prescribed diet.

Diet therapy in most instances is not a remedy in itself but is a measure which supplements or makes the medical or surgical treatment more effective.

3.2.1. Factors to be Considered in Planning Therapeutic Diets

i. The underlying disease conditions which require a change in the diet.

ii. The possible duration of the disease.

iii. The factors in the diet which must be altered to overcome these conditions.

iv. The patient's tolerance for food by mouth.

The normal diet may be modified to

i. Provide change in consistency as in fluid and soft diets.

ii. Increase or decrease the energy value.

iii. Include greater or lesser amounts of one or more nutrients, for example, high protein, low sodium, etc.

iv. Provide foods bland in flavour.

3.2.2. Modification of Diets in Different Nutrients

Modifications in diets in diseases may involve changes in different constituents such as

i. Bland diets, omitting spices and condiments.

ii. Low fibre or high fibre diets.

iii. High protein or low protein diets.

iv. High fat or low fat diets.

v. High carbohydrate or low carbohydrate diets.

vi. High calorie or low calorie diets.

vii. Low sodium diets.

The types of changes required in the diets in different diseases are:

1. Modification in Carbohydrate Content

High Carbohydrate diet may be indicated in liver diseases and in pre-operative conditions. Restricted Carbohydrate diet is essential in the treatment of diabetes mellitus.

2. Modification in Calorie Content

Diets with increased calorie content are required in fever, infections and hyperthyroidism. Low calorie diets are used for the treatment of obesity and heart diseases.

3. Modification in Protein Content

High protein diets are prescribed in protein - calorie malnutrition, and cirrhosis of the liver. Low protein diet may be necessary in nephritis and hepatic coma.

4. Modification in Fat Content

Moderately high fat diet is used in the treatment of severe under-nutrition. Low fat diet is essential in heart diseases, obesity and diseases of the liver.

5. Modification in Mineral Content

High calcium diet is essential in the treatment of rickets and osteomalacia, while a diet restricted in calcium is desirable in kidney stones. Sodium restricted diets are essential in the treatment of hypertension, cardiac failure and kidney diseases.

6. Modification in Fibre Content

Diets rich in fibre are prescribed for the treatment of constipation, while low fibre diets are essential in the treatment of diarrhoea, peptic ulcer and dysentery.

3.2.3. Routine Hospital Diets

1. Clear Fluid Diet

This diet is made up of clear fluids that leave no residue, and it is non gas forming, non irritating and non stimulating to peristaltic action. This diet can meet the requirement of fluids and some minerals and can be given in 1 to 2 hour intervals. The foods which can be included are barley water, dhal water, tea and coffee without milk, etc.

2. Full Fluid Diet

This diet bridges the gap between the clear fluid and soft diet In this diet, foods which are liquid or which readily become liquid on reaching the stomach are given. It is used following operations, in acute gastritis, acute infections and in diarrhoea. This diet is given at 2 - 4 hours interval. The foods included are kanji, milk shakes, lassi, custards, etc.

3. Soft Diet

It may be used in acute infections, following surgery, and for patients who are unable to chew. The soft diet is made up of simple, easily digested food and contains no harsh fibre and no rich highly seasoned food. In this diet, three meals with intermediate feedings should be given,

3.2.4. Special Feeding Methods

1. Tube Feeding

This is done by passing a tube into the stomach or duodenum through the nose which is called nasogastric feeding or directly by surgical operation known as gastrostomy and jejunostomy feeding. The type of foods supplied through the tube may be

- natural liquid foods
- solid foods blenderised to make liquid food
- commercially supplied polymeric mixtures or elemental diet like Complan, Horlicks, etc.,

The advantages of tube feeding are

- Adequate nutrition could easily be given by this method.
- Foods and drugs which may not be liked by the patients can be administered.

2. Parenteral Feeding

Here the nutrient preparations are given directly into a vein. This method may be used to supplement normal feeding by mouth but can provide all the nutrients necessary to meet a patient's requirements. Then it is known as ***total parenteral nutrition*** or TPN. The nutrients given in TPN are glucose, emulsified fat, crystalline aminoacids, Vitamins including B_{12}, folic acid and vitamin K, electrolytes like sodium, potassium, calcium and magnesium, trace elements like Zinc, Copper, Iodine and Water.

3.2.5. Diet in Different Diseases

1. Fevers

Fever is an elevation in body temperature above the normal. Fever are of three types:

i. Short duration fever (eg) typhoid, influenza,

ii. Chronic fever (eg) tuberculosis

iii. Intermittent fever (eg) malaria.

General Dietary Considerations

Energy: A high calorie diet is prescribed because there is increase in the metabolic rate. Around 2500 - 3000 calories is prescribed.

Protein: About 80 – 100g of protein is prescribed. High protein beverages may be used as supplements to the regular meals.

Fats: Fried foods and highly concentrated foods are avoided because it cannot be digested easily.

Vitamins: Fevers apparently increase the requirement for Vitamin A, B Complex vitamins and Vitamin C.

Fluid: The fluid intake must be liberal to compensate for the losses from the sweat. 2500 - 5000ml is necessary, including soups, fruit juices and water.

Bland, readily digested food and soft foods should be given to facilitate digestion and rapid absorption. Small quantities of food at regular intervals of 2 - 3 hours will permit adequate nutrition without overtaxing the digestive system at any time.

Foods to be Included: Fruit juices with glucose, coconut water, barley water, custards and cereal gruels.

Foods to be Avoided: Oily foods, ghee, spices, fried foods and rich pastries.

2. Peptic Ulcer

The term peptic ulcer is used to describe any localized erosion of the mucosal lining of those portions of the alimentary tract that come in contact with gastric juice. The symptoms of peptic ulcer are epigastric pain, discomfort and gas formation in the upper part of abdomen, weight loss and iron deficiency anaemia.

Dietary Guidelines

1. Bland diet, which consists of mechanically, chemically and thermally non-irritating foods should be given.
2. Moderate use of seasonings is permitted.
3. Regularity of meal times is essential. Small frequent meals are given.
4. In between meals, protein rich snacks should be taken.
5. Meals should be eaten in a relaxed atmosphere and the person should forget personal or family problems while eating.
6. Foods should be eaten slowly and chewed well.
7. Milk and cream can be included because it helps in healing of the ulcer.
8. High protein foods should be included because it helps in healing of the ulcer.

Foods to be Included: Milk, cream, butter, custards and well cooked cereals.

Foods to be Avoided: Strong tea, coffee, alcohols, pickles, spices and condiments and fried foods.

3. Diarrhoea

Diarrhoea is the passage of stools with increased frequency, fluidity or volume compared to the usual for a given individual. Nutritional care includes the replacement of lost fluids and electrolytes by increasing the oral intake of fluids, particularly those high in sodium and potassium such as soups and juices.

Oral Rehydration Solution (ORS) is given which is made by mixing one glass of boiled cooled water with one pinch of salt and one teaspoon of sugar. When the diarrhoea stops, starchy foods like rice, potato and plain cereals can be given followed by protein foods. Fat need not be limited if the individual is otherwise healthy.

4. Liver Diseases

Liver is a vital organ, which secretes bile and takes part in the metabolism of carbohydrates, fats and proteins and in many other vital metabolic processes. The diseases of the liver include:

i. Infective Hepatitis

This is otherwise called as viral hepatitis. The symptoms include anorexia, fever, headache, rapid weight loss, abdominal discomfort and jaundice, (ie) yellow discolouration of the skin and body tissues.

ii. Cirrhosis of Liver

Cirrhosis is a condition in which there is destruction of the liver cell due to viral infection, alcohol and toxins. The symptoms include anorexia, nausea, vomiting, pain, muscle cramps, weight loss, fever, jaundice and ascites. i.e. accumulation of fluid in the abdomen.

iii. Hepatic Coma

This results from entrance of certain nitrogen containing substances such as ammonia into the cerebral circulation without being metabolized by the liver. The precipitating factors are gastro intestinal bleeding, severe infections, surgical procedures and excessive dietary protein. The symptoms include confusion, restlessness, irritability, inappropriate behaviour and drowsiness. Treatment consists of dietary protein restriction and increased calorie intake.

Dietary management of hepatitis and cirrhosis

Energy: A high calorie diet is prescribed. The calorie requirement is between 2000 - 2500 calories.

Proteins: Protein requirement varies according to the severity of the disesase. In severe jaundice 40g is given while in mild jaundice 60 - 80g of protein is permitted.

Fats: About 20g of fat is given. Coconut oil, which contains medium chain fatty acids are given because it does not require bile acids for digestion.

Carbohydrates: High Carbohydrate content in the diet is essential to supply enough calories so that tissue proteins are not broken down for energy purposes.

Vitamins: They are essential to regenerate liver cells. Vitamin supplementation is essential for patients with liver diseases.

Foods Included: Cereal porridge, bread, rice, skimmed milk, fruit juices, biscuits and non stimulant beverages.

Foods Avided: Pulses, bakery products, concentrated sweets, fried foods, whole milk and cream.

5. Heart Diseases

Heart disease affects people of all ages, but is most often caused by atherosclerosis. The term ***atherosclerosis*** is used to describe a condition in which lipids are deposited in the intima of blood vessels. The important contributory causes for the development of atherosclerosis are

- High calorie intake
- High saturated fat and cholesterol intake.
- Increased level of cholesterol in blood.
- Sedentary life.
- Stress and strain.

Dietary Management

The objective are maximum rest for the heart and maintenance of good nutrition.

Principles of Diet

Energy : The calorie intake should be just adequate to meet the requirements. For obese patients, it may be necessary to reduce calorie intake.

Fats :

Fats should be restricted to not more than 20% of the total calories consumed. The diet should consists of polyunsaturated fatty acids, (eg) sunflower oil.

The diet should contain adequate amount of proteins and vitamins. Fishes are a good source of n-3 fatty acids. Consumption of 100 - 200g of fish 2-3 times a week helps to prevent heart disease. Three or four smaller meals are suggested instead of two big meals.

Regular exercise and relaxed mental attitude help to reduce blood pressure. Smoking and drinking of alcohol should be stopped.

6. Hypertension

World Health organisation (WHO) defines hypertension as a condition in which systolic pressure exceeds 160 mm Hg and diastolic pressure exceeds 95 mm Hg. Cardio vascular diseases, renal diseases, tumours of the brain or adrenal glands, hyperthyroidism or diseases of the ovaries or pituitary may cause hypertension.

Predisposing factors of hypertension are heredity, stress, obesity and smoking.

Headache, dizziness, impaired vision, failing memory, shortness of breath, pain over the heart, gastrointestinal disturbance and unexplained tiredness are some of the symptoms.

Dietary Management

Energy : About 20 kcal/kg of ideal body weight are prescribed.

Protein : A diet of 60 g protein is necessary to maintain proper nutrition.

Fats : As they are prone to atherosclerosis it is advisable to avoid a high intake of animal or hydrogenated fat. About 20 g of fat is permitted.

Sodium : A low sodium diet should be given in severe hypertension, salt in cooking and salt on the table should be avoided. The other foods rich in sodium to be avoided are pickles, papad, chips, cheese, salted butter, canned foods, sauce, ketchup, baked foods where baking powder is used and foods where sodium salts are used as a preservative.

Fibre : A high fibre diet should be given.

Foods Included : Salads, Steamed foods, low sodium foods.

7. Kidney Diseases

i. Nephritis

This condition affects mostly children and young adults. Streptococcal infections causes inflammation of the glomeruli. The symptoms are haematuria (blood in the urine), proteinuria (protein in the urine), oedema, shortness of breath, anorexia, tachycardia (increased heart beat), decreased urine output and elevated blood pressure. The dietary management include:

- High calories - 2000K calories
- Low protein because the kidney cannot excrete the waste products of protein metabolism like urea and uric acid
- Restricted fluid
- Restricted sodium
- Restricted potassium

Foods Included: Rice, sago, ash-gourd and sugar.

Foods Avoided: Salt, pickles, nuts, jaggery, pulses and meat.

ii. Nephrosis

This can be caused due to progressive nephritis, diabetes mellitus and toxins. The symptoms include proteinuria (protein in the urine), hypoalbuminaemia (low serum albumin levels), oedema and increased serumcholesterol. High carbohydrate, restricted protein, moderate fat, restricted fluid and restricted sodium diet is recommended for a nephrotic patient. Vitamin supplements especially vitamin C should be given.

iii. Kidney Stones (Urolithiasis)

Urinary calculi or kidney stones are usually found to be lodged in the urinary tract, namely kidney, ureters, bladder or urethra. The

causative factors are warm climate, occupation, urinary tract infection, heredity and hyperthyroidism. The majority of stones are made up of calcium phosphate, calcium oxalate, uric acid or magnesium ammonium phosphate. The diet should provide adequate fluids and restrict foods rich in calcium, oxalate and uric acid.

8. Diabetes Mellitus

Diabetes mellitus is a chronic metabolic disorder that prevents the body to utilize glucose completely or partially due to the deficiency in the secretion of insulin. The predisposing factor of diabetes mellitus are mainly heredity and stress. The symptoms of diabetes mellitus are

- Increased thirst (polydypsia)
- Increased urination (polyuria)
- Increased hunger (polyphagia)
- Weight loss
- Glycosuria (sugar in the urine)
- Hyper glycemia (increased blood sugar level)
- Skin irritation or infection
- Weakness, loss of strength.
- Delayed wound healing.
- Fluid and electrolyte imbalance.

A blood sugar level between 80-120 mg per 100 ml is considered to be normal.

Dietary Management

- Simple Carbohydrates like sugar and honey are avoided.
- The diet should provide high fibre. Salads should be included in every meal.
- Whole grams and sprouted grams should be included in the diet
- Wheat is preferred to rice because it is high in fibre and reduces the rate at which glucose is absorbed in the blood.
- Poly unsaturated fatty acids are included in the diet.
- High protein intake helps to increase insulin production and promote satiety.
- Three main meals and three in between meal snacks are taken.
- Patient should avoid fasting and feasting.
- Vitamins and minerals are supplemented to meet daily requirements.
- Low fat diet is preferred to prevent atherosclerosis.

Foods to be Avoided: Simple sugars, honey, sweets, dried fruits, cake, fried foods, alcohol, nuts and sweetened juices.

Foods to be Restricted: Fats, cereals, meat and egg.

Foods to be Included: Green leafy vegetables, fruits except banana, coffee or tea, skimmed milk, butter milk, salads and lemon.

9. Food Allergy

Food allergy may be defined as normal tissue reactions that may occur in some individuals after consuming a particular food or groups of food. Food allergens consist mostly of proteins like milk

and eggs and also include tomato, brinjal, orange, potato and chocolate. The signs and symptoms of food allergy include:

1. Skin lesions such as rashes and eczema.

2. Nausea, vomiting and diarrohea

3. Headache, cold and asthma.

4. Redness, swelling, burning and itching of the eyes.

5. Irritation of the nasal mucous membrane.

The procedures adopted for the diagnosis are history of the consumption of foods and skin tests. ***Elimination diets*** (i.e) exclusion of certain foods or food groups in the diet for some time are used in the treatment of food allergy. Drugs like antihistamines and corticosteroids are also given to treat allergy.

3.3 HEALTH AND HYGIENE

The preparation and service of food requires handling of materials which are extremely vulnerable to becoming the media of contamination thereby leading to the spread of infection and disease. To assess the hygiene and sanitation requirement of an establishment, the following aspects need to be considered.

3.3.1. Environmental Hygiene and Sanitation

This refers to the total environment in which food is prepared and consumed.

1. Site

The place should be scrutinised for the amount of air pollution or whether it is free from the potential of infestation by insects, rats, flies, etc.. The water lines and sewage disposal lines should not run too close to each other because in the event of a leak, the water supply can get contaminated.

2. Structure

The cleanability of floors, walls, ceilings or any other surfaces is the basis for maintaining a structure free from the hazards of infection. The materials selected therefore should be non absorbent, non - corrosive and easy to keep clean. The kitchen should be subjected to regular pest control treatment.

Facilities for proper sewage disposal and the construction of adequate plumbing for kitchen is of consequence in sanitation. All sewage lines must be directed into the public sewage system. Faulty plumbing can prove a hazard if it leads to frequent blockages of drains that results in backflows.

3. Equipment, Furniture and Fittings

These should be designed so that they do not harbour dust or dirt, which is the source of microorganisms. Any equipment, which are chipped or damaged, should be discarded. In addition, knowledge of the use of proper detergents is essential to avoid leaving chemical residues on surfaces that may contaminate food.

4. Ventilation

Ventilation plays a very important role in clearing the hot air and bringing down temperature as well as the carbon-di-oxide content. All kitchens must be provided with exhaust fans and extraction hoods to provide proper ventilation.

5. Lighting

All areas should be well lighted to make dirt, grease and infestation easily detectable.

6. Water Supply

The water supply should be treated to ensure that it is fit for drinking, cooking of food and washing of utensils.

All natural water supplies contain mineral salts and organic materials in addition to dissolved gases from the air. Microbial activity also influences the colour, odour and taste of the water. Water for food preparation purposes may be considered hygienic when it is sufficiently pure to have only very small quantities of substances dissolved in it which do not prove injurious to health.

Impurities in water may be present as fine suspensions or dissolved form of salts of metals like lead, iron, zinc or others like carbonates, chlorides and sulphates of calcium and magnesium which tend to cause hardness of water. The other impurities may include particles of sand, pathogenic micro organisms, eggs of parasitic worms and excessive amount of chemicals used as preservatives which generally leads to diarrhoea, cholera, typhoid, dysentry, weakness and loss of appetite.

7. Waste Disposal

Kitchen waste which consists of peelings, spillage, empty cans, etc. must never be allowed to remain anywhere near the kitchen because they can attract insects, which can become agents of contamination to wholesome food. Improper disposal can pollute water and through it, contaminate equipment and food.

3.3.2. Hygiene in Food Handling

1. Purchasing Food

Each category of food items bought should be checked for signs of microbial contamination, accidental chemical additives due to pesticide residues or insect infestation. The following table suggests checks to ensure hygiene in foods.

Table 1

FOOD CATEGORY	CHECKS TO ENSURE HYGIENE
Fresh fruits and vegetables	Examine each lot for degree of ripeness. Use all perishables within one or two days. Reject blemished, cut, leaky or discoloured fruits and vegetables as these are likely to harbour microorganisms. Reject items with holes in them as these indicate insect infestation.
Fresh meats	Examine for freshness by colour, firmness of flesh and odour.
Poultry	Fresh birds should have tight flesh, bright colour, good sheen and medium weight.
Fish	Check for freshness by colour, firmness of flesh, brightness of eyes and gills and odour.
Milk and milk products	Check for good seal, signs of curdling, odour, acid, or bitter taste.
Cereals, pulses and legumes	Examine for presence of insects and foreign material like dust, stones, etc.. Reject if lumpy, discoloured, or with odours characteristic of infestation.
Fats and oils	Any signs of leakage or an unusual seal are indications of replacements and resealing may indicate spoilage or rancidity.

2. Storage

Most perishables should be kept at temperatures below 10° C and semi or non perishables between 10° C - 20° C to arrest microbial growth. Pests may find their way into food through defective drains, holes in food packages or bags, or doors and waste material storages outside or within kitchens. Some pests like cockroaches remain in dark, uncleaned corners, crevices of walls, backs of cupboards, under equipment, etc. It is also difficult to locate a cockroach infestation, unless it is very heavy because cockroaches generally do not come out of their hideouts in the daytime. An inspection is therefore necessary at night.

3. Preparation

- Fresh fruits and vegetables especially roots and tubers which grow nearest the soil, need to be washed very thoroughly in plenty of water, to remove adhering soil or other particles.
- High protein foods such as eggs, milk and meats must be kept separately as they are likely to take up micro organisms very fast, being excellent media for their growth.

Foods should be cooked as quickly as possible after preparation, unless frozen for later use. Cooking meats require high internal temperatures to make them safe for consumption.

3.3.3. Personal Hygiene

Personal hygiene refers to the general health and personal grooming of people working in the kitchen.

- Hands should be washed well with soap before starting work or after using toilets during working in the kitchen.
- All cuts must be covered with waterproof dressings.
- Infection is easily transferred from hair, nose and mouth. Therefore.

a. Combs should be kept out of the kitchen.

b. When sneezing while handling food, the face should be turned away from food and a handkerchief should be used.

- Leaning or sitting on the work table is an objectionable habit.
- All peels, etc should be thrown into a container and not kept lying around on the work table near the prepared food. The containers should be emptied into covered bins as soon as the work is done.
- Food should be kept covered and maintained either ice cold or piping hot.
- Food must be handled correctly and as little as possible.

3.4 FOOD BORNE INFECTIONS AND FOOD POISONING

Raw foods such as meat, fish, milk and vegetables grown on sewage purchased from the market are likely to be contaminated with harmful microorganisms. These are generally destroyed during cooking or processing of the food. Some of the microorganisms may survive due to inadequate heat processing. Further, some of the foods if consumed in the raw state can cause food poisoning Recent studies have shown that food grains when stored in humid atmosphere are infected by pathogenic fungus which can cause serious illness.

3.4.1. Bacterial Infections

Some of the important diseases caused by pathogenic bacteria contaminating foods are discussed below:

1. Typhoid and Paratyphoid

Shell fish and vegetables grown on sewage are common carriers of typhoid and paratyphoid. Foods kept exposed for sale are liable to be infected by typhoid and paratyphoid bacteria as flies can transmit these bacteria from infected material to exposed foods. The symptoms include vomiting, diarrhoea and fever.

2. Botulism

Botulism is usually caused by consuming canned foods contaminated by botulinum spores. The causative organism is ***clostridium botulinum*** and it produces an endotoxin, which is highly toxic. The exotoxin can be inactivated by heat The incubation period is 8-36 hours. The onset of the disease is sudden. The signs and symptoms include disturbed vision, dizziness, and sometimes headache, abdominal pain and physical exhaustion. The toxin affects the central nervous system causing paralysis affecting speech and swallowing. Death from respiratory or cardiac failure occurs after a few days.

3. Clostridium Perfringens Food Poisoning

This is mostly associated with consumption of defectively processed pre cooked meat product. The causative organism is ***clostridium perfringens*** and the symptoms are abdominal pain and diarrhoea. The incubation period is 8 – 12 hours.

4. Salmonella Food Poisoning

The causative organism is ***Salmonella typhosa***. Defectively processed meat, fish and egg and raw vegetables grown on sewage are mainly involved in transmitting the infection. The symptoms are vomiting, diarrhoea and fever. The incubation period is 12 – 48 hours and the duration is for 1 – 7 days.

5. Staphylococcal Food Poisoning

The causative organism is ***staphylococcus aureus***. This organism produces an exotoxin and the poisoning is due to the presence of exotoxin in the contaminated food. The toxin is heat stable. Pre cooked animal foods are most commonly involved in this type of poisoning. The symptoms are vomiting, diarrhoea and abdominal pain. The incubation period is 2 – 6 hours.

6. Streptococci

Streptococci are the causative agents for sore throat and scarlet fever.

7. Shigella

This group causes bacillary dysentry. The symptoms are loose motions with mucous and blood and abdominal pain. It is caused mainly from consuming raw milk to which unclean water has been added and cooked food kept exposed. Flies are the common carriers of this disease, transferring the bacteria from infected material to food.

3.4.2. Viral Infections

This is caused through water polluted with sewage. The viruses however only multiply in living cells and not in food. The various diseases spread include hepatitis, cholera and poliomyelitis.

3.4.3. Fungal Contamination of Foods

1. Fusarium and Cladosporium

This is caused due to the consumption of cereals and millets infected with fusarium and cladosporium.

2. Aspergillus Flavus

This fungus can grow in moist groundnuts, soyabean, cottonseed, legumes and cereals. It produces toxins called as aflatoxins. These can cause liver damage and cancer.

3.4.4. Parasitic Infestation

The mode of transmission and the effects of some worm infestation is given in the following table.

Table - 2

WORMS	MODE OF TRANSMISSION	EFFECTS
1. Taeria saginata	Infested pork	Forms cysts in the brain
2. Taeria saginata	Through meat infested with tapeworm	Loss of appetite, palor
3. Diphyllobothrun latum	Through sea fish	Results in Vit. B12 deficiency.
4. Ascaris lumbricoides (round worm)	Through people, food and water	Abdominal pain, palor, cramps.
5. Trichinella Spiralis	Fine worm transmitted through infested pork, meat and its products	Nervous system get affected, sweating, acute pains, loss of appetite, severe Conjuctivitis
6. Threadworms	Through food infected with human feces. Generally infects the lower bowel.	Anal irritation
7. Entamoeba Histolytica	Raw vegetables grown on sewage farms	Amoebic dysentry, epigastric pain, loss of blood in anaemia.

3.4.5. Toxicants Naturally Occuring in Some Foods

Some foods contains toxic substances which may cause serious illness when consumed in large amounts. An important example is the legume - ***Lathyrus sativus,*** which contains a toxin. When consumed in large amounts, the subjects develop a crippling disease

known as ***lathyrism.*** Some varieties of mushrooms contain toxic substances which when consumed produce serious ill effects.

3.4.6. Insect and Rodent Contamination of Stored Foods

1. Insect Infestation

Insect infestation of food grains causes heavy losses and damage to the quality of grains in storage. Taste, flavour, hygienic quality and acceptability of the food grains are affected due to the presence of insect excreta, insect fragments and dead insects. The content of B-Vitamins and the nutritive value of the proteins are also lowered.

2. Rodents

Damages caused by rodents to stored foods are as follows:

i. They consume large quantities of food grains.

ii. The hygienic quality of the grain is affected by the excreta of the rodents and also by some disease producing microorganisms present in the food grains. They cause diseases like leptospirosis and plague.

3.5. FOOD FORTIFICATION AND FOOD ENRICHMENT

Objectives of Fortification and Enrichment of Foods

1. Restoration to Natural Levels

Rather significant amounts of nutrients are either destroyed or extracted when foods and food products are stored, milled, dried or otherwise processed. Some manufacturers attempt to undo the processing damage by restoring these nutrients which have been most affected.

2. Fortification Above Natural Levels

Infant foods and products designed for weight control are generally fortified with nutrients above natural levels.

3. Enrichment with Public Health Objectives

Usually bread is fortified with thiamine, riboflavin, niacin and iron to raise the levels of these nutrients sufficiently to protect against deficiencies.

4. Fortification to make a food self sufficient

Sweets and confectioneries contain negligible amounts of vitamins. Such foods should be fortified with thiamine and niacin to make the food self sufficient in the above nutrients.

The following table shows the foods and the nutrients with which it is fortified.

Table - 3

FOODS	NUTRIENTS
Flour	Thiamine, riboflavin, niacin, calcium and iron salts.
Bread	Thiamine, niacin and iron.
Breakfast cereals - corn flakes	Thiamine, riboflavin, niacin and iron.
Milk (Aavin)	Vitamin A
Infant milk foods	Vitamins A and D, ascorbic acid, Vitamin B6 and iron
Vanaspathi	Vitamins A and D.
Fruit and sugar products	Thiamin, riboflavin, calcium, niacin.
Salt	Iodine and Iron.

The iodisation of common salt should be considered as a special preventive measure of proved value in the campaign against endemic goitre. The stipulated level of iodine compound in salt is 1 in 100,000I.U KIO_3.

3.6 FOOD ADULTERATION AND FOOD LAWS

Adulteration is defined as the process by which the quality or the nature of the given substance is altered. Adulteration of food may endanger health if the physiological functions of the consumer are affected due to either addition of a deleterious substance or the removal of a vital component. Adulteration means not only intentional addition of substances which adversely affect the nature of substances and quality of foods, but also their incidental contamination during growth, harvesting, storage, processing, transportation and distribution.

3.6.1. Types of Adulterants

Adulterants may be intentional or unintentional or incidental. The former is a willful act on the part of the adulterator intended to increase the margin of profit. Incidental contamination is usually due to ignorance, negligence or lack of proper facilities.

Intentional Adulterants:

Intentional adulterants are sand, marble chips, stones, mud, chalk powder, water, mineral oil and coaltar dyes. These adulterants cause harmful effects in the body.

The following table gives methods of identification of adulterants in different foods.

Table - 4

Name of the food item	Adulterant	Simple method for detection of adulterant
Butter	Vanaspathi	Take about one teaspoonful of melted ghee or butter with equal quantity of concentrated hydrochloric acid in a test tube and add to it a pinch of cane sugar. Shake well for one minute and test it after 5 minutes.

		Appearance of crimson colour in lower (acidic) layer shows the presence of 'vanaspathi'. This test is specific for seasame oil which is compulsorily added to vanaspathi. Some of coaltar dyes also give a positive test.
Milk	Water	Mashed potato, sweet potato and other starches. Add a drop of tincture of iodine. Iodine which is brownish in colour turns to blue if starches are present.
		a. The lactometer reading should not ordinarily be less than 1.026.
		b. The presence of water can be detected by putting a drop of milk on a polished vertical surface. The drop of pure milk either stops or flows slowly leaving a white trail behind it; whereas milk adulterated with water will flow immediately without leaving a mark.
	Starch	c. Add tincture of iodine, Indication of blue colour shows the presence of starch. * This test is not valid if skimmed and thickening material is added.
Khoa	Starch	Add tincture of iodine. Indication of blue colour shows the presence of starch.

Edible oils	Argemone oil	Add concentrated nitric acid to a sample and shake carefully. Red to reddish brown colour in acid layer indicates the presence of argemone oil.
	Mineral oil	Take two ml of edible oil and add an equal quantity of equal quantity of N/2 alcoholic potash. Heat in boiling water bath for 15 minutes and add 10 ml of water. Any turbidity shows the presence of mineral oil.
	Castor oil	Dissolve some oil in petroleum ether in a test tube and cool in ice salt mixture. Presence of turbidity within 5 minutes indicates the presence of oil. * This test is not for minute traces.
Sweet meat, Ice cream, sherbet	Metanil yellow (a non permitted coal tar dye)	Extract colour with luke warm water from food article. Add few drops of cone hydrochloric acid. If magenta red colour develops, the presence of metanil yellow is indicated .
	Kesari dhal	Add 50ml of dilute hydrochloric acid to dhal and keep on simmering water for about 1 5 minutes. The pink colour if developed indicates the presence of kesari dhal.
	Clay, stones, gravels, lead chromate	Visual examination will detect these adulterants. Shake five grams of dhal with five ml of

		water and add a few drops (yellow) of hydrochloric acid. A pink colour shows the presence of colour.
Hing	Soap stone (pumice stone) or other earthy matter	Shake with water, soap stone or other earthy matter will settle to the bottom.
	Starch	Same tests as in the case of milk.
Tea leaves	Exhausted tea or black or Bengal gram dal husk with colour.	a. Tea leaves sprinkled on wet filter paper would immediately release added colour. b. Spread a little slaked lime on white porcelain tile or glass plate. Sprinkle a little tea dust on the lime. Red, orange or other shades of colour spreading on the lime will show the presence of coal tar dye. In the case of genuine tea, there will be only a slight greenish yellow colour due to chlorophyll which appears after sometime.
Saffron	Dyed tendrils of maize cob.	Genuine saffron will not break easily like artificial one. The colour dissolves in water if artificially coloured. Pure saffron when allowed to dissolve in water will continue to give its saffron colour so long as it lasts.

Wheat, bajra and other food grains	Ergot (a fungus containing a poisonous substance)	a. Purple black longer size grains in bajra show the presence of ergots.
		b. Put some grains in a glass contaning 20% salt solution. Ergot floats over the surface while sound grains settle down
	Dhatura - seeds	Dhatura seeds resemble chilli seeds with blackish brown colour which can be separated out by close examination.
Sugar	Chalk powder	Dissolve in a glass of water, chalk will settle down at the bottom.
Black pepper	Dried seeds of papaya fruit	Papaya seeds are shrunken, oval in shape and greenish brown or brownish black in colour and has repulsive flavour quite distinct from the bite of black pepper.
	Light Berries	Light Berries float on spirit.
Silver Leaves	Aluminium leaves.	On ignition genuine silver leaves burn away completely, leaving glistening white spherical ball whereas aluminium leaves are reduced to ashes of dark grey blackish colour. The silver foil is very thin and if crushed between two fingers, crumbles to powder. Aluminium foil is comparatively thicker and only breaks to small shreds when done similarly.

Turmeric	Metanil yellow	Take a teaspoon full of turmeric powder in a test tube. Add a few drops of conc. Hydrochloric acid. Instant appearance of violet colour which disappears on dilution with water. If the colour persists presence of metanil yellow is indicated.
Chilli powder	Brick powder soap stone	Any grittiness that may be felt on tapping the sediment at the bottom of glass confirms the presence of brick powder or sand. Smooth white residue at the bottom indicates the presence of soapstone.
	Artificial colour	Water soluble artificial dye can be detected by sprinkling a small quantity of chilli or turmeric powder on the surface of water contained in a glass tumbler. The soluble dye will immediately start discending in colour streaks.
Jaggery powder sugar	Chalk powder	Add a few drops of hydrochloric acid. Effervescence indicates adulteration. Stir a spoonful sample of sugar in a glass of water. The chalk settle down.
Cloves	Volatile oil extracted cloves	Exhausted cloves can be identified by its small size and shrunken appearance. The characteristics pungent taste of genuine cloves is less pronounced in exhausted cloves

Rava	Iron fillings	By moving a magnet through it iron fillings can be separated
Rice	Marble or other stones	A simple test is to place a small quantity of rice on the palm of the hand and gradually immerse the same in water. The stone chips will sink.
Wheat flour	Maida	When dough is prepared from resultant wheat flour, more water has to be used and chapathies prepared out of this will blow out. The normal taste of chapathies prepared out of wheat is some what sweetish whereas those prepared out of adulterated wheat flour will taste insipid.
Common salt	White powdered stone, chalk.	Mix one teaspoon of salt in a glass of water. The presence of chalk will make it white and larger particles will settle down.
Mustard seeds	Argemone seeds	Mustard seeds have smooth surface. The argemone seeds have grainy and rough surface and are blacker. Hence can be separated out by close examination.
Honey	Molasses (sugar and water)	A cotton wick dipped in pure honey when lighted with a match stick burns. If adulterated the presence of water will not allow the honey to burn. If it does it will produce a crackling sound.

Supari	Colour dye	Colour dissolves in water. Saccharin gives excessive and lingering sweet taste.
Pulses (green peas)	Colour dye	Sample is kept immersed in water for about half an hour and stirred. Colour separation indicates adulteration.
Cinnamon	Cassia bark	Cinnamon barks are very thin and can be rolled. Cassia barks are thick and stiff.
Coffee	Chicory	Gently sprinkle the coffee powder sample on the surface of water in a glass. The coffee floats over the water, but chicory begins to sink down within a few seconds. The falling chicory powder particles leave behind them a trail of colour due to large amount of chramel they contain.
Coffee powder	Tamarind or date – seed powder	Sprinkle the suspected coffee powder on white blotting paper and spray over it 1 % sodium carbonate solution. Tamarind and date - seed powder will, if present, stain blotting paper red.

Incidental contamination in food can also occur by the microorganisms. Raw foods such as meat, fish, milk and vegetables grow on sewage are likely to be contaminated with harmful microorganisms. These are generally destroyed during cooking or processing of food, some of the microorganisms may survive due to inadequate heat processing. Further, some of the foods if consumed in the raw state may cause food poisoning. Recent studies

have shown that food grains, legumes and oil seeds when stored in humid atmosphere infected by pathogenic fungus can cause serious illness.

Incidental Adulterants

Incidental adulterants are pesticide residues, tin from can, droppings of indents and larvae in food & metallic contamination with arsenic, lead, mercury, etc. can also occur incidentally. The following table shows the toxic effects of some metals and chemicals.

Table - 5

Arsenic	Fruits sprayed by lead arsenate, drinking water	Dizziness, chills, cramps paralysis leading to death.
Barium	Foods contaminated by rat poison (barium carbonate)	Violent peristalsis, muscular twitching and convulsions.
Cadmium	Fruit juices and soft drinks, that come in contact with cadmium and plated vessels, crabs, oysters and kidneys.	Excessive salivation, liver, kidney damage, prostrate cancer, multiple fractures (painful 'itai -itai' disease reported from japan due to cadmium poisoning.)
Cobalt	Water, beer	Cardiac failure.
Copper	Acid foods in contact with tarnished copper ware.	Vomiting, diarrhoea, abdominal pain.
Lead	Some processed foods, water	Paralysis, brain damage, blindness.

Mercury	Mercury fungicide treated seed grains of mercury contaminated fish particularly pike, tuna and shell fish.	Paralysis, brain damage and blindness
Tin	Canned foods	Colic, vomiting, photophobia.
Zinc	Foods stored in galvanized ironware	Dizziness, vomiting.
Pesticides	All types of foods.	Acute or chronic poisoning causing damage to liver, kidney, brain and nerves leading to death.
Diethyl stilbestrol	Present in meat of stilbestrol fed animals and birds.	Teratogenesis, carcinogenesis.
Antibiotics	Meat from animals fed with antibiotics.	Drug resistance, hardening of arteries, heart diseases.

The incidental poisoning can be prevented by:

- Regular market surveys to warn people of dangerous build up of toxins in foods.
- Using safer pesticides like synthetic pyrethroids or malathion.
- By washing vegetables thoroughly before cooking
- By teaching farmers to use pesticides judiciously

3.6.2. Food Laws and Standards

Effective means of food quality can be achieved by legislative measures, certification schemes and public participation and involvement in the programme. The following acts has been passed by the government of India to prevent food adulteration and to maintain food quality.

1. Prevention of Food Adulteration Act

This act was passed in the year 1954. The act prohibits the manufacture, sale and distribution of not only adulterated foods but also foods contaminated with microorganisms and toxicants and misbranded foods. PFA specifies microbial standards for pasteurized milk, milk powder, skimmed milk powder, infant milk food and malted milk food. According to PFA, an article of food shall be deemed to be adulterated,

i. If the article is not upto the standard prescribed.
ii. If the article contains any other substances which affects the nature or quality of the substance.
iii. If any inferior or cheaper substance has been substituted wholly or partly.
iv. If any constituent of the article has been wholly or partly abstracted.
v. If the article has been prepared, packed or kept under unsanitary conditions whereby it has become contaminated or injurious to health.
vi. If the article consists of decomposed or diseased animal or vegetable substance or insect - infested or otherwise unfit for human consumption.
vii. If the article contains any poisonous or other ingredient which renders its contents injurious to health.
viii. If any colouring matter other than that prescribed and in amounts not within the prescribed limits of variability is present in the article.
ix. If the article contains any prohibited preservative or permitted preservative in excess of the prescribed limits.
x. If the quality or purity of the article falls below the prescribed standard or its constituents are present in quantities which are in excess of prescribed limits of variability.

2. Essential Commodities Act, 1954

The main objectives of this act is to maintain supply of essential commodities to the public by proper regulation, prevention of black market and making it available to the public at reasonable price. A number of control orders have been formulated under this act

a. Fruit Products Order, 1955

This lays down statutory minimum standards in respect of the quality of various fruits and vegetable products and processing facilities. Packaging fruits and vegetables of a standard below the minimum prescribed standards is an offense punishable by law. This order is operated by the food and nutrition board of the Ministry of food processing industries.

b. Milk and Milk Products Order, 1992

The milk and milk products order is to set sanitation and hygiene standards for dairy plants and establish an advisory board to advise the government on production, sale, purchase and distribution of milk and milk products.

c. Meat Products Order, 1973

This makes it illegal to transport meat unless it has been prepared and processed according to the provisions of the inspection. The order also lays down rules and conditions for procedure to be adopted for the selection of disease free animals, slaughter house practices for further treatment of the meat so as to maintain the meat in a wholesome manner devoid of pathogens.

The following agencies have also laid down quality standards for foods.

i. Bureau of Indian Standards (BIS)

Standards are laid for vegetables and fruit products, spices and condiments and animal products and processed foods. Once

these standards are accepted, manufacturers whose products conform to these standards are allowed to use BIS label on each unit of their product.

ii. The Agmark Standard

The word AGMARK is derived from Agricultural Marketing. The AGMARK standard was set up by the Directorate of Marketing and Inspection of the Government of India by introducing an Agricultural product Act in 1937.

A sample AGMARK seal is given below.

