



# Multicellular Organisms and Reproductive Structures



B10CH3



## Learning Objectives

**Upon completion of this topic, students will be able to:**

- discuss the functions of the four types of tissues;
- explain the concept of organ as a combination of tissues and systems as a combination of organs;
- describe the general characteristics of multicellular organisms;
- describe the general characteristics and morphological features of sponges and hydra;
- classify and structurally differentiate worms;
- explain parasitism among worms and the alternative hosts considering their life cycles;
- outline measures for preventing parasitic worm infections;
- differentiate between the leech and earth worm based on morphology;
- compare the structures and functions of the human reproductive systems;
- identify the various stages of the menstrual cycle and explain essence of contraceptive;
- recognize that substance abuse (alcohol and drugs) is harmful to life.