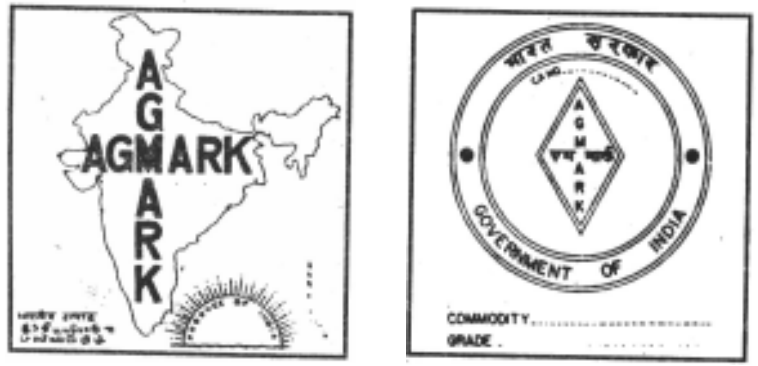


Fig. 14 : Agmark Standards

The quality of a product is determined with reference to the size, variety, weight, colour, moisture, fat content and other factors are taken into account. The act defines quality of cereals, spices, oil seeds, oil, butter, ghee, legumes and eggs and provides for the categorization of commodities into various grades depending on the degree of purity in each case. Grading of commodities like tobacco, spices, basmati rice, essential oils, etc. which are meant for export is compulsory under AGMARK. AGMARK ensures the quality of the product to the importers. In India consumer awareness about the various aspects of

PFA is lacking. If consumer cooperation is not forthcoming, controlling adulteration is not an easy task.

3.7. FOOD PRESERVATION

When food is available more than the present use, it is preserved for future consumption. Foods such as fruits and vegetables have a short growing season and preservation makes them available for use throughout the year and avoids wastage of surplus crops.

Principles of Food Preservation

1. Prevention or delay of microbial decomposition.
   a) By keeping out microorganisms – asepsis
   b) By removal of microorganisms - filtration
   c) By hindering the growth and activity of microorganisms - low temperature, drying.
   d) By killing the microorganisms - heat or radiation.
2. Prevention or delay of self decomposition of food -By destruction or inactivation of food enzymes, (eg) blanching.
3. Prevention of damage caused by insects, animals and mechanical causes.

Methods of Food Preservation

All methods used for preserving foods are based upon the general principle of preventing or retarding the causes of spoilage. - microbial decomposition, enzymatic reactions and damage from mechanical causes insects and rodents.

3.7.1. Preservation by low Temperature

i. Freezing

Freezing may preserve foods for long periods of time provided the quality of food is good to begin with and the temperature is maintained in freezers. In slow freezing process or sharp freezing the

foods are placed in refrigerated rooms at temperatures ranging from -4°C to 29°C. In quick freezing process the lower temperatures used -32° C to -40° C freeze foods so rapidly that fine crystals are formed and the time of freezing is greatly reduced over that required in sharp freezing.

ii. Dehydrofreezing

Of fruits and vegetables consists of drying the food to about 50 percent of its original weight and volume and then freezing the food to preserve it.

3.7.2. Preservation by high Temperature

i. Pasteurisation

Pasteurisation is a heat treatment that kills part but not all the microorganisms present and usually involves the application of temperatures below 100° C. The heating may be by means of steam, hot water or dry heat and the products are cooled promptly after the heat treatment. Usually milk is pasteurized. Three general methods are used now-a-days.

a. Holding or Batch system (Holder method)

This consists in bringing the milk or cream to a temperature usually 65° C and holding at that point for at least 30 minutes followed by rapid cooling.

b. High Temperature Short Time Method (HTST) (Flash method)

This consists of raising the temperature of the milk to at least 72° C for 15 seconds followed by quick cooling.

c. Ultra High Temperature System (UHTS)

In this system, milk is held for 3 seconds at 93.4° C. After pasteurisation the milk is cooled rapidly to 7° C or lower.

ii. Canning

Canning involves the application of temperatures to food that are high enough to destroy essentially all microorganisms present plus air tight sealing in sterilised containers to prevent to contamination. Fruits, vegetables and flesh foods are preserved by this method.

3.7.3. Preservation Using Preservatives

Preservatives has been defined as chemical agents which serve to retard, hinder or mask undesirable change in food. These changes may be caused by microorganisms, by the enzymes of food or by purely chemical reaction. The PFA classifies them as class I preservatives and class II preservatives. Class I preservatives are salt, sugar spices, vineger, honey and edible vegetable oils. Class II preservatives are benzoic acid and its sodium and potassium salts, sorbic acid and its sodium and potassium salts. The preservatives generally used in fruit and vegetable products may be broadly classified as organic and inorganic preservatives.

The organic preservatives are benzoic acid, chlorobenzoic acid or salicylic acid. The only permitted inorganic preservative is sulphur-di-oxide which is generally used in the form of sulphites. The preservatives permitted in fruit and vegetable products in India are sodium benzoate, sulphites and sorbic acid. Sulphur-di-oxide, sulphites and metabisulphites are used in confectionary, fruits and fruit juices and wines. Sodium or potassium metabisulphites are used in the preservation of fruit products. Sodium benzoate is used as a preservative in grape crushes and tomato ketchup.

3.7.4. Preservation by high Osmotic Pressure

By the principle of osmosis, jams, jellies and pickles are preserved.

i. High Concentration of Sugar

Apples, guavas, grapes and pineapples are suitable for making jams and jellies. For making jams and jellies, the fruit should be just ripe because the pectin content is high in such fruits.

ii. High Concentration of Salt

Salt is used to control microbial population in foods such as butter, cheese, vegetables, meats, fish and bread. Spices and other condiments have bacteriostatic effect. In addition to salt and several spices, oils are used in making pickles. Aerobic bacteria and mould growth are prevented by covering the top with oil. Properly prepared and stored pickles can last upto a year or more without spoilage. The important preservative agents in pickles are salt, vinegar, sugar, oil, spices and condiments.

3.7.5. Preservation by Dehydration

Dried foods are preserved because the available moisture level is so low that microorganisms cannot grow and enzyme activity is controlled. Dehydration processes are used commercially for many foods including dried milks, eggs, coffee, tea, fruit drinks, dessert mixes and traditional dried fruits, vegetables, meat and fish. As a result of heat applied during the drying process many of the organisms present in the food are destroyed. Bacteria require 18% available moisture for their growth, yeast 20% or more and moulds 13-16 %. It is therefore essential in the preservation of food by drying to reduce moisture as much as possible without damaging the essential quality of the food.

3.7.6. Food Irradiation

Food irradiation is a process of food preservation in which food is exposed to ionizing energy - radio isotope cobalt - 60. The potential uses of food irradiation are

- To avoid the use of harmful chemical compounds like methyl bromide and ethylene oxide for insect disinfestation in stored products and microbial decontamination of spices.

- To extend shelf life of meat, poultry and sea foods by killing microorganisms causing their spoilage.
- To enhance safety of food by killing food borne pathogenic microorganism and parasites.

Food irradiation reduces post harvest storage losses. Irradiation at the appropriate level does not change the flavour, taste, smell, texture and mineral contents of foods. Irradiated foods are safe and wholesome for human consumption.

- - -

PRACTICALS

1. Prepare charts showing symptoms of deficiency diseases of different macro and micro nutrients.
2. Plan and prepare recipes rich in protein, calories, vitamin A, iron and folic acid suitable for PEM, vitamin A deficiency and anemia.
3. Visit to the nearby noon meal center to learn about the government measures to reduce the incidence of deficiency diseases.
4. Plan and prepare diets for the following disease conditions - fever, peptic ulcer, cirrhosis, hypertension, artherosclerosis, nephritis and diabetes mellitus.
5. Preparation of sanitation checklist to see whether the foods lab is maintained in good sanitary condition. Include environmental sanitation, hygiene in food handling and personal hygiene.
6. Collect samples of different foods from different shops and do the test for detecting food adulteration to see whether the foods are adulterated.

QUESTIONS

Section A

I. Fill up the Blanks

1. Deficiency of vitamin B_6 causes _____
2. Calcium deficiency in elderly women may lead to _____
3. Megaloblastic anaemia is caused due to_____deficiency.
4. The deficiency of vitamin_____leads to hemorrhagic condition.
5. The lesions at the angles of the mouth due to riboflavin deficiency is called as _____.
6. Epigastric pain is a symptom of _____.
7. An example of intermittent fever is_____.
8. Salt is fortified with_____ and _____.
9. Mustard is adulterated with _____ seeds.
10. Consumption of contaminated pork causes_____food poisoning.

II. Write True or False

1. Pyridoxine deficiency causes hypochromic microcytic anaemia.
2. Moon face is a symptom of marasmus.
3. The diet that bridges up the gap between the clear fluid and soft diet is called as full fluid diet.
4. Ascites is accumulation of fluid in the abdomen.
5. Milk and cream cannot be included in a peptic ulcer diet.

6. Moderate zinc deficiency causes impaired taste and impaired smell.

7. Turmeric powder is adulterated with metanil yellow.

8. Perishable foods should be stored at temperatures below 10^{o} C.

9. In quick freezing process the temperature maintained is - 32^{o}C to -40^{o}C.

10. All kitchens should be provided with exhaust fans to provide proper ventilation.

III. Choose the Correct answer

1. The normal blood glucose levels ranges from

   a) 80-120 mg / 100ml b) 60-80 mg / 100ml

   c) 100-180 mg / 100ml

2. Complan is an example of

   a) blenderised food b) predigested food
   c) Natural liquid food.

3. Niacin deficiency causes

   a) Beriberi b) Scurvy c) Pellagra

4. PEM is widely prevalent among

   a) Adolescents b) Preschool Children
   c) Adult Man

5. A high fibre diet is given for

   a) Ulcer patient b) Diabetic patient
   c) Person suffering from diarrohea

6. A high calorie diet is prescribed for

   a) Fevers b) Hypertension
   c) Diabetes mellitus

7. Low protein diet is given in

   a) Hypertension b) Nephritis c) Peptic ulcer

8. Bread is fortified with

   a) Protein b) Fat c) Thiamine

9. This bacteria causes bacillary dysentry

   a) Salmonella b) Streptococci c) Shigella

10. This fungus can grow on moist groundnut causing contamination

    a) Fusarium b) Cladosporium

    c) Aspergillus flavus

IV. Match the following

1. Thiamine	Scurvy
2. Vitamin C	Hypochromic anemia
3. Vitamin D	Goitre
4. Folic Acid	Osteoporosis
5. Calcium	Pellagra
6. Iodine	Megalo blastic anaemia
7. Pyridoxine	Angular stomatitis
8. Riboflavin	Koilonychia
9. Niacin	Rickets
10. Iron	Beriberi

Section B

Answer in a sentence or two

1. Deficiency of calcium in pregnant women leads to this disease
2. ORS
3. Bland diet
4. Hypertension
5. Elimination diets
6. Diarrohea
7. Write any one objective of diet therapy
8. Food adulteration.
9. BIS.
10. Salmonella food poisoning

Section C

VI. Answer in 30 words

1. Total parenteral Nutrition
2. Vitamin A prophylaxis programme
3. Rickets
4. Beri Beri
5. Pre disposing factors of hypertension
6. List 2 uses of food irradiation.
7. List 2 symptoms of food allergy

8. Cirrhosis
9. Hepatic coma
10. Types of fevers
11. Write any 2 objectives of fortification and enrichment of foods.
12. How is honey adulterated?

Section D

VII. Answer in 100 words

1. Write short notes on tube feeding.
2. Explain the symptoms of Vitamin A deficiency
3. Write on routine hospital diets.
4. Write short notes on pasteurisation
5. List any 4 chemical preservatives
6. How will you maintain personal hygiene?
7. Write on the dietary management of hepatitis and cirrhosis
8. What are the dietary guidelines to be given to a patient suffering from peptic ulcer? List the foods to be avoided and included.
9. Explain prevention of food adulteration act.
10. Explain dietary management of fevers.

Section E

VIII. Answer in 200 words

1. Explain the causes, symptoms and treatment of protein energy malnutrition
2. Explain the symptoms of deficiency of B complex vitamins.
3. List the different methods of preserving food. Explain any 3 methods of food preservation
4. Explain the symptoms and dietary management of diabetes mellitus.
5. Write on the causes and dietary treatment of atherosclerosis and hypertension?
6. Explain the dietary management of kidney diseases.
7. Explain incidental food adulteration
8. List 5 foods, which are adulterated commonly and the simple method for detection of these adulterants.

4. LIFE SPAN DEVELOPMENT

In the earlier text, we had discussed the meaning of developmental changes, stages in the life span starting from prenatal stage to late childhood. In this book we will glance through the periods starting from puberty, then adolescence, adulthood and old age.

Growing up is never easy. It is also difficult for the adults who are part of children's lives. Parent's often find that they are at a loss to know what to do about some of the stages of childhood.

4.1. PUBERTY

This is the period in the development span when the child changes from an asexual to a sexual being. As Root has explained "Puberty is that stage in development during which maturation of the sexual organs occurs and reproductive capacity is attained. This stage is also called ***"age of manhood"***. It refers to the physical rather than the behavioral changes which occur when the individual becomes sexually mature and is capable of producing off springs.

Males begin to produce sperm when 14 years have been completed at the same time pubic hair begins to appear.

In female a swelling of the breast begins and the menses begins.

Puberty is a unique and distinctive period and is characterised by certain developmental changes that occur, at no other time in the life span.

Puberty is an overlapping period - because it encompasses the closing years of childhood and the beginning years of adolescence. ***Until they are sexually mature, children are known as "pubescents" after they become sexually mature, they are called "adolescents".***

Puberty is a short period - last from two to four years when many and extensive changes take place inside the body as well as externally. They can be 'rapid matures' or 'slow matures'. Girl tend to mature more rapidly than boys, but there are marked variations within each sex groups.

Puberty is divided into stages - though it is short period in the life span, it is subdivided into three stages namely the prepubescent stage, the pubescent stage and the post pubescent stage.

4.1.1. Stages of Puberty

1. Prepubescent Stage

This stage overlaps the closing year or two of childhood when the child is regarded as a "prepubescent" – one who is no longer a child but not yet an adolescent. During the prepubescent (or "maturing") stage, the secondary sex characteristics begin to appear but the reproductive organs are not yet fully developed.

2. Pubescent Stage

This stage occurs at the dividing line between childhood and adolescence; the time when the criteria of sexual maturity appear – the menarche in girls and the first nocturnal emissions in boys. During the pubescent (or "mature") stage, the secondary sex characteristics continue to develop and cells are produced in the sex organs.

3. Postpubescent Stage

This stage overlaps the first year or two of adolescence. During this stage, the secondary sex characteristics become well developed and the sex organs begin to function in a mature manner.

Puberty is a time of rapid growth and change - puberty is one of the two periods in the life span that are characterised by rapid

growth and marked changes in body proportions. It is refered to as ***"adolescent growth spurt"***.

Puberty is a negative phase - an 'anti' attitude towards life. There is evidence that negative attitude and behavior are characteristics mainly of the early part of puberty and that the worst of the negative phase is over when the individual becomes sexually mature. This is pronounced in girls than in boys.

Puberty occurs at a variable age - puberty can occur at any time between the ages of five or six and ninteen years. There are also variations in the amount of time needed to complete the transformation process of puberty.

Criteria of Puberty used to determine the onset and to pin point a particular stage that the child has reached are the menarche, nocturnal emissions, evidence derived from chemical analysis of the urine, x-rays of bone development.

The ***menarche***, or the first menstruation, is a criteria of sexual maturity for girls. On the other hand for boys it is nocturnal emission, chemical analysis of the first urine passed by boys and the presence of oestrogen for girls is done, x-rays of hands and knees has proved to be dependable.

4.1.2. Conditions Responsible for Puberty Changes

Role of the Pituitary Gland

The pituitary gland produces two hormones: the growth hormone, which is influential in determining the individual's size, and the gonadotropic hormone, which stimulates the gonads to increased activity. Just before puberty, there is a gradual increase in the amount of the gonadotropic hormone and an increased sensitivity of the gonads to this hormone; this initiates puberty changes.

Role of the Gonads

With the growth and development of the gonads, the sex organs – the primary sex characteristics – increase in size and become functionally mature, and the secondary sex characteristics, such as pubic hair develop.

Interaction of the Pituitary Gland and the Gonads

The hormones produced by the gonads, which have been stimulated by the gonadotropic hormone produced by the pituitary gland, act in turn on this gland and cause a gradual reduction in the amount of growth hormone produced, thus stopping the growth process. The interaction between the gonadotropic hormone and the gonads continues throughout the individual's reproductive life, gradually decreasing as women approach the ***menopause*** and men approach the ***climacteric***.

Body changes in puberty

1. Changes in body size - in terms of height and weight. The greatest increase in height comes in the year following the onset of puberty. After that growth declines and continue at a slow rate. Weight gain comes from increase in fat, bone and muscle tissues.
2. Changes in body proportions - the thin long trunk of the older child begins to broaden at the hips and shoulders and waistline develops.
3. Primary sex characteristic in the growth and development of the sex organs - the gonads or testes and that of the penis in male. For girls it is the first menstrual flow. This is the discharge of blood, mucus and broken down cell tissues from the uterus that will occur every twenty - eight days.
4. Secondary sex characteristics.

4.1.3. Important Secondary Sex Characteristics - Boys

Hair

Pubic hair appears about one year after the testes and penis have started to increase in size. Axillary and facial hair appear when the pubic hair has almost completed its growth, as does body hair. At first, all hair is scanty, lightly pigmented and fine texture. Later it becomes darker and coarser.

Skin

The skin becomes coarser, less transparent, and lighter in color and the pores enlarge.

Glands

The sebaceous or oil-producing glands in the skin enlarge and become more active, which may cause acne. The apocrine glands in the armpits start to function and perspiration increases as puberty progresses.

Muscles

The muscles increase markedly in size and strength, thus giving shape to the arms, legs, and shoulders.

Voice

Voice changes begin after some pubic hair has appeared. The voice first becomes husky and later drops in pitch, increases in volume, and acquires a pleasant tone. Voice breaks are common when maturing is rapid.

Breast Knots

Slight knobs around the male mammary glands appear between the ages of twelve and fourteen. These last for several weeks and then decrease in number and size.

Secondary Sex Characteristics - Girls

Hips

The hips become wider and rounder. There is enlargement of the pelvic bone and the development of subcutaneous fat.

Breasts

Shortly after the hips start to enlarge, the breasts begin to develop. The nipples enlarge and as the mammary glands develop breasts become larger and rounder.

Hair

Pubic hair appears after hip and breast development is well under way. Axillary hair begins to appear after the menarche, as does facial hair. Hair appears on the limbs late in puberty. All except facial hair is straight and lightly pigmented at first and then becomes more luxuriant and darker.

Skin

The skin becomes coarser and thicker, and the pores enlarge.

Glands

The sebaceous and apocrine glands become active as puberty progresses. Clogging of the sebaceous glands can cause acne, while the apocrine glands in the armpits produce perspiration, this is especially heavy and pungent just before and during the menstrual period.

Muscles

The muscles increase in size and strength especially in the middle of puberty and towards the end, thus giving shape to the shoulders, arms and legs.

Voice

The voice becomes fuller and more melodious. Huskiness and breaks in the voice are rare in girls.

4.1.4. Effect of puberty changes on attitude and behavior

The desire for isolation especially from family members and activities referred to as withdrawal syndrome. Boredom is very common. Rapid and uneven growth affects habitual patterns of coordination leading to clumsy and awkward behavior. Pubescent child is often uncooperative, disagreeable and antagonistic moodiness, sulkiness, temper out bursts and irritability are found. They lack self confidence. They become excessively modest.

4.1.5. Effects of Endocrine imbalance at Puberty

Insufficient Growth Hormone

An insufficient amount of growth hormone in late childhood and early puberty causes the individual to be smaller than average at maturity.

Insufficient Gonadal Hormones

If the gonadal hormones are not released in adequate amounts soon enough to check the growth hormone, growth of the limbs continues too long, and the individual becomes larger than average. Insufficient amounts of gonadal hormones also affect the normal development of the sex organs and the secondary sex characteristics, with the result that the individual remains childlike or takes on characteristics of the opposite sex, depending on when the interruption in the development cycle occurs.

Excessive Supply of Gonadal Hormones

An imbalance in the functioning of the pituitary gland and the gonads can cause production of an excessive amount of gonadal hormones at a very young age, resulting in the onset of puberty

sometimes as early as five or six years of age. This is known as precocious puberty or puberty precox. While such children are sexually mature in that their sex organs have begun to function, they are still small in structure and the secondary sex characteristics are not as well developed as in those who mature at the usual age.

4.1.6. Hazards of Puberty

1. Physical Hazards - The major physical hazards of puberty are due to slight or major malfunctioning of the endocrine glands that control the puberty growth spurt and the sexual changes that take place at this time.
2. Psychological Hazards

a. Unfavourable self concepts - is revealed in their behavior. They either become withdrawn from others or become aggressive and defensive.

b. Under achievement - with rapid physical growth comes a sapping of energy. This leads to a distinclination to work and attitudes of boredom toward any activities.

c. Lack of preparation for puberty changes - parents and teachers play an important role in this, especially giving the necessary information about puberty or else it would turn out to be a traumatic experience for them.

d. Acceptance of socially approved sex roles - for many pubescent girls, the psychological hazard of acceptance of the traditional female sex role is intensified by the periodic discomforts they suffer at the time of their menstrual periods while boy are not subject to this.

Because the ***three 'A's of happiness - acceptance, affection and achievement*** - are often violated during these years, puberty finds to be one of the most unhappy periods of the life span. This is serious because unhappiness can and often does become habitual.

4.2. THE ADOLESCENT YEARS

Primitive people did not consider puberty and adolescence to be distinct periods in the life span, the child is regarded as an adult when capable of reproduction.

As it is used today, the term adolescence has a broader meaning. It includes mental, emotional and social maturity as well as physical maturity. This period is from the beginning when children become sexually mature and ending when they reach the age of legal maturity. Early adolescence extends roughly from thirteen to sixteen or seventeen years and late adolescence covers the period from then until eighteen, the age of legal maturity. ***Early adolescence is referred to as the "teens" sometimes even the "terrible teens".***

4.2.1. Characteristics of Adolescence

1. **Adolescence is an important period -** because of their immediate effects on attitude and behavior. It is important for both psychological and physical effects. Along with the rapid physical development, adolescents go through rapid mental development as well. These give rise to the need for mental adjustments and necessity for establishing new attitudes, values and interests.
2. **Adolescence is a transitional period -** during any transitional period, the individual's status is vague and there is confusion about the roles the individual is expected to play. The adolescent, at this time, is neither a child nor an adult. If they behave like children, they are told to "act their age". If they try to act like adults, they are often accused of being "too big for their age".
3. **Adolescence is a period of change -** During early adolescence, when physical changes are rapid, changes in attitude and behavior are also rapid. Due to sexual maturity they have feelings of instability which are often intensified by the ambiguous treatment

they receive from parents and teachers. Changes in their bodies, interests, social group expectations, create new problem. Their value system change as interest and behaviour pattern changes. They try to act independently.

4. **Adolescence is a problem age -** throughout childhood, their problem and needs are taken care of by parents and teachers. Suddenly during adolescence they feel they are independent and try to do everything on their own ending up in frustration.

5. **Adolescence is a time of search for identity -** in dress, speech and behavior adolescents want to be as nearly like their gang-mates as possible. They use status symbols in the form of clothes, vehicles, other observable material possessions.

6. **Adolescence is a time of unrealism -** they have a lot of unrealistic aspirations, desires and goals not only for themselves but also for their families and friends. They will get angry, and disappointed when they feel that others have let them down or that they have not lived up to the goals they set for themselves.

7. **Adolescence is a threshold of adulthood -** they want to create an impression that they are close to adults which they show in their dress and behavior, associated with the adult status like smoking, drinking, using drugs, engaging in sex etc.,

4.2.2. Body Changes During Adolescence (External Changes)

Height

The average girl reaches her mature height between the ages of seventeen and eighteen and the average boy, a year or so later. Boys and girls who were immunized during babyhood are usually taller, age for age, than those who were not immunized and who, as a result, suffered from more illness that tended to stunt their

growth.

Weight

Weight changes follow a timetable similar to that for height changes, with weight now distributed over areas of the body where previously there was little or no fat.

Body Proportions

The various parts of the body gradually come into proportion. For example, the trunk broadens and lengthens, and thus the limbs no longer seem too long.

Sex Organs

Both male and female sex organs reach their mature size in late adolescence, but are not mature in function until several years later.

Secondary Sex Characteristics

The major secondary sex characteristics are at a mature level of development by late adolescence.

Body Changes During Adolescence (Internal Changes)

Digestive System

The stomach becomes longer and less tubular, the intestines grow in length and circumference, the muscles in the stomach and intestinal walls become thicker and stronger, the liver increases in weight, and the esophagus becomes longer.

Circulatory System

The heart grows rapidly during adolescence by the age of seventeen or eighteen, it is twelve times as heavy as it was as birth. The length and thickness of the walls of the blood vessels increase and reach a mature level when the heart does.

Respiratory System

The lung capacity of girls is almost at a mature level at age seventeen; boys reach this level several years later.

Endocrine System

The increased activity of the gonads at puberty results in a temporary imbalance of the whole endocrine system in early adolescence. The sex glands develop rapidly and become functional, though they do not reach their mature size until late adolescence or early adulthood.

Body Tissues

The skeleton stops growing at an average age of eighteen. Tissues, other than bone, continue to develop after the bones have reached their mature size. This is especially true of muscle tissue.

4.2.3. Emotionality During Adolescence

Traditionally adolescence has been thought of as a period of "storm and stress" - a time of heightened emotional tension resulting from the physical and glandular changes that are taking place. Instead of having temper tantrums adolescents express their anger by sulking, refusing to speak, criticizing those who angered them. They envy others. Parents and teachers should help them to disclose their feelings and personal problems including adjustments made to members of the opposite sex. Since adolescents spend most of their time with friends, it is understandable that they have a greater influence on adolescent attitude, speech, interests, appearance etc.

They take a lot of interest in extra curricular activities like sports, travelling, reading, movies, radio, television etc., Some of the social interests of adolescents are partying, drinking and smoking, helping others and world affairs.

There is a growing interest in sex and sex education is important at this stage which can be provided by the family members and teachers.

4.2.4. Family Relationship during Adolescence

A very common expression used is ***"generation gap"*** between adolescents and their parents. This gap is partly the result of radical changes in values and standards of behavior that normally occur in any rapidly changing culture and partly the result of the fact that many young people now have greater educational, social and cultural opportunities than most of their parents had when they were adolescents. Thus it is more correctly a ***"cultural gap"*** not entirely due to differences in chronological age.

As adolescence progress, the fictional relationship is replaced by a more pleasant and affectionate relationship.

Common causes of family friction are standards of behavior, methods of discipline, relationship with siblings, hypercritical attitude, feeling victimized due to difference in socio-economic status etc.

They put up a "pleasing personality" knowing what their friends and member of the opposite sex admire.

How successful adolescents will be in their attempts to improve their personalities depends on.

- They must build up ideas, that are realistic
- They must make a realistic assessment of their strength and weaknesses.
- They must be reasonably well satisfied with their achievements and eager to make improvements in any area in which they feel deficient.

4.2.5. Common Obstacles in making Transition to Maturity

Poor Foundations

Adolescents who did not establish good habits during childhood will be unable to master the developmental tasks of adolescence. As ***Eisenberg has explained, Optimal development in adolescence depends on successful accomplishment of the development tasks in infancy and childhood.***

Late Maturing

Late matures have less time in which to make the developmental tasks of adolescence. The early matures are those who mature at the average age. Many late matures have barely completed the puberty changes when adolescence is drawing to a close.

Prolonged Treatment as Children

Adolescents who, because they were late matures, are often treated as children at the time when their contempraries are treated as near adults. As a result, they may develop feelings of inadequacy about their abilities to assume the rights, privileges, and responsibilities that comes with adulthood.

Role Change

Adolescents who go to work after completing high school, or after dropping out of school, undergo a drastic role change almost over night. They must assume adult roles earlier than their contempraries who continue their education, and they are deprived of the opportunity to make a slow transition into adulthood.

Prolonged Dependency

A prolonged state of dependency, as when adolescents continue their education into early adulthood, is a handicap in making the transition to adulthood. Because girls, as a group, are more apt to be

forced into a state of prolonged dependency than boys, they are especially handicapped in making the transition into adulthood.

4.3. ADULTHOOD

Different cultures have different ages at which children reach the adult status or the age of legal maturity. Generally, they reach this status when their puberty growth is complete and when their sex organs have developed to the point where they are capable of procreation.

4.3.1. Subdivisions of Adulthood

Early Adulthood

Early adulthood extends from age eighteen to approximately age forty, when the physical and psychological changes, which accompany the beginning of the loss of reproductive capacity appear.

Middle Adulthood (Middle Age)

Middle adulthood, or middle age, begins at forty and extends to age sixty, when both physical and psychological decline become apparent in the average person.

Late Adulthood (Old Age)

Late adulthood - senescence, or old age – begins at sixty and extends to death. While physical and psychological decline speed up at this time, modern medical techniques, as well as careful attention to clothing and grooming enable many men and women to look, act, and feel much as they did when they were younger.

4.3.2. Characteristics of Early Adulthood

Is a period of adjustment to new patterns of life and new social expectations. The young adult has to take roles such as that of spouse, parent and bread winner and to develop new attitudes, interests and

values in keeping with these new roles. Some of the outstanding characteristics are;

1. Early Adulthood is the ***"settling - down age".*** This is the period when young men and women are trying out different life patterns in terms of jobs and different individuals to share their life. Once individuals decide upon the pattern of life they believe will meet their needs, they develop pattern of behavior, attitudes and values which will tend to be characteristically theirs for the ramaining of their lives.

2. Early Adulthood is the ***"Reproductive Age"*** - parenthood is one of the most important roles in the lives of most young adults.

3. Early Adulthood is a ***"Problem Age"*** - young adults need to cope up with all adjustments within their work and with partner and larger circle of friends and relatives. Expectations are too high and to meet demand make it even more difficult.

4. Early Adulthood is a period of ***"Emotional Tension"*** - what young adult's worry about which leads to emotional tension will depend upon their work load at their work place, at home and in the social circle and also how much success or failure they are experiencing in meeting these problems.

5. Early Adulthood is a period of ***"Social Isolation"*** - with the end of formal education and the entrance into adult life pattern of work and marriage, the association with peer groups is slowly weaned. This is when they experience social isolation.

6. Early Adulthood is a ***"time of Commitment"*** - As young adults change their role from student and dependent (characteristic of adolescence) to that of independent adults, they establish new pattern of living, new responsibilities and take up new commitments for themselves and their partners.

Young adults with high level of education, good health support and guidance from partner and family members, high ambitions and realistic goals, ability to accept success or failure gracefully, ability and willingness to communicate with others, respect for others and active participation in prestigious community affairs will easily climb up the ladder to successful economic and social status.

Poor health or physical defects can be hazardous to personal and social adjustments but these can always be overcome with the support one gets from the family and friends.

A lot of adjustments need to be made by young adults, the most important being - adjustment to marriage, to parenthood, and to the expanded family circle.

There are chances of singlehood also but how women feel about unmarried life and adjustment to singlehood differs from that of men. For men stress is less than single women.

4.3.3. Reasons Why Young Adults Remain Single

- An unattractive or sex-inappropriate appearance.
- An incapacitating physical defect or prolonged illness
- Lack of success in the search for a mate
- Unwillingness to assume the responsibilities of marriage and parenthood
- A desire to pursue a career that requires working long and irregular hours or much travelling
- Residence in a community where the sex ratio is unbalanced
- Lack of opportunity to meet eligible members of the opposite sex

- Responsibilities for aging parents or younger siblings
- Disillusionment as a result of unhappy earlier family experiences or unhappy marital experiences of friends
- Sexual availability without marriage
- An exciting lifestyle
- Opportunity to rise in the vocational ladder
- Freedom to change and experiment in work and lifestyle
- Belief that social mobility is easier when single than married
- Strong and satisfying friendships with members of the same sex
- Homosexuality

4.3.4. Divorce

Divorce is the culmination of poor marital adjustment and comes when husband and wife have been unable to find any other satisfactory solution to their problem. Many unhappy marriages do not end in divorce because of religious, moral, economic or other reasons and many marriages end up in separation, either legal or informal, and desertion.

The traumatic effect of divorce is usually greater than that of death because of the bitterness and emotional tension preceding it and because of the social attitude towards divorce. This has a major impact on the children.

Success of adjustment to Adulthood can be measured in terms of three criteria – ***achievement, satisfaction and personal adjustment.*** Adults usually reach the peak of their carrier and family life by the time they are in their late thirties. The degree to which adults are successful in adjusting to the important problems they face in adult life will determine the degree of their satisfaction.

4.4. MIDDLE AGE

Is generally considered to extend from age forty to age sixty. The onset is marked by physical and mental changes. Some of the most important characteristics are.

4.4.1. Characteristics

1. **Middle age is a dreaded age –** It is recognized that, next to old age, it is the most dreaded point in the total life span and the one, adults will not admit that they have reached until the calendar and the mirror force them to do so. Some of the reasons are, the mental and physical deterioration, cessation of the reproductive life, restrictions in finance and independence.

2. **Middle age is a time of transition –** transition always means adjustment to new interest, new values, new pattern of behaviour, physical changes, changed roles etc., The most important adjustment is with death of a spouse. Of course adjustment with the problems of aging parents is always there.

3. **Middle age is a time of stress –** while major adjustment's to work, home, social life are made, this will lead to stress. Women have stress during the period of menopause.

4. **Middle age is a time of achievement –** middle age should be a time not only for financial and social success but also for authority and prestige. They usually reach their peak after which they rest to enjoy the benefits of their hard work.

5. **Middle age is a time of evaluation –** evaluation of their achievement and accomplishments in terms of money, social status, family size, their earlier aspiration, plans for future life etc., is carried out.

6. **Middle age is the time of the empty nest –** the time when the children no longer want to live under the parental roof. This period is much more traumatic for women than men. This leads to boredom especially if one has given up the job and other activities.

4.4.2.Adjustment in physical changes

One of the most difficult adjustment middle age men and women must make is to change the appearance. They must recognize that their body is not functioning as adequately as it formerly did and may even be 'wearing out' of in certain vital areas. This reproductive capacity is coming to an end and losing some of their sex drive and sexual attractiveness.

Women may experience a sudden cessation of menstruation. Many women gain weight during menopause mainly around the abdomen and hips. They also experience personality changes, become depressed and hostile. Among men, there is a gradual decline in gonadal activity leading to decline in sexual desire and sex organ functioning.

Good social adjustments in middle age is important. They should give up the "rocking chair" philosophy which many middle age people follow. They should not think they have to remain inactive and give up many of their normal activities and desires. Instead they need to develop skills to keep them engaged in economic and social activities, take up responsibilities in the family like looking after grand children and giving a moral support to the members of the family.

Adjustmental hazards are more to single women than single men. Adjustment to loss of a spouse presents many adjustment problems for the middle aged man or woman. This will lead to disruption in the pattern of living.

They also have to adjust to approaching old age and retirement. The success with which men and women adjust to middle age can be assured by their achievements, emotional status, effects of physical and psychological changes or personality and the degree of satisfaction of happiness the middle aged person experiences.

4.5. OLD AGE

Old age is the closing period in the life span. Age sixty is usually considered the dividing line between middle and old age. Chronological age is a poor criteria to use in marking off the beginning of old age because there are such marked differences among individuals in the age and better aging actually begins. Because of better living conditions health care, most men and women today do not show the mental and physical signs of aging until early seventies. The characteristics of old age are far more likely to lead to poor adjustment than to good and to unhappiness rather than to happiness. That is why old age is even more dreaded than middle age.

4.5.1. Characteristics of old age are

1. Old age is a period of decline – decline comes partly from physical and partly from psychological factors. There is change in body cells due to the aging process. Unfavorable attitude towards one self and life in general can lead to decline or become depressed and disorganized. Motivation plays a very important role in decline.
2. There are individual differences in the effects of aging. People age differently because they have different hereditary endowment, different socio economic and educational backgrounds and different patterns of living. The general rule is physical aging precedes mental aging.
3. Old age is judged by different criteria – age is judged in terms of physical appearance and activities. One who has white hair is

labeled as old. There are many who try to cover up their aging symptoms to create illusion that they are not yet old.

4. There are many stereotypes of old people – let it be the folklore, the media, poetry, fiction, jokes or different forms of humor or scientific studies, all portray the aged as those who are worn out physically and mentally, unproductive, accident – prone, hard to live, days of usefulness are over, should be pushed aside to make way for younger people.

Poor adjustment is characteristic of old age – Because of the unfavorable social attitudes towards the elderly that are reflected in the way the social group treat them, it is not surprising that many elderly people develop unfavourable self-concepts. These tend to be expressed in maladjusting behavior of different degree of severity.

4.5.2. Common Changes in Appearance during Old Age

Head Region

- The nose elongates
- The mouth changes its shape as a result of tooth loss or the necessity of wearing dentures.
- The eyes seem dull and lusterless and often have a waterly look.
- A double or triple chin develops.
- The cheeks become pendulous, wrinkled, and baggy.
- The skin becomes wrinkled and dry, and dark spots, moles, or warts may appear.
- The hair on the head becomes thin and turns grey or white, and tough, bristly hair appears in the nose, ears, and eyebrows.

Trunk Region

- The shoulders stoop and thus seem smaller
- The abdomen bulges and droops
- The hips seem flabbier and broader than they did earlier.
- The waistline broadens, giving the trunk a sack like appearance.
- The woman's breasts become flabby and droop.

Limbs

- The upper arm becomes flabby and heavy, while the lower arm seems to shrink in diameter.
- The legs become flabby and the veins prominent, especially around the ankles.
- The hands become scrawny, and the veins on the back of the hand are prominent.
- The feet become larger as a result of sagging muscles, and corns, bunions, and collouses often appear.
- The nails of the hands and feet become thick, tough, and brittle.

4.5.3. Changes in Physiological functions include decline in the ability to see, hear, marked changes in taste, sense of smell becomes less, and also that of sensitivity to pain. Elderly people tire quickly and require a longer time to recover from fatigue, changes in skilled movements especially handwriting, slow in learning new skills and quite often tend to become awkward and clumsy. Recall is affected. Old people tend to have poor recent memories but better remote memories.

Quite often due to lack of income or low economic status they become dependent and have to compromise on many of their hobbies, interests, activities etc.,

4.5.4. Common physical hazards

Include disease and physical handicaps like circulatory, metabolic and mental disorders. Heart diseases, rheumatism, arthritis, visual and hearing impairment, etc., are also common. Due to psychological and physiological disorder and economic reasons, malnutrition in old age is common.

4.5.5. Advantages and Disadvantages of Institutional living for the elderly

Disadvantages

- It is more expensive than living in one's own home.
- Like all institutional food, it is usually less appealing than home-cooked food.
- Choice of food is limited and often repetitious.
- Close and constant contact with some people who may be uncongenial.
- The location is often some distance away from shops, amusements, and community organizations.
- Location is usually at some distance from family and friends.
- Living quarters tend to be considerably smaller than in former homes.

Advantages

- Maintenance and repairs are provided by the institution.
- All meals are available at reasonable costs.
- Provision is made for suitable recreation and amusements.
- Opportunities are available for contacts with contemporaries with similar interests and abilities.
- Greater change for acceptance, by contemporaries than with younger people.

- Eliminate loneliness because people are always available for companionship.
- Holiday celebrations for those who have no family are provided.
- Opportunity for prestige based on past accomplishments that would not occur in groups of younger people.

4.5.6. Physical and Psychological needs in living arrangements for the elderly

Physical needs

- The house temperature should be comparatively even from floor to ceiling because poor circulation makes the elderly especially sensitive to chilling.
- Elderly people need large windows to ensure plenty of light because of the gradual impairment of vision.
- Provisions should be made for safety. If the elderly should have to climb few steps, floors should be unwaxed or covered with wall-to-wall carpeting, and danger areas should be lighted at all times.
- There should be adequate space for indoor and outdoor recreation, a conditon best met in multiple-housing developments or in institutions.
- Noise should be controlled, especially during the night. This can be done by locating sleeping quarters in a quiet part of a house or an apartment.
- Elderly people should have labour-saving devices, especially for cooking, dishwashing, and cleaning.
- The living quarters should be on one floor to avoid possible falls on steps.

Psychological Needs

- Elderly people should have at least one small room of their own so that they can have some privacy.
- Living arrangements should include space for sedentary recreation, such as reading and television watching.
- There should be provision for storage of cherished possessions.
- Elderly people should live close to stores and community organizations so that they can be independent in their activities.
- Elderly people should be near relatives and friends so that frequent contacts are possible.
- Provisions should be made for recreation and amusement, especially during the very hot/cold months when going outdoor is difficult and being housebound becomes monotonous and boring.
- Provision should be made for transportation to shopping areas, places of amusement, hair-dressers, and churches/temples.

4.5.7. Some important conditions contributing to happiness in old age

- A favourable attitude toward old age developed as a result of earlier pleasurable contacts with elderly people.
- Happy memories of childhood and adulthood.
- Freedom to pursue a desired lifestyle without outside interference.
- A realistic attitude toward, and acceptance of, the physical and psychological changes that aging inevitably brings.
- Acceptance of self and present living conditions even if these fall below expectations.

- An opportunity to establish a satisfying, socially acceptable pattern of life.
- Continued participation in interesting and meaningful activities.
- Acceptance by and respect from the social group.
- A feeling of satisfaction with present status and past achievements.
- Satisfaction with marital status and sex life.
- Reasonably good health without chronic health problems.
- Enjoyment of recreational activities with relatives and friends.
- Productive activities whether in housework or volunteer services.
- A financial situation adequate to meet needs and wants.

We had a chance to glance through the stages from puberty to old age with reference to good and bad in each stage. All these references are for the normal human being without much physical or any other problem.

Now let us look at the special needs of disadvantaged children.

4.6. SPECIAL NEEDS OF DISADVANTAGED CHILDREN

You have already studied that the children grow and develop physically, socially and emotionally.

Each individual is

Like all other people,

Like some other people and

Like no other person.

All children are ‘unique’ yet similar to one another in most aspects of growth. However, some children are very different from

their age-mates that they 'stand out'. The obvious 'standing out' creates problems during the growing periods. Such children have to deal with the normal/usual problems of growth along with all those difficulties that may arise because of being different.

Have you ever noticed any such child?

The child's ability to cope with these problems is limited. The child is unable to deal with the social and emotional problems. This has marked effect on the child's personal and social development. Such a child needs special attention during the formative years so as to be able to grow to the full potential.

After reading this chapter you will be able to:

Define a normal and a disabled child.

Differentiate between normal and disabled/disadvantaged child.

Categorize disabled children as physically handicapped and socially maladjusted.

According to psychologists a Normal Child can be defined "as one who is physically, socially, mentally, intellectually and morally adjusted and is in harmony with one-self and his/her surrounding environment." Such a child is able to conform to the norms of the particular society.

Baker, ***a well-known psychologist defines the Disabled Child as "one who deviates from what is supposed to be an average in physical, mental, emotional and social characteristics to such an extent that the child requires special educational services to help develop to the maximum capacity."***

4.6.1. Categories of Disabled / Disadvantaged Children

The disabled children can be broadly grouped into three categories. These are:

a. Physically handicapped children

b. Mentally disadvantaged children.

c. Socially maladjusted children.

4.6.2. Causes of Disability among Children

The various causes of physical disability are as follows:

a. Heredity

b. Unfavourable prenatal environment

c. Injury during child birth

d. Accident during early childhood causing orthopaedic problems.

e. Surgery requiring the amputation of the diseased part.

f. Mental and emotional problems in early childhood result in stammering, and speech defects.

g. Ear infections and injuries resulting in hearing defects.

h. Psychological, emotional problems and feeling of neglect result in behavioural problems. Such children are not able to keep up with the desired social norms and hence are at disadvantage.

i. Imaginary defects called ***'Phantom handicaps'*** occur when small children imagine they are handicapped and demand to be excused from doing things they don't want to do.

4.6.3. Types of Disabilities / Handicaps

Handicaps result in physical, neurological and social maladjustment and defects.

A. Physical Defects

a. **Eyes.** Blind and partially sighted

b. **Ears.** Deaf and hard of hearing

c. Missing limb/weak limb

d. ***Physical abnormalities*** such as webbed fingers, hunch back, sixth finger/toe, malformed ear, harelip, cleft palates, face and body birth marks.

e. **Defective speech.** It results in stammering that affects child's personality.

f. **Chronical defects.** The defects that exist year after year are generally referred to as chronical defects i.e. congenital heart diseases, rheumatism and muscular atrophys.

B. Neurological Defects

These are caused by disorders of the central nervous system e.g. cerebral palsy, epilepsy and schizophrenia. Cerebral palsy results in paralysis/motion disorder of limbs due to brain malfunction. Sudden uncontrollable attacks (seizures) resulting in loss of consciousness and muscle control are common among epileptic patients.

These defects can be corrected/ improved to a great extent when detected and treated in time. Medical, surgical and scientific advancement is providing tremendous improvements to cope with the different handicaps.

C. Social Maladjustment Defect

Socially maladjusted children do not conform to the acceptable social norms of the society. The children can be indulging in anti-social activities leading to juvenile delinquency and other related problems. Socially disadvantaged child is a deprived child deprived of love, proper guidance and general social security.

4.6.4. When is the Child Considered Disabled / Disadvantaged

A Child is considered disadvantaged:

a. When he/she cannot make the maximum use of one or several of the senses e.g. blind child, deaf and mute child.

b. When he/she is not able to adjust well in the society one lives in. Such a child will exhibit behavioural problems.

Kauffa defines children with behavioural disorders as "those who chronically and markedly respond to their environment in socially unacceptable/personally unsatisfied ways but who can be taught more socially acceptable and personally gratifying behaviour.

c. Do you know that a child who is able to make sharper use of senses e.g. exceptional/ bright child can also be disadvantaged.

4.6.5. Blindness

Vision is a critical tool that children use in obtaining information about the world in which they live. Impairment of vision can lead to partial or total blindness. The children without vision will need special materials and attention to develop fully.

Very often a blind child is not able to compete with the normal one. As a result these children may remain physically and economically dependent to a certain extent.

4.6.6. Causes of Blindness

Visual impairment can be caused by the following factors:

A. Congenital Blindness

It refers to a child being born blind. Genetic impairment results in the malformation of vital organs like eyes during the foetal development. Such children learn about their environment through the senses of touch and hearing.

B. Acquired Blindness

In this case the child is not born blind. The child may lose eye-sight on account of some accident. The resulting eye-defect is called acquired or adventitious blindness.

C. Nutritional Blindness

It is the result of prolonged absence of vitamin-A rich foods in the diet. Deficiency of vitamin-A causes dryness of eyes, (xerophthalmia) and impaired vision in dimlight (night blindness). Poor state of epithelial tissues coupled with resulting eye infections causes serious damage to the eyes.

D. Delayed Remedial Treatment

Poverty, ignorance and superstitions are responsible for delayed medical treatment. Lack of proper medical facilities also add to eye related problems. India's blind population forms a major chunk of world's total.

4.6.7. Characteristic of a Partially blind child

A partially blind child is clumpsy, awkward and cautious in his/her movements.

Their eyes may be red, watery, swollen, itching and sensitive to light.

Child may complain of headache, nausea and blurring of vision.

Child may have squint and appear ***'cross-eyed'***.

Poor vision makes the child irritable, self-centered and pre-occupied.

Child has fewer opportunities to learn to get along with different social groups. This results in social adjustment problems.

The children become rebellious and aggressive for they have to rely on others to do things for them. This often leads to frustration and inferiority complex among them.

4.6.8. Special needs of a blind child

It is important to render all possible help and attention to the blind child to enable him/her to be independent, self-reliant and economically

viable. Physical, social and emotional needs have to be attended with special attention to yield satisfying results.

Physical Needs. Parents of a young blind child have to give special attention to feed and clothe their little one. Children need to be trained to do their daily routine jobs like toilet, bath, dressing and feeding etc. Special effort is needed to help them move around the house without knocking things and hurting themselves. Orientation and mobility training for such children is a must from the early age. These children must be made familiar and comfortable with their bodies and the surroundings they live in. The parents may need to take these children often to the doctors to protect them from diseases arising out of general constitutional weakness.

Emotional and Social Needs. Parents and siblings need to develop special contact by hugging, petting and reassuring the handicapped child when scared and emotionally upset. Constant reassurance with love and tender care will help the disadvantaged child in exercising better control on emotions and feel emotionally secure.

Love, hatred, jealousy, fear, happiness are some of the emotions you are familiar with. A young child has very little control on his emotions. One is able to exercise better control on emotions as one grows. Fear and panic are known to relax the bowels. Emotionally maladjusted children may urinate due to temporary loss of bladder control. Being sad and morose lowers the appetite resulting in poor nutrition and ill health. Children may have spasms and froth at the mouth when they cannot control their emotions.

Every child needs to be loved to feel secure. This enables one to interact in a correct way and with confidence. A blind child's social world is his/her parents. Parents' attitude and acceptance of the disability of their child goes a long way in providing the child with confidence to deal with the routine problems. It must be accepted that total

development of the child is slower when compared to a normal child.

The need to ***love*** and ***be loved*** is strong among handicapped children. The strong bonds of love help the child take bigger leaps in the process of development. Consequently the child will be well-adjusted in his/her social environment. Social and emotional adjustments are essential for disadvantaged children.

Need for Independence. The parents should help the child to explore his/her surroundings and do routine jobs independently. To start with combing hair, buttoning up of shirt and tying of shoe laces etc. may be time-consuming and clumsy. Appreciation will encourage the child to take on new jobs with confidence. The child's need to feel capable can be enhanced by providing vocational guidance for the jobs he/she can perform. This will ensure self-reliance. Have you ever noticed the 'white' stick used by the blind to move around? The stick may be fitted with bell.

Educational Needs. It is possible to educate children with poor sight, total/partial blindness.

Books with big print and desk with proper light are of considerable help to the child with defective vision. Green/grey board instead of a blackboard, unglazed paper and use of soft black pencils improve the visibility for such a child. Handicapped children learn better with special equipment under the guidance of special educators.

Children with severe defects will need to be educated with special tools. Have you heard of BRAILLE? It is a system of reading and writing the letters, numbers and words. The basic Brailler is a six-keyed device like a typewriter. The Braille dots are punched out one at a time from right to left. Children learn to use Braille with ease, once coached properly.

Recorded tapes are being used to impart education to the blind. Blind children need to develop listening skills to better their learning.

Special attention is being given to the blind children in the form of education and training. More employment opportunities provided to the blind adults are an assurance of their legal and human rights.

4.6.9. Deafness

New born infants are able to respond to the sound by startling and blinking of eyes. As they grow they recognize their parents' voices and enjoy their own cooing and gurgling sounds. Listening leads to language development. Latter the children learn to attach meanings to sound.

Children born with hearing impairment are unable to learn for they have not heard the sound to which they can attach meanings. This result in communication barrier.

4.6.10. Deaf and Hard of Hearing

A Deaf child is one who has lost the sense of hearing before learning the language. This means that the child is born without the ability to hear. Such children are often mute and silent.

Hard of hearing on the other hand is a defect that is acquired later in life. The child experiences varying degrees of hearing loss.

4.6.11. Causes of Deafness and Hearing Loss

Hearing impairment and loss are due to the following factors:

a. **Conductive Deafness** is better understood when you are acquainted with the structure of the ear.

The sound is conducted through the air into the outer ear. On reaching the tympanic membrane the sound waves changes the fluid level in semicircular canals. The passage of air in the outer ear is called the 'Conductive Pathway.' The conductive pathway can get affected due to

i. build up of wax in the ear,

ii. a foreign body in the pathway, and

iii. any swelling of the outer ear.

The conditions can cause temporary deafness that can be medically treated. Conductive deafness causes blockage of the Eustachian tube. The blocking fluid becomes thick like ***'glue'*** and can be drained out with surgical operation.

b. Sensory Neural Deafness is due to the damage of the ear drum, cochlea, auditory nerve and the associated brain cells. Such a damage can be (i) congenital or (ii) acquired.

c. Congenital Deafness can be due to genetic disorders and premature birth. A pregnant mother having German Measles during the first trimester of pregnancy may give birth to a deaf child. An attack of severe jaundice in which the mother's blood is incompatible with that of the foetus also results in congenital deafness.

d. Mixed Hearing Loss is a result of hearing impairments arising due to a combination of conductive and sensory neural defects.

4.6.12.Characteristics of a Deaf Child

The child may be dumb besides being deaf.

The speech defects are common among children with hearing impairment.

They have difficulty in learning language/vocabulary. It is an enormous challenge to learn to communicate in a language one cannot hear.

Consequently these children are low in intelligence because they are incapable of using available opportunities.

Such children have suspicious minds because of lack of coordination between vision and hearing. This also results in their

inability to make friends.

A deaf child is often indifferent and stubborn.

Sensitivity to hearing impairment among children leads to frustrations and inferiority complex.

The resultant poor communication causes tremendous socializing problems.

4.6.13 Special needs of a Deaf Child

Hearing defects cause a lot of problems ranging from language and vocabulary to comprehension and communication.

Physical Needs can be effectively taken care of by providing physical comfort to enable these children to improve their listening skills. Parents can help the child to locate sounds i.e, running of water to the tap or ringing of bell to the door. Intelligent parents can use playway techniques to help child recognize the sound e.g. hiding a musical toy and encouraging the child to look for it.

The child is helped to discriminate the sounds e.g. difference between father's and mother's voice, singing and crying etc.

The next step is the recognition of speech sounds. It is directly influenced by child's ability to use vision and other senses.

Emotional and Social Needs: As already studied suspicion is almost the second nature with deaf children. Consequently they get emotionally affected. Their social behaviour also needs to be improved and refined.

Need to Love and be Loved is as important for these children as it is for the blind. Love and affection provide emotional security besides the much needed encouragement for better learning.

Educational Needs involve child's ability to understand the languages. They learn to communicate through visual and manual means.

Oral Method or Lip-Reading is a special way of educating deaf children to identify sounds by watching the lip movement. It is slow method involving a lot of patience for the learner as well as the educator.

Manual Method or Sign Language helps the child to communicate with gestures, cues and finger-spellings. Have you ever watched on T.V. the news bulletin meant specially for deaf and dumb?

Need to be Independent is of utmost importance to the deaf child. It reduces his/her dependency on parents, and siblings. The ability to be independent makes them important components of the society they live in. Invention of hearing aids have provided the much need relief to the deaf.

4.6.14. Cause of Affected and Missing Limb

A Child with affected limb is not able to perform fully the activities involving the use of bones, muscles and joints. Similar handicap is experienced by children with the missing limb. Such children are known to be orthopaedically crippled.

Cruickshank, the psychologist defines a child with affected and missing limb "as one who has a defect which causes a deformity or an interference with the normal functioning of bone, muscle or joint." Such orthopaedic (bony) conditions may be congenital or acquired.

a. **Congenital Deformity** can occur due to genetic problems. Pregnancy is a critical period. Foetal formation is adversly affected if the pregnant mother suffers from measles, mumps, jaundice and other severe viral infections. Drug abuse among pregnant mothers may also result in the improper foetal formation of bones, limbs and other important body organs.

b. **Acquired Orthopaedic Defects** can occur at any stage in life. Polio and bone tuberculosis among small children has long lasting crippling effect on them.

Congenital or acquired muscular atrophy (Muscular damage) affects the efficiency of muscular performance. The extent of damage is determined by the severity of the atrophy.

Spinal injuries are often responsible for limiting the efficiency of one's motor activities.

Accident involving limb amputations result in bone deformities coupled with varying degrees of incapacitation.

4.6.15. Measurement of Orthopaedic Defects

The seriousness of the defect can be measured in terms of limb performance. Minor impairment of limbs may not be much of a hindrance in child's movements. On the other hand if the defect is severe and permanent, then the child's movement and independence will be seriously affected. And this can lead to maladjustment problems.

4.6.16. Characteristics of a Child with Affected / Missing Limb

Physical defect leads to inferiority complex among young children.

The feeling of inadequacy result in self pity.

These children isolate themselves from those around them. Loneliness reflects awkward social behaviour.

A little older child often goes through psychological trauma because of the discrepancy between his/her aspirations and the ability to perform.

Anxiety, extreme depression, escapism and over aggression are seen among children with affected and missing limbs.

4.6.17. Special needs of Children with Missing / Affected Limbs

These children like the blind and deaf ones, have special physical, social, emotional and educational needs.

Physical Needs consist of being able to cope with one's daily routine. The parents attitude should be to help the child to his/her best rather than "do things for them." Parents often feel responsible for their child's handicap and become over indulgent. As the time passes the child starts demanding and accepting help and stops making efforts to be independent and self-reliant. Science and technological advancement has led to the discovery of artificial limbs. These help one to overcome the physical defects. Hence they can look and perform quite like normal individuals. Physiotherapy is a paramedical science that helps the handicapped child to exploit his physical potentials to the maximum. Use of special equipment like calipers, shoes and artificial limbs alongwith proper training has yielded very good results.

Social and Emotional Needs. Playing is an important socialising tool. Children with affected limbs are very often left out of such group activities. This discrimination adversely affects the ongoing socialising processes. The child may feel frustrated, dejected and neglected. The social stigma attached to the handicap, interferes with the parents and friends lowers child's self-esteem. The social attitude like the belief that a "crippled body has a crippled mind" gives rise to wrong self-image.

Extreme aggression and temper tantrums are quite common among such children. Loving care and proper training to be independent and self-reliant are the basic needs of all handicapped children.

Education Needs involve and include activities that require 'doing'. writing, playing, drawing, painting, knitting and even dancing are some such activities. How can a child with weak/missing limb move

from one place to another? Use of stretchers and wheel chair improves the mobility beside boosting the confidence. Have you ever seen a child with a missing hand? Such children have been known to make beautiful paintings by foot/mouth. The environment of these children can be specially designed to promote education and learning among them.

4.6.18. Causes of Social Disadvantage Amongst Children

Socially handicapped children find it difficult to have a place for themselves in the society. Lack of social acceptance is due to the fact that they do not behave like the so called normal children of their age. They indulge in antisocial activities like stealing, pick-pocketing, gambling, alcohol and drug abuse. Some take to crime and abnormal sexual behaviours. Various causes leading to social handicap can be summed up as follows:

a. **Broken Homes.** Children fall out from families where there is constant bickering among the parents. The children do not get the love and guidance due to them. They may even be deprived of the basic necessities of life and take to streets for survival. Unwanted children and orphans often fall victims of social maladjustments.

b. **Poverty and Ignorance.** Children from very poor families and of ignorant parents are often deprived of food, clothing and shelter. In the absence of proper guidance from their parents, these children start petty thefts to survive. Later they get habituated to antisocial activities in a big way.

c. **Inadequate Schooling.** School is the second place where the children learn the values of life. Do you know which is the first place? Yes, Home. Poor parents do not send their children to school for want of funds. These children remain unguided in streets for long hours. They often get into gang fights and undesirable activities. Lack of school discipline is a cause of

truancy. Children also succumb to negative peer pressure when they do not have strong normal and social values from parents, teachers and other adults in their environment.

d. **Lack of Good Role Models.** Children have very sensitive minds and learn fast from adults in their environment. Living with corrupt and dishonest persons give negative values to the children. They fail to differentiate between right and wrong. Moral values are not taught like they used to be in olden days. Children imbibe these values from adults and siblings at home, from teachers and peers at school. Problems arise when they have wrong individuals as their role models.

e. **Lack of Supervision During the Formative Years.** This can happen to children from poor as well as rich families. Poor parents have to put in long hours of work to sustain life while rich ones overlook/neglect the upbringing in their desire to become richer. These parents leave the upbringing of their children to the maids and servants. Parents should be committed to the upbringing of their children, specially during the formative years. They should spend quality time with children for healthy upbringing.

4.6.19. Ways of Helping a Disadvantaged child to Learn and be Self-Reliant

Despite the limitations the children with handicaps can and do learn. What comes easily to a normal child is a matter of hard work, training and immense courage on the part of the handicapped child. All disadvantaged/handicapped children have similar rights to growth and development like their normal counterparts. Infact these special children are now referred to as "differently abled" individuals.

Time have changed and there is greater awareness of the need to give lots of love, and instill a sense of independence and train these children to be as normal as they possibly can be. Each handicapped/

disadvantaged child has specific problem that needs to be attended to individually.

The various ways of helping disadvantaged children are listed below. You can select the ways to deal with the specific disadvantage:

Lots of love and parental support is essential.

Proper guidance by trained teachers/special educators/parents/ siblings and peers.

Individuals coming in contact with special child should be good role models. This enables the disadvantaged child to imitate the ideal model and learn the task well.

These children should have high level of motivation. They should be given lots of opportunities and encouragement to learn and perform. The extent of learning depends upon repetition and the effort taken to master the skill/lesson/task.

The ***"differently abled"*** children require lot of patience and encouragement from family, teachers and peers.

Special exercise/therapies alongwith special-learning materials and techniques promote better learning. Can you name some of these materials/techniques?

Handicapped children should be given special aids that will enable them to overcome their limitations. These are spectacles, Braille books, artificial limbs and hearing aids etc.

Interaction with peers is equally important. Acceptance of child's handicap by the peers is extremely important to the differently abled child. Being accepted as a part of the mainstream children, gives tremendous boost to the special child. Being a part of the peer group provides ***'Identity'*** to the handicapped child.

Socially disadvantaged children do need help similar to the one required by other special children. Government/voluntary agencies and philanthropist individuals should join hands to provide these children

with the basic needs of life. They have an urgent and greater need for counselling and psychological guidance by specially trained personnel. They also need constant monitoring for improvement in their behaviour. It takes a lot of time and effort to get the children on the right track.

Socially disadvantaged children need special attention for education, occupational skills and behavioural modification for rehabilitation in the society.

Lastly no effort should be spared to make the children self reliant, happy, physically and emotionally strong for the family and society to be proud of.

Summary

There is difference between normal and disabled/disadvantaged children.

Physically-handicapped and socially maladjusted children are disadvantaged children.

Disability among children can be congenital and acquired.

Children are disadvantaged on account of physical, neurological defects and social maladjustment.

A child is considered handicapped/disadvantaged when his/her physical, social, emotional and educational needs require attention.

Poor vision can be improved by wearing spectacles. Blind can be educated by the use of special equipment and techniques.

Hearing impairment often causes speech and communication problems. These can be rectified by using hearing aids. Lip-reading and sign language make learning possible for a deaf child.

Missing limbs/affected limbs require special attention for a child to become independent and self-sufficient.

It is important to rehabilitate disadvantaged children.

4.6.20. Rehabilitation

"The combined and coordinated use of Medical, Social, Educational and Vocational measures for training and retraining the individual to the highest possible level of ability" (W.H.O.)

1. Medical Rehabilitation	- Restoration of function - Surgery - Physiotherapy, appliances, artificial limbs.
2. Social Rehabilitation	- Restoration of family and social relationship - counselling and guidance services.
3. Education Rehabilitation	- with a view to help in the vocational rehabilitation
4. Vocational Rehabilitation	- restoration of the capacity to earn a livelihood - vocational therapy - occupational therapy.
5. Psychological Rehabilitation	- restoration of personal dignity - results from the above 4 rehabilitation.

4.7. TRAINING CHILD DEVELOPMENT WORKERS

In any programme of human development there should be focus on the child as he is the future adult.

Child Development

In all human societies, child care has been basically the responsibility of the family, particularly the mother. In olden times, health, education and recreation services for the general well-being of the child were provided by the child's family. Later, when social institutions outside the family began to develop, children were taken care by secondary institutions like the school, the health centre, baldwadi and the like. Because of the complexity of our society and the race for economic development, it has not been possible to ensure that the

family is so strengthened as to be able to take care of the needs of its children. Hence secondary institutions have to take up more responsibilities in child care programmes. In this regard, the State has to assume a bigger responsibility in child care programmes.

Child Development Workers

With a view to providing child care services, there is need for a variety of child care workers, who work with the child at the grass-root level, performing some of the functions which the family is normally supposed to perform. In this regard, the child care worker also works with the family in order to improve the skills and capacities of the mother to look after the child better. The need for the training of child care workers is also felt because of the complexity of human society and the availability of expertise through various social groups, which help in our understanding of the needs of the human child. Thus the needs of the child are met through a suitably trained child care worker.

4.7.1. Categories of Child Development Workers

i. **Non-Institutional Community Services.** Child care workers for non-institutional community services are those concerned with pre-school children such as crèche attendants, nursery school/baldwadi teachers, balasevikas, anganwadi workers, etc. There are workers organizing recreation, hobbies, libraries and cultural activities for children. There are others who work with families for adoption and foster care services. Child health and school health service is the concern of the health functionaries such as midwives, auxiliary nurse, midwives, paediatricians and the like. Psychologists, psychiatrists and psychiatric social workers are working in social work service, child guidance clinics, etc. In addition, there are multipurpose workers like grama sevikas who look after the needs of children, nutrition services, welfare of mothers, etc. These workers are also assisted by associate women workers known as gram lakhmi/gram kaki.

ii. **Residential Services.** For residential institutions, there are house-mothers, group workers, superintendents of institutions for socially handicapped children, etc.

Community Development Workers

The children's programmes are of the nature of balwadis, crèches, play centers, nutrition centers, maternity and child welfare centers, etc. Therefore, a functionary known as grama sevika was introduced to implement the programmes for women and children.

The mukhya sevikas who supervised the work of grama sevikas are trained by various Social Education Organizers Training Centres either run directly by the Government or by voluntary agencies like the Gandhi Gram near Madurai, Vishwa Bharti at Shanti Niketan, the Ramakrishna Mission in Calcutta, Sewa Mandir in Udaipur, M.S. University of Baroda, etc. The Directorate of Extension organizes subject-matter courses for mukhya sevikas and the instructors of the Farmers Training Centres, in child development and nutrition at different Home Science Colleges on a grant-in-aid basis.

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Practicals

1. Identify and discuss problems at different stages of life span.
2. Discuss the various counselling techniques followed to tackle some of the problems.

Questions

Section – A

I. Fill in the blanks

1. Males begin to produce sperm when _____ years have been completed.
2. _____ _____ is the reproductive age.
3. Middle age begins at _____ and extends to age of _____
4. The traumatic effect of divorce is usually greater than that of_____
5. _____ is the time of the 'empty nest'.
6. _____ defects exist year after year.
7. _____ blindness refers to a child born blind.
8. It is important to _____ socially disadvantaged children _____
9. Both male and female sex organs reach their mature size in late _____
10. Until they are sexually mature, children are known as 'pubescent' after that they are called _____

II. Match the following

1. Old age	time of rapid growth and change
2. Middle age	is a problem age
3. Early adulthood	time of evaluation
4. Adolescence	period of decline
5. Puberty	period of social isolation

III. True or false

1. Early adolescence is referred to as the 'teens'.
2. Boys tend to mature more rapidly than girls.
3. The menarche or the first menstruation is a criteria of sexual maturity for girls.
4. Adolescence is thought of as a period of 'calm and quite'
5. Middle age is referred to as 'wearing out' in certain vital areas.
6. Adulthood is also called 'age of manhood'
7. Sensory neural deafness is only congenital and not acquired.
8. Children reach adulthood when their puberty growth is complete and when their sex organs have developed to the point where they are capable of procreation.
9. Adolescence is the threshold of 'Adulthood'.
10. Gramasevika is in charge of programs for women and children.

Section B

Explain the following terms

1. Puberty
2. Adolescence
3. Adulthood
4. Divorce
5. Old age
6. Braille
7. 'Differently abled'
8. Three 'A's of happiness during puberty

9. Adolescent growth spurt.
10. Generation gap and cultural gap
11. Legal maturity
12. Gramasevika
13. Baker's definition for a disabled child
14. Transitional period
15. Non-Institutional community services.

Section C

1. Mention the causes for disability among children.
2. What are the stages of puberty?
3. Mention the primary sex characteristics in girls and boys.
4. What are the special areas of interests shown by adolescents?
5. What are the subdivisions of adulthood?
6. Give the reasons for divorce.
7. Why is adolescence a transitional period?
8. Write on the different categories of child development workers.
9. Give five reasons why young adult women remain single.
10. What are the causes for blindness?

Section D

1. Write on the effects of endocrine imbalance at puberty.
2. What are the advantages and disadvantages of institutional living for the elderly?
3. Explain the need for rehabilitation of the disabled
4. What are the internal and external changes during adolescence?
5. Explain the special needs of a deaf child.

5. HOME MANAGEMENT

Family is an important part of man's social environment. Home management is an essential component of family living, contributing to health, happiness and well being of the family.

A **family** consists of two or more persons related to each other by blood, marriage or adoption living in the same household. Family as a social institution performs the activities of procreation, economy, education and recreation. As a family is made up of human beings living together with love, affection and mutual understanding, the management of a family is basically concerned with the qualities of human relationships.

The present society is greatly different from that of our fore fathers. The impact of western technology, mass education, democracy, industrialization, employment and bureaucracy has led to a decline in the joint family system. It has brought in lot of changes in the home and family life. Because of rapid improvement in communication network, the facility to see, hear and assimilate information has increased. There is increased production of a variety of goods and service required for day to day living. The advancement in science and technology has paved way for more number of women to take up employment outside, which has resulted in the increased number of intercaste and inter religious marriages.

Time consuming house hold tasks are being accomplished by time saving appliances. Convenience food has facilitated the employed home maker to accomplish her task easily and quickly.

The traditional roles played by the various members in the family had undergone rapid changes due to the involvement of women in labour force. The participation of all the family members

in the house hold tasks has become a necessity due to the scarcity of labour in the domestic front.

Management is a means of adjusting to change and also results in change.

5.1. CONCEPT OF HOME MANAGEMENT

Home management is a very important factor, which contributes to the health, happiness and well being of a family. It paves way for a better growth and development of the family members. Life has become very complex because man has increased tools and has changed the tactics of living. As a result, it has become necessary for him to develop more skills in the use of available resources in order to get what he wants for himself and his family to improve his status. In other words management deals with **"using what we have, to get what we want."** What we have is the resources. The resources that we have may be time, money, energy, skill etc. What we want is the achievement of goals. Goals are the aims in our life. Attainment of goals give pleasure and non attainment gives dissatisfaction.

Dissatisfaction can be avoided only through the wise application of management process. The quality of management will vary depending on the managerial abilities of individuals. Management process will enable one to identify and locate available resources and use them effectively to achieve the desired goals

5.2. MANAGEMENT PROCESS

Management process consists of three steps 1). Planning 2) Controlling 3) Evaluating. We will discuss about each one of these in detail.

Planning

Planning is very important to the success of management process. It is basically working out ways or course of action to

achieve the goals. Our day to day experiences help a great deal in planning. It needs a certain amount of thinking. Planning can be habitual or conscious. Planning involves thinking through the possible ways of reaching a desired goal. The entire task from its beginning to its completion must be viewed in whole. If the paths leading to the goals are easy to see, the choice of the best plan can be made quickly. When the path is hard to see due to some obstacle, the planner must find ways of overcoming them. As children do not have enough experience, they can get the help of an experienced adult to plan. The final act in planning is arriving at a decision. 'It is the gate that releases action'.

As a planner we constantly make use of our powers of thinking, memory, observation, reasoning and imagination. Based on our past experiences and observations we plan things by reasoning. We see the relationship between facts and through imagination, we arrange facts into new relationships and patterns. The more we develop these powers, the easier it is to plan and to meet situations in everyday living. For example, when we plan to have birthday party the following points should be borne in mind while planning.

1. The place or the venue of the party.
2. Number of invitees
3. Menu
4. How much money are we going to spend?
5. When are we going to have the party?

While planning, the following points should be considered.

1. There should be a balance between the amount of resources available and the demands or needs.
2. The decision should be made according to individual situations

3. The plan should be realistic

4. The plan should be flexible.

Controlling

Controlling is carrying out the plan. This step calls for flexibility in thinking. At times new decisions are required which may result in changes in plan. For example: when the menus are planned for meals, if certain things are not available during shopping a fresh decision need to be made.

The different phases of controlling are

1. **Energising :** This is initiating and sustaining the action. The individuals who are involved in doing a particular task must be energized in order to get results. In spite of having a good plan, sometimes implementing the plan would become difficult. Here the energizing function would act as a catalyst.

2. **Checking :** This is a quick step by step evaluation of the progress of a plan. To go to school on time one has to get the clothes, the meals and books ready, which need checking of time at all stages.

3. **Adjusting :** Adjusting is done in the plan if there is a need for fresh decisions to be taken. This should be done taking into account the problem in hand and the resources available.

Getting into action, keeping the resources mobile and knowledge of what is to be done are all important in this step.

Evaluating

This is a checking up process, which may help one move forward. The efficiency of the process and the quality of the end product are to be checked. When we have clear cut objectives it becomes easier to evaluate the entire process. The success or failure

of the plan must be evaluated on the basis of the set goals. In case of failure the demerits of the plan may be noted and rectified while making further plans. Evaluation can be general or more detailed.

Thus management in the home is a dynamic force in day to day living and is the administrative side of family living. Efficient, effective and dynamic use of resources lead to the proper management of the house, whereby goals are achieved to attain maximum satisfaction.

5.3. VALUES, GOALS AND STANDARDS

Management plays an important role in shaping our lives. It enables to recognise the values, the allocation of resources to attain the family goals so as to enhance the standard of life.

Goals, values and standards are closely related concepts. **Value** is the base and from values stem the other two concepts - **goals and standards.** Values are important to the individual but vague to express in operational terms. The concept of goal is more specific. It signifies something definite towards which one works. A standard is defined as something used as a basis.

Value indicates the worth that is attached to any object, condition, principle or idea. Value is the capacity of something or somebody to satisfy the human desire. These are the ways behind our actions and the basis for setting goals.

All values are human. They are created, evaluated and enjoyed by persons. A value is always important to the person who holds it. It is desirable and satisfying. It has the ability to develop in self-creative way. It is relatively stable but tends to change gradually.

The intensity of values vary from individual to individual. Values help an individual to direct his effort more intelligently in seeking satisfactions.

Values are of two types - ***Intrinsic and Instrumental***. An ***intrinsic value*** is one that is important and desirable for its own sake. e.g. art. The interest in beauty is an intrinsic value. An ***instrumental value*** is the means to attain other values, e.g. Efficiency in work. Some values possess both intrinsic and instrumental worth. The human values - love, affection, health; comfort, ambition, knowledge, wisdom, play, art and religion have both intrinsic and instrumental values.

The major values classified by ***Parker*** are

Love: It is the interest in relationship with people in its broad sense and its various forms are expressed as sex love, parental love, friendship and community love.

Health: It is the interest in physical and mental well-being.

Comfort: It is the interest in making life as pleasant and agreeable as possible.

Ambition: It is the interest or desire for success in life for a victorious achievement.

Knowledge and wisdom: It is the interest in truth and its use in all activities in living.

Technological interest or efficiency in work: It is the interest in the efficient making and using of things.

Play: It is the interest in beauty in all forms of expression.

Religion: It is the interest in goodness and rightness in unifying all aims and purposes in living.

Values grow out of human desire and interest. Values differ in cultures. The family has the major responsibility for fostering values among the members.

Goals

Goals are value based objectives. The goals grow out of desires, past experiences and environment. Goals are the ends that any individual or family is willing to work for. The family's goal will help in shaping the family's life pattern and setting standards.

The formulation and attainment of individual and family goals require the knowledge, judgment and understanding the ways of using family resources. Goals should be definite and attainable. Goal-setting is a continuous process. Many goals are immediately attainable. One goal stems from another and leads to a third.

Goals can be for short term, mid term or long-term. The short-term goals are the initial goals, which leads to the final long-term goals. The major goals that are created by the family grow out of its own environment and experience.

The major goals of home making are

1. Providing optimum physical and mental health for the members of the family.
2. Facilitating for optimum development of the individual members of the family.
3. Satisfying family relationships.
4. Recognition, acceptance and appreciation of human differences.
5. Establishing satisfactory relationship with the community and other subsystems of the society.

Standards

Standard is defined as ***scale or parameter*** used for comparison. Standards are more specific than values or goals. Standards are related to specific materials. It is influenced by external factors.

Standards are set limits one will accept in working toward a goal. Standards are mental pictures of what is considered essential and necessary to make life satisfying. If achieved, leads to satisfaction, if not achieved leads to uncomfortable situation. Standards remain as part of one's pattern of living and habit.

Standards vary according to the values of the family or group. On this basis they can be classified as conventional standards and flexible standards.

Conventional Standards are fixed and arise from the values of social acceptance. In this people change to meet the standards. Conventional standards are traditional and are accepted by the community or by a social group within it. They are fixed at a given time and liable to change when condition change.

Flexible standards are developed and changed according to the individual's demand. They change to suit the human situation. But they are not widely accepted by the community.

Standard of living is the combination of many specific standards. It consists of a pattern of commodities, services and satisfactions which a person thinks essential for happy living. According to Hazel Kyrk, ***"standard of living is made up of the essential values to be sought. It is an attitude towards a way of regarding or of judging, a given mode of life".*** Standard of living determines the character of the real income of the family. The standard of living of a family encompasses not only the actual qualities and quantities of goods and services but also the ways of using these goods and services.

5.4. DECISION MAKING

Home management, a dynamic process involves decision making. Decision making is the heart of Home management. It requires knowledge of essential information, application of

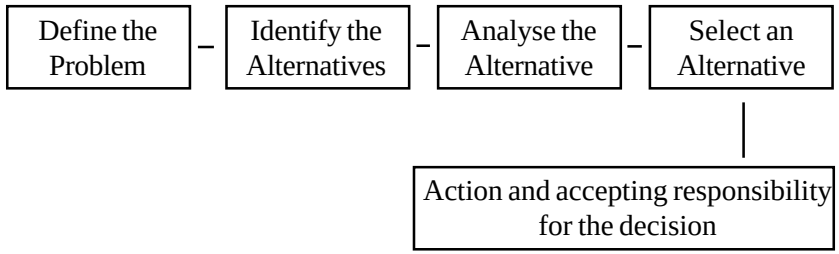
knowledge in life situation and the willingness to know and to apply. So the role of decision making in management involves knowing and actually applying essential information in problem situations of day to day life.

Management is a mental process which involves a series of decision -making. The steps in decision making are:

1. Defining the problem
2. Identifying the alternative solutions
3. Analysing the alternatives
4. Selecting an alternative
5. Action in carrying out the plan and bearing responsibility for the consequences.

This may be given diagrammatically as follows

Decision Making Process



Defining the Problem

It involves the recognition of the problem. It needs relevant information to identify and define it first. Unless the problem is clearly defined and analysed the ultimate decision would not be effective. For e.g. Planning household activities, purchasing labour saving devices, selecting clothing for the family.

Identifying the Alternatives

Decision making will be effective only when one identifies possible alternatives. The choice of best selection of alternatives requires thorough knowledge about the availability of resources and their limitations.

Analysing the Alternatives

After identifying the alternatives, one should think of the consequences of each alternative systematically to find out the relevant one, considering the goals, values and standards.

Selecting an Alternative

After analysing the problem one should carefully select from the possible alternatives. Evaluation plays a very important role in this selection. Choosing the best from the several possible alternatives will be helpful in solving the problem.

Accepting the Consequences of the Decision

This is the ability to assess and accept the consequences of the decision for making future decision. It is the evaluational process. This experience would indicate the final outcome of the decision making. It creates self confidence in people to make effective decisions in the future.

Types of Decisions

There are different types of decisions namely individual decision, group decision, habitual decision, central decision, economic decision, technical decision and decision making due to experience and knowledge.

Individual Decision

It is the decision pertaining to an individual e.g. education. Individual decisions are more quickly made. The decision making

of an individual revolves around the values, goals, standards and roles the individual assures in the relevant set of frame work.

Group Decision

It is made from the collective action of several individuals each of whom has distinct values, goals, standards and role perception. It is a difficult process and a slow process. Role conflicts would emerge in this situation.

Habitual Decision

It is the lowest level of decision. Once an individual is trained to do systematic work, he will follow that throughout his life. They are routine, repetitive actions related to daily activities. Once it becomes a habitual choice, the resultant action is quick and spontaneous.

Central Decision

Central decision has many supporting decisions to complete the whole task e.g. purchasing a house is a central decision. This leads to look out for other supporting decisions like transportation facilities, community facilities, savings etc.

Economic Decision

It is based on allocation and exchange process relating to resource use. This decision needs the allocation of human and non human resources to attain a goal. It reveals the allocation of resources among the combination of goals that will bring about the greatest degree of satisfaction.

Technical Decision

This decision involves a decision, which will .enable the best combination of resources to achieve the stated goal.

Decision Making Based on Experience and Knowledge

There are certain decisions made in day to day living which are purely based on past experiences and knowledge. This helps a person to become more efficient and skilled in decision making process.

5.5. FAMILY RESOURCES

Every family has certain needs to be fulfilled. Need for food, clothing, shelter etc. are the primary needs and the needs for education, entertainment, comfort etc are secondary needs. How far these needs are met depends on the availability of resources.

Resources are the means of satisfying wants. They are essential for achieving family goals. Resources are the materials and human attributes which satisfy our wants. They vary for individuals, communities, states and nations.

Resources are of two types - ***Human resources and non-human or material resources.*** Human Resources include the personal characteristics and attributes i.e., education, occupational status, skills, attitudes, personality trait and other personal characteristics and also resources that are used for the productive purposes which includes, time, energy, abilities and interests.

Non-human or material resources are material goods, such as house, furniture, money and community facilities which include parks, library, government hospitals, schools, shopping and recreational facilities. Non- human resources are easily identifiable but are limited in their availability.

The success of the management depends upon the recognition, allocation and use of resources. All resources are useful, but the usefulness of a particular resource varies from goal to goal. The resources are limited. The limitation may be qualitative or quantitative. e.g. time is a limited resource since no one can have more than 24 hours per day. We cannot save the time for each day

for future use. Energy is another limited resource. It varies from person to person. The limits of money are measured quantitatively. The amount and the demand for money varies from individual to individual and from situation to situation and from time to time. The abilities of the family members are limited by the inherent capacity and the training involved.

The qualitative limitation of the resources cannot be easily measured. It can be identified in material goods and the available community services.

All the resources are interrelated. The integration of all the available resources will lead to a satisfactory path to attain the goal. The use and abuse of the different types of resources affect the efficiency of the management. ***Management means planning, directing, guiding, co-ordinating, controlling and evaluating the use of the human and the material resources of the family, for the purpose of attaining maximum satisfaction.*** Quality of life is determined by the proper utilisation of the resources e.g. using labour saving devices. This conserves time and energy and lead to better products in food, clothing and house sanitation.

5.6. TIME AND ENERGY MANAGEMENT

5.6.1. Time Management

We all have twenty four hours a day to use in some way. Time is one resource we all share. Locating ourselves in our environment with reference to time is an important part of time management. All our activities for example going to bed, getting up in the morning, having meals, playing, etc is based on the available time. Time and energy are closely related, the management and use of one affecting the other.

Time use is affected by the following factors.

1. Stage of family life cycle

The beginning stage is the period of establishment which starts from the date of marriage till the first baby is born, a period of approximately 0 to 4 years. The time demand will differ based on whether the home maker is employed or not. The second stage is the expanding stage where the demand for time will be more for guiding and being with children. The third stage is the contracting stage when the children leave home because of marriage or employment. The time requirement at this stage will be much lighter and they will have more time for participation in community activities etc.

2. Environment

The size and type of the house, the number of persons in the family, the age of the family members, work area, tools and equipment available affect the usage of time.

3. Who perform the household task

Whether the household tasks are performed individually or shared by the family members affect the use of time.

4. The attitude towards house work and whether the homemaker is gainfully employed also has a role in affecting time use.

5.6.2. Energy Management

Energy management is more difficult and complex as the energy that each person has to do various activities depend on physical and mental health. Like time the demand for energy will be less during beginning and contracting stage and more during the expanding stage.

The various efforts are needed to perform different household tasks. They are mental effort, visual effort, manual effort, torsal effort and pedal effort. Depending on the energy requirement tasks can be classified as below.

Light work – Eg. Sewing, Washing dishes, Dusting furniture, sweeping etc.,

Moderate work – Eg. Kneading dough, ironing, hanging clothes.

Heavy work – Eg. Bed making, mopping floor, laundry, carrying children etc.

Energy expenditure for doing various tasks depend on the mental approach, postural strain, muscle tension, concentration in work and the skill they acquire. Fatigue is a condition where the amount of work output would be reduced. This can be classified as physiological and psychological fatigue.

The reason for fatigue could be

1. The long period of mental or physical work
2. Heavy physical work
3. Working under pressure
4. Unfamiliar work
5. Non accomplishment of work
6. Monotonous work
7. Lack of motivation
8. Dislike for work
9. Desire to stop work
10. Failure of plans

Management of time and energy

Planning

The first stage of management is planning. The time and activity pattern of the family should be planned taking into consideration the daily, weekly, seasonal and special tasks, and the amount of time required for various activities. The steps is making the time plan are

Step I - This consists of listing the every day, weekly, special and recreational activities of the family

Step II - Making a plan for routine tasks considering those work that must be done at a definite time of the day. By this one will know the block of free time available.

Step III - Fitting the special and seasonal jobs into the free time block.

Step IV - Deciding who will do the various tasks in the family. This can be decided through group discussion.

Controlling

Carrying out time and activity plan is the next step in managing time and energy. Change of plan may occur depending on the interruptions. Motivation plays an important role in carrying out the activity plans. Developing skill and use of work simplification techniques will reduce time and energy expenditure.

Evaluating

Evaluation should be done while making and carrying out plans as well as reviewing the results. Constant evaluation of performance and checking of accomplishments should be done to make sure that things are going on as planned.

5.7. WORK SIMPLIFICATION

Work simplification is making work easier. According to ***Nickell and Dorsey*, *"it is the conscious seeking of simplest, easiest and quickest method of doing work."*** It aims at accomplishing more work with limited amount of time and energy ***(Gross and Crandall).***

Home making involves various types of activities which are most of the time tedious, monotonous, time consuming and involves various types of skill. Most of the work if done without much skill and under pressure would lead to unhappiness or frustration. To manage the house one should know the best way of doing each household activity. To do the work easily one should know why, how, when, who and where a work should he done.

Dr. Marvin Mundel has given five factors that influence the character of work. They are:

1. Change in hand and body motions

Work can be simplified by using each part of the body properly and economically.

This can be achieved by

1. Keeping body parts in alignment
2. Using muscles effectively
3. Doing the work in rhythmic motion
4. Developing skill in work.

2. Change in equipment and work arrangement

Using labour saving devices, planning work surfaces at proper height, depth and width with proper tools and adequate storage space and lighting will improve the efficiency of work.

3. Change in production sequence

When there are a lot of household activities to be accomplished time and energy can be saved by simplifying the work through combining the tasks and eliminating unnecessary steps.

4. Change in finished product.

Simplification of work could be achieved by changing the standards or expectations of the finished product.

5. Change in material

This refers to the change in the raw ingredient to get the same final products.

5.7.1. Fuels and Ovens

The more economical, convenient, clean and attractive the kitchen, the greater is the satisfaction it gives to the housewife. Wise selection of fuels and ovens help to conserve time and energy of the homemaker and induce economy in family finance.

Combustible substances used for the production of heat are known as fuels. They can be graded according to the amount of heat produced. No home or industry can exist without them. All fuels contain the basic combustible elements carbon and hydrogen along with non- combustible materials such as carbon-di-oxide and moisture.

Qualities of a Good Fuel

A good fuel should be

1. Exothermic
2. Inexpensive
3. Easily storable and transportable
4. The products of combustion should be easily disposable.

Types of Fuels

Fuels fall under three major categories solid, liquid and gaseous in their natural or prepared state. Fourth category is electricity and micro wave and fifth category includes solar energy.

Solid fuels	:	Natural	:	Wood, Coal
		Prepared	:	Charcoal
Liquid fuels	:	Natural	:	Petroleum
		Prepared	:	Kerosene
Gaseous fuels	:	Natural	:	Natural gas
		Prepared	:	Coal gas, Acetylene, Biogas, Methane gas

Electricity and Microwave

Solar energy.

Wood

It is the cheapest and widely used type of fuel. When considering wood, some burn quickly and steadily for a longer time. Wood is well dried and cut into desired pieces before use. When one end of a piece of wood is burnt, an oily liquid can be seen to ooze out at the other end. The more the oil in the wood, the better it burns (e.g.) Eucalyptus. Commonly the wood of tamarind, margosa, mango and casuarina trees are used. Expensive wood is never used unless it is decayed. People who are bothered about the use, care and maintenance of oil, feel that gas or electricity is highly convenient than fire wood. It is freely available in many rural parts of India.

The disadvantages of using wood are as follows:

1. It is difficult to kindle and when wet, does not burn properly.
2. Transportation and storage may be a problem.
3. Storage place may become a breeding place for ants, white ants and reptiles.

4. Certain types of fire wood gives out more smoke.
5. Smoky kitchen suffocates the worker. The kitchen and vessels are darkened with soot and smoke from fire wood.
6. Cleaning the dirty vessels will be more difficult for the homemaker.
7. Proper chimneys need to be constructed to let out the smoke from the kitchen.

Cowdung

In India, cowdung cakes are used as a supplementing fuel along with firewood. They are considered unhygienic since a lot of insects multiply in the place where they are stored. However, they are good fertilisers and it would be more appropriate to use them as manure.

Coal

Owing to earthquakes and other natural phenomenon, forests were burnt and burried. As a result, coal is the product of heat and pressure on vegetable and animal matter through many generations. Coal is dugout from underground mines, in many parts of India. In India, coal mines exist in Singareni of Andhrapradesh, and Raniganj of West Bengal. Lignite is available in Neyveli. It gives intense heat and produces more smoke.

Charcoal

It is the charred remains of wood heated out of contact with air and is widely used for domestic purposes all over India. It burns till completely consumed.

Liquid Fuels

The liquid fuels are petroleum, petrol spirit, kerosene, alcohol, etc. Kerosene is commonly used in rural Indian homes for stoves and lamps. It is cheap and easy for use in stoves.

Gaseous Fuels

Coal gas, acetylene gas, liquefied petroleum gas, cowdung gas are gaseous fuels. In India liquefied petroleum gas is commonly used. It is considered as the best domestic fuel as it does not blacken the vessel and wall. It is economical and the heat can be easily regulated. Gas can cause carbon monoxide poisioning if it is not lighted hence care must be taken to turn off the cylinder valve securely when not in use.

Cowdung gas (Biogas)

Bio gas is produced by the degradation of biological matter by the bacterial action in the absence of free oxygen. The cheapest and easily obtainable biogas is gobar gas or dung gas which is produced by the anaerobic fermentation of cattle dung in specially constructed plants. Methane 60% and hydrogen 40% are the main combustible constituents of biogas. Bio gas burns with a smokeless blue flame. The gas has all the advantages of gaseous fuel such as high calorific values, economical and cheaper, cleanliness of utensils and surrounding areas, absence of smoke, dust and dirt. It does not contain the poisonous gas carbon monoxide as an ingredient.

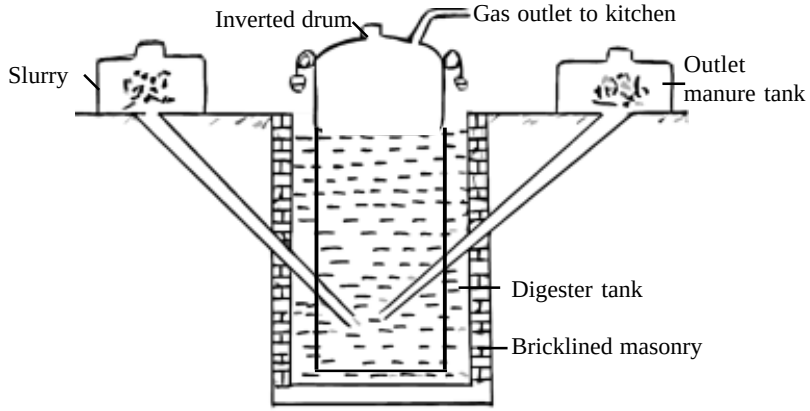


Fig. 1 : Bio-gas plant

Gas Plant

The fermentation tank is a brick-lined well, which is filled with cowdung made into a liquid paste with water. This is then covered with an iron drum, introduced upside down into the well. The gas produced is collected into the inverted drum. Through an opening at the top of the drum, the gas can be led to the kitchen by pipes. It solves the fuel problem in villages.

Electricity

Though electricity is the common fuel in many advanced countries, its use for cooking is a luxury, known only to a few rich Indian families. It gives intense heat very quickly. There is no botheration of smoke or dust, and the kitchen can be kept clean. Electric cooking ranges are still beyond the reach of many people in India. One has to remember the saying that electricity is a good servant, but bad master.

OVENS

1. The traditional Chulah

In India this is the commonest type in most parts, but rather old fashioned. It stands on three stones holding any type or size of vessel over it. The fuel burnt in this chulah is usually pieces of wood and twigs. Fire wood makes a better fuel compared to other fuels such as saw dust, waste paper, cowdung cake, husk, coconut shells and other organic waste. Proper chimneys need to be constructed to let out smoke from the kitchen.

2. Smokeless Chulah

The ordinary traditional chulah was made more efficient and economical by evolving smokeless chulah. The Hindi word "chula" means a fire place or stove for cooking. Some of the smokeless chulahs are magan chulah, gujarat chulah, nada chulah and Dr. S.P.Raju's chulah. Red clay, cowdung and hay are used to set the

platform. The pot seats are scooped out. There is a passage between the pot seats, large enough for the flame to pass. The smoke is drawn out through the chimney. Hence kitchen can be maintained smokeless. Usually there are three pot seats, at one end the fuel is fed. If any pot seat is not used, it must be covered to prevent the smoke escaping from it.

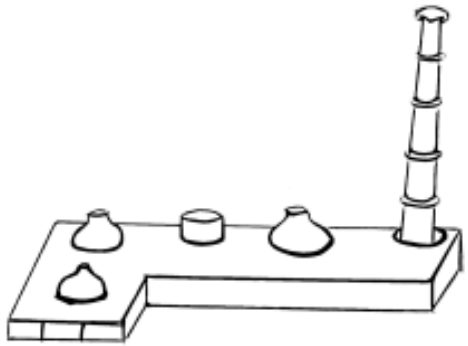


Fig. 2 : Smokless Chulah

3. Charcoal Sigri

A charcoal sigri is made up of iron. The stove is not costly and has the advantage of producing less smoke. Charcoal is the charred remains of heated wood. It is black and brittle. It is easy to light and when lit it burns, intensely glowing red. It needs fanning often to ensure a uniform heating. The disadvantage of this stove is, if the room is not well ventilated there is the danger of carbon monoxide poisoning through the fumes of the unconsumed gas given out from the charcoal.

4. Oil Stove

In the market, several oil stoves are available for cooking. They are economical, portable, can be easily lit, and well managed. They are available in various shapes and sizes. Oil stoves are more extensively used in places where there is scarcity of electricity and gas.

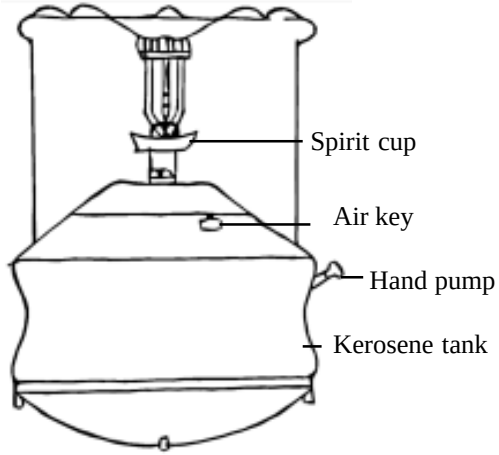


Fig. 3 : Pressure Stove

Clean kerosene oil should be used. The kerosene stove does not burn the liquid kerosene straight away but only burns the vapour of kerosene which is produced by heat. The result is a blue flame which gives out intense heat. Special care is needed to keep them clean and in good order. The odour of kerosene oil will otherwise make the food unpalatable. Their efficiency depends upon how regularly wicks are trimmed, oil is fed and the stove is maintained.

Pressure Stove

Pressure Stoves are an improvement over the wick stoves. This appliance consists of a burner top and a tank at the bottom for the kerosene. The tank is filled with pump, a lid and an air key. There is a spirit cup at the centre of the stove and a nipple on top of it. In general pressure stoves consume less of kerosene and produce a hotter flame than the wick stove.

The pressure stoves are not easy to keep clean. Pressure stoves need pricking, priming and pumping before they can be lit. It causes soot on lighting. It is too hot for simmering purposes. It needs to be pumped up from time to time.

5. Gas Stove

For domestic use, liquefied petroleum gas is generally supplied in steel cylinders used in this type of stove. Cooking in gas stoves are efficient, as heat is easily regulated. It is convenient and economical in the long run. A short piece of special tubing connects the cylinder carrying the gas. When the cylinder valve is opened, the evaporated gas pass through the regulator to the stove. Gas stove saves time and energy for the home makers. Hence, labour saving. It does not produce soot on the cooking utensil, since there is no smoke. It helps to maintain the kitchen neat, tidy and clean. It is more helpful in quantity cookery in hostels and hotels. Leakage of gas should be prevented.

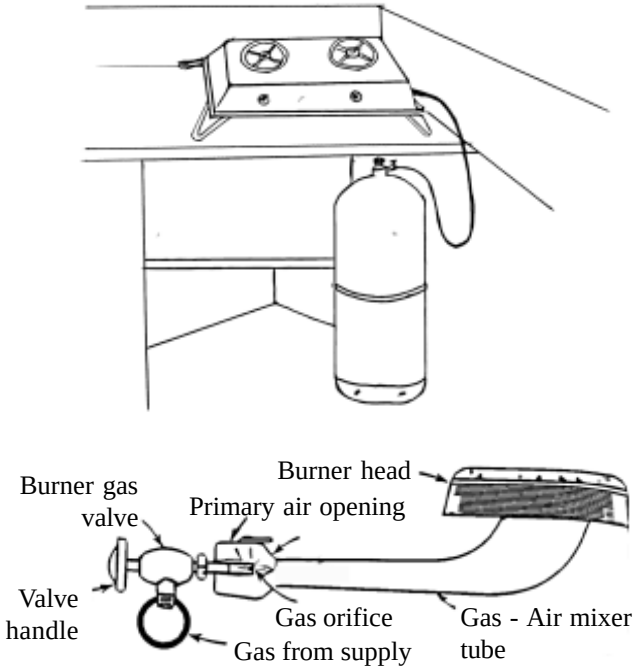


Fig. 4 : Gas stove

6. Electric Range

When a current of electricity passes through a conductor, heat is produced. Electric stoves, are heated by coils through which current passes. Appliances such as heaters, hotplates, kettles and toaster are coming into common use. The absence of smoke, smell or ash are the advantages. In India, due to the high cost of electricity, electrical equipment, scarcity of electricity and fear of accidents, it is not commonly used.

7. Solar Cookers

The advancement of modern science has made available many techniques for using the different potentials of energy and utilizing them for increasing fuel needs. Many cooking devices utilizing the solar energy have been developed at present. One such is solar oven that has received considerable attention. The reflector solar devices have taken many sizes, shapes and materials of construction. The solar cooker properly designed can deliver temperature as high as 450°c. In a tropical country like India, the wide use of solar ovens should be enthusised with proper results to suit urban and rural or high and low income families.

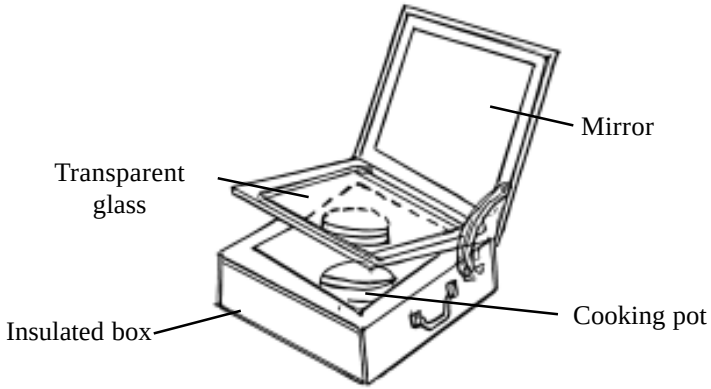


Fig. 5 : Solar Cooker

The solar cookers are used to boil rice and dhal, bake biscuits and roast groundnut. The solar heaters are used for the provision of hot water for domestic uses. Solar heated water may be sufficient for bathing, washing and cooking needs of the family.

Microwave Oven

It is an Electronic oven designed for cooking most foods usually cooked in gas and electric range including foods commonly cooked on surface units. It is also used to thaw frozen foods, to heat leftovers, to warm the baby's bottle.

Microwaves themselves are the sources of energy and not the heat. Microwave cooking appliances heat only by radiation. In electronic ranges the microwaves penetrate the food, setting the food molecule in motion, an action that generates heat within the food and brings about the cooking results. The process is very rapid, two to ten times faster than the conventional methods depending upon the amount of food. In the conventional methods of cookery, heat is applied to the outside of the food. Pyrex glass and ceramic cookware (Corning ware) are used as dish materials.

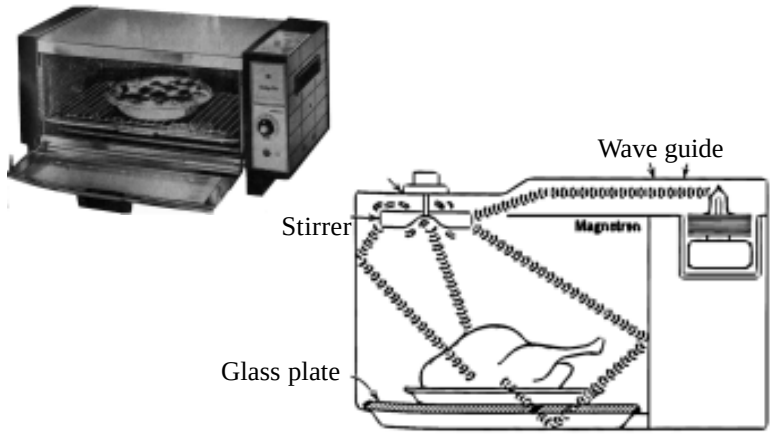


Fig. 6 : Microwave oven

Advantages

The cooking process is very rapid.

Disadvantage

1. Electricity is expensive.
2. Not suitable for quantity cookery.

Labour Saving Devices

Changes in social and economic conditions in the last few years have resulted in changed responsibilities for both the gainfully employed and full time homemaker. Normally the homemakers spend much of their time in the kitchen. It will be helpful if they can save steps, energy, money and time in several ways in the kitchen. Labour saving devices both electrical and non-electrical are increasingly utilized by the homemaker at present. These tools and appliances have become part and parcel of the houses because of the comforts they yield. Adjusting the homemakers workload at home and outside the home necessitates the use of tools and appliances for carrying out the household activities.

Labour saving devices are the tools and appliances used to save both time and energy of the homemaker.

Uses of Labour Saving Devices

1. It reduces time and energy thereby reducing the drudgery of the homemaker.
2. It improves the quality of the work being done.
3. More work can be done within the same time.
4. A high standard of sanitation and varied menus are possible.
5. The dependence of the housewife on domestic servant is reduced.

6. It gives chances to the families to enjoy their leisure time activities.
7. The possession of Labour saving devices give prestige value.

Selection of Labour Saving Devices

The efficiency and use of a labour saving device includes the correct selection, operation and care of appliances so that the homemaker may accomplish maximum amount of work with the minimum efforts, in the shortest possible time. There are a number of appliances available in the market. The criteria for selection of one equipment vary from the other. But in general the factors to be considered in the selection of equipment are as follows.

1. The needs of the family members.
2. The cost of the equipment.
3. The usefulness of the equipment.
4. Quality.
5. Durability
6. Family size and type.
7. Guarantee
8. Brand
9. Safety
10. Suitable size and shape.
11. The care required for its maintenance.
12. Availability of spare parts and service facilities.
13. Easy assembling and reassembling of parts while using and cleaning.
14. Storage Space and easy installation.

Use and care of Labour Saving Devices

Modern household use a number of labour saving devices. A knowledge of how an appliance works is useful as it helps the homemaker to use and take care of it well. Let us see some of the Labour Saving Devices commonly used by the homemaker and its merits and de-merits.

Non electrical Equipments

1. Pressure Cooker

The pressure cooker is so designed that food is cooked approximately at 121°c, and the steam pressure of 15 1b. per sq.metre is approximately maintained.

Merits

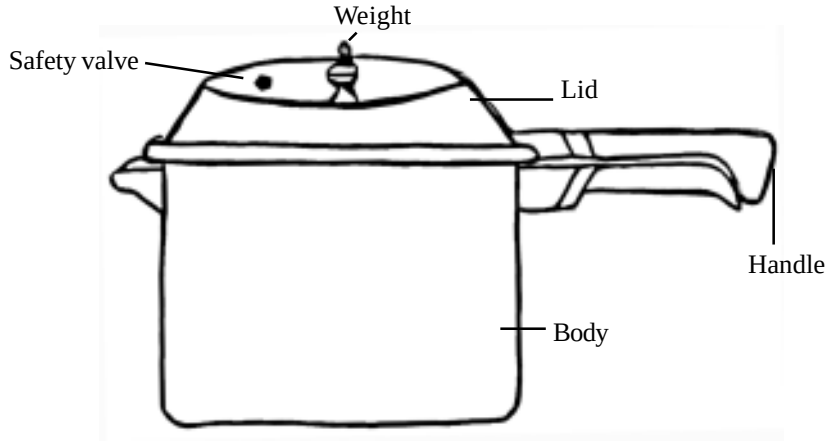


Fig. 7 : Pressure Cooker

1. The use of a pressure cooker means a saving of fuel, time and energy of the homemaker.
2. Several dishes can be cooked in a shorter time.
3. As the cooking time is reduced, the loss of nutrients is also reduced.

4. The need to stir the food continuously is eliminated.
5. The food cooked in a pressure cooker will remain warm for sometime and reheating may not be required.

De-Merits

1. The rubber gasket needs to be frequently replaced.
2. Any obstruction in the vent tube may cause the pressure to build up without a means for the steam to escape and cause fire accidents.
3. The pressure cooker lid should remain locked and the weight must not be removed from the cooker until the pressure has lowered completely. Failure to do so may result in serious accidents.

Care

1. The cooker must be cleaned with warm soapy water or a cleaning agent after use.
2. The rubber gasket needs to be checked periodically for cuts and cracks and replaced.
3. The weight, valve and safety valve need to be checked to ensure safe operation.
4. The pan and lid must be wiped dry and put away after use.

2. Gas Stove

Merits

1. Gas stove is used extensively in most of the houses for cooking purposes. Cooking in gas stove saves time and energy since it cooks fast.
2. Well constructed burner ensures complete combustion with no smoke. So it is easy to keep the kitchen and the cooking utensils clean without soot.

3. Though the fuel cost is high, maintenance cost is the barest minimum.

De-Merits

1 LPG is one and half times as heavy as air and therefore requires careful handling.

3. A leak from the cylinder will settle down and cause a fire or explosion hazard.

4. If the room is not ventilated gas leakage may cause carbon monoxide poisoning.

Care

1. Periodical cleaning of the burner heads and checking the leakage must be carried out.

2. The cylinder valve must be closed when the stove is not in use for safety operation.

3. Hay Box Cooker

Hay box cooker is a fuel less cooker which can be effectively used by the rural women. A large wooden box of 60cm x 45cm x 45cm could be used for this purpose. The box is filled with hay which is a bad conductor of heat and allows very little heat to escape. A pillow of jute almost of the size of the box is filled with the hay to work as a perfectly insulated box. Care should be taken to see that the pillow is well fitted on the box. The pot of preboiled food is then firmly placed in the hay and covered with the pillow of hay. The food gets cooked within half an hour to one hour, with the retained heat. Two or three items can be cooked depending upon its size. Hay box cooker takes 15 minutes for vegetable, 30 minutes for rice and about 1 hour for dhal to cook.

Uses

This method is very useful for cooking rice, porridge and anything requiring slow cooking. It saves fuel as no fuel is required in .the hay box. The food remains warm for 5 to 6 hours. There are no chances of burning and 'boiling over' of the food.

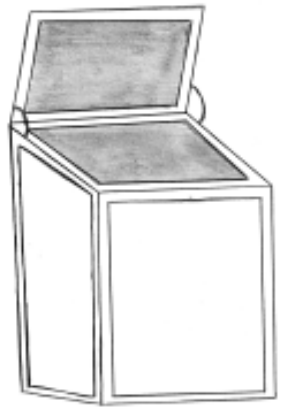


Fig. 8 : Hay Box

De-Merits

1 It is a slow process. It requires pre cooking of the items.

2 If the box is not well insulated with hay the heat will escape and the food will remain uncooked.

Care

1. The hay box should be filled with clean hay material.

2. The hay box should be kept in the sun frequently so that the moisture in the straw is removed.

4. Beaters

They are used to incorporate air into a mixture to develop a fine texture and to blend ingredients. Hand beaters may be of two types.

1. Whisk Beater
2. Rotatory beater.

l. Whisk Beater

It is effective in incorporating large amount of air and gives maximum volume of mixture. It require one hand for operation. It consist of a series of several small wires brought together at the top to form handle.

2. Rotatory Type

The rotary beater, is a tool with blades that rotate as a hand wheel is turned. It generally requires two hands for operation- one for support and the other for turning the wheel.

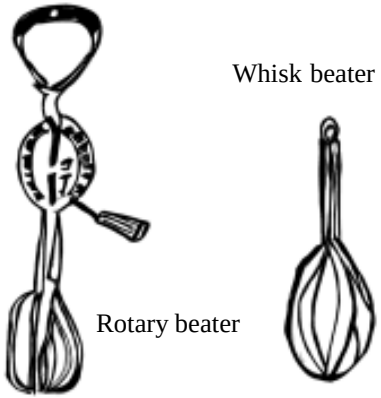


Fig. 9 : Beater

Care

Beaters of either type should be cleaned and dried thoroughly after use.

5. Graters

Graters are extensively used as kitchen utensils. Graters may be of various shapes-flat, cylindrical or square. Graters are available with various sizes of holes which are either punched or drilled.

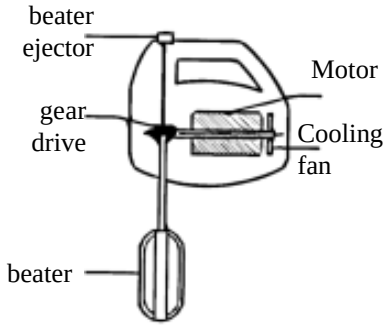


Fig. 9A

Use

1. The drilled holes are round or oval in shape, produce slices of food and fairly a large volume of food.

Care

After use it must be thoroughly cleaned, dried and stored properly.

6. Peelers

It is one of the accessory tools used in most of the houses. Peelers are used to remove the skin of the vegetables and fruits. Several kinds of peelers are available in the market. A vegetable peeler peels closely so it is economical and quicker than an ordinary knife.

Fig. 10 : Peeler

Electrical Equipments

1. Refrigerator

Refrigerator is a device that maintains the temperature at O°c (32°F) or above and humidity which influence the quality of food stored in the freezer.

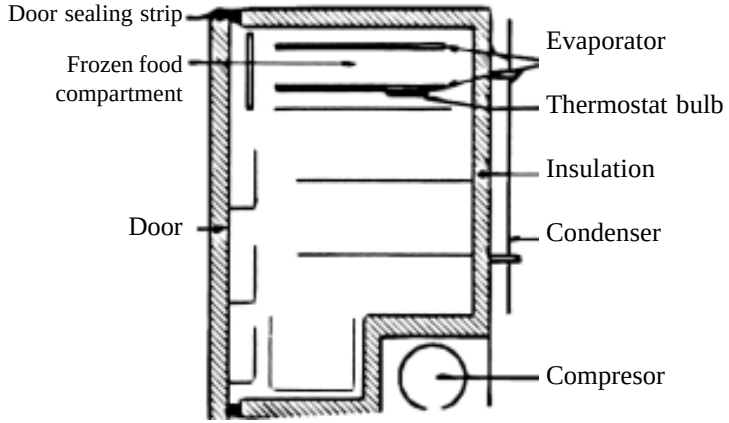


Fig. 11 : Refrigerator

Merits

1. It helps to preserve food stuffs so that they maintain their natural, physical appearance and nutritive value.
2. It helps to keep things cool.
3. It has made possible the enjoyment of many foods throughout the year.
4. Daily shopping is no longer necessary. It saves steps, energy and time.

De-Merits

1. The advent of no frost or automatic de-frosting refrigerators and freezers have resulted in a tendency to clean these less frequently. So it results in food spoilage.
2. If spills are not wiped up and foods not covered, their odours may be absorbed by other foods in the compartment. As a result the original flavour may be altered.

Care

1. The refrigerator should not be over crowded.
2. Frequent opening of the refrigerator should be avoided.
3. Hot vessels should be cooled before being placed in the refrigerator.
4. Regular inspection of stored food and the removal before spoilage is required to keep the refrigerator clean.
5. Defrosting should be done periodically. This may be done by shutting off the current or by opening the fridge door. Defrosting is advised before the deposit is too thick.
6. It should be placed in a cool place about 15 to 30 cm away from the wall to permit heat escape.

7. Avoid using sharp instruments to remove ice in ice trays or in scraping off frost.

2. Electric Blender

Is is otherwise known as mixie which usually combines the work of a blender, a mixer, a grinder and a juice extractor.

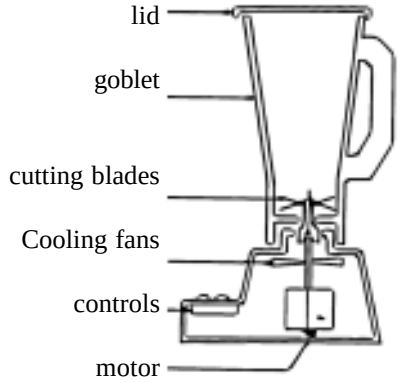


Fig. 12 : Blender

1. It is used for grinding chutneys, preparing dry and wet masalas.
2. It is used for churning butter milk and mashing fruits.
3. It is used for extracting fruit juice, grating and slicing vegetables.

De-Merits

1. Mixie should not be used to do things for which it was not designed. It will cause damage to the motor.
2. It should be handled with care. Touching the equipment with wet hands when it is on, may prove fatal. Some jars are designed with a removable portion in the lid for adding foods or liquid. While pouring water into the container one should switch off the current. Otherwise one is liable to get an electric shock.

Care

1. The container should be immediately cleaned with soap water after use.
2. The container must never be removed or fitted on the mixie base while the motor is running.
3. Plastic spatula should be used to stir and remove the contents from the jar.
4. The external surfaces of the machine may be kept clean with a damp cloth and covered when not in use.

3. Washing Machine

The purpose of a washing machine is to remove soil (dirt) from the clothes. It consists of a drum in which dirty clothes, water and detergent are filled. These are agitated by means of a rotating plastic impeller called agitator. Some models have a spin dryer attached. The rinsed clothes are rotated in an empty drum while hot air blows through them. They may be taken out almost dry and ready for ironing. Automatic and semi-automatic washers are now available in the market.

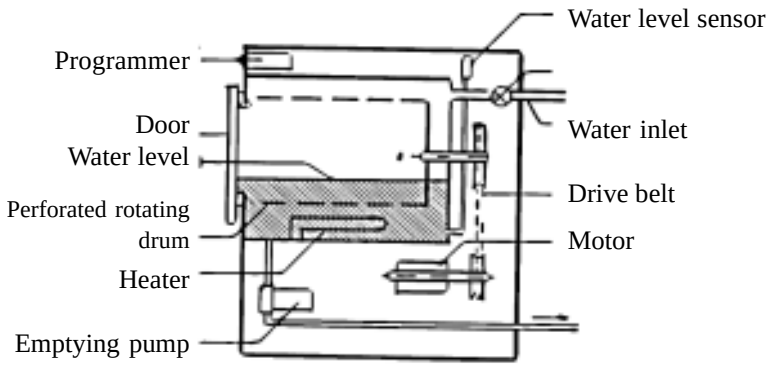


Fig. 13 : Front loading washing machine

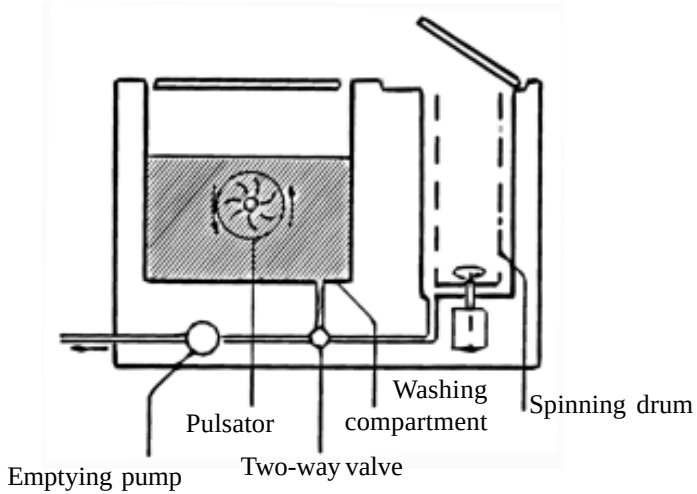


Fig. 13A : Twin-tub washing machine

Demerits

1. Overloading of washer creates strain on the motor. When garments are crowded they neither wash well nor rinse well.

Care

1. After the clothes have been removed from the washer, the lid should be kept open until the washer cools to prevent a musty odour.
2. Apart from the routine care, the outer surface of the washing machine should be wiped with a wet cloth.

4. Wet Grinder

Wet grinder works on electricity with the principle of diminishing manual work. It reduces time and energy. Electrically operated wet grinders for both commercial establishment and homes are now available in the market. Though expensive, these take the drudgery out of such chores. The commonest types used for wet grinding are

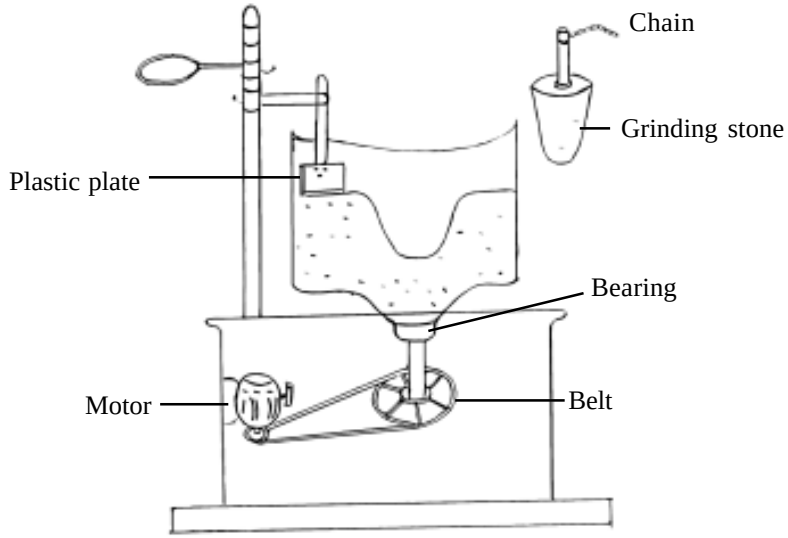


Fig. 14 : Wet grinder

1. Ordinary model
2. Tilting model
3. Table top model

Uses

Wet grinder is a mechanical device used for grinding large quantities of chutneys or preparing the batter for idli, dosa and vadas.

De-Merits

1. In the ordinary type, lifting and cleaning the grinding stone poses a problem because of heavy weight.
2. Since the grinding vessel is uncovered, it may harbour household pests like cockroaches and get deposited with dust.
3. In the tilting model, it takes a longer time to grind because the stone is light in weight. There is a possibility of water getting into grinder machine through an outer opening around

the grinding vessel. As a result it may cause damage to the inner parts due to rust formation.

Care

1. Overloading of wet-grinder should be avoided to prevent overheating of motor.
2. It should not be used in a low-voltage situation. Low- voltage may cause the motor to run slowly and eventually overheat it.
3. It should be thoroughly cleaned and dried after use to prevent bad odour.
4. The equipment should be covered when not in use.
5. The equipment should be used according to the manufacturer's direction.

5. Vacuum Cleaner

Vacuum cleaners are the home care appliances that aid in maintaining high standards of cleanliness and sanitation. The three basic principles involved in vacuum cleaning are suction, sweeping and agitation.

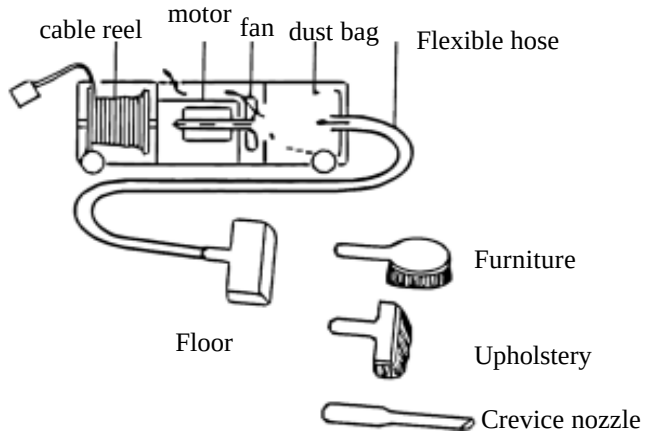


Fig. 15 : Vaccuum Cleaner

The ***primary functions*** of an electric cleaner are

1. To remove surface dirt from the walls, ceiling, floor and furniture.
2. To remove the embedded dirt and grit from floor coverings such as rugs and carpets.
3. The long flexible hosepipe and several attachments enable one to blow off the dirt and dust from the windows and spray water to clean the doors and window glasspanes.

De-Merits

1. Vaccuum cleaners are not designed to pickup water because of electrical hazard. Therefore this should not be attempted.
2. If the motor is for a longer time, it can be damaged from over heating. Overheating for a sufficient period of time will burn out the motor.

Care

The vaccuum cleaner must be cared for efficient use and long life.

1. Thread and hair may wrap round the cleaning brush. It is important to remove the items from the ends of the brush, so that they do not impair its freedom of movement.
2. The bag must be emptied often to maintain its cleaning power. A fuller bag requires increased force to push air through it, so there is less suction for picking up dirt.

6. Range

The range is an appliance used for food preparation. It consists of surface units or gas burner and an oven. Heat for majority of the ranges used in the homes today is produced from either gas or electricity.

Fig. 16 : Cooking range

Use

Cooking range performs surface cooking, baking, roasting and broiling operations.

De-Merits

1. If the range is not installed properly on level heat distribution will not be even and the quality of the end products will be poor.
2. It should be handled with care as it is electrically operated.

Care

1. The extension surface of the range should be cleaned regularly with a clean cloth that has been wrung out in hot soapy water to remove grease splatters that might not be seen.
2. Oven cleaning is much easier if done frequently. Food spills should be wiped as soon as the oven cools down.
3. Electric range is finished in porcelain enamel. It is not advisable to wash the porcelain enamel on a hot range because it tends to cause the enamel to crack.
4. Acid foods spilled on the enamel surface stain it and remove the gloss. So it should be avoided.

7. Toasters

The primary function of an electric toaster is to toast sliced bread. Different types of toasters are available in the market, namely automatic, semi-automatic and non- automatic.

The automatic toaster is faster, requires less attention and eliminates some manual operations.

De-merits

Since it is electrically operated equipment, it must be handled with care.

Care

1. Apart from wiping the outside with a damp cloth the toaster may be inverted and gently tapped to get rid of the burnt bread crumbs lodged inside it.
2. Forks should never be used to remove the bread slice as they may damage the heating element as well as give an electric shock if the toaster is connected to the main.
3. The toaster should be placed on a heat-resistant non-conducting asbestos sheets.

8. Electric Gysers

Electric Gysers are quite popular in modern houses both in kitchen and bathroom. Gysers are fixed on to the wall so that they do not occupy space.

Use

It is used for heating water for bathing and washing purposes.

De-merits

It is advisable to touch the pipe only after disconnecting the electric supply. At any rate they should not be switched on or off with wet hands. It may give an electric shock.

Care

The electric supply of the house should be properly earthed to avoid short circuit.

9. Immersion Rod

It is used for heating water in the homes where gysers are not in use. It consists, of a heating element made of a high resistance alloy. When current passes through it, it gets heated to a high temperature and in turn is used to heat water.

De-merits

As water is a good conductor of electricity, it is essential to switch off the current, to remove the heater from the bucket. Many fatal accidents have happened because this simple precaution was not followed.

Care

1. Unless it is dipped into the water, it must never be switched on.
2. The minimum water level at which it is safe for use is marked on it. This instruction should be followed.

5.8. MONEY MANAGEMENT

Money plays an important role in the life of man as an instrument through which he can satisfy his physical, material and mental needs. The income and expenditure pattern of the family decides the family's standard of living and its place in the society. It also decides the economic well-being of the family and the nation.

Family Income

Family income may be defined as money or purchasing power earned by family members during a specific period of time and goods and services received or created in that time by the family eg. goods like vegetables from kitchen garden, services like doing household chores, teaching children etc.

5.8.1. Types of Income

There are three major types of family income. They are

Money income

Real income

Psychic income.

Money Income

This income flows into the family in the form of currency, bank draft or cheques. Money income includes all the income received in the form of money like salary or wages, house rent, gifts, interest earned from bank deposits and other investment.

Money is valued by individuals and families because of its purchasing power over goods and services like food, clothing, shelter, educational and medical expenses etc, some of which are vital for the survival of human beings.

Real Income

Apart from money income, families may also receive real income. Real income is the flow of commodities and services available to families for satisfying their needs and wants.

Real income can be classified as direct and indirect.

Direct Income

It consist of those material goods and services available to the family members without the use of money. Examples are vegetables, fruits and flowers from home garden as well as other services. These services include those of the home makers who prepares food, cares for the family members, clean the house, the son who purchase things for the family and the services of the daughter who help the mother in the household activities. Employment benefits offered by employers to employees such as free housing, medical aid, free education schemes, loan facilities represent direct real income. Another source of direct income is free or social income

provided by the community. Library facilities, parks, schools, fire protection, community hall, police protection are commodities and services for which families need not spent.

Indirect Income

Indirect real income consists of those goods and services available to the family involving the use or exchange of money.

Psychic Income

This is the satisfaction which people experience. It consists of the mental and emotional satisfaction received from the use of money and real income. It is subjective in nature. For realising such income, the quality of management plays a vital role.

Expenditure

Happiness of the family is secured by income use or expenditure. Expenditure provides the satisfaction of life for the members of the family. All expenditure for the household may be divided into needs and wants. The needs are those which are necessary for maintaining a healthy, efficient household which a family must take care of and there are emergencies and special demands arising occasionally.

The regular monthly items of expenditure for most families include food, clothing, shelter, education, health, house keeping, recreation. Part of the income may be set aside in the form of savings for special needs or emergencies such as marriage, education, pleasure trips or sickness and old age.

The various factors that affect one's expenditure are:

1. Income of the family.
2. Size and composition of the family.
3. Age and occupation of the family members.
4. Education.

5. Location of the house.
6. Health status of the family members.
7. Interests and abilities of the members.
8. The availability of the goods.
9. The price of goods.
10. The customs of the family.
11. The personal likes and dislikes.
12. The general consumption pattern.
13. The saving pattern of the family in the future.

5.8.2. Budgeting

The common planning device for the use of money is the budget. It is a carefully prepared spending plan based on the actual family income. It is a plan based on previous experience, present needs and future expectations. A budget is always prepared for a fixed period of time generally for a month.

Importance of Budgeting

1. Budget acts as an intelligent guide to spending.
2. It enables a family to have an over all view of their income.
3. Budgeting facilitates adjusting irregular income to regular expenditure.
4. Budgeting helps people to discuss their needs and set their own priorities on them.
5. It helps one to cut unnecessary expenditure.
6. It helps one to be free from debts.
7. It helps one to live within one's income.
8. It encourages conscious decision making which may help in including long term goals in the Budget.

9. It relieves the family members from worries of future.
10. It forces one to decide what one wants most out of life.
11. It provides for future saving.

Budget is a guide to realistic spending aimed at avoiding over expenditure. Its success depends upon its being simple, realistic, flexible and suited to the family or individual for whom it is made. Control of the plan in action is impossible without a written plan. A written plan can serve as an excellent record for future planning. A mental plan though it may serve the effort of noting down, may not help in controlling expenditure. Important needs maybe overlooked.

Steps in Preparing the Budget for a Family

a. List commodities and services needed by the family members throughout the budget period.
b. Estimate the cost of desired items. Total each classification and estimate the total for the budget. Past records are helpful in this connection (Bills, cheques, receipts etc.).
c. Estimate and total expected income from all sources for the budget period.
d. Set aside a definite sum as emergency fund as well as for goal-oriented savings and insurance.
e. Bring expected income and expenditure in balance.
f. Check the plan if it is realistic.

The list of Budget Items

It is necessary to list the chief budget items to make sure that each item is attended to in the expenditure plan while portioning the income. Each family may have their own way of listing the items.

The chief budget items are:

Food

Food is the most important of all the items since it is a necessity. The quality and quantity of food available for the family affects their health, efficiency and happiness. Hence the expenses on the actual purchases of groceries, meat, egg, milk, fruit and vegetables are included under this head.

Clothing

Only items bought from a shop are to be included. These may be garments, shoes or other accessories needed by the family. Costs of fabric and tailoring charges may also figure in this group. However, it will not cover expenses likely to be incurred on laundry, drycleaning and repairs of the above items.

Housing

This includes charges on a rented house, repair charges and maintenance charges paid by the tenant. This does not include sums paid towards the purchase of a house or plot, fixtures, electricity and water charges.

Education

The educational expenditures depend upon the importance attached to education. All expenses incurred in connection with school or college education such as tuition fees, other fees, cost of note- books, text books, stationery.

Transport

It includes the expenses incurred on the use of public or personal transport. This would include the cost of fuel, service and maintenance charges, repairs, road tax and insurance for privately owned cycles, two-wheeler and four-wheeler.

Personal Expenses (Sundries)

The purchase of toiletries, laundry and drycleaning charges, cost of subscription to membership fees of clubs and associations, purchase of gifts, expenses incurred on cultural and recreational activities. Medical bills may also be budgetted under this head.

Household Expenses

All the expenses for running the house- electricity, water, fuel, telephone bills, wages of part-time and full time helpers are included here.

Savings

Money has to be set aside for investments, insurance premium, for chit funds and other schemes.

Engle's Laws of Consumption

A German statistician by name **Earnest Engle** found a statistical analysis of budget facts by research. The principles enunciated by him through his study of family budgets are known as Engle's Laws of Consumption. They are:

"As income increases, the proportion of income spent on food decreases, though the actual amount of money spent on food increases".

"The proportion of income spent on sundries, cultural wants, recreation, education, health etc. increases as income increases".

The proportion of income spent on shelter, clothing, lighting and fuel remains practically unchanged whatever the income may be.

Three typical budgets of families belonging to low, middle and high income groups are given below. Using these model budgets each family can draw its own budget to suit its needs and financial condition, making changes in the budget items wherever necessary.

Family Budget

For the sake of comparison the income levels have been fixed at Rs.1000, Rs.4000 and Rs.8000 per mensum. The family consists of husband and wife with two school going children living in urban area. The budget should be kept for reference during the budget period for exercising control over expenditure in the succeeding month. This would help to live within the income to save for future and provide for emergencies without increasing unnecessary debts.

Specimen budget for low, middle and high income groups

Expenditure	Rs. 1000 Actual amount spent Rs.	month %	Rs. 4000 Actual amount spent Rs.	month %	Rs. 8000 Actual amount spent Rs.	month %
Food	700	70%	1800	45%	2000	25%
Housing	50	5%	400	10%	800	10%
Clothing	50	5%	200	5%	400	5%
House keeping Expenses	100	10%	520	13%	1200	15%
Sundries	20	2%	200	5%	720	9%
Transport	20	2%	200	5%	560	7%
Medical	20	2%	320	8%	720	9%
Education	Free	--	120	3%	640	8%
Savings	40	4%	240	6%	960	12%

5.8.3. Supplementing Family Income

The problem of insufficient income is so great in our country that many families fall within the poverty line. It is essential in the grave context of unemployment, under employment, and population explosion that every one must work hard with high vision, so that our standard of living will be high.

Supplementing or enhancing family income is very much possible if one takes up certain activities during the leisure time. Subsidiary occupations are activities which augment the main income, and thereby help to utilise their leisure. Leisure time available to certain group of people can be fully made use of by such creative activities. Especially in rural areas people are not employed during the off season. To them subsidiary occupation is a boon.

Kitchen gardening, poultry keeping, dairy farming, goat rearing, basket .making, book binding, cartoon making, various craft works, embroidery, garment making, drawing and painting, doll making, spinning and weaving are a few of the subsidiary occupations one can take to enhance the family income.

Apart from this, the family's real income can be improved by the wise management of the family, so that thrift is followed in spending money. A homemaker needs to be a wise manager in planning the expenditure, investing in savings for the future etc. to meet the varying needs of the members.

The family members can contribute their share of 'labour' to the family so that they avoid engaging outside help for their family jobs - as household work, tuition, marketing, baby care, care of sick, sewing etc. The members can produce their own pickles, jam or other preserved foods as well as prepared foods instead of spending extra money to buy the same from retail sellers or hotels.

Such early concepts in economy, practicing self-help and wise use of leisure etc. pay dividends in enhancing the familys' money income as well as real income.

Wealth from Waste

When man utilises resources for his everyday activities producing and consuming food and various other commodities he

generate. Waste is simply some useful substances that we do not know to use. Waste can also be described as a resource out of place. It should be realised that waste is a treasure which could be recycled to form wealth. It is technically possible to recover atleast two third of the resource, that people waste in everyday life.

Recycling of waste reduces the cost of disposal and provides extra profit by reducing wastage of resources.

Methods and Benefits of Reusing Household Waste

Food wastes are, the animal, fruits or vegetable residues resulting from the handling, preparation, cooking and eating of foods. Due to food shortage it is necessary to prevent food wastages and make use of the wastages in cooking. In vegetable cookery certain amount of wastage occurs by peeling the skin portion of certain vegetables. The skin of ridge gourd, beetroot, seeds of bitter gourd, snake gourd can be used for preparing chutneys. Ladies finger toppings can be added to blackgram while grinding it for idli or dosai. Left over rice could be used to prepare rice vathals.

Finding Creative use for Waste Materials

An old china teapot that has lost the lid can be used effectively as flower vase. Similarly old wash basins can become indoor plant holder. Used tooth brushes are excellent for cleaning combs, and handles of cups. An old cooker gasket can be wound with a rope and can be used as hot pads on the dining table. It can be wound with colorful wool thread, plastic wire and used for decorating the walls at home.

Small scraps are used for repairing and decorating old garments for making rugs, bags and soft toys and in many places for enchanting patch work in table cloth, wall hangings, etc. Old cloths can also be used for stitching colourful bags, cushion covers and window curtains. The wastes like empty bottles and tins can be made into beautiful flower vases and containers.

5.8.4. Account Keeping

The only best way to determine whether the family income is being well spent or not, is by keeping accounts. While the budget is a plan for future spending, account keeping is a record of past spending. A household account is a record of expenditures actually incurred by the family in the course of a day, or a month. It will include the income earned by the family, the expenditure incurred, and the amount spent on each item of expenditure.

Generally accounts help to

1. Show where the money goes actually.
2. Check the amount spent on each item according to the budget.
3. Check the adequacy of allotting the income over the items.
4. Give basis for a better planning of expenditure in future.
5. Change our way of life either by reducing the consumption of certain costly food items, or taking up extra job etc.

Different methods of accounting used in the household are given below.

1. The Sheet System

It is a very simple method. Single, double or multiple sheets can be used for keeping accounts. The sheet along with the pencil can be hung in any convenient place (e.g.) back of door or a shelf.

2. Note book System

It is a very convenient method. Either bound or loose leaf notebooks can be used, since here insertions can be made easily. It is especially convenient for children if they help in account- keeping. The book should have columns to indicate the total income, the date, the account head and daily expenses. Neat recording prevents confusion. Calendar and diary are also helpful to keep the accounts.

3. The Envelope System

In one type, a number of envelops are kept for different budget heads. The portion of allotted income is put in the envelope for each item as per the budget allocation. This system is essentially helpful for those who earn weekly wages.

In another system, a large envelop is used in which day to day bills, slips, tickets etc. are put. Later at a convenient time, they can -be accounted. The outside of the envelope may be used for noting down the expenses.

4. Card File System

Separate cards may be maintained for income - budget allocation, and expenditure on each budget head. All expenses are entered as and when they occur daywise and categorised under each head. Various cards can be filed together. While keeping accounts, one should start a convenient system that is easily workable and make account keeping a regular habit.

5.8.5. Savings

Savings means, setting aside a portion of monthly income in terms of money. Today's income may be sufficient for today's needs but the future may bring increased need or decreased income or both. Only savings enable one to face future bravely.

Savings do not occur on its own. It is the result of careful planning and achieved by denying or postponing some present needs. So to say savings is the result of wise spending plan of the individual.

Savings may be temporary or permanent. Temporary savings are designed to achieve immediate goals such as purchasing a household equipment or going for a trip during vacation. Permanent savings are set aside for future security.

The following are the reasons for savings

1. To meet the demands at the time of fall in income during old age, sickness, unemployment.
2. To meet increased expenditure caused by illness, accidents, robbery or household repairs.
3. The desire to buy capital goods or assets like land, house and durable goods such as four wheeler, refrigerator etc.
4. For pleasure trip during holidays.
5. To celebrate functions and festivals.
6. To meet the expenditure on higher education and also for marriage.
7. To invest in business.
8. To gain social status and economic security.
9. To provide a secure life for the dependents.
10. To attend the social functions like marriages, birth day parties, etc.

Savings play an important role in raising ones standard of living and improving the quality of living also. Infact, savings well invested can help to generate more income. Savings give mental satisfaction and the capital to build up the nation's progressive plans.

Different Types of Savings

1. Individual Savings

Individuals have been in the habit of saving in one form or the other. Traditionally people were saving a part of their income in the form of commodities, animals, precious metals like gold and silver.

2. Corporate Savings

Corporate savings are exercised by some agencies or companies which highly help in the capital formation of a country (e.g.) Banks.

3. Compulsory Savings

When the state exercise an element of compulsion or force in making the individuals to save, that is called as compulsory savings (e.g.) Employee's provident Fund, General provident Fund.

Factors Affecting Savings

The factors such as income, current needs of members, habit for thrift, opportunities available for savings, the provision for future, and the size of the family, the standard of living, the cost of living, the economy of the country and the willingness of family members have a bearing on savings.

Institutions which Promote Savings

Several institutions are ready to help a person to save periodically by offering various attractive schemes.

The Role of Post Offices

Post offices have been rendering banking services along with its postal duties. In the post office savings account, an amount of Rupees five and above can be deposited at anytime, but withdrawals are allowed once a week. The deposited amount earns (5.5%) annual interest. The interest is exempted from income tax.

The post offices also provide five year and ten year recurring deposit schemes. An amount of Rupees ten and above can be deposited every month in this account. At the end of the period, the capital with 11% interest is repaid to the depositor.

Time deposit accounts for 1, 2, 5, 10 or 15 years can be opened in any post office for any amount. This scheme is helpful for those who receive regular monthly income by way of interest.

Kisanvikas patras are available in major post offices in the denominations of Rupees 100 and above. At the end of seven years and eight months the amount doubles in this scheme.

National savings certificates are also sold in post offices for a minimum of rupees one hundred and above. It qualifies for income tax rebate. It also carries 10% compound interest annually. At the end of six years, the amount together with interest is repaid. The annual interest accumulated is also exempted from income tax as it is again re-invested in the same scheme.

National savings scheme account can also be opened in major post offices by depositing a minimum of Rupees one hundred. It carries 8% annual interest (current interest 9%). A maximum, of Rs 40,000/- may be deposited annually. 20% of the amount invested qualify for income tax rebate. Loans are granted after a period of three years from the date of opening the account.

For all the post office small savings scheme, gift coupons were given by the government of Tamilnadu and various prizes were provided to the investors. Cash incentive of 1.5% is also available to the investors.

Role of Banks

The main purpose of the banks is to accept deposits and to lend these deposits to reliable borrowers at a higher rate of interest.

Savings bank account is a system where small deposits are accepted. Deposits may be made at any time, but interest is calculated for a minimum period of three to six months. (5 to 6 percent per annum). Withdrawals can be made by presenting the pass book.

In the case of fixed deposit account, the depositor withdraws the deposited amount only after a fixed time. The minimum period is 45 days. The interest rate offered is 10 to 12 % per annum (current interest 7.5% - 8.75%). As the period increases the interest also increases. It is suitable for those who want regular monthly income.

The Recurring Deposit scheme, marriage deposit scheme, loan linked deposit scheme, prize deposit scheme, double benefit schemes are the other schemes offered by the Banks for the welfare of the people. Loans at a lower rate of interest are advanced to farmers by the banks

Role of Life Insurance Corporation of India

Life insurance is a contract between the individual called the insured and the insurance company. Here the insured makes payment of money every year or at different intervals.

In return, the company agrees to pay a certain amount after a specific period or at the death of the insured to a third party known as the beneficiary. In the case of the death of the insured too, the family can lead an economically secured life. The premium amount that one has to pay varies according to the age of the insured, the sum insured and the period. Following are some of the various forms of life insurance policies now in force: Jeevan mitra, Jeevan sathi, Jeevan surabi, Jeevan akshay, Asha deep.

Unit Trust of India (UTI)

This is a public Sector financial institution and offers various schemes for attracting investments from the public. The Unit Trust Offers a safe way for people to invest their money in companies. The Unit Trust buys shares and stocks in various companies. Individuals can buy units from the Unit Trust. Each unit has a face value of Rs.10 and units can be purchased or sold. The income earned is passed on to the

unit holders as dividends and capital appreciation. Besides selling units, the Unit Trust has also other schemes such as Unit Linked Insurance Plan (ULIP), Children's Gift Growth Fund (CGGF) and Monthly Income Unit scheme to encourage savings.

Shares and Debentures

Stock and share are the means by which the individual can become part owner. When a person buys shares, he enjoys certain rights like right to dividend, participate in the profit or in the assets of company when it gets wound up. Shares are also sold and exchanged in the stock and share market. The money invested is multiplied in a short time and it is suitable for those who want to make quick money.

A debenture is a document or a certificate issued by a company as a proof of the money invested in the company debentures. The interest is payable periodically till the maturity of the term debentures and is paid along with the capital sum in case of cumulative debentures. Unlike shares, debentures carry a fixed rate of interest.

Chit Fund

This is one of the oldest methods of savings and raising money. Chit funds provide a ready means of getting a lumpsum while payments are in instalments. There are different varieties known as the lottery chit and the auction chit.

Lottery Chit

Specific number of individuals get together and contribute a fixed sum every month. The promoter usually gets the first month's total collection. During each succeeding month, the names of persons are written on pieces of paper and one is picked out. Thus the person to whom the chit fund is to be paid is decided by lottery every month.

Auction Chit

In this scheme, the monthly collection is put up for auction among the members. The one who bids the lowest amount or offers the highest discount is paid the fund and the balance amount called discount is divided up among all the subscribing members. Next month the successful bidder of the previous month drops out of the auction although he continues to contribute. Thus each member gets the amount once and the last member gets the full amount.

Nidhi

Nidhis were originally temporary societies of members who contributed monthly a certain amount which was then available as loans to members. The origin of the Nidhi scheme dates back to about 1850, when a fund for officials in Madras was created to save them from the money lenders who charged very high rates of interest. The Madras officials decided to start a fund of their own which would offer needy persons with fixed incomes an opportunity to borrow at reasonable rates.

Nidhis now have to be registered under the Indian Companies Act. The objectives of Nidhis are:

To afford facilities for saving

To give relief to members from the burden of old debts

To grant loans for special purposes.

Loans are given to outsiders also on sufficient security, but preference is given to members, and loans are given at reasonable rates.

Provident Fund (PF)

This is a compulsory saving scheme for all salaried persons. This gives a lot of financial security to every employee. There are two kinds of provident Fund. They are the general Provident Fund

(GPF) and Contributory Provident Fund (CPF). Under GPF, a Specific amount or a certain Percentage of the basic pay is deducted from the salary of the employee every month. It is ideally suited because the accumulated amount is paid to the employee at the time of retirement. One can take loan upto 60% of his collection and return it later from his salary every month. This kind of provident fund is followed for government employees.

CPF is a compulsory saving scheme for private company employees. The rate of subscription is uniformly fixed at 10% for both the employer and the employee.

5.9. CONSUMER AND THE MARKET

Consumer Behaviour

Consumer is the final buyers and user of goods and services for the satisfaction of personal wants. Buying implies the exchange of goods and services for cash. Even families with adequate income may lead unsatisfactory living because they do not know how to plan, buy and consume in the best manner. Effective buying of goods and services is an important aid to ensure family's happiness and well-being as well as to improve the Standard of living.

5.9.1. Classification of Market

The buying practice of majority of the consumers is not very satisfactory. This is due to lack of good buymanship. For wise buying every consumer must know to make decisions as to what, when, where and how much to buy goods.

Markets can be classified as following

1. On the basis of selling area we have local, national and international markets.
2. On the basis of articles sold we have cotton market, bullion market etc.

3. On the nature of exchange we have cash market or forward markets.

4. On the basis of nature of goods we have consumer goods market and industrial goods market.

5. On the basis of period we have short term and long term markets.

6. On the basis of nature and magnitude of selling we have wholesale and retail markets.

5.9.2. Types of goods

Based on consumers' buying practice, goods can be classified into three types.

1. **Convenience goods:** These goods are bought frequently in small quantities from shop within easy reach. E.g. Newspapers, soap, food articles etc.

2. **Shopping goods:** There are two types of shopping goods namely fashion goods and service goods. These goods need some time to shop around and are not urgent purchases. It need not have numerous retail outlets and can be bought at buyer's convenience. E.g. Furniture, jewellery etc.

3. **Speciality goods:** These goods are unique and needs shopping efforts. They are sold in speciality shops. E.g. Radio, T.V, cars etc.,

5.9.3. Buying Decisions

Determine what you need such as grocery items, fruits, vegetables, milk, medicine and personal beauty products etc. Planning helps to avoid buying unnecessary items.

Decide on the quantity of the items to be bought. This is helpful in avoiding wastage of items. Evaluate the products by looking at products brand, label, price, and quality marks such as I.S.I and

AGMARK. This will help the consumer to buy good quality food at a cheaper rate.

1. What to Buy

A consumer should plan the list of items based on needs and requirements within the budgeted resources.

2. Where to Buy

It indicates the decision about the place of purchase.

Items that are used daily are best bought through cooperatives because items are cheap, and of good quality.

If large quantities are required, one should go to whole sale shops. Buying through whole sale shop is not only cheaper than retail shops but also of superior quality.

Always shop at reliable stores.

Customary store shop seller is more receptive to bargaining for price concessions and quality products.

3. When to Buy

It indicates the time of purchase.

The best time to purchase things is when the shop is less crowded. One can read labels carefully, choose at ease and shop around leisurely to learn more about new products in the market.

Food stuffs such as vegetable and greens should be bought early in the morning

In the case of purchase of consumer durables like refrigerator, fans, the most efficient time is during off season, because they are cheaper.

Buy perishable foods like fruits and vegetables only if they are seasonal because they are cheaper and fresh.

Non-perishable items can be bought in larger quantities during April and May and stored for 3 to 6 months, or a year.

One can make use of discount sales, during festival times in trade fair and state- run emporia when they offer genuine discount upto 20%.

4. How to Buy

There are a number of ways in which one can buy goods.

Cash purchase: This is the most usual method of buying in exchange for money. This is the simplest method of getting what one wants.

Credit purchase: Instalment buying is the method usually adopted while purchasing expensive items like television, mixie, refrigerator, car etc. which an average consumer cannot afford to pay at one time. In Instalment purchase, a down payment is made and the rest of the amount is paid in easy monthly instalments.

5. How much to Buy

It indicates the amount of items to be purchased.

A consumer should buy fresh foods according to the quantity one can use daily.

If he has a refrigerator or Janatha refrigerator (mud cooler) he can buy vegetables once a week and store the items.

Dry provisions can be bought and stored for a month. If the place permits, the items can be stored for 6 months to one year.

Garments are only bought occasionally and according to season.

5.9.4. Consumer Guidance

Consumer education assures an important role in consumer protection. Everyone of us is a consumer and therefore have a right to consumer education which enables us to act as 'informed' consumers throughout our life.

1. It develops a person's ability to choose goods and services intelligently.
2. It helps a person to become a discriminate buyer who can distinguish needs from wants.
3. Provides information about existing laws and standards for the benefit of consumers.
4. Prepares consumers to demand safe, reliable, quality products and services at fair price.
5. Make people aware of their rights and responsibilities in society.

Rights of a Consumer

1. **The Right to safety** - consumer has the right to be protected against product and services which are injurious to health or life
2. **The Right to be informed** - consumer has the right to be given adequate information to buy wisely.
3. **The Right to choose** - the consumer has the right to select products of varying qualities, prices, sizes and designs and to choose according to his needs and wants.
4. **The right to be heard** - consumer has the right to fight against consumer exploitation in the society.
5. **The right to redressal** - the consumer has the right to receive compensation for faulty consumer goods or services
6. **The Right to live in a healthy environment** - the consumer has the right to live in a safe protected environment that will enhance the quality of life.

Consumer Responsibilities

1. A consumer should plan what exactly he wants to purchase.
2. A consumer should feel free to select from the variety of products according to his needs.
3. Consumer should make his own buying decisions. He should not get influenced by the seller or advertisements.
4. Consumer should make efforts to obtain product information at the time of purchase.
5. Consumer should look for guarantee while purchasing costly items.
6. Consumer should maintain records of the receipts and other documents for future reference. This is very important especially in the case of durable goods
7. A consumer should avoid "Impulse buying".
8. Consumer should not encourage black marketing of goods by buying more than what he needs at the time of scarcity of essential commodities.
9. It is also the responsibility of the consumer not to pollute his environment while disposing off waste material.

5.9.5. Consumer Protection

Due to mass production, new products are constantly introduced in the market. Consumers find it difficult to determine the uses for which they are fitted and to select them wisely because advertisement, attractive packaging, display and mass media are extensively used by manufacturers to push goods on consumers. Not all producers and sellers are honest. The desire for profit lead some manufacturers to cheat consumers by offering adulterated and poor quality products in the market. In short consumers in India are worst sufferers of the economic

exploitations and unfair trade practices. It is therefore necessary for consumers to educate themselves about their rights and seek protection from exploitation with the help of government and voluntary organisations.

Legislations

In India there are a number of laws enacted to protect consumer's interest directly. Some of the important laws are mentioned below.

The prevention of Food Adulteration Act (PFA)

In 1954 the Indian parliament enacted a law called" The Prevention of Food Adulteration Act" It came into force from 1st June 1995. The P.F.A lays down minimum standard requirements for all categories of food. Any food stuff that does not come up to the minimum standards specified by the PFA rules is considered adulterated.

The Agmark Act 1937

The 'Agmark' is a trade mark of quality levels of agricultural commodities set up by the Directorate of marketing and Inspection of the Government of India. 'Agmark' seal can be seen on food stuff such as edible oils, butter, ghee, eggs, cereals, pulses, oil seeds, legumes, etc. This helps the consumer in selecting foods and offers him protection with regard to quality.

I.S.I. (1947)

This is a certification mark of the Bureau of Indian Standards (BIS) which was earlier called as the Indian Standard Institution (I.S.I.). Indian standards cover food items such as vegetables, fruit and meat products, spices, and condiment, processed foods, cereal and soya products, candies, beverages, print paper, etc. For the consumers, certification marks ensures that the product is cheap, safe and pure.

Drugs and Cosmetics Act - 1940

This Act was passed to protect consumers from drugs and cosmetics of substandard quality by preventing them from being manufactured and marketed. It lays down that no person or firm can stock, sell or distribute drugs unless they have a proper license issued by the state government for the purpose. Under this law it is mandatory that every dealer must issue a cash memo for the drug sold to the consumer.

Essential Commodities Act, 1955

Under the provision of the Act, the central and state government have been empowered to regulate the production, supply, distribution, and processing essential commodities such as cattle fodder, coal, iron, steel, paper, cotton and woolen textile, petroleum, petroleum products, drugs, foods, raw jute and cotton. It provides punishment on any hoarder, black marketer and profiteer. The offenders can be imprisoned for 3 – 5 years.

The Standards of weights and measures Act 1976

The act provides for the

1. Establishment of an international system of units (metric) for weighing and measuring.
2. Formulation of specifications for weights, measures and equipments used for weighing and measuring.
3. Approval of models of equipment before they are manufactured.

Weights and measureb without seal or verification stamp are not genuine under any circumstances.

COPRA – 1986

The enactment of 'Consumer Protection Act' 1986 is a milestone in the consumer movement. This law gives a consumer the right to get compensation for any loss suffered in accordance with the negligence of the manufacturers.

5.9.6. Consumerism

In a free economy, consumers are regarded as kings and queens, but in reality they are the least important persons. Sellers exploit buyers by adopting unfair trade practices such as adulteration, misbranding, poor quality, short weights and measures, deceptive packaging, false advertising, hoarding and black marketing. Consumer exploitation and the resulting dis-satisfaction is the root cause of consumerism in India. Consumerism (consumer movement) stresses the cooperative effort by consumers themselves to protect their rights and interest in the market place against unfair trade practices.

"Consumerism may be described as organization and united activities of consumers in response to consumer dis-satisfaction arising from exchange relationship between buyers and sellers".

Consumerism is an attempt to make the market work better.

Objectives of Consumerism

1. To restore the balance in the buyer seller relations in the market place.
2. To protect consumers from unfair trade practices.
3. To safeguard consumer rights.
4. To represent consumer problems to the government and pressurize government to provide consumer protection by legislation.
5. To organize consumer resistance against business malpractices.

6. To undertake programme of consumer education to create awareness among consumers regarding business malpractices.

The consumer movement has been totally absent in the past and at present is growing extremely slowly in India for number of reasons.

Reasons for Slow Growth of Consumer Movement in India

1. Absence of general awakening in consumers
2. Poverty
3. Illiteracy
4. Ignorance
5. Lack of consumer education and guidance
6. Vast country and big population
7. Unfavourable attitude of government and political leaders.
8. General passive attitude of consumers against malpractices of traders.

Role of Consumer Organisation

Consumers need a voluntary consumer protection and consumer guidance agency for adequate information in the purchase of consumer goods. The consumer organisation create greater awareness among consumers about various business malpractices. Consumer organisation educate consumers how to become better consumers, provide information about product safety, knowledge of protective laws and protective agencies of consumer interests through mass media like television, radio and annual exhibition.

Consumer Guidance Society of India [CGSI]

It is one of the leading consumer organisation in India. It is a voluntary, non-profit, non-political organisation established in 1966 by 9 housewives and few social workers to unite the Indian consumers in a strong enduring movement. Today it is the leading

consumer organisation with representatives at central and state bodies. The society takes up consumer complaints, fights all kinds of complaints, and gives information through its monthly publications to create awareness among consumers.

Consumer Court

The consumer protection Act, 1986 provides for better protection of rights and interests of consumer. If there is a dispute between the buyer and the seller for settlement and redressal of grievances, it can be done through consumer rederssal forums and commissions. But it is always better to make an attempt with the manufacturers or seller before approaching the redressal forum or commission.

For redressal there are quasi-judicial machinery at three levels. They are

1. Consumer dispute redressal forum at the district level for settlement of complaints claiming compensation upto 5 lakhs.
2. Consumer dispute redressal commission at the state level for settlement of complaints claiming compensation between 5 lakhs and 20 lakhs.
3. National consumer redressal commission at the national level for settlement of complaints claiming compensation above 20 lakhs.

The district forum is established by the state government in each district. This consists of a person who is qualified to be the judge of a district court and two other members, one of whom shall be a lady social worker. Every member shall have a tenure of five years with age limit of 65 years.

The following points needs to be remembered when one is filing a complaint

1. Complaint can be made out on an ordinary paper. No court fee stamps or revenue stamp are necessary.
2. The petition which is sent to consumer redressal forum should contain -

a. Name and address of complainant.

b. The name and address of person against whom the complaint is made.

c. Complaint details.

d. Complainants claim.

If one is not satisfied with the order of the district or state commission, they can appeal to the state or national commission respectively even if the value of the complaint is less.

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PRACTICALS

1. Group discussion - giving each group a simple family problem and making them find a solution for the same.
2. Visit to a bio-gas plant.
3. Visit to shops to see the various labour saving equipment.
4. Market survey on various labour saving equipment.
5. Demonstration of various labour saving equipment.
6. Plan a budget according to various income.
7. To make products out of waste.
8. Test for food adulterants.
9. Visit to departmental stores, super markets and shopping complex.
10. To visit consumer court and have a role play in class.

QUESTIONS

Section - A

I. Fill in the Blanks

1. The two major types of resources are _____ and _____.
2. The two types of fatigue are _____ and _____.
3. Commodities and services are _____ income.
4. The planning device for the use of money is called _____.
5. PFA was enacted in the year _____.
6. ISI mark is given by _____.
7. The main combustible constituents of biogas is _____ and _____.
8. _____ is the quality mark for agricultural products.
9. LPG is _____ times as heavy as air.
10. Engle's law of consumption states as income increases the proportion spent on sundries _____.

II. Match the following

1. Engle	car
2. Mundel	1986
3. Control	gaseous fuel
4. Values	check
5. Ability	work simplification
6. Bank deposit	law of consumption
7. GPF	voluntary saving

8. Acetylene	Parker
9. Speciality good	compulsory saving
10. Copra	Human resource

True or false

1. Quality of life is determined by the use of resources.
2. Central decision does not need many supporting decision to be taken.
3. One can simplify the work by using muscles effectively.
4. The satisfaction which people experience is called indirect income.
5. As income increases the proportion of income spent on food also increases.
6. Bio gas is a natural fuel.
7. Speciality goods need shopping effort.
8. Combustible substances used for the production of fuel are known as fuels.
9. Petrol is a liquid fuel.
10. Hay box require pre cooking of items.

Section - B

1. What is a family?
2. What are the steps in management process?
3. Give any four advantages of planning.
4. What is energizing in management?
5. What is evaluation in management?
6. Explain the importance of evaluation.
7. What are values? classify.

8. Classify standards.
9. What is central decision?
10. What are resources? classify.
11. Give any four reasons for fatigue.
12. List out the various efforts needed to perform tasks.
13. Define work simplification.
14. Classify income.
15. Define Engle's law of consumption.
16. Give any two methods of keeping accounts.
17. List out the different types of savings.
18. State the importance of savings.
19. State the factors affecting savings.
20. List the qualities of a good fuel.
21. State the various types of fuels.
22. List out the uses of labour saving devices.
23. Classify Market.
24. Classify goods.
25. Give any four responsibilities of a consumer.
26. What is PFA?
27. Define consumerism.

Section - C

1. Explain the concept of home management.
2. Explain the importance of planning in management.
3. Explain Parker's classification of values.
4. Give a note on the various types of decision.

5. State the factors affecting the use of time.
6. Explain the various ways of supplementing family income.
7. Write note an any four types of ovens.
8. List the factors to be considered in the selection of equipment.
9. Explain the rights of consumers.
10. State the objectives of consumerism.
11. List the reason for the slow growth of consumer movement in India.
12. Give an account on CGSI

Section - D

1. Explain the importance of management in present day living.
2. Give a detailed note on management process.
3. Explain the importance of values, goals and standards.
4. Explain the steps in decision making with example.
5. How would you apply management process in managing time?
6. Explain mundel's classes of change.
7. Explain the importance of budgeting.
8. State the various factors affecting expenditure.
9. What are the steps in preparing a family budget?
10. Plan a budget for a middle-income family with husband, wife and two school going children.
11. What is a good buymanship?
12. Give a note on the various consumer protection laws.

6. FUNDAMENTALS OF TEXTILES AND CLOTHING

6.1. CLOTHING SELECTION

In the past, most people bought new clothes only when a need arose, for a very special occasion, or because their old clothes worn out. The average person simply could not afford to buy more than the basic necessities. Today income is larger, people can buy new clothes rather frequently. Therefore buying motives have changed. we are able to buy clothes because we want or like them. Buying motives vary from consumer to consumer and from day to day. They include the desire to.

Be Fashionable

We discard clothing that is still wearable only because it is out of fashion. This is referred to as consumer obsolescence.

Be attractive

We want clothes that will make us look our best or show off our physical attributes.

Impress others

We may want to exhibit our taste level or income level through clothing. Expensive brands of certain items have been labeled status symbols.

Be accepted by friends or colleagues (peer groups)

Peer groups have conservative tastes, they do not want to differ from their groups. Buying patterns suggest that they like some direction or guidance as a framework for their choices.

Fill an emotional need

New clothes often help a person feel better psychologically. However, this motive often leads to impulse buying (buying without careful consideration)

Elements of fashion appeal

The elements of fashion appeal are basically the same as the elements of design, but here they are viewed by the purchaser rather than the creator.

Colour

Usually the first aspect of a garment or accessory to which consumers respond is colour. People relate very personally to colour, usually selecting or rejecting a fashion because the colour does or does not appeal to them or flatter their own colouring.

Texture

The surface interest in the fabric of a garment or accessory is called texture. Consumers relate to texture because of its sensuous appeal.

Style

The elements that define a style include line, silhouette and details. A garment's appearance is also affected by hanger appeal. Depending on the consumer's level of fashion consciousness, their judgment will be conditioned by their opinion of what is currently fashionable.

6.1.1. Practical Consideration

Price

Price is probably the most important practical consideration for the average consumer. The consumer evaluates the total worth of all the fashion appeal aspects of the garment or accessory and their relationship to its retail price.

Fit

The try-on is a crucial step in the consumer's selection of a garment because sizing is not a guarantee to fit. Each company tries its sample garments on models who are typical of the company's customers. However, it is difficult to set size ranges and grading rules to fit every figure. The fitting room, try-on, further enables the customer to judge if fashion appeal elements are suitable to his or her figure type or general appearance.

Appropriateness

It is important that a fashion item be suitable or acceptable for a specific occasion or for the needs of the consumer's life-style. For example, life in a large city requires more formality in clothing than life in the country. Impulse shoppers do not consider appropriateness and therefore purchase many items that do not fit into their wardrobe.

Brand

Brands are a manufacturer's means of product identification. Some consumers buy on the basis of a particular brand's reputation, often as a result of heavy advertising.

Fabric performance and care

The durability of a garment or accessory and the easy or difficulties of caring for it are often factors in selection. Most consumers prefer easy-care, wash and wear fabrics, although designer and contemporary customers may not mind paying for dry cleaning and more delicate fabrics they prefer. Easy care and durability are of special concern in children's wear and work clothes. Government regulations now require fibre-content and care-instruction to be sewen into apparel.

Workmanship

This term refers to the quality of construction, stitching and finishing. Quality standards have fallen due to rise in labour costs. Unfortunately, many consumers cannot and do not bother to evaluate workmanship. The junior customer cares little about quality. She is likely to throw away a garment before it wears out. The designer, contemporary or missy customer, on the other hand, generally considers clothing an investment and may not mind spending more for the lasting qualities of fine detailing and workmanship.

Consumer Demand

To meet consumers demand and changes in consumer life-styles, manufacturers and retailers have developed various size and price ranges as well as categories for styling and clothing type.

Size Ranges

Each size range caters to a different figure type:

The junior customer, sizes 3 to 15, has a less developed figure and a shorter back-waist length than the missy figure.

The missy figure, sizes 6 to 16 is fully developed. In missy seperates, some blouses and sweaters are sized 30 to 36 or small, medium and large. Sizing 30 to 36 was originally inches, but sizes have grown over the years.

Petite sizes come in both junior and missy. Junior petite is meant for shorter junior figures, petite sizes in missy are for smaller proportioned missy figures.

Large or women's sizes, used for sports wear, are 36 to 52 for uppers (jackets and shirts) and 30 to 40 for lowers (pants and skirts)

Half-sizes ($12\,^1/_2$ to $24^1/_2$) are used for large size dresses. They have a shorter back-waist length and a slightly larger waist than regular large sizes.

Men's suits range in size from 36 to 44, based on chest measurements. Lengths are designated after the size number. R for regular, S for short, and L for long.

Young men's sizes, equivalent to junior sizes for women, have a narrower fit in the jacket and hip, and a shorter rise in the trouser than regular men's sizes.

Children's wear is sized by age group. Infant sizes are based on age in months, usually 3, 6, 9, 12 and 18. However, since development varies so much from child to child, many manufacturers are now also identifying weight ranges on their labels.

Toddler clothes, for the child who has learned to walk, are sized 1 to 3, children's sizes are 3 to 6. At this point, sizes seperate for boys and girls. Girls wear comes in sizes 7 to 14, the developing adolescent wears subteen 6 to 14, and the young teen wears young junior 3 to 13. Boy's sizes are patterned after men's and include sizes 7 to 14.

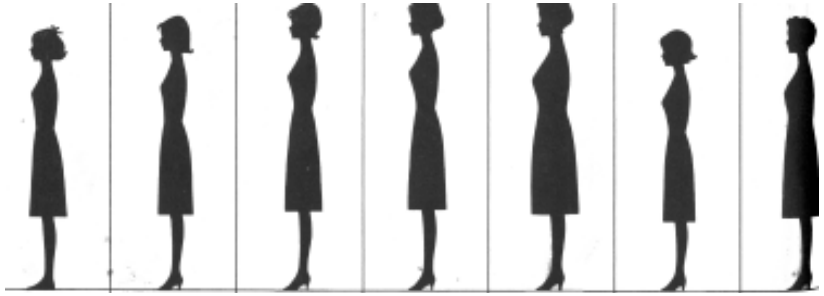


Fig. 1 : Size Range for Women

Price Ranges

A garment should give good value for its price. There are many price ranges, each with a different level of customer expectations. As the price goes up, the customer expects higher quality in fashion, fabric, fit and finish.

Designer garments are becoming so expensive that the group of people who can afford them is shrinking. Therefore, many designers are adding less expensive lines. Each garment manufacturer generally specializes in one price range. The designer and merchandiser must consider the cost of every fabric trim or construction detail that goes into a garment. Costs must fit into a specific price range.

Style Ranges

Both women's dresses and women's sports wear currently come in style ranges as well as size ranges. Some of the terms overlap because style ranges grew out of age groups. However, many women today cross the boundaries, dressing to fit their figure and personality rather than their age.

6.1.2. Clothing Classifications

There have never been as many type of clothing as we see today. Variety in dress has resulted from changes in our habits and roles. We now have clothing for all occasions, all life-styles. Retail stores have seperate departments for each category of clothing.

Women's wear

Women's clothes have many classifications:- lingerie, dresses, evening clothes, suits, outer wear, and sports wear. There are also speciality categories, such as bridal dresses and maternity clothes. In addition, there is a huge array of accessories within the general categories of wraps, head coverings, handbags, and footwear.

Men's wear

There are now almost as many categories available to men as to women. Tailored clothing for men includes suits, overcoats, topcoats, sport coats, seperate trousers for both day and evening wear, shirts, sweaters, tops, socks, undergarments, robes and pyjamas.

Thus the consumer is an important determinant of what fashion is and what the industry produces. The fashion industry caters to powerful consumer groups because they have the most discretionary income.

So far we have learnt about clothing selection. Now we shall see the basics needed in clothing construction as a beginner.

6.2. BASIC SEWING EQUIPMENT

Most of the equipment needed for clothing construction can be found in almost any home, be it a mansion or a furnished room, for these items are indispensable to womankind. The excellence of the tools of clothing construction add a great deal to the quality of the finished garment. For beginners, the list of equipments which follow is more than adequate.

Equipment

Shears

Cutting shears eight to ten inches long with a bent handle are best. The bent handle makes it possible to cut faster and easier while the fabric remains flat on the table. Keep your shears sharp. Never use them for anything but cutting fabrics.

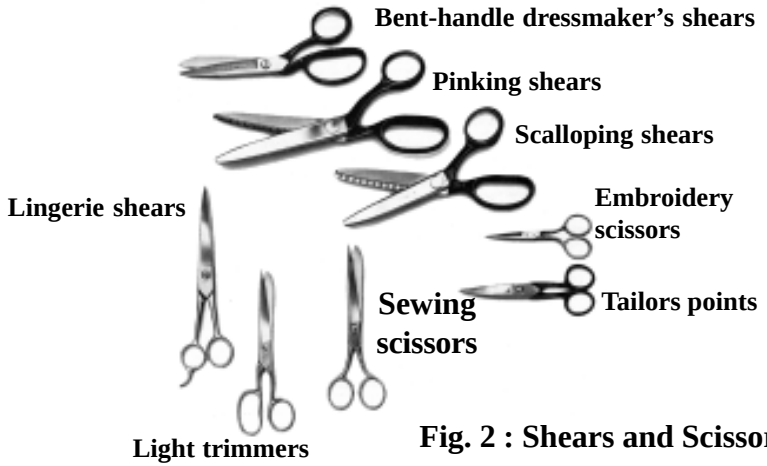


Fig. 2 : Shears and Scissors

Scissors

Scissors about six inches long with good sharp points are preferable. Always have them ready to hand, since you will use them for clipping, slashing, trimming and other cutting operations.

Embroidery scissors

These scissors are not necessary equipment, but are extremely useful for undoing seams, cutting threads, clipping for fine or delicate detail.

Pinking shears

Get a size of pinking shears that is comfortable for you to use. Try them out for weight. Use them only for pinking seams, or decorative edges on felt.

Pins

Insist on good steel pins, and buy them by the box. They are less expensive when purchased this way and are easier to use. Most of us can take pins from a box more easily than from a pin cushion, and you should keep a box by the machine, the table and the ironing board.

Ruler

Several good rulers are available in most departmental stores. Your ruler should be made of metal and have a slide for marking hems. The width of the ruler is convenient for marking button holes. Keep the ruler by your sewing machine so that you can measure and check as you sew.

Ironing board

When you sew, your iron and ironing board are most important. The professional dress maker actually does a good deal of "sewing" at the ironing board. Be sure it is set up when you start to sew. As

you learn these short, easy methods, you will realize how important "press as you sew" can be.

Steam iron

The instant steam or dry iron is preferable. It is impossible to do really professional sewing without one. You probably have one for pressing and caring for your clothes. It is a tremendous time over for professional work.

Tailors chalk

Be sure you get chalk, not wax. It comes in many colours, but white will be usually enough. Chalk is widely used nowadays instead of tailor tacking since it is a good deal faster and just as accurate.

Tape measure

Get a good strong tape measure, either plastic or plastic-coated, so that it won't stretch. Be sure it is numbered from either end. You'll use it in countless sewing operations.

Yardstick

You'll use it for checking lines and hems. If you decide to try your hand at altering a pattern, this is a necessary equipment.

Tape measure

Yardstick

Fig. 3 : Measuring devices

Tracing wheel and carbon paper

The tracing wheel is not a necessity, all marking can be done with tailor's chalk. There are, however, many instances when the tracing wheel is faster. Dressmaker's carbon paper is not the blue carbon used in typing. It is a special carbon to be used with the tracing wheel. It comes in several colours, but white and yellow are probably all you will need.

Dress form

Unless it is an actual duplication of your own figure, the dress form is not a great help in fitting. However, collars, shoulder lines and other details can be checked on a standard form. There are dress forms which can be made to conform to your body. These are rather light weight and not too practical if also used for designing.

Sewing machine

No matter how beautifully you sew, you don't want to make a whole dress by hand. It is unnecessarily time consuming. There are so many good makes of sewing machine. An ordinary sewing machine which comes with a variety of attachments will be perfectly suitable.

You'll get instruction for the use and care of the machine when you purchase it. If you have an old machine, have it serviced regularly by the manufacturers and learn how to care for it properly to keep it in good condition.

Now we proceed further to learn the basic sewing techniques for clothing construction.

6.3. BASIC HAND STITCHES

There are two types of sewing, hand sewing and machine sewing. The two types involve quite different techniques. As a

beginner, hand sewing techniques can be learnt for basic sewing. To work hand sewing quickly and perfectly, it needs practice but learning the basic procedure helps to develop the desired skill.

The basic hand stitches can be divided into temporary stitches and permanent stitches.

Temporary stitches are further divided into Even basting, Uneven basting, Diagonal basting and Slip basting.

Preliminary steps to thread a needle:

1. Cut a length of thread of about 30 inches. Do not use a very long thread, it may knot and interrupt while sewing.
2. Use one end to thread the needle and pull it out from the eye of the needle.
3. Hold two ends and tie a knot.

6.3.1. Temporary Hand Stitches

1. Even Basting

A single thread of contrasting colour should be used. Secure the thread with a knot on the wrong side or several firm small stitches at the end of the seam. Make the running stitches ¼" long, where the stitch is the same length on the right and wrong sides. Secure the thread well at the end of the seam. Even basting is used where there is strain while stitching bodice seams and also as a guideline for stitching intricate top stitched details (Figure 4).

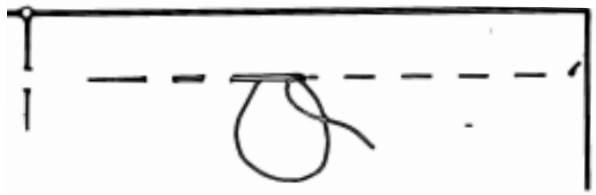


Fig. 4 : Even Basting

2. Uneven basting

A single thread of contrasting colour is used. Secure the thread with a knot on the wrong side or with several small firm stitches. Make two stitches one ¼" long and the other ¾" long and repeat from one end of the cloth to the other. Secure the thread well at the end of the seam. Uneven basting is used to stitch the fall of sarees and later removed when permanent stitches have been worked. It is also used as a guideline to stitch straight lines. (Figure 5).

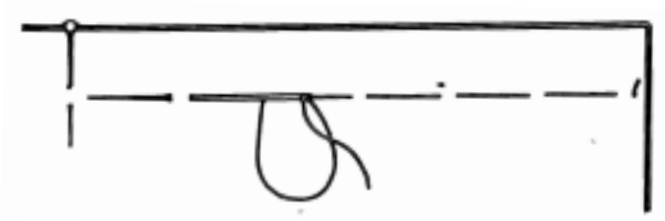


Fig. 5 : Uneven basting

3. Diagonal basting

Insert the needle into the fabric, the point facing you. A short vertical stitch is produced on the wrong side and a long slanting

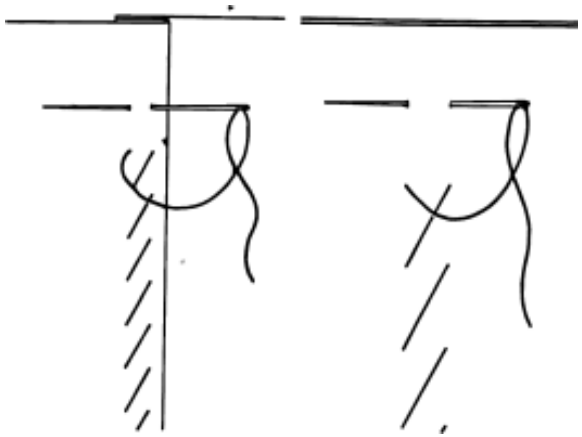


Fig. 6 : Diagonal basting

stitch on the right side of the fabric. Diagonal basting hold two layers or edges of fabric together temporarily. It is not used on seam lines but on linings and interlinings and on edges of buttonholes and pockets (Figure 6).

4. Slip basting

To slipbaste, work from the right side, turn under the seam allowance on one piece, and lap it over the seamline on the other piece. Using a single thread of contrasting colour take a short stitch on the seamline of the under piece. Slip the needle through the fold of the upper piece and repeat the stitches. The needle is never brought through the upper surface of the top layer. Slip basting is used to match patterned fabrics where seams have to be stitched from the right side of the fabric. (Figure 7).

Fig. 7 : Slip basting

Removing Bastings

Bastings should be removed as soon as they have served their purpose. If not, they will interrupt in the opening and pressing of seamlines. Cut off knots and clip the bastings every few inches before pulling the thread. Do not pull with tweezers for it may damage the fabric.

6.3.2. Permanent Hand Stitches

Permanent hand stitches are worked instead of machine stitches. They are permanent and serves the purpose. Permanent

stitches are divided into Running stitch, Backstitch, Overcast stitch, Over hand stitch and Whipping.

1. Running Stitch

Running stitches are usually 1/8 inch or less in length. Work by taking several stitches on a long needle as the fabric permits. Very fine running stitches replace machine stitching on seams used in lingerie, blouses and infants clothes (Figure 8).

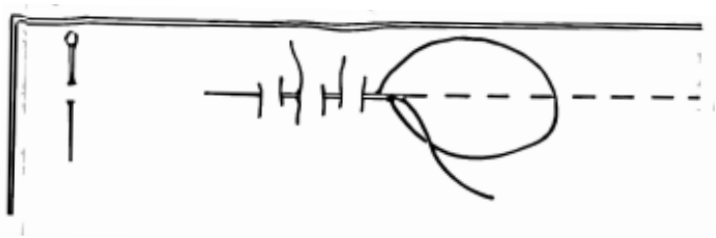


Fig. 8 : Running Stitch

2. Back Stitch

Back Stitch resemble machine stitch on the right side, but unlike machine stitch it overlaps on the wrong side. Take a running stitch 1/8 inch long, and reinsert the needle at the end of the first stitch and bring it forward on the under side and up through the surface one stitch length beyond the previous stitch. Repeat for the next stitch. Backstitches are used to replace broken machine stitches and also for beginning and ending of embroidery and appliqué. (Figure 9).

Fig. 9 : Back Stitch

3. Over Cast Stitch

Overcast stitches are worked to keep the raw edges from fraying and may be done on single or double edges. Hold the raw edges of the seams with the thumb and fingers of the left hand. Insert the needle from behind the raw edge and 1/8 inch below it. Space the stitches evenly and twice as far apart as they are deep. (Figure 10).

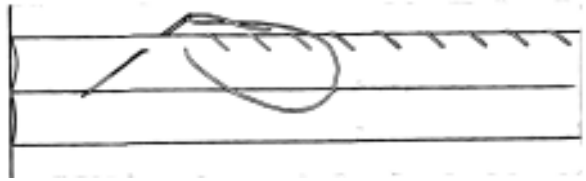


Fig. 10 : Over Cast Stitch

4. Overhand Stitch

Overhand stitches are similar to overcast but are made in the very edge of the fabric and 1/16 inch apart. Insert the needle straight toward you and use a short and very fine needle in order to pick up tiny stitches. Overhand stitches are used to apply lace or to make flat invisible seams where two folded edges join. (Figure 11).

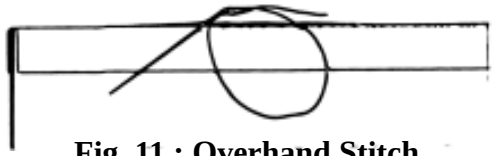


Fig. 11 : Overhand Stitch

5. Whipping

Whipping is done with a single thread of matching colour. Fold the hem allowance and work from right to left with the needle, catch one or two threads of the fabric and one or two threads

along the fold of the hem. The stitches should not be seen on the right side of the fabric. The whipping stitch should be placed ¼ inch apart. (Figure 12).

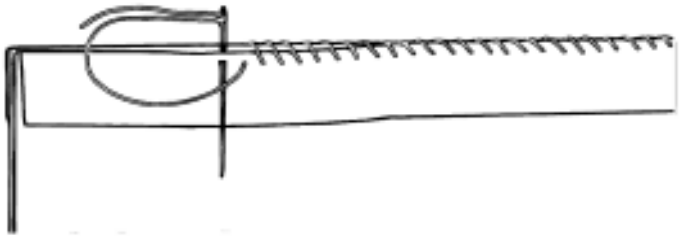


Fig. 12 : Whipping Stitch

6.4. EMBROIDERY AND APPLIQUE

Embroidery is one of the oldest of all crafts. From earliest times, when all cloth was hand-woven-often from undyed yarn-people have found various ways of embellishing it. The word "embroidery" conjures up a wealth of styles.

Materials Required

Fabrics

Embroidery can be worked on any pliable material from chiffon to leather. The enormous range of both synthetic and natural fabrics can, in fact be rather daunting to the beginner. Many synthetic fabrics have the advantage of being cheaper and more durable than natural fabrics, but in general they are more difficult to handle and are best avoided until you have gained some experience with natural fabrics.

Threads

Embroidery can be worked in many different kinds of thread-silk, cotton, linen, wool, synthetics and metal in various weights and thicknesses. The distinctive qualities of each-from the luster of

silk to the soft, hairy texture of wool create strikingly different effects. A piece of embroidery may be worked entirely in one type of thread, or it may combine several different types to create pleasing and exciting contrasts. The basic principle is that the thread and fabric should be in sympathy with and complement one another.

Some of the most common embroidery threads are :

a) Crewel and tapestry wool

b) Cotton broader

c) Pearl cotton

d) Stranded cotton (embroidery floss)

e) Soft embroidery cotton

f) Silk floss

g) Twisted button hole silk

Fig. 13 : Embroidery

Ordinary sewing or tacking (basting) thread may be used in transfering a design.

Needles

The needle is such a simple tool, yet without it embroidery would be impossible. The fine steel needles are used. There are a range of types, sizes and gauges now available which have been developed for specific uses.

Sharp: Small round eye to take a single thread, pointed tip. Used mainly for dressmaking.

Crewel : Long eye, slender, pointed tip.

Chenille: Long eye, shorter than crewel, larger range of sizes, pointed tip.

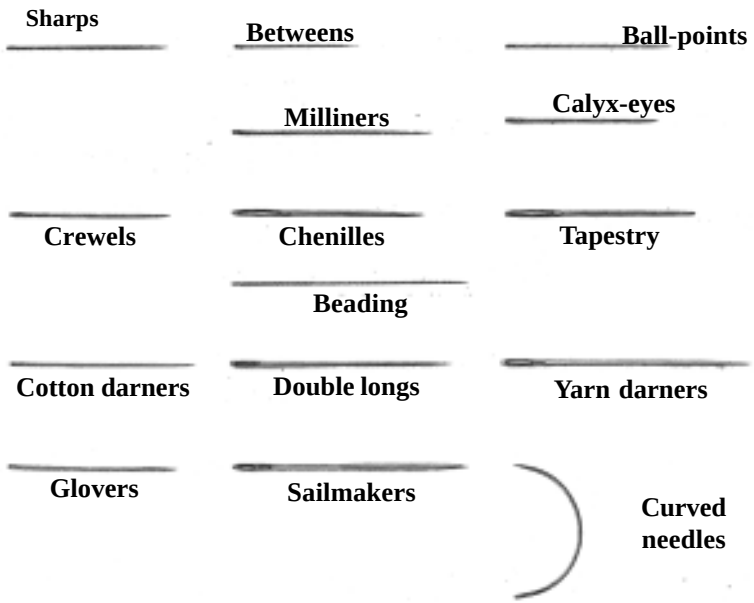


Fig. 14 : Needles

Tapestry : Long eyes, blunt tip.

Beading : Very long, fine and flexible.

Darning : Similar to crewel.

Curved : Large and small-eyed, half circle curve. Used mainly for upholstery.

When choosing a needle consider how it will be used. The thread or threads should pass easily through the eye. The needle should make a hole in the fabric large enough for the double thickness of thread, so that no effort is required when pulling it through.

Tools

A pair of embroidery scissors with sharp, pointed little blades is essential. These will cut thread neatly, making it easy to insert in the needle.

For drawing and transferring designs onto the fabric you will need a ruler and tape-measure, pencils and marking pen, french chalk, graph paper, tracing paper and dress makers carbon.

Frames

The type of frame you choose will depend largely on the size and type of embroidery, the fabric used, and whether or not you want the work to be portable. Round frames are the simplest type of frame to use, consisting only of two hoops placed one inside the other, trapping the material between them. The outer hoop can be tightened by means of a screw at the side. They are made of wood, comes in various sizes and some models can be attached to a floor or table stand or clamp.

Finishing Technique

Soak the embroidered work in cold water, then lay it right side up, while still wet, on a board covered with a clean cloth, such as an

old sheet. Nail it to the board, using drawing pins and beginning with the corners. Continue nailing on all the four sides, alternately starting in the middle and pulling the fabric taut. Allow the work to dry thoroughly.

Care of Embroidery

1. Never hand embroidery in direct sunlight.
2. Frequent washing and ironing should be avoided.
3. Embroidered house-hold linen and furnishings can be washed gently by hand in a mild liquid detergent and luke warm water if dyes are fast. If dyes are not colour-fast then the embroidery must be dry cleaned.
4. If embroidery must be stored for any length of time it should always be cleaned first and packed in white acid-free tissue.
5. Keep it in a dark, dry place and check it frequently for moths.

6.4.1. Embroidery Stitches

Outline Stitches

These stitches are used for outlining the design motifs.

Back Stitch

Backstitch is most often used as a straight outline stitch. Its simple in line effect. This stitch also forms the base line for other decorative stitches. Work basic stitch from right to left. Bring needle out at 1, insert at 2 and exit at 3.Distance between 3-1 and 1-2 should be equal. Repeat sequence for next stitch, needle entering at point 2 should be made into hole by thread emerging from point 1 of previous stitch. Keep length of back stitches consistent (Figure 15).

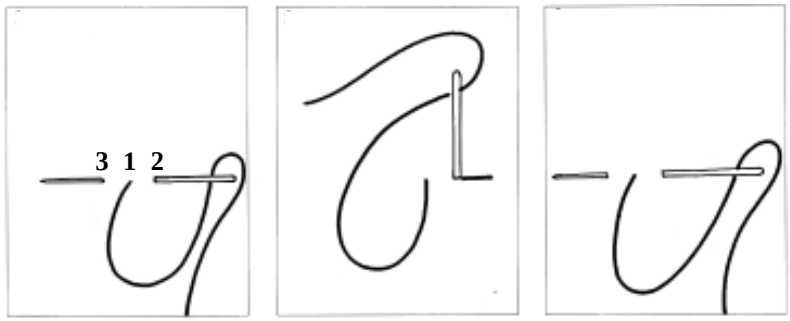


Fig. 15 : Back Stitch

Stem Stitch

Stem stitch is primarily an outlining stitch, but is often used to work stems in floral designs as well. Working from left to right, bring needle out at 1. Insert at 2 and exit a half stitch length back at 3; distance 1-3 and 3-2 should be equal. Repeat sequence. Note that point 3 of previous stitch is now point 1, and the needle emerging at 3 is coming from hole made by thread entering at point 2 of the previous stitch. For a broader stem stitch, angle the needle slightly when entering at 2 and existing at 3 as shown in the last drawing (Figure 16).

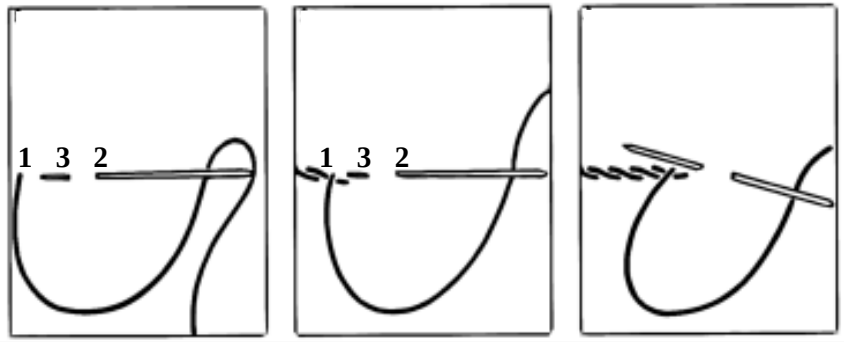


Fig. 16 : Stem Stitch

Split Stitch

Split Stitch is worked like the stem stitch, except when the needle emerges, its splits the working yarn; the final effect resembles a thin chain stitch. Although outlining is its most common use, split stitch can be used in solid rows as well. Working stitch from left to right, bring needle up at 1 and down at 2. Bring needle back up at 3, splitting center of laid yarn. Repeat sequence. Note that point 3 or previous stitch is now point 1 keep stitch length even; when going around curves, however shorten length slightly (Figure 17).

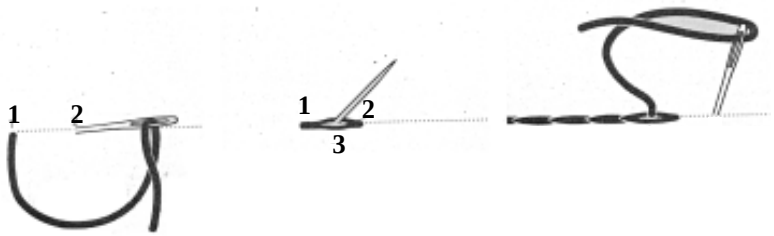


Fig. 17 : Split Stitch

Blanket Stitch

Blanket stitch is a popular finishing stitch for edges. When worked small, it can be used for outlining as well. Stitch is worked from left to right. Bring needle out at 1 on bottom line. Insert at 2 on top line and slightly to the right, then exit at 3, directly below. Before pulling needle through, carry yarn under point of needle as shown. Proceed to next stitch. Note point 3 of previous stitch is now point 1. Work entire row in the same way, keeping height of stitches even throughout (Figure 18).

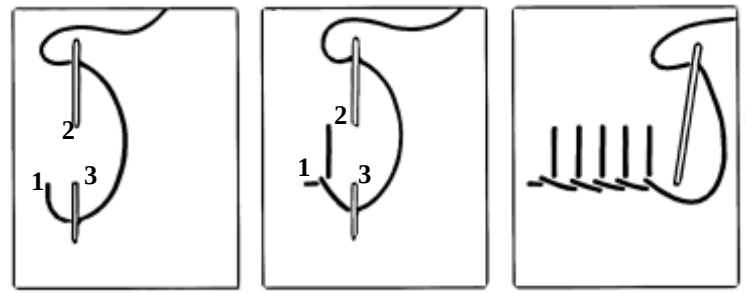


Fig. 18 : Blanket Stitch

Chain stitches

Chain stitch is one of the most popular embroidery stitches for outlining, or if worked in close rows, for filling an area. Bring needle out at 1. Insert back into same hole at point 1 and bring out at 2, carrying yarn under needlepoint, then pull it through. Point 2 is now point 1 of next stitch. Work all stitches the same way, always inserting needle into the hole made by the emerging thread. To end row, take a small stitch over last chain loop to hold it down (Figure 19).

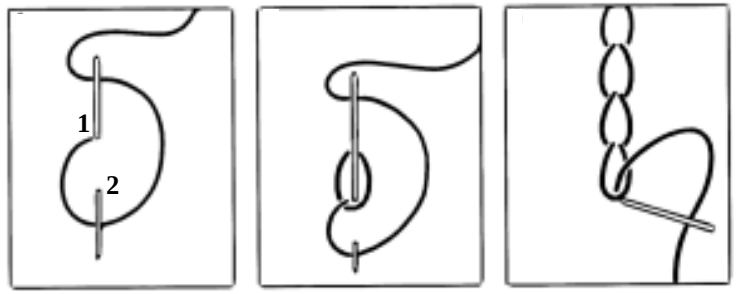


Fig. 19 : Chain stitch

Lazy daisy stitch

Lazy daisy stitch is a single unattached stitch worked in a circle to give an impression of petals. Bring needle out at 1 Insert back into same hole at point 1, and exit at 2, carry yarn under

needle point, then pull through. Insert needle at 3 over chain loop, then bring needle out at point 1 for next chain stitch. Continue this way until all petals are completed (Figure 20).

Fig. 20 : Lazy daisy Stich

Filling stitches

Seed stitches

Seed stitch is one of the simplest filling stitches. It can be used in clusters or scattered, if worked close together, groups of seeding stitches can even be a means of shading. Bring needle up at 1 and take a tiny stitch down at 2. For a heavier stitch, bring needle up at 3 and take another small stitch at 4 close to the first stitch. If all the stitches are worked in one direction, filling will be uniform (Figure 21).

Fig. 21 : Seed Stitch

Satin Stitch

Satin stitch is a solid filling stitch that covers the design area with long, straight stitches placed close together. Care must be taken to keep the stitches smooth and at even tension. The stitch is usually worked from left to right. Bring needle up at 1, insert at 2 directly above, exit at 3 close to point 1. Continue until area is filled (Figure 22).

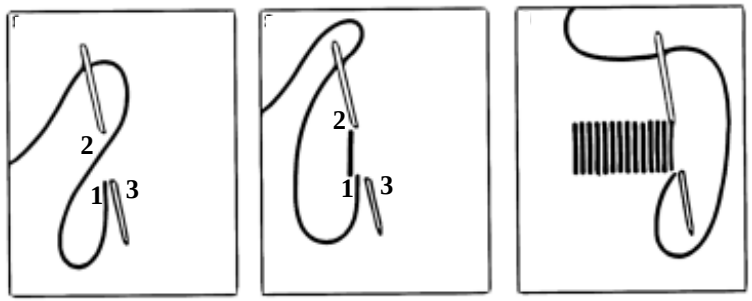


Fig. 22 : Satin Stitch

Knotted Stitches

French Knot

French knot is used like seeding stitch, but it is considerably more textured and raised. Knots can be worked close together to completely fill an area, producing a hubby effect. Bring needle up at 1. Holding yarn taut with left hand, warp yarn around needle twice as shown; gently pull the yarn so the twists are tightened against the needle. Carefully insert needle near point 1 and pull

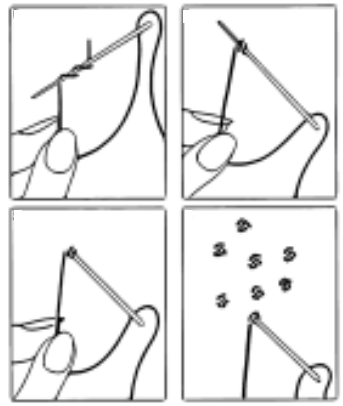


Fig. 23 : French Knot

through, and be sure yarn is still held taut. Scatter knots as desired with in design area. French knots can be made larger by increasing number of yarn twists around needle (Figure 23).

Bullion knot

Bullion knot can be used as a filling or as an outline stitch. Bring needle up at 1. Insert at 2 and exit at 1 again, but do not pull yarn through. Twist yarn around needle point five to seven times depending on length of stitch. Then carefully pull needle through both fabric and twists, take care not to distort twists. Pull yarn toward point 2, so coil can lie flat. Pull working yarn tight and use point of needle to pack yarns in coil together evenly. Re-insert needle into point 2 (Figure 24).

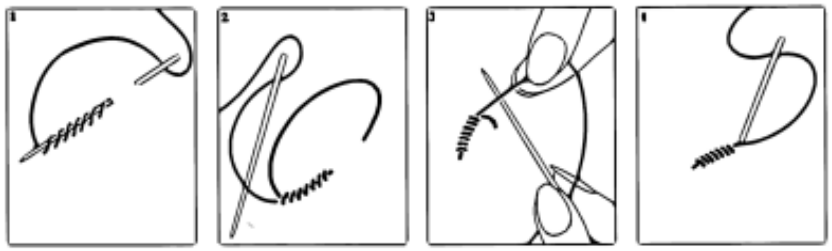


Fig. 24 : Bullion knot

6.4.2. Applique

Applique work is basically a sewing craft, and so it calls for much the same tools and supplies. Fabrics are ofcourse essential, but not necessarily in great quantities scraps and pieces are usually adequate for a small project.

To stitch an appliqué in place, use an all purpose sewing thread. For additional decorative stitching, you go to embroidery floss or pearl cotton. Sharps are a type of medium-length needle excellent for hand stitching. Another essential tool in appliqué work is a sharp pair of scissors. Other useful sewing supplies include fine

straight pins for holding appliqués in place, and a dressmaker's marking pencil. Frames, heavy tracing paper and coloured construction paper are helpful to have for copying or cutting out designs.

Transferring designs

Before transferring a design, cut background fabric, which may be a patchwork block or even a garment section, to desired size. In order to center the design accurately, mark lengthwise and crosswise centerlines through the background piece. The centerlines are especially helpful in patch work because they enable you to position the appliqué in exactly the same spot for each of the block involved. The placement of single appliqués is not always marked on the background if the centerlines will serve adequately as guides. For greater accuracy, however, placement marking is recommended.

Cutting appliques

The first step, if you will be cutting several appliqués, is to assemble your fabric scraps and decide which ones will be used for each piece. Try to achieve a balance of colours as well as a balance of prints, solids and textures. If the fabrics you have selected have a dominant print or weave, consider carefully how you want that print or weave placed on each appliqué piece. For eg, if a fabric is striped, it can be cut so that the stripes run vertically, horizontally, diagonally or a combination of these. In making each decision, consider the surrounding fabrics as well.

a). Pin template to right side of fabric. Trace around pattern with dressmaker's pencil. Remove template. Mark a 1/8" to 1/4" seam allowance outside the drawn seamline, use the wider seam allowance on fabrics that are loosely woven.

b) Cut appliqué outside of marked lines so that an ample fabric width is left. This wider margin will make it easier for you to stay stitch in the next step.

c) To facilitate turning under of edges, stay stitch a hair outside inner marked seamline. Set sewing machine to 12-15 stitches per inch.

d) Trim margin by cutting appliqué on outer marked lines as shown. Clip seam allowances around curves and corners so edges can be properly turned.

Securing appliqués by hand

An appliqué can be hand-stitched in place by either of the two method. The first method, though somewhat time consuming, is recommended for beginners. It calls for an additional basting step that holds the turned-under seam allowance in position, making it less awkward to secure the appliqué to the background. The second method skips initial basting of edges instead the appliqué is pinned in place, and the edges turned and stitched.

To secure the appliqué a fine slip-stitch is recommended, it holds the appliqué dependably and is almost invisible when carefully worked. An overhand stitch, though not invisible, should be used in small areas that tend to fray. Embroidery stitches such as the running stitch and the cross stitch can also be used to fasten down as appliqué. Remember that these are decorative stitches, meant to be seen, they will become part of the design.

To slip stitch

Work from right to left. Bring needle and thread through folded edge of appliqué. Pick up a thread or two from background fabric just opposite, then insert needle back into folded edge and slip it through fold about 1/8", bring needle out and pull thread through. Continue this way to end (Figure - 25:).

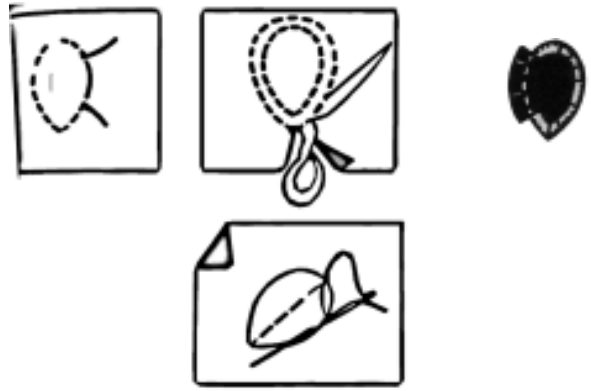


Fig. 25 : Applique

Decorating appliques

Decorating with embroidery can greatly enhance the over all look of any appliqué design. Even though you may not deliberately plan on any such embellishment, possibilities may occur to you, after your appliqué is completed. There is a vast array of embroidery stitches to choose from, you can use them to work out original details or special effects, or simply as a decorative means of securing the appliqué in place.

6.5. FASTENERS

Fasteners are applied on garments to secure the openings. There are many types of fasteners and their application also differs with the types of garments. The different fasteners are Buttons and Buttonholes, Botton loops, snaps and press buttons, hooks and eyes, eyelets and cords.

6.5.1. Buttons and Buttonholes

Button closings should be appropriate to the style of the garment. Buttons too large, or too small, or of the wrong texture can mar the entire design. There are also decorative buttons which should be selected with same care as costume jewellery.

To Determine the length of buttonhole

The length of the buttonhole is determined by the particular button size you use. The general rule is the diameter plus height of button equals length of buttonhole.

A slash can be made by cutting scrap of fabric and the button to be stitched can be passed through it. But the general rule is an excellent guide to follow.

Placement of Fabrics

Buttonholes are placed on the right so that right overlaps left while securing the buttons for girls and women garments and buttonholes are put in the left front for men garments to facilitate left over right closing.

Hand Worked Buttonholes

The following are the steps to work buttonholes by hand.

1. Work a basting stitch through the buttonhole marking near the center-front line. Decide on the length of buttonhole and put in a marking basting parallel to the first. Mark placement of buttonholes with a cross basting.
2. Machine stitch around the rectangle. Count the stitches, so that the rectangles will be equal in length and width, double stitch for a few stitches so that no knot will be needed. Remove bastings. Cut down the center of each rectangle, cutting exactly along a thread of the fabric.
3. Work buttonhole stitches from right to left. Put the needle through the slashed opening with the point of the needle coming through the fabric just beyond the machine stitches. Bring both the threads around the point of the needle and complete the stitch, keeping the loops of thread along the cut edge of the slash. Repeat the stitch and be sure the stitches are close together, revealing no fabric between them. They must also be of an equal depth.

4. Worked buttonholes have a fan shape at the end nearest to the center front, where there will be strain due to the pull on the button. The other end is called the bar end. Make several long stitches at the end to form the bar.
5. Cover the bar with short blanket stitches as shown (Figure 26).

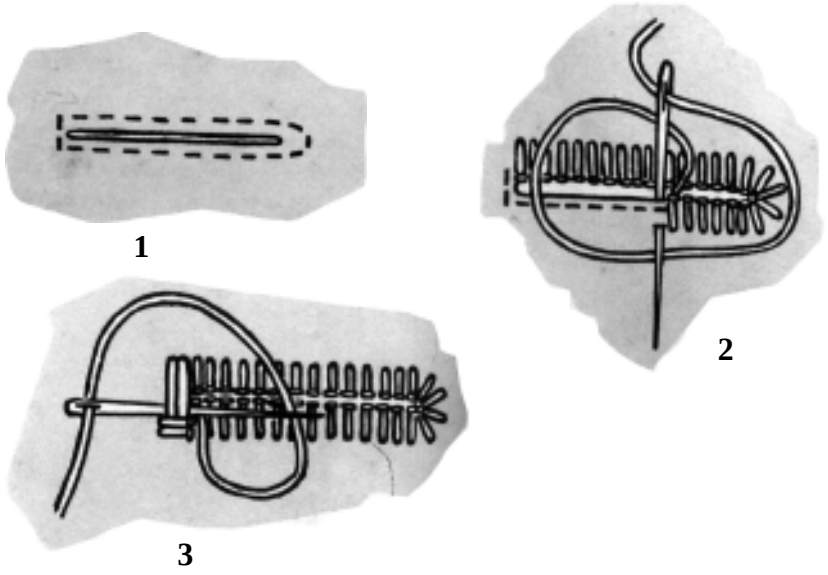


Fig. 26 : Hand Worked Buttonhole

Button loops

Button loops are made on cuffs of sleeves, as well as at the front or back of blouses and dresses. Button loops can often be substituted for buttonholes, provided loops are compatible with the overall style of the garment. Although any type of buttons can be used in loops, ball buttons fit will be best. Button loops may be set

into the seam at the opening edge of the garment, or they may be part of an intricate, decorative shape called a frog, which is served in place on the outside of the finished garment.

Always make a test loop to see how the fabric works into tubing, and to determine the proper size for the loop. Sew a button onto a scrap of fabric to be sure that the loop will slip easily but also fit snugly over the button, which it must, if it is to hold the garment edges securely closed. Also check the diameter of the tubing to see whether it is suitable to the button size.

Making loop or Tubing

Cut true bias strips of fabric 2½ inches long and 1 inch inside. Fold inhalf lengthwise with right sides together. Stitch about $^1/_8$ inch from folded edge, stretching the fabric slightly and being careful to keep the line of stitching parallel to the edge. Thread a large needle with several inches of heavy-duty thread. Fasten thread at seam at one end of tubing, then insert needle, eye first, into tube and work it through to other end. Gradually turn all the tubing to the right side. This can be done by pulling on thread and feeding seam allowance into tube.

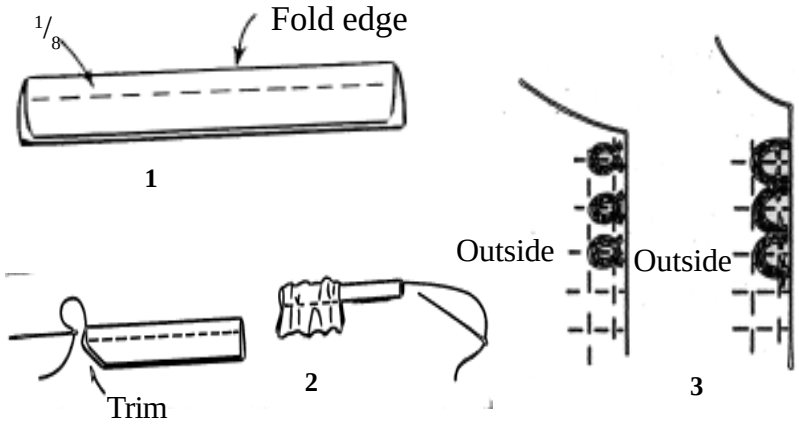


Fig. 27 : Button Loop

Attaching the loops to the garment

1. Stitch as many number of loops required according to the number of buttons. Buttons should be placed on the right front and close together with no more than ¼ inch between them. Run a marking basting stitch along the seam line at the front edge. Use cross basting to mark the spacing for the loops.
2. Experiment with the size of loop needed for the button. Tack one tube into a loop and push the button through it; it should be a snug fit but not so snug as to cause undue strain on the button or the loop. When the size is correct, put another row of marking basting the required distance from the seam line.
3. The loops may be attached in one of two ways as shown. The finished appearance is slightly different. They must be basted to the seam line with very firm, small stitches, and trim off excess length of loops.

Button placement

Button position should be marked when the garment is nearly completed and after the buttonholes or button loops are made. Although button position line should be marked at the beginning of construction and button location can be marked, the location should be finally determined when buttonholes are finished. Lap buttonhole side of garment over button side as garment will be worn, matching center front or center back lines, pin securely between buttonholes.

For horizontal buttonholes, place a pin through buttonhole opening, $^1/_8$ inch from the end that is nearest the finished garment edge, into fabric beneath. For vertical buttonholes, button should be positioned $^1/_8$ inch below the top of the buttonhole opening. Carefully lift the buttonhole over pin and refasten the pin securely at the proper location. Center button at pin mark, directly on

centerline, and sew in place according to the type of button you are using.

To sew a button with eyes

Buttons for tailored garments may have either two or four eyes. The button with four eyes can become a subtle design feature, for the thread can be inserted through the eyes in various ways.

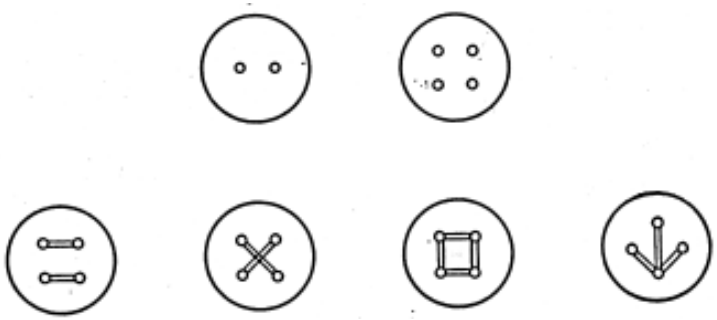


Fig. 28 : Types of buttons with eyes

This button is flat with no shank, and so one must be made with thread. This is done by sewing over a match to make the stitches looser than they otherwise would be. From the outside take a small stitch ($^1/_{16}$ inch) at the desired point; catching through all thicknessess. Take another thread to secure the knot. Place the match over the button and bring the needle up through the eyes of the button. Take several stitches through the button and over the match. Remove the match and lift the button to pull the threads tight against the button, a shank of threads will appear beneath the button. Wind the thread around and around these threads, and fasten thread securely (Figure 28).

6.5.2. Snaps and Press buttons

Snaps are a kind of small fastener, have less holding power than hooks and eyes. Each snap has two parts – a ball half and a socket half. Snaps are available in various sizes and weights to serve every

purpose. They are either black or silver (Figure 29).

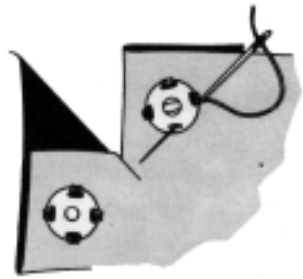


Fig. 29 : Snaps and Press buttons

1. Mark position of snaps; if a row of them is required, space them evenly.
2. Place the flat surface on the edge of the garment that will be upper most when finished.
3. Use a double thread of matching colour.
4. Take several small overhand stitches through one hole, slip the needle under the snap, and bring it out alongside the next hole.
5. Take small overhand stitches through that hole and continue.
6. Stitches should not be seen on the right side of the garment. Fasten threads.

6.5.3. Hooks and Eyes

Hooks and eyes are small but comparatively strong fasteners. Though they are most often applied at single points of a garment opening, such as a waistband or neckline, they can also be used to fasten an entire opening.

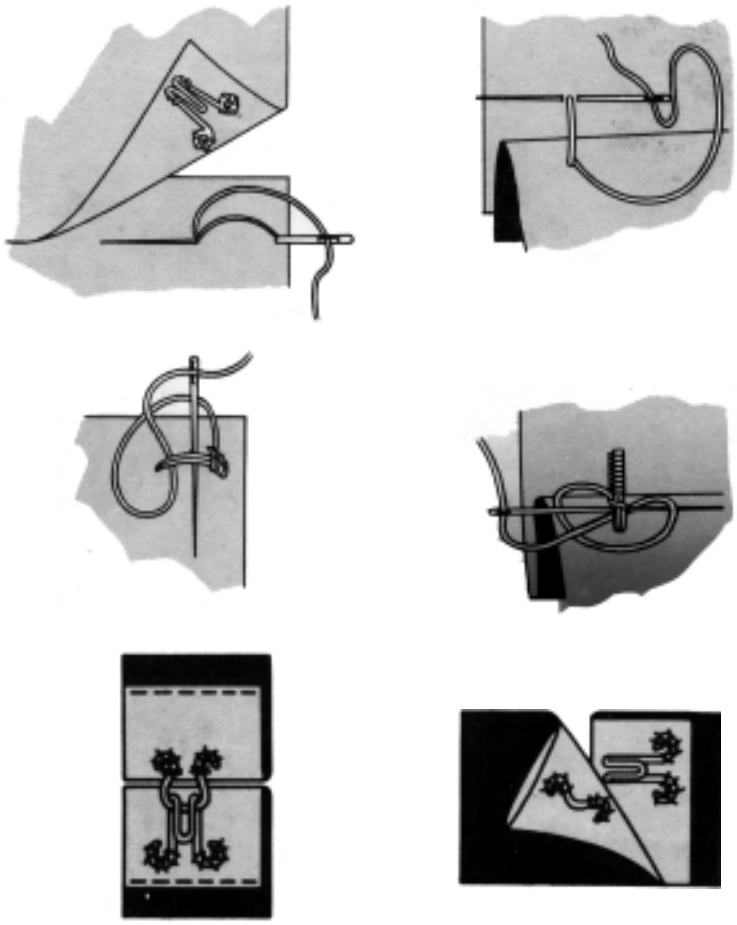


Fig. 30 : Hooks and Eyes

There are several types of hooks and eyes, each designed to serve a particular purpose. They are available in various sizes and weights. Two types of eyes are included on each card. The round eye is used to fasten edges that meet each other, the straight eye is used to fasten edges that lap over each other. The hook is placed on the right front for front openings and on the front for skirt openings (Figure 30).

1. Mark position and sew hooks on first.
2. Set the hook back at least $^1/_8$ inch from the finished edge, so that it will not be pulled into a position where it will show.
3. Take several small overhand stitches over the rings, being sure stitches do not show on the right side of the garment. Secure the hook with overhand stitches.
4. When the round eye is used for edges, which will meet each other, the end should extend $^1/_8$ inch beyond the finished edge. Sew with small over hand stitches along the rings and at the finished edge.
5. The straight eye, for edges that lap over, may be placed at various distances from the finished edge, depending on the amount of overlap. Remember that the eye will pull to the end of the hook; therefore, to mark the end of the hook with a pin, and use this as the position for the eye. The eye has a curve in it; be sure the hook will pull with, rather than against, the curve. Sew in place with several small overhand stitches over the rings.

6.6. HEMS

A hem is a finish for any bottom edge of a garment. Selection of a hem depends largely on garment style and fabric. Whatever the choice, certain criteria should always be met:

1. The garment should hang evenly and gracefully.
2. There should be no lumpiness in the hem allowances.
3. Unless meant to be decorative, finished hems should be totally inconspicuous.

Purpose of the Hem

1. The most obvious purpose of a hem is to finish off the raw edge.

2. Another important purpose of the hem is to add weight and body to ensure a nice hang to the garment. Weight and body are especially important in the hems of skirts.

Marking the Hemline

The first step common to all hem finishes, is marking the hemline. Except for certain pleated styles, marking is done after garment construction has been completed. Though a garments finished length is largely determined by the pattern style and current fashion, it should be modified in a different length will be more flattering to the wearer. It is wise to check the hemline location before cutting the pattern, in case a change is required.

1. Mark the final line for the hem after the waistline and placket have been completed, usually at the second or third fitting. Wear the type of foundation garment and shoes that you will later wear with the dress or skirt, since a variation in tightness or a difference in heel height will change the skirt length.

2. Various types of chalk and pin markers for hemlines are made for marking hems. You can also use a tailors square or a yardstick. Marking will go more rapidly if you place a narrow strip of gummed tape or an elastic band at the correct point on the stick.

3. Stand in a natural position with arms at sides and with feet parallel and close together, maintaining the same position until the hem is completely marked. If a self marker is not being used, stand on a step or a solid work table so that the hemline can be at the eye level of the fitter. The fitter should move around the hemline as she marks it.

4. Mark the line with pins or chalk every 3 or 4 inches. Do not turn up the hemline as it is marked.

Preparing the Hem

Turning Hem and Making it Even

1. Spread the hemline out on a flat surface so that any unevenness in the line can be detected. Before turning the hem, mark the line with 1 inch basting stitches, using a long slender needle.

2. Turn up the hem to the wrong side, pinning at right angles, near the turning line. Match the centerlines and seamlines on the hem to those on the garment. Baste $^{1}/_{8}$ inch from the turning line, using 1 inch stitches.

3. To check the evenness and the becomingness of the hemline, pin the upper edge of hem in place and try on the garment.

4. After the hemline is checked on the figure, determine the depth of the hem according to the weight of the fabric. Garments moderately flared and of medium weight look well with hems 2 or 3 inches deep.

5. Measure with a guage or a card, and chalk an even depth for the hem. Before marking be sure that the fullness in the upper edge is laid in the right position. Cut along the chalked line.

6.6.1. Types of Hem

There are many types of hem finishes:

Four types of hem finishes are discussed below:

1. The Stitched and Turned Hem

The hem is evened, and the raw edge is turned under ¼ inch and machine stitched very close to the edge. Then the hem is slip-stitched in place with stitches ½ inch apart (Figure 31).

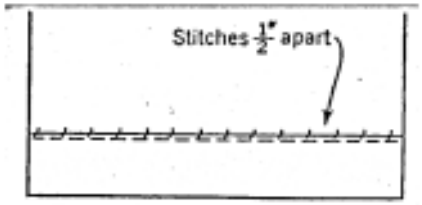


Fig. 31 : Stitched and Turned Hem

Uses :

a. This method should be used for almost all sheer fabrics.

b. Use this method for lightweight cottons, because it is quick and very adequate.

c. It is well to use this finish on cascaded drapery effects or cascading ruffles. As the drapery falls into folds, the hem will be revealed in places.

d. This finish has an advantage for circular skirts too.

2. Herringbone Hem or Catch Stitched Hem

The hem is evened and the raw edge is left unfinished. The hem is merely turned up and held in place with catch stitches ½ inch apart.

Uses:

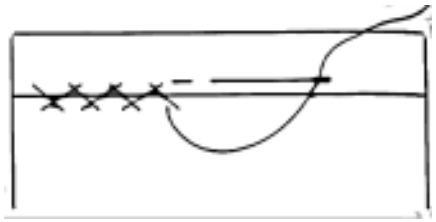


Fig. 32 : Herringbone Hem

a. This method is sometimes used for very heavy wools of the tailored variety.

b. Its most important use is for hems of lined garments.

3. Whipped Hem

The hem is evened and the raw edge is turned under ¼ inch, then whipping stitch is done ½ inch apart to hold the hem in place. Be sure the stitches are inconspicuous on the right side of the fabric (Figure 33).

Uses :

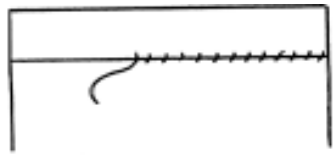


Fig. 33 : Whipped Hem

a. This method is useful for light weight cotton fabrics.

b. It is also used on narrow hems, to finish bias facings.

4. Shell edge hem by hand

Turn $^{1}/_{8}$ to $^{3}/_{16}$ inch hem to the wrong side, and crease between the fingers or press. If the edge is curved or on the bias begin by machine stitching near the outside edge. Using a fine needle, hold the turned side of the hem toward you, and work from right to left. Fasten the thread with a small back stitch and slide the needle inside the fold to conceal the thread. Bring the needle out along the edge and make an overhand stitch over the hem, to produce a scalloped edge. Then slide the needle through the fold and continue (Figure 34).

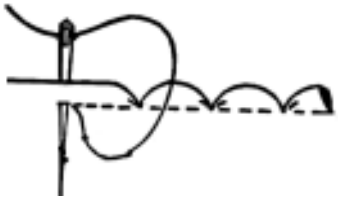


Fig. 34 : Shell edge hem

Shell edged hem by machine

To achieve this shell-edge or multiple scalloped effect, use the blind stitch of your machine, the zigzag stitches reach over the folded edge of the garment to create tiny scallops.

Uses :

1. It is a decorative hem used to decorate the night gowns.
2. It is a popular finish used in lingeries.

6.7. MENDING AND PATCHING

Darning and patching are most commonly used types of mending. There are several types of darns that may be used in repairing fabrics. The kind depends on the position of the tear and the fabric used. Possibly the simplest type is that used in mending a straight tear.

Fundamental rule for Darning

1. The needle should be fine and the thread of the same colour and texture as the material should be used.
2. Fit the edges of the tear together and to reinforce it, begin the stitches about ½ inch beyond its end. Sew back and forth with small running stitches.
3. Do not use a knot in the end of the thread as there is no strain at this point.

4. Continue sewing with small running stitches across the opening to hold the edges to tear together. The rows of stitches should run at right angles to the tear and parallel with the thread of the materials.
5. Have the stitches over the opening alternate, one over and the next one under the edge. This makes a flat darn.
6. The strain will be more evenly distributed if the row of running stitches are irregular in length.
7. Be careful not to draw the stitches tightly enough to cause the darn to pucker.
8. This type of darn is usually made from the right side of the fabric.

6.7.1. Types of Tear

There are three types of tear, straight tear, three-cornered tear and diagonal tear.

1. Straight Tear

If a straight tear occurs on a part of the garment that has to with stand strain, it may be reinforced by a strip of material basted on the wrong side and held in place by the darning stitches. This material may be the same as the garment, or it may be similar in colour but lighter in weight.

In case the threads of a garment have worn thin, but have not broken, they may be reinforced by placing a piece of the same material under the thin spot and then darning as for a straight tear. The stitches should be taken through both thicknesses of the material.

2. Three-Cornered Tear

This tear is darned as a straight tear, with the stitches running at right angles to the opening. The snag is across both lengthwise and crosswise threads. Begin at one end and darn one side of the tear completely. Then begin at the other end and darn the other side. This causes the stitches to overlap at the corner, thus strengthening it.

3. Diagonal Tear

In a diagonal tear both the warp and filling threads are cut. This makes it necessary to run darning stitches parallel to both sets of threads to mend the tear securely. The first groups of stitches are made as they are for the other darns previously discussed, except they are not made at right angles to the tear. The second group is worked in at right angles to the first (Figure 35).

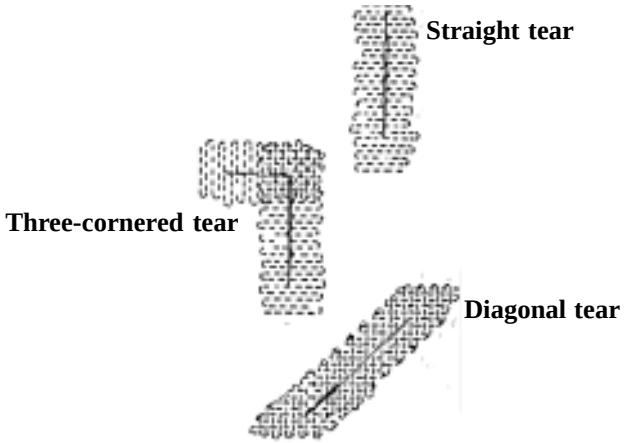


Fig. 35 : Darning

Darning a Hole

To darn a hole insert a darner in the stocking, placing it under the hole. If the stockings are of cotton, they can be mended with darning

cotton of the same colour, if it is silk silk or mercerized cotton thread should be used. No knot is used in the thread. Trim a row of small running stitches to the top of the hole, draw the thread across the opening, and extend the running stitches below the hole. Continue this until the hole has been covered. Care should be taken to have the rows of stitches irregular in length to distribute the strain. Running stitches are then made at right angles to the first ones. They are crossed over one thread and under one as in a plain weave. When the darn is finished, the thread is cut without being fastened (Figure 36).

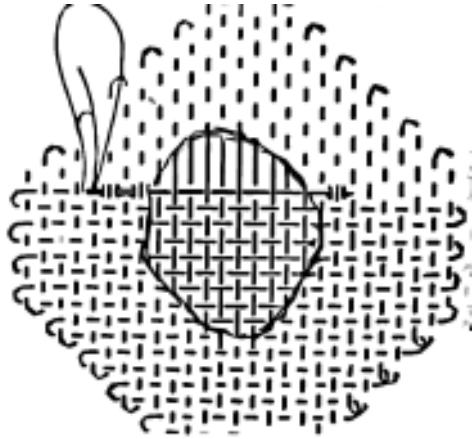


Fig. 36 : Darning a Hole

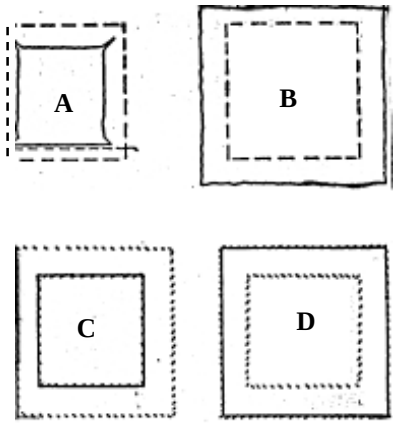
6.7.2. Patching

A quicker and more durable method would be to fill in the hole with a separate piece of material, called a patch. The patch should always be of the same material as the dress. Sometimes it is necessary to cut a piece from the under side of the hem or in seams in order to obtain a patch to match. If the material is washable and has faded, the patch should be faded to correspond. This may be done by washing it in hot soapsuds to which a little baking soda

has been added. Rinse well and dry in the sun. In setting a patch the grain or threads of the material should match those in the garment. If the material is figured the pattern should match perfectly when the patch is completed.

A Hemmed Patch

A hemmed patch is generally used on articles that are laundered frequently, as it is probably the most durable type. To make it, trim off the edges along one thread of the material, making the hold either square or rectangular in shape. Cut the piece of material to be used for the patch about an inch larger on all sides than the hold, after the edges have been straightened.



A) right side with the patch basted in place

B) wrong side

C) hemmed patch finished, right side

D) wrong side

Fig. 37 : Hemmed Patch

Pin the patch in place with the right side of patch to the wrong side of the garment, so that it covers the hole and extends the same distance beyond the opening on all edged and with the pattern or threads matching. Baste in place.

Clip each corner of the hole diagonally about ¼ inch, or the width to be turned under. Turn the raw edge under about ¼ inch and baste in place.

To finish the edge of the patch on the wrong side turn under the raw edge ¼ inch and baste to the garment. After both the right and wrong sides are basted, press smoothly. The edges may be stitched down by machine, or they may be sewed with a hemming stitch. Remove the bastings and press. Stitching by edges of the patch by machine is quicker than hemming them by hand but it makes a more conspicuous patch. Hand hemming is more satisfactory.

Print Patch

Cut a piece of the same material being careful that the pattern matches the pattern on the garment exactly. Then turn a narrow edge on the patch and over sew to the garment on the right side. On the wrong side cut the holes square and blanket stitch the raw edge.

- - -

PRACTICALS

1. Collect picture, photos from magazines and study the factors affecting the clothing selection.
2. Prepare different types of temporary stitches and permanent stitches and on fabric samples and mount them in the record book.
3. Do embroidery stitches on pillow covers, cushion covers, hand kerchiefs, table covers, napkins, etc., also prepare samples in the record book.
4. Do an appliqué work on any fabric.
5. Stitch different fasteners on small samples of fabric and mount in record book.
6. Prepare fabric sample for hemming. Stitch different hemming stitches for record book.
7. Do mending and patching work also for record work using darning and patching.

QUESTIONS

Section A

I. Fill in the blanks

1. _____ have conservative tastes, they do not want to differ from their groups.
2. _____ often help a person feel better psychologically.
3. The elements of fashion appeal are basically the same as the _____
4. The elements that define a _____ include line, silhouette and details.
5. _____ is used for checking lines and hems.
6. _____ is a temporary hand stitch.
7. _____ is also called as temporary stitch.
8. _____ is one of the oldest of all crafts.
9. _____ is an outline stitch.
10. Satin stitch is a _____ stitch.
11. _____ is a knotted stitch.
12. A _____ is a finish for any bottom edge of a garment

II. Match the Following

1.	Price	Embroidery thread
2.	Tracing Wheel	Knotted stitch
3.	Overcast stitch	Needle
4.	Pearl cotton	Fastener
5.	Tapestry	Mending
6.	French knot	Permanent hand stitch
7.	Snaps and Press button	Womens wear
8.	Darning	Marking Tool

9.	Maternity Clothes	Toddler size
10.	Size 1 to 3	Practical consideration

III. Say True or False

1. Workmanship refers to the quality of construction, stitching and finishing.
2. Petite sizes come in both junior and missy.
3. Cutting shears six inches long with a bent handle are best.
4. Pinking shears are used for cutting the fabrics.
5. Slip basting is one of the temporary hand stitch.
6. Running stitch is a temporary hand stitch.
7. Silk floss is an embroidery needle.
8. Crewel is an embroidery needle.
9. Lazy daisy stitch is an embroidery stitch.
10. Blanket stitch is an outline stitch.

Section B

One Word

1. What is the first aspect of garment to which a consumer responds?
2. How do we want our clothes to show off our physical attributes?
3. What is the most important practical consideration while buying fabrics?
4. How is a product identified?
5. How will you see whether your garment is according to your size?
6. What is the size of best shears?
7. What is the equipment needed to undo seams and cutting threads?

8. Name a marking tool.
9. What is the equipment needed to take measurements?
10. Name a temporary hand stitch.
11. Name a permanent hand stitch.
12. Write any one-embroidery thread.
13. Write any one tool needed for embroidery.
14. Write any one outline embroidery stitch.
15. Write any one filling stitch.
16. What is the stitch used to secure appliqué to fabrics?
17. Name a fastener.
18. Write any one hem.

Section C

Two Marks

1. What is texture in a fabric?
2. What is style?
3. List a few points, which affects clothing selection.
4. Define Brand.
5. Write a note on fabric performance and care.
6. List how the manufacturer meets the consumers demand.
7. What are shears?
8. List 10 equipments needed for basic sewing.
9. What is even basting?
10. Write about slip basting.
11. How is backstitch done?
12. What is whipping?
13. List the various types of stitches.
14. List the common embroidery threads.
15. List the various needles used in embroidery.

16. What are frames?
17. What are the tools needed in embroidery?
18. What is stem stitch?
19. Write a short note on chain stitch.
20. What is satin stitch?
21. What is Applique?
22. What are fasteners?
23. Where are button loops placed?
24. What are snaps and press buttons?
25. Define hem.
26. What are hooks and eyes?
27. List the types of hem.
28. What are the types of mending?
29. List the types of tear
30. What is print patch?

Section D

5 Marks

1. Discuss clothing classifications.
2. What are the different types of Shears & Scissors?
3. Write about temporary hand stitches?
4. What are permanent hand stitches?
5. How will you care for the embroidery?
6. Write about two types of filling stitches?
7. What are the two types of knotted stitches?
8. How does the manufacturer meet the consumer demand?
9. Write short notes on

   a) Tailors chalk b) Tape measure

   c) Yardstick and d) Tracing wheel and carbon paper

10. Write any two outline stitches.
11. How will you transfer an appliqué design?
12. What are the steps involved in cutting appliqués.
13. Write a note on button loops.
14. How are snaps and press buttons made?
15. Write the steps involved in marking the hemline.
16. Write the steps in preparing the hem.
17. Write any two types of hem and their construction.
18. How is a hole darned?
19. Write a short note on patching.
20. How is a hemmed patch done?

Section E

1. What are the factors influencing clothing selection?
2. What are the practical considerations to be seen while selecting a fabric?
3. Write in detail the basic sewing equipments.
4. Discuss in detail the two types of hand stitches.
5. Discuss about the materials required for embroidery.
6. What are the different types of outline stitches?
7. Discuss filling stitches and knotted stitches in detail.
8. What are the steps involved in appliqué work?
9. Write in detail the construction of buttons and buttonhole.
10. Discuss the construction of hooks and eyes.
11. What are the different types of hems? Discuss in detail.
12. Write the three types of tear.
13. What are the fundamental rules for darning?
14. Discuss the two types of patching in detail.

7. COMMUNICATION SKILLS

METHODS OF TEACHING HOME SCIENCE

Communication is the process by which messages are transferred from a source to a receiver. It is also a process of sending and receiving messages through appropriate channels between two people or group of people.

Channel of communication constitutes the medium through which information or message is conveyed. These channels or methods of teaching / learning or techniques of communication may be classified or discussed in many ways. They include both formal and non-formal teaching methods and use of audio/visual aids. Details of these were discussed in the earlier text. In this chapter we will learn a few selected methods and aids which can be used in the class room by the teachers and students to present ideas and information in simple ways.

Home Science has two distinct situations of teaching, i.e. formal and non-formal. Learners under the non-formal education system differ from learners under the formal system of education, in their background, resources and motivation. The traditional classroom teaching methods used for formal groups may not be equally effective with the non-formal. In a formal situation, teacher-oriented methods can be used whereas in non-formal teaching situations learner-oriented methods have to be implemented.

However, whatever may be the teaching situation, the basic values, principles and limitations of the teaching methods remain the same. A communicator should be able to adopt each method according to the situation by modifying or improvising it. For example, in a formal situation, necessary classroom arrangements have to be made if demonstration or workshop methods are to be used, but in a non-formal situation students may be seated under a tree or in the verandah of a school, temple or panchayat office.

7.1. LECTURE METHOD

Lecture has been the most widely used method of teaching in all types of higher education including Home Science. In spite, of many criticisms regarding its effectiveness as a method of teaching, it seems to have considerable potential for achieving certain objectives of teaching, such as imparting basic information to students particularly since Home Science is an applied discipline, involving teaching of many facts and theories relating to various subjects.

Lecture involves many activities, such as, introducing the topic, illustrating the examples, using blackboard, questioning and explaining the content. The success of this method largely depends upon how it is delivered.

Values of the Lecture Method

1. It is an effective method for introducing a new topic or lesson. Through a lecture, one can give an overview of the lesson and have a quick review of the completed work.
2. Large portions can be covered in a relatively short period as the teacher prepares the lecture, referring to various books and author's points of views which are presented to the class in a condensed form within a given period of time.
3. It provides the most up-to-date information, since the lecturer can modify his/her lecture up to the last minute.
4. It is the most explanatory method as the communicator can explain as much detail as he/she wants. Moreover, immediate feedback from students helps the lecturer to know which points of the lesson need to be further explained and clarified.

Using Lecture Method

Lecturing is an art. There is no particular style of lecturing. Styles vary from lecturer to lecturer, and its effectiveness depends on an

individual's speaking skills. However, one can try to make his/her lecture more effective by employing the following guidelines:

1. Planning Stage

a. Analyze the group/audience

A lecturer should know the background of the group to whom the lecture is to be delivered. For example, if the group is heterogenous, then the pace of lecturing would vary, amount of stress to be put on various points also would vary. If the group is very intelligent and mature, it may stimulate the lecturer to present challenging material to the group. The time available for lecturing also should be kept in mind so that the lecture can be scheduled accordingly.

b. Organize the content

Depending on the objectives of the lesson, select the content and related information from different references and decide the sequence and mode of presentation. Prepare lecture notes covering major points to be covered in a lecture.

2. Presentation Stage

Effective presentation requires certain qualities on the part of the lecturer, such as, a well modulated voice, gestures, humour, pause, good command over language, and self-confidence. The lecturer should be able to establish rapport with the group. This can be done with movement of eyes from one side of the class to the other, by questioning the group and by seeking their participation in class discussion.

Presentation of a lecture should be done along with the use of teaching aids, structured notes or handouts. At the end the lecture should be summarised, and references for reading should be given to students.

3. Post-presentation Stage

This stage requires the lecturer to give an assignment to the students based on the lecture previously delivered. This could be a reading assignment, writing assignment, gathering some information, designing a room or garment, and so on.

Disadvantages of the Lecture Method

1. It may result in one-way communication, and students may become passive learners, if their participation is not sought at various stages of the lecture. Thus, it may limit the opportunity for interaction.
2. The topic/subject may not be of equal interest to all students.
3. Poor audio attenders may be at a disadvantage.
4. Only theoretical topics can be covered through this method.

In short, the lecture method can be used successfully only through proper planning and effective presentation. Because of its formal nature, this method may not be effective with non-formal education groups.

7.2. DEMONSTRATION METHOD

Demonstration may be the most effective method of showing how something works, what it is composed of, and why it is important. Students become involved with the subject because they are looking at specific things, which hold their attention.

Demonstration generally involves manipulation of tangibles such as food preparation, home decoration, etc. but it can also be used for exploration of intangibles such as, good posture, mannerisms, how to introduce a person, how to appear for interview, and so on.

Demonstration can be given by teachers, outside experts or students. For students, giving demonstration is a valuable activity because it makes them participate in a process of communication, which involves many responsibilities and actions. They may have to give oral explanations and use a variety of teaching aids for clarifying the points. Through this process they learn about the techniques which can make communication effective.

Values of Demonstration

1. ***It helps to visualise a process that might be difficult to understand completely only through verbal description.*** For example, teaching how to design a dress can be taught through demonstration.
2. ***It makes people aware of the advantages of improved practices,*** for e.g., if cooking practices in the community are poor then the demonstration of the advantages and methods of good cooking practices can be given.
3. ***It arouses interest in adopting new techniques, and thereby motivates people to take action.*** The demonstration on good cooking practices may set a better standard of taste in the food which may arouse interest in adopting the new cooking practices.
4. ***It makes learning easy and saves time.*** As the students see the teacher demonstrating, step by step, they remember the process more easily. Thus, it saves the teacher from explaining the procedure again and again and saves time.
5. ***It is useful especially when the material is very expensive and all the students cannot have it for experimenting.*** For example, operation of a washing machine / microwave can be demonstrated for all the students, as all the students may not have it.

6. ***It helps in teaching set standards in technique or in the finished product.*** For example, demonstration on 'icing on cake' can teach students the correct quantity of ingredients to be used, consistency of a paste and technique of icing.

Mainly there arc two types of demonstrations:

7.2.1. Method Demonstration

It means the demonstration of a new technique or practice, that is, ***how the thing is done.*** When a Home Science teacher or student shows how to prepare a cake, for example, he/she shows how to beat the egg, how to mix the ingredients, how to put it in the oven, how to know whether it is sufficiently baked or not, and so on. The learners watch the whole process shown in the method demonstration.

7.2.2. Result Demonstration

In result demonstration, ***a comparison of the result of demonstrated practices and existing practices is made.*** The demonstration can be supplemented by the use of audio-visual aid. For example, comparison of food with baking soda and without it, old and new methods of room arrangement, and so on.

Preparing for Demonstration

Demonstrations involve two elements - demonstrator and observers. Therefore, preparation for demonstration requires careful attention to the needs of both. Here are the important guidelines which should be considered while planning for a method demonstration:

1. Determine the purpose of your demonstration, that is, whether it is going to demonstrate a skill or create awareness regarding a new practice or technique.
2. Decide how you are going to determine whether you have accomplished your purpose.

3. Select the real things, models, films, pictures and photographs, or any other supporting material that will contribute to the demonstration.
4. Arrange the sequence of steps and the content of the demonstration.
5. Plan how you will arrange materials on the demonstration table or area to have them conveniently at hand when you need them.
6. Decide how you are going to arrange the room so that all viewers are able to see what is being demonstrated.
7. Make time limits realistic in your lesson plan allotting sufficient time for demonstration as well as for the questions after the demonstration.
8. Make the introduction to your demonstration clear and direct so that learners know exactly what purposes the demonstration is to serve, what they will learn from it, and so on.
9. Plan for assistance by others during demonstration, if necessary.
10. Decide when to provide learners with handouts or any other 'carry home' material.

Conducting a Method Demonstration

Although hazards are possible in demonstrations, the following suggestions can ensure reasonable assurance of success:

1. Keep ready everything needed for a demonstration in advance.
2. Have a semi-circular seating arrangement so that all the learners can see what is being done.
3. Remember to speak loud enough so that everyone can hear. Call for the attention of the learners time to time. This helps in learning.

4. Tell or show only what viewers need to meet their goals. Concentrate your talk/lecture on the essential ideas, don't talk just to be entertaining.

5. Keep an eye on your learners and watch for puzzled or confused expressions and try to clear the same.

6. Keep a proper pace in your demonstration. Move slowly over difficult steps and repeat them, if necessary.

7. Use teaching aids to emphasize important points, such as, specimens to show ingredients used, pictures and photographs to explain nutritive value, or a set of flash cards with illustration to explain procedure.

8. Involve learners in demonstration by asking them to help in preparation or try out a special technique involved in the preparation. For example, a recipe requiring special kind of rolling or folding can be tried out by the learners.

9. Strictly follow the time plan made for demonstration.

10. Encourage questions, and summarize the process. This will help in clarifying doubts and confusions.

This method is particularly effective with non-formal groups. It is easier to convince them about new ideas through this method because ***'seeing is believing'.***

The evaluation of a demonstration can be carried out by the teacher with the help of the checklist or rating scale.

7.3. DISCUSSION METHOD

Discussion takes place whenever there is a difference of opinion concerning the situation. It involves an interchange of questions and ideas among the participants. The purpose of discussion is to encourage exchange of ideas and viewpoints even though it may not lead to any decision or solution to the problem.

Hall and Paolucci (1968) have noted that various research studies comparing the effectiveness of discussion procedures and lectures have found discussions to be approximately as effective as lectures when the- acquisition of information was measured immediately after the experimental periods. Measurements at a later time indicate that ***discussion methods may be superior to lectures or reading for the retention of information.*** Discussion methods have been found to be superior also in contributing to the application of the material learned and in building attitudes that are important in shaping behaviour patterns.

Values of Discussion

1. It develops in students the ability to discuss.

2. It increases self-confidence of students.

3. It brings out all the different points of view of students to solve a problem.

4. It brings out past experiences and known facts which have bearing on the question being discussed.

5. It inspires individuals to act to improve their own situations. For example, as a result of discussion of the effects of immunisation against disease, including presentation of facts and the relating of experiences, individuals may be led to immunise themselves and members of their families.

6. It may lead groups to work out plans of action. For example, a discussion of the benefits to be gained through income generating activities for women may lead women to take up such activities.

Types of Discussion

There are various types of discussion methods which can be used for teaching. They are:

1. Class discussion
2. Panel discussion
3. Symposium
4. Colloquium

Amongst these, informal class discussion is the most widely used method for classroom teaching.

1. Class Discussion

Class discussion can be on a general topic such as the need for Home Science education or it can be on a specific topic such as 'vocations in Home Science'.

The effectiveness of the class discussion is related to the age levels and abilities of the students, the class size, the subject matter to be covered, and the experience and skill of the teacher in conducting the discussion.

2. Panel discussion

Panel discussion is also known as round table discussion. It consists of a panel of three to six persons who express their opinions on a given problem. The panel clarifies the problem before each member reacts to it by taking over the discussion on each point easily and freely so that the discussion becomes lively. In a class room, when a panel is made of students, a teacher or student can perform the role of moderator. He has to successfully elicit the participation of each panel member.

The advantage of panel discussion is that it provides an experience to the students to think quickly and independently and express themselves.

Sometimes this type of discussion leads to poor organisation as the panel may not reach any solution due to the varied opinions expressed by the members.

3. Symposium

In this method, several speakers present their viewpoints on a given subject. The aim is not interaction amongst the speakers but only the expression of viewpoints. Thus, it provides the presentation of various ideas or practices in a short period of time. Moreover, it provides students an experience in public speaking. The presentations can be followed by class discussion on the same topic.

4. Colloquium

This method consists of two groups, one of experts or specialists or resource persons, and the other of students. The students' group raises the questions on interesting and relevant topics and seeks answers from the panel.

This kind of discussion may provide students with information, which may not be available otherwise. The teacher or a student can be the moderator. The main problem in using this method is that competent persons are difficult to find.

The process of discussion involves three major steps:

1. ***Recognizing the problem.*** The group should agree upon the problem to be solved.

2. ***Thinking of possible solutions. O***nce a problem is recognised, the members of a discussion group can express opinions as to the ways in which each thinks the problem can be solved.

3. ***Agreeing upon a satisfactory solution.*** This may be a solution for an entire group in which plans of action can be worked out. Regardless of the result of the discussion, it will be profitable because each individual will have the opportunity of contributing something to the solution of the problem.

7.4. FIELD TRIP

This method requires a visit to the community or places outside the classroom, which can provide rich sources for instruction in courses of Home Science. For example, field trips to the institution working for women, welfare of handicapped children or a visit to food industry can be very informative for various courses. The most important factor in planning a field trip is that it should fit into the teaching plan.

Values of Field Trip

1. It provides ***first hand and direct experience*** of the existing situation, to the students through observation.

2. ***It motivates*** students to learn as they have opportunities to examine materials and obtain new ideas.

A successful field trip involves the following stages:

1. ***Planning for the Field Trip:*** The teacher should visit the place in advance or correspond with the agency or host about the purpose of the trip and decide the convenient day. He/she should prepare students by telling them the purpose of the trip and what information they should seek through enquiry and observation. Students and teacher should together prepare a list of questions to be asked to the host on the field, plan for transport, food, etc. Students should be involved fully in making arrangements for the trip so that they come to know the procedure, problems and hazards in organising a trip.

2. ***On Field Procedures:*** Students can be divided into small groups, if the number is big, so that they can observe and hear better. The host should be introduced to the group. Students should be encouraged to ask questions. Some selected students should be given the responsibility of recording the field trip.

3. ***Follow up:*** The follow-up of a field trip involves writing 'thank you' letters to the host and all others who helped in making the field trip a success.

Students should be asked to submit group or individual reports of the trip in light of the objectives of the field trip as set before.

A discussion on the experiences of various students and how they profited out of the exercise should be carried out in the class. If some material has been collected, then it can be displayed for all to see.

A well planned field trip can help students in applying the knowledge.

7.5. EXHIBITION

An ***Exhibition is a systematic display of models, specimens, charts, photographs, pictures, posters, information etc. in a sequence around a theme to create awareness and interest in the community.*** This method is suitable for reaching all types of people. Exhibitions may be held at the village, block, sub-division, district, state, national and international levels. Though an exhibition is organized around a major theme, other related themes and some unrelated items like entertainment may also be included. While school functions and inter school activities are going on exhibitions can be organized as part of these activities. Exhibitions may also be organized by taking advantage of local fairs and festivals. In fixing dates for exhibition, the weather condition and the schedule of other activities and programs may be kept in view.

Objectives

1. To acquaint people with better standards and information.
2. To create interest in a wide range of information.
3. To motivate people to adopt better practices.

Technique

Planning and preparation

- Form a Steering Committee and suitable Sub-Committees with the specialists, local leaders and administrators.
- Decide on the theme and the organizations to be involved.
- Prepare a budget. Estimate and procure funds.
- Decide on the venue, time and duration
- Prepare a written programme and communicate to all concerned in time. Keep some cultural and recreational programmes in the evening.
- Get the site ready within the scheduled date. Make provision for essential facilitites.
- Earmark a stall for display of exhibits to be brought by the different departments..
- Arrange a pandal for holding meeting, training and entertainment programmes.
- Display posters at important places. Publicize about the exhibition through mass media.
- Decorate the stalls simply and tastefully. Make adequate arrangements for lighting. Use special-effect lights where necessary.
- Prepare good quality and colourful exhibits which shall convey the desired message to the visitors. Use local materials as far as possible. Label the exhibits in local language with bold letters.
- Display exhibits about 50 to 60 cm above the floor of the stall, upto a height of about 2 meters. Maintain proper sequence. Avoid

overcrowding of exhibits. Take precaution against display of insignificant and unrelated exhibits.

- If possible, arrange action and life exhibits.
- Train up interpreters and allot specific duties. For a long duration exhibition, arrange rotation and replacement of personnel.
- Exhibits can include a range of displays, models, posters, pictures, photographs and maps etc.

Implementation

- Organize formal opening of the exhibition by a local leader or a prominent person.
- Arrange smooth flow of visitors.
- Let the interpreters briefly explain the exhibits to the visitors so that the intended message is clearly communicated. Distribute publications during visit.
- Organize a panel of experts to be present nearby, so that the visitors who would like to know more or discuss some problems could get the desired information.
- Conduct meetings, training programmes etc. as per schedule during the day time. Use the pandal at night for entertainment programmes.
- Arrange judging of exhibits brought by the public and give away prizes and certificates.
- Keep the exhibits and the premises clean. Replace exhibits as and when necessary.
- If desired, judge the stalls on the basis of their quality of display, ability to draw visitors and effectiveness in communicating message, and award certificates.

- Conclude the exhibition as scheduled by thanking the participants and those who have helped.

Follow-up

- Meet some visitors personally and maintain a visitors' book for comments during the exhibition to get feedback information.
- Talk to the local leaders and assess success of the exhibition.
- Ensure availability of critical inputs and facilities emphasized during the exhibition.
- Look for changes in practice in the community in the coming years.

Limitations

- Requires lots of funds and preparation.
- Cannot be held frequently.

7.6. WHAT TEACHING AIDS CAN DO?

Teaching aids

- Provide greater ***sensory experiences*** to help the students develop understanding and retain knowledge for a longer time through five senses - ***vision, hearing, touch, smell and taste,***
- Provide a ***variety of learning materials and experiences;*** using chart, films-strip, model, puppet, tape etc.,
- ***Increase interest and involvement of students'*** in learning; instead of plain lectures. Lectures with teaching aids can hold attention and interest of students,
- Supply ***a concrete base for conceptual thinking;*** developing a concept of colour harmony through a colour wheel,

- Aid a teacher in giving ***clear explanations;*** explaining process of reproduction with the help of charts and models,
- Provide experiences which are not easily available to make ***learning wide and deep;*** video tapes on life of people in other countries.
- Help to increase ***meaningful vocabulary;*** learning correct names of Indian embroidery with the help of samples of embroidery,
- Develop ***continuity of thought;*** need for good health need for population education,
- Introduce ***self-activity;*** making posters, reading maps; making flowers from waste materials,
- Aid in ***mass communication;*** using films, television, radio broadcasts, leaflets, folders, pamphlets.

However, remember that the teaching aids cannot do one thing, that is replace "a teacher". They are in general, to "aid" the teacher in enriching the learning experiences to communicate better. A teacher cannot entrust her class to a teaching aid and leave the room to attend to some other work.

General Principles of Selection of Teaching Aids

Academic:

Are they appropriate for the level of the learners? Consider

- ***age*** - children, youth, adults
- ***experiences*** as rich and poor, urban and rural, male and female
- ***mental ability*** - slow, average and superior
- ***interest*** - not interested, less interested, and highly interested.

Do they truly and correctly convey the up-to-date ideas they claim to? For example:

- amount of food using area graph
- size of house through model of a house
- colour of clothes by objects
- rate of growth using bar graph

Do they add important content and clarity to the relevant topic? They can be:

- classification of food
- process of stencil or batik printing.

Do they help students to think for themselves and initiate self activity? For example:

- understanding relationship of style of clothes to one's activities and construction of such clothing can be undertaken by the student.
- Are they indispensable to teach the topic?
- Names of cooking methods can be learnt without the help of any teaching aid.

***Physical*:**

- are they affordable by the institution?
- television and films have high initial and repair cost.
- can they be easily maintained?
- accessibility of parts, repair facilities, special storage facilities, air-conditioned rooms and steel cabinets .may not be there.
- are they easy to carry?

Projectors and screens are very bulky and require stable transportation like van and extra persons.

7.7. THREE - DIMENSIONAL AIDS

Direct, purposeful experiences are not always available and if available, are not always usable or applicable in making the teaching very effective. To teach a concept of wild life and its preservation, it may not be possible to visit all the wild life resorts and show all those animals to the students. Some experiences belong to remote past or future and so it is not possible to experience them in reality. A real human eye or any other human organ may be available but for a detailed study, they may prove to be useless as their handling may be awkward. Thus, sometimes, the real things are too large or too small for easy handling.

In these circumstances ***contrived experiences help to simplify teaching by editing the realities.*** Some complicated or distracting details are omitted, and some new ones are added and the sizes are changed for the sole purpose of better understanding of the original things. Such ***contrived experiences are provided through objects, specimens, models, mock-ups, mobiles and puppets.***

7.7.1. Objects

Objects are actual real things such as furniture, toys, refrigerators, pressure cookers, fruits, flowers, books etc. Many objects are easily available in the home or from friends, local markets, educational institutions and museums. The use of objects must be encouraged for classroom teaching as they -

- require no preparation, example - actual carpets for floor coverings,
- make teaching interesting by breaking the monotony of a lecture, example - vegetables and fruits for a talk on nutrition,
- help to visualise the concepts, example - the concept of saving time and labour through the objects of pressure cooker and mixer,

- make teaching more effective by making the explanations very clear, example - ways to make self-help children's garments through the actual garments,
- give opportunity to students to touch, experience, investigate and study in the class.

You can present the objects in the class, either by displaying them in a show case, specially those which are rare, expensive and delicate or by placing them on tables for the whole class to see. You may pass them around among the students for closer view and study, if the objects are small, unbreakable and safe. Make a collection of objects for your teaching, whenever possible, for use in future to save time and energy in hunting for them when needed. Store objects either in cardboard boxes or in cellophane bags or display them in enclosed glass show cases permanently like we find in museums.

Sometimes, objects are not usable in the class as they may not:

1. Be suitable to classroom situation; examples-

- if they are too large, like an elephant, and aeroplane, they cannot be brought in the room.
- if they are too small, like insects and household pests, they are not convenient to see and conduct detailed study.
- if they are dangerous, like snakes and wild animals they are not safe to bring in the classroom.
- if they are soft and slippery they are inconvenient to handle, like a human eye.
- if static, like buildings and gardens, they cannot be brought to the class.

2. Some may be highly perishable, examples green leafy vegetables.
3. Some are not available easily in the local communities, examples - expensive costumes or food items of other countries, objects depicting past centuries, architecture of the remote past or future.

4 Some are not affordable due to high cost, example - machines, real ornaments, blue pottery.

7.7.2. Specimens

According to Schuller, Charles and Walter, (1957) ***"a specimen is an object which is incomplete, or which is representative of a group or class of similar objects",*** examples -

- incomplete object-piece of a silk sari
- representative of a group - a leaf, a cow or a folder.

They can be ***perishable*** like a butterfly, flowers etc. or ***non-perishable*** like tiles, fabrics, stones, grains etc.

Specimens are inexpensive and can be easily collected from the same sources as objects. In some cases where original objects are not usable specimens can serve the purpose. Presentation of specimens in a class depends upon their size and the size of the group of students.

- if they are large, keep on a table and students can view them while remaining seated; example - large decorative earthen articles from Kutch or Rajasthan.
- if they are small, convenient and safe to carry, pass them around among the students during class time; examples - cloth pieces, paper designs, colour specimens. Label them before circulating
- if they are small, inconvenient and unsafe to pass around, call students individually or in small groups to the front, to study

them during or after the class; examples - diamonds, butterflies wings, fine silver jewellery etc.

Always store specimens carefully for ready future use. Perishable items require special care. Any biological specimen can be preserved in a glass jar or vial with the help of chemicals like formalin, glycerine etc. Non-perishable or dry specimens can be stored in clearly marked wooden or steel cupboards or in shallow cardboard boxes. You may mount a dry specimen with glue, pin, tape or thread on a piece of stiff cardboard that fits well at the bottom of a shallow box. Label each specimen.

7.7.3. Models

A ***model is a three-dimensional, recognisable imitation of an object. A model may be the same size as the object it represents or it can be smaller or larger.*** It can be handled and seen from a number of angles. Models can be of many types.

Scale Model

A scale model has the correct representation of the thing through the exactness of the scale. It can be either enlarged or reduced depending upon the need; examples - insects, buildings, etc.

Simplified Model

A simplified model is roughly the external form of an object, used mostly for education of children and illiterate persons; examples- birds, fruits, pots, etc.

Relief Model

A relief model also known as a relief map is a realistic, recognisable, representation of a country or a part thereof; examples - India, Gujarat. This is mostly used for teaching elevation in geography; however, a relief map proves to be very useful in

understanding the life of people living in a particular area; examples - Himalayas and plains of Rajasthan.

Working Model

A working model shows how things function in a simple way. Process and mechanism can be understood better by the use of a working model; example - working of human heart, washing machine etc.,

Cross Section Model

This type of model shows the internal structure of an object as it is cut crosswise. It is useful in teaching physiology, nutrition and technical topics; example - models of brain, eye, compost pit, smokeless chulla, etc.

Models are used when real objects are not usable.

Besides these, they are also used

- to express abstract ideas and processes; examples-digestive system of body.
- when flexibility is needed to teach by moving the articles which originally are either too big or static;, examples - houses and their arrangements; layout of a garden, etc.

Remember that models:

- require professional skill in preparation
- can be expensive
- are breakable.

They can be bought from the educational material stores, or can be borrowed from leading libraries, universities and museums, besides being prepared by professional artists, teachers and students. They can be made from a variety of materials such as cardboard, wood, metal, wax, clay, plastic, plaster of paris, plasticine or cotton.

Using Models in the Class

Before the class meets, check that the

- scale of the model is correct - Colour of the model has not faded
- model is not damaged.

During or after the class, models should be properly positioned where they can be seen by everybody and handled if necessary for personal study. If the models are not checked and used properly, misconceptions may arise. So precautions should be taken as follows:

- for enlarged or reduced models, the scale should be clearly specified.
- real weights of fruits and vegetables, if different from the models, must be clarified.
- if possible, original objects or the colour samples may be brought to the class to show the real colours of the objects, if the colours of the models are different from that of the original.

Models must be stored properly to avoid damage through dust, strong light and pressure of other articles. If not, they will break and their colours may fade. They can be stored in conical cupboards with glass tops or cupboards with glass fronts, to serve the purpose of their permanent display.

7.7.4. Puppets

Puppets have been used for thousands of years all over the world to stimulate and entertain people. Now their use in promoting social action has also been experimented successfully. Puppets can be of many kinds. Hand or Glove, Rod, String or Marionette or Shadow.

Puppets can be used for educational purposes because:

- being funny, with exaggerated features and characteristics, help to motivate learners, specially children, villagers and illiterates.
- can communicate ideas related to desirable social action such as community improvement, prohibition, family planning, nutrition, social evils, superstitions, ill treatment of women in society etc.
- can present sensitive topics through the effective use of satire and humour, which may otherwise hurt the feelings of the audience.
- can be easily prepared and used, except string puppets for which special skills are required.
- are relatively inexpensive and require little by way of costumes, scenery and stage equipment as compared to a real drama when used for classroom or extension education purposes.
- can involve the entire group/class in preparation and presentation of the puppets (puppet making, costumes, scenery, music, lighting and manipulation).
- can be reused after proper storage and a change of costumes.

All types of puppets used for educational purposes, must possess some characteristics:

- they should have prominent, pleasant or crude features that are visible from far.
- they need to be colourful and of an appropriate size for a group of 30 to 40 persons.
- they should have costumes suitable for their roles, example - rural characters should be dressed like village folks, an old couple should look old through white hair, spectacles etc.

- they should be made of durable, light-weight materials (paper pulp).

Since marionettes and shadow puppets are difficult to manipulate and require special puppet stages/screens, their use in actual classroom situations is limited. So here, the preparation of only glove and rod puppets is discussed, which are handmade with stuffed cotton.

A Glove puppet consists of a head and a loose glove-type body which fits over the puppeteer's hand and helps to hide the hand. The index finger fits into the puppet's head, and the thumb and second finger slide into the slits or sleeves with stuffed hands to form movable arms. The head can be made of a

- brown paper bag stuffed with paper
- cloth stuffed with cotton or two layers of cloth figures stitched
- papermache with the help of a clay mould
- rubber ball.

Add the features and distinguishing marks like a bindi or a moustache. Then, make the neck of the glove puppet by rolling a chart paper to form a tube-like-structure and push it inside the head through the hole at the bottom of the head.

Stitch the glove with two layers of cloth, wide enough to hold the hand and long enough to come up to the elbow. Dress the glove puppet appropriately, example - sari and ornaments or cap and shirt. A rod puppet usually has a jointed body made of stiff paper attached with stiff wire, umbrella ribs or thin wooden sticks to it's arms and the body or a head and a wooden stick. Rods can also be used to push animal cut-outs, stage furniture or scenery on or off the stage or to move while on the stage.

Puppets have their Limitations

Puppets cannot change their facial expressions. Throughout a play it has to have the same face, happy, sad or neutral. Puppets cannot change their dress during the play. This creates a problem when showing a puppet doing a variety of activities in different places; examples - to show a puppet getting married and then attending a funeral. Except string puppets, other types of puppets cannot show a variety of actions, specially leg movements as they have no legs.

- Topics which require detailed information cannot be taught through puppets as they can only motivate people initially.

Puppet Plays

To be most interesting, the puppet plays should:

- try to convey social-action-ideas only.
- have a topic interesting to the age and experience of the audience- children, youth or adults; urban or rural; literates or illiterates.
- be short.
- be based on fantasy and imagination.
- be full of action rather than words.
- have short and simple dialogues.
- have few characters, at a time, on the stage.
- have ample amount of music.

The puppet stages could be either real or improvised.

Improvised Stages

A sheet or a table can be used for hiding the puppeteers and showing glove and rod puppets from below. Pillars or two chairs with some distance (5 to 6 ft) in between can be joined with a sheet

or a sari to form a hiding place for the puppeteers juggling glove or rod puppets. Extra lighting on the puppet stage, appropriate accessories and scenery with pinned-up cut-outs are a must for drawing and holding the attention of the audience.

7.8. DISPLAYS

Depending upon the type of the display, materials can be arranged with the help of insulation, or soft board, perforated, magnet or chalkboard of glass or painted wood, showcases, tables, stands, or blocks. A display usually involves a careful and attractive arrangement of materials, which may be two-dimensional - paper, cloth, ribbons etc., or three - dimensional-objects, models, specimens etc. A single display can have materials of both dimensions; example - a display consisting of pictures and models of houses.

Different types of displays serve many purposes:

- stimulate interest of the students (a bulletin board display on flower arrangement, a chalkboard work involving diagrams and line drawing)
- publicise ideas (a perforated or a magnetic board display to publicise a family planning campaign)
- explain things effectively (a chalkboard work on the various steps in cleaning precious metals)
- bring several scattered ideas together (a flannel board story on sources, nutritional values and deficiency diseases of protein)
- helps to introduce or summarise a topic (a showcase display on four food groups either in the beginning or at the end of a lesson on "balanced diet")
- give recognition to the creative and original work of students; examples - an insulation board display of stencil printing articles

- develop a group feeling if the displays are'put up by the students as a group
- help students share things for which only one copy or specimen is available; examples - a recipe, an article, a picture- on any home science topic.

Like graphic aids, displays also are comparatively inexpensive, therefore, most schools and adult education agencies can afford them. They consist of locally available materials and it is possible to introduce improvisation. All displays have some common advantages. They

- can be put up in advance/or their display material can be prepared in advance
- are easy to put up, use, and transport
- can be used repeatedly
- can be used for a variety of subjects.

7.8.1. Chalkboards

A chalkboard, a universally used teaching aid for writing and drawing can be made of slate, or of glass, or by painting wood or a part of a wall with blackboard paint. A chalkboard could be in the form of sliding doors and storage facility can be provided behind it. A piece of oil cloth - 30 x 40 inches, painted with blackboard paint can make a roller chalkboard, which can be carried from one place to another very conveniently, for community teaching and extension work.

Place a Chalkboard Correctly

A wall chalkboard can be permanently fixed on the wall which is next to a wall which has doors or windows, to avoid glare but also to have enough light. In a graded, gallery type classroom, a

chalkboard can be at the eye-level. Take a round in the classroom to check the lighting and visibility from different angles. The chalkboard can be kept on an easel stand, which can be carried from one room to another and also can be lowered or raised as desired by the audience. Remove any pictures, photographs or decorative pieces hanging too close to a chalkboard, which may distract the attention of the students. A chalkboard, also known as a blackboard, is used extensively because of its many advantages:

- it is comparatively cheap and easily available or made.
- it permits advanced preparation. Before a demonstration class meets, a teacher can write down the ingredients and the method of the demonstration.
- it can be used for any topic in home science; examples - protein, neck-lines, first aid, care of a new-born baby etc.
- it is suitable for all age groups - nursery school children to adults.
- it is a flexible medium of teaching. One can write or draw, rub and rewrite, add new details, join related information and so on, while teaching.
- the students are encouraged to participate. They can come forward and do some explaining or drawing with the help of a chalkboard.

Guidelines to use a Chalkboard effectively

- before using a chalkboard, see that it is clean and there is an adequate supply of chalks and a duster. Wash the chalkboard with a clean, wet cloth once in a while.
- plan your chalkboard presentation beforehand. For advance students and simple topics, extempore drawings and terms may be written but for young students and complex subjects, chalkboard work must be planned in advance.

- use simple, bold, large enough print type, straight rather than slanted letters for easy readability. Avoid ornamental and running script, type letters.
- combine capital letters with lower case letters.
- poise the chalk slanted on the chalkboard to avoid screeching.
- give enough weight to the chalk while writing to make bold impressions.
- use coloured chalks to emphasize points and to form contrasts.
- use arrows, circles, and bars to stress the key points.
- control your movements as they distract the students.
- talk and then immediately write briefly. Avoid talking while writing which will seem as if you are talking to a chalkboard rather than the audience. After writing, stand on one side, face the audience and explain further. You may use a pointer to direct and focus attention on any particular point.
- erase in a uniform manner from top to bottom so that the chalkdust gets collected on the extended narrow shelf at the bottom of the chalkboard or on the floor.
- avoid overcrowding the chalkboard with too many words and figures. Rub out the things already explained and not needed anymore. Good planning helps a lot.
- also use other visual aids, like charts, graphs, maps, etc.
- illustrate ideas with drawings which can be done freehand or with the help of a silhouette or perforated stencils of wood or cardboard. Line or stick drawing is also helpful.

7.8.2. Bulletin boards

A bulletin board is a board that is usually used to exhibit bulletins but may be used also for -

- making announcements
- placing notices
- posting examination results
- exhibiting displays

Posting anything that has to be seen or read by the students.

You may use anything light in weight on a bulletin board, such as, bulletin, leaflet, folder, pamphlet, booklet, journal, picture, cutout, notice, announcement, chart, light model, sketch etc. Besides having all the general advantages of displays discussed earlier, a bulletin board display allows the study of subjects not otherwise brought up in a class; examples - display on - "What does India Export", or "Literacy among Urban and Rural Women".

A bulletin board can be of any size. It might cover a part of the wall or the entire wall but the vertical dimension should not be less than 30 inches. If illustrative materials are to be displayed, use 40 inches wide board. A bulletin board can be made of-

Insulex board (available in various thicknesses and in a size of 8 x 4 feet)

- cork board
- gunny bag or khadi
- brown paper or newspaper layers

Anything that is soft but firm enough to hold the display materials well with pins or tacks.

A perforated board or a panel of boards on stands with evenly distributed holes can be used with the help of special pins and accessories available with it to hold two-dimensional and small three-dimensional articles, such as craft pieces, and books.

Protect your bulletin board. Frame it with a wooden frame or plastic tape or any other material. A bulletin board can form the front or back side of a storage cupboard or can be the inner back-side of a shallow glass case (4 inches in depth) with a one-piece glass door or two sliding doors which can be locked and can be used for displaying small three-dimensional articles like books, models, specimens, besides two-dimensional things. The board can be either fixed on a wall with screws, or kept on an easel-stand or placed on a table.

A bulletin board that is used for day-to-day purpose of posting notices, announcements and bulletins, needs no special arrangement; however it can be covered with a dark colour background or paper or cloth or permanently painted with plastic paint, (since most of the paper articles are in white or light colour).

A bulletin board display which is arranged, specially to exhibit the display materials either for classroom teaching or for a special public exhibition needs very careful planning and arrangement.

1. Select a topic appropriate to the age, experience and understanding of your audience, example - college students; women belonging to various communities who are attending adult education classes, etc.
2. Decide upon the display material such as pictures, light models, cut-outs, sketches, written materials etc. The illustrations must be large, colourful, related to the topic, simple and easy to understand.
3. A bulletin board may or may not have a main title, but if it has, select titles which are brief, attention compelling and relevant to the topic; example -

   "When there are no flowers...."

   "Care for your Woollens!"

4. Legible and attractive captions, labels and titles are a must for effective displays.

5. Size of the lettering should be according to the size of the board and the audience. Avoid very large letters for the main caption, and too small letters for the sub-titles and text. Use simple bold letters and avoid ornamental styles. The spacing should be optical rather than mechanical. For some purposes, typewriting may be adequate and convenient, but with practice, most people can do freehand lettering with felt-tip pens.

6. Plan the layout. It can be formal or informal. The former being more appropriate for classroom teaching, and the latter for the whole institution or general public, for greater motivational appeal. Avoid overcrowding of display material.

Heavy articles and large pictures should be kept at the bottom to give a feeling of solid security. Titles can be written both vertically or horizontally, though better readability is achieved with straight horizontal ones. Avoid splitting words, or writing them by spreading out each letter.

7. Use a few striking and pleasing colours. Start with the colours already present in the display materials since you cannot change them. Then select the colours of the background and titles which are well matching with effective contrast. The background should make the display materials stand out rather than draw attention to itself. Therefore, avoid flashy, heavily textured, bright or merging type backgrounds. You can use cheap coloured cloth or coloured paper, which can be easily cut into the same size as the bulletin board and can be reused in future. Combine two or more colours in unequal sizes to make an interesting background.

Balance the colours of the display materials, on a bulletin board arrangement, harmoniously. As a rule, very bright colours should

be used sparingly as they give the effect of burning and so cause uneasiness among viewers. People continue to look at cool colours for a longer time. So use very bright colours like, red, yellow, shocking pink, green etc. in small proportions just to attract attention, but present major visuals in cool colours only.

Use colours to:

- attract attention
- show boundaries
- indicate classification of groups
- have effective background for materials.

8. Usage of a special colour, unusual shape, picture etc. helps to attract attention even if it does not add to the educational value of a bulletin board. This principle may not be necessary for day-to-day teaching but for a special public exhibition, it is indispensible. A bulletin board, however well and neatly arranged is a failure if it fails to attract the attention of a passerby in the first instance!

9. Use strips of paper, ribbons, or yarn to connect the display articles and direct the eye to move in a specific direction.

10. Lay out the arrangement with some pins. Make necessary alterations and only then fix the display material securely and neatly. Fix boundaries of the bulletin board also very neatly.

11. Achieve a three-dimensional effect on a bulletin board display by using light models made of balsa wood, styrofoam and cork, putting these behind the flat tiles and objects and not by letting the pins go down completely inside the board. This helps the thick flat materials to stand away from the board and create a three- dimensional effect

12. Change the bulletin board displays frequently to attract the stu dents attention. You may store your display materials carefully for ready reuse.

7.8.3. Flannel boards

When you attach pieces of flannel or sand paper to the back of pictures, photographs and drawings, and place them on a board covered with flannel, they stick to the board without pins: This magic display is called a flannel board display, or a flannelgraph. It is used mainly:

- to capture and hold attention of your students/audience through its dramatic approach of bringing and removing the display materials instantly.
- to help students specially children and illiterates learn creatively as this medium helps them to construct and reconstruct concepts visually.
- to build up a story or a demonstration or to present a set of steps one by one and thus no element can distract viewers before its function is introduced.

Its use is flexible and its presentation can be shortened or lengthened according to:

- purpose of the lesson
- nature of the audience (children, youth or adults; urban or rural; educated or illiterate)
- size of the board
- amount of display material
- time, available, to the instructor.

To prepare your own Flannel Board You need:

- a foundation board which can be of plywood, hardboard or cardboard. If an insulex board is used, it will, also serve the purpose of a bulletin board as you can fix the display materials,

those which do not have flannel at the back with pins and tacks. Use a board that is 36 x 48 inches in size for a group of 30 persons - cloth for covering - cotton, flannel, woollen cloth, felt or khadi.

Take a foundation board and cut the covering cloth 3 to 4 inches larger than the board to allow the overlap for securing it at the back. Stretch it tightly over the board, fold it at the back and tack it. For improvising a flannel board, take an old, woollen shawl or a blanket and stretch it on a wall or a raised charpoi or a table.

Display Material for a Flannel Board

Besides being attractive, your flannel board display must be easy to see and understand from a distance. So select the display materials which have:

Illustrations - big, bold and simple

Lettering - large, bold and print letters

Colours - few and pleasing colours that are clearly visible on the background.

Check the colour of the background material. There may not be much choice as cotton flannel is available mostly in white and pastel shades. The display materials - pictures, letters and drawings, should be large enough to be seen by the group but not so large that they fall out from the flannel board, because of their weight. Cut strips or pieces of flannel and paste them with glue/fevicol to the back of the display materials.

Sand paper instead of flannel, may be used with rough side on the outside, but it is found less effective as it does not stick as fast as flannel and has a tendency to curl.

Using a Flannel Board

Place your flannel board on an easel stand or a slanted table, to help the display material to stick to the board during a presentation. All the other points regarding placement of a flannel board are the same as the bulletin board.

Rehearse the presentation and know the basic story or steps by heart. Do not refer to your notes in between, and have all your display materials ready and in order of presentation, on a nearby stool/table.

- Stand on one side of the board and look at the audience as soon as you have placed the display piece. Talk to the audience. You may remove the first scene or step, to put the next ones on, or you may build up the entire set of steps of a story by keeping all of them one by one on the flannel board.

- Give enough time to your students to see each picture or strip of writing to understand each point/step before you proceed to the next.

- Seek student participation; example - after discussing the sources of various vitamins, students may come forward, select and place illustrations of foods containing these vitamins from a large collection of illustrations of different food items.

7.9. GRAPHIC AIDS

Graphic aids are charts, diagrams, graphs, maps, flashcards, posters, pictures, photographs, leaflets, folders, pamphlets, cartoons and comics. They are two-dimensional materials having no depth which communicate facts, ideas and relationships clearly through words, lines, drawings, symbols and pictures. Graphic aids can serve many educational objectives for group teaching of 20 to 30 students. They help to:

1. Visualise abstract concepts which are difficult to understand - concepts of size, rate of growth, inner structure of an object or machine etc.
2. Reduce the amount of verbal talking and help in giving clear explanations; visuals in charts, graphs, diagrams and posters, cut down words.
3. Present the information in a specific and systematic manner. Since majority of them are formal aids, they have to be very systematic and organised.

They are also popular because they are

1. Comparatively less expensive.
2. Easy to make as no technical skills are required. Regular teachers, with some knowledge of drawing and who desire to be creative can prepare them.
3. Easy to use. Very special arrangements and machines are not required.
4. Easily usable and reusable as they are flat, two-dimensional materials.

Graphic Aids - I

This section includes those graphic aids which have similar principles of preparation, presentation and storage, and can be employed to do serious classroom teaching in home science.

7.9.1. Charts

A chart is a visual aid which helps in explaining the subject matter through such processes as summary, contrast and comparison. It may be all writing or some writing and pictures. There are many types of charts.

Any information to be plotted with time is presented in columnar form. Columns can be added or reduced depending upon the information to be presented.

Growth and development can be shown. It starts with a single source/stem and then spreads out into branches.

Functional relationship within an organisation or an institution can be shown by lines or arrows; examples:

Administrative structure of

- Residential University
- All India Home Science Association
- Integrated Child Development Scheme, etc.

Similarities and contrasts between two or more things such as methods, institutions, products, persons, theories, architecture, schemes, etc. can be shown.

7.9.2. Diagrams

A diagram is a visual symbol, made with the help of lines and geometrical forms without pictorial elements to explain mostly a process or parts of something. Diagrams can be of many varieties.

The area and shape of objects are shown with an outline, and may be filled with colours.

Inner parts and their arrangement are shown by cutting an object longitudinally.

It gives a scaled presentation of the design of a plan such as a floor plan.

Parts of a machine are shown; directions also may be given.

Scientific experiments are explained through this type of diagram.

7.9.3. Graph

A graph is a diagramatic representation of numerical or quantitiative data. Graphs can be in many forms.

In an area graph, the simple kinds of comparisons for approximate and not exact differences in size can be made. Two-dimensional, geometrical shapes such as squares, circles, rectangles are used to compare two or three items.

In a solid graph, three-dimensional, geometrical or pictorial symbols of any other shape are used for comparison. It is more difficult than the area graph as the comparison is to be made in terms of volume instead of area.

A line graph, also known as a 'curve' graph, is the most appropriate type to represent two related data in an exact and complete manner. It is mostly used to combine quantity with time to show progress, change and development of more than one data.

A bar graph is simple and easy to construct and is used to make comparisons of two or more data. It has a zero base and the data is plotted with the help of horizontal or vertical bars. The length of the bar represents the amount in terms of percentages, calories, grams, mean, etc.

A pie graph is also known as "Circle graph" or "Sector graph". Pie is the circle representing the total numerical amount and each slice is a specific percentage. It is ideal for showing fractional relations. However, it is difficult to prepare and to understand if the segments or percentages are too small, too many or too similar.

The students learn better if actual percentages are included on the slices instead of letting them judge by the size of the slices.

In a pictorial graph, conventional self explanatory symbols are used instead of erecting bars. It is mostly used when the purpose is to advertise, publicise, or motivate people for some action or product. The simple pictorial symbols suggest rather than represent. A pictorial graph:

1. shows number rather than size for indicating quantities.
2. compares rather than shows isolated elements.
3. shows approximate quantities and not exact amounts.

So, though it provides realism, it cannot:

1. be read quickly.
2. provide precise information.
3. show fractional percentages.

7.9.4. Maps

Webster (1967) defines a map as a ***"representation of the surface of the earth or some part of it, showing the relative size and position according to a scale or projection or position represented".*** Even when, study of Home Science may not be able to involve use of maps as extensively as geography, a student must know the various physical facts about the earth, as well as it's social problems, situations and events. These can be understood best, if seen in their natural environmental setting. From this point of view, physical maps assume importance for students of home science also. A physical map may be of simple geographical outlines of land and water surfaces or may contain various details such as altitudes, temperatures, vegetation and soil. Maps can be industrial (when related to economy) or political also.

Use maps to -

- stimulate students to learn
- furnish means for self expression, projects for groups of students; example: projects of preparing maps on - boundaries of India, Home Science Colleges in India, Home Science Schools in Gujarat, Women's Organisations in Baroda and Adult Education centres in a district.
- provide visual basis for comparison and contrast; example: milk dairies in the state or a district. 1RDP (Integrated Rural Development Project) - projects in villages of a district.
- serve as a method of study; example - drawing a map of any community that has to be studied by the students themselves. Maps can be presented in different forms.

The globe is approximately the shape of the earth. The extremes represent the poles. It can be rotated along its vertical planes. It helps us to sec the various parts of the earth in relation to each other.

This is a flat two-dimensional map, making use of pictures, photographs, dots, triangles or any other realistic symbols to develop strong associations between regions and relevant information. A key is a must and the symbols must be very clear.

The outline map may be printed permanently on board or the outline can be traced with the help of a cardboard or wooden stencil. Copies of small size maps can be reproduced on a duplicating machine for individual student's use.

Graphic Aids - II

This section includes those graphic aids which primarily may not be used for serious classroom teaching, and have individual, specific principles of preparation and presentation. Nevertheless, their knowledge may aid a home science teacher in doing her job efficiently.

7.9.5. Flash Cards

Flash cards are brief, visual messages presented on thick cards to emphasize important ideas, through the form of either a story or steps or points. But they are not useful for teaching a lot of details of a serious nature. After selecting the theme or message, build up a story of the events for presentation and transfer these ideas into cards to be flashed in sequence. They are used to:

1. convey a message easily, quickly and correctly; example - detect leprosy early.
2. motivate learners; example - a story on how cholera spreads.
3. build and develop an idea; example - include green leafy vegetables in the diet
4. summarise and emphasize the main points in a talk; example - agencies / organisations functioning for the welfare of mother and child.
5. produce lasting effect on illiterate persons and children as the content is presented in a simple visual manner.

While preparing flash cards, remember to:

1. have a total of 10 to 12 cards only.
2. make them on thick paper as they have to be held straight without any fastenings or pins.
3. have them in an appropriate size; use the rule that an object one inch high can be properly seen from 32 feet away.
4. have ½ to 1 inch margin on all four sides.
5. have bold and simple illustrations to help convey the idea properly, easily and quickly.
6. have few minimum details; example-plain instead of printed sari, line drawing and silhouettes in different colours.

7. have a light background and black or very dark coloured illustrations to make them stand out and be easily visible.
8. have few colours to provide clarity and emphasis.
9. write the number and the brief message for each card at the back of it
10. store them in strong labelled envelopes.

Flash cards are presented in a slightly different manner than the rest of the graphic aids. Use them in the following manner

- rehearse the presentation of the flash cards several times before demonstrating them to the audience.
- check that the flash cards are arranged according to their numbers before the talk begins.
- make the audience sit either at the floor level (in extension work) or on chairs in a semi-circular arrangement so that all can see well.
- if necessary, give a brief introduction before displaying the flash cards.
- stand and hold flash cards at chest level.
- explain the first card and then slip it behind the stack, or put it face down on the table; explain the next card and repeat the procedure till the whole series of cards are over.
- hold the flash cards so that their surfaces are not obscured but are wholly visible to the learners; point out anything special from above or below the card.

7.9.6. Flipchart

They are similar to flash cards except that the cards are spiral bound to enable the instructor use them conveniently by placing it on the table and flipping the cards to narrate the story.

7.9.7. Pictures and Photographs

Pictures and photographs are visual materials, used to stimulate a learner's interest. Properly selected and adapted they can help readers to understand and remember the content of accompanying verbal materials. They aid in teaching and learning as they:

1. Provide exact visual records of objects and persons; the photographs have greater exactness than the pictures as the artists's ability and bias are not reflected in these; example - a photograph of woman is an exact likeness of her, but a portrait may show her more young and beautiful than she is.
2. Recapitulate both inanimate and animate objects.
3. Can be used for individual study by students which is particularly useful for the slow learners.
4. Cover a variety of subjects; it is possible to take a photograph or draw a picture of almost anything; a teacher must build up her own picture/photograph file by collecting these whenever she can for ready use, rather than waste time by hunting for a specific picture only when she needs; examples - photographs of traditional wedding costumes of the different religions or states; home decorations in various communities, etc.
5. Are compact and can be preserved for many years with special care and lamination treatment; this helps in conducting historical surveys of the past; examples-costumes, architecture, way of living, vehicles etc.

However, pictures and photographs have some limitations also. They may develop misconceptions of time, size and colour among the students:

Time - Photographs of child development-The actual development may have taken 12 years and the students may think it was faster than that.

Size - Picture of an elephant - a child who has never seen an elephant may think that it is as big as it is in the picture; or an enlarged photograph of a mosquito may convey the idea that it is actually of that large size; including other objects in the picture with which the students are familiar will help them to judge the size of the new objects.

Colour - If the pictures of flowers have colours, different than the real flowers, the students may develop misconceptions regarding colours of the flowers.

6. The photographs can prove to be expensive because of rising cost of cameras, developing and printing. Check whether the cost of camera, film and processing are within your budget. Cameras range in complexities from those that are fully automatic to simple aim and shoot models; a camera which is easy and convenient to use is preferable.
7. Pictures, if drawn rather than collected from printed sources, require artistic ability.
8. These aids cannot depict ideas mainly dependent on motion; example - working of a sewing machine.
9. Both pictures and photographs, if not properly stored, can fade and tear.

   To minimise this damage -

   Put them in envelopes to avoid folding.

   Label them in albums.

Mount them either by wet method that is, by glue or fevicol, or by dry method which includes the use of butter paper and a hot iron.

7.9.8. Posters

A poster is a bold illustration with little or no writing. A good poster conveys the message at a glance. It is not used for

serious classroom teaching as its main purpose is to publicise **an event** - demonstration, lecture, exhibition etc. or **a product** - embroidered garments, children's clothes, knitted articles etc. or **an idea** - save money, give up smoking, preserve water, keep clean, abolish dowry, conserve energy, etc.

While preparing a poster

1. Have only one idea suggesting an action.
2. Use a thick chart or drawing paper, which is usually available in 22 x 28 inch size, keeping to 1 inch margin on all sides.
3. Have an informal but balanced layout.
4. Use large, bold and simple illustrations for a passerby to get the message easily. Avoid details and shading.
5. Have brief, personal, forceful and appealing titles. For example eat vegetables, - be healthy - health is important, etc.
6. Use simple, large, bold, horizontal lettering.
7. Plan definite eye movement.
8. Use colour to make the poster attractive. A dark colour background with white or light colour lettering, and an illustration make a very appealing and unique poster. Use a few, well matched colours to have a pleasant picture, and bright colour in small proportion to attract attention.
9. Place a poster at a high level, in a place which is free from other advertisements, and from where many persons pass by; examples - cafeteria, library, common room, etc.

PRACTICALS

Every student will choose a teaching method and a suitable aid and present in the class, any one concept from the Home Science topic, (Physiology, Nutrition, Home Management or Textiles)

QUESTIONS

Section A

I. Fill in the Blanks

1. _____ method is the most effective method of introducing a new topic or lesson.
2. _____ is the most effective method of showing how something works.
3. _____ is a bold illustration with little or no writing.
4. _____ increase interest and involvement of students in learning
5. _____ can be used for educational purposes especially with illiterate population.
6. _____ experiences help to simplify teaching by editing the realities.
7. _____ is a universally used teaching aid.
8. _____ _____ are flat two diamentinal aids.
9. _____ are representation of the surface of the earth.
10. _____ is the process by which messages are transferred from a source to a receiver.

II. Match the following

1. Method Demonstration	Round table discussion
2. Pannel Discussion	Demonstration of a new technique
3. Symposium	presentation of view points
4. Field trip	numerical or qualitative data
5. Graphs	first hand information

III. True or false

1. Demonstrations help to visualize a process.
2. Puppets are used in promoting social action.
3. Objects rarely give opportunity to students to touch, experience and investigate.
4. Discussion takes place whenever there is a difference of opinion.
5. Lecture is not an art.
6. Communication is purely one-way.
7. A bar graph is simple and easy to make comparisons of two or more data.
8. Diagrams and graphs represent the same ideas.
9. Illustrations for display boards can be of any size.
10. A built up story is essential for flannel graph.

Section B

Explain the following terms

1. Method Demonstration
2. Lecture method
3. Specimens
4. Flannel board
5. Diagrams
6. Scale models
7. Three diamentional aids
8. Bulletin Board
9. Discussion method
10. Communication

11. Field trips
12. Graphic acids
13. Flash cards
14. Photo graphs
15. Maps

Section C

1. Write on the three planning stages of lecture method
2. What are the steps involved in the process of discussion?
3. Explain the types of models used.
4. Write on the use of puppets.
5. What are folk songs?
6. How do you use bulletin board?
7. How is method demonstration different from result demonstration?
8. Write on the use of models in class room teaching.
9. What makes an exhibition?
10. What are the different aids that can be used in non-formal teaching?

Section D

1. Write on the values of Demonstration
2. Explain the different types of discussion.
3. What are three dimentional aids?
4. Write on the different kinds of puppets and their use.
5. Write on the value of field trips.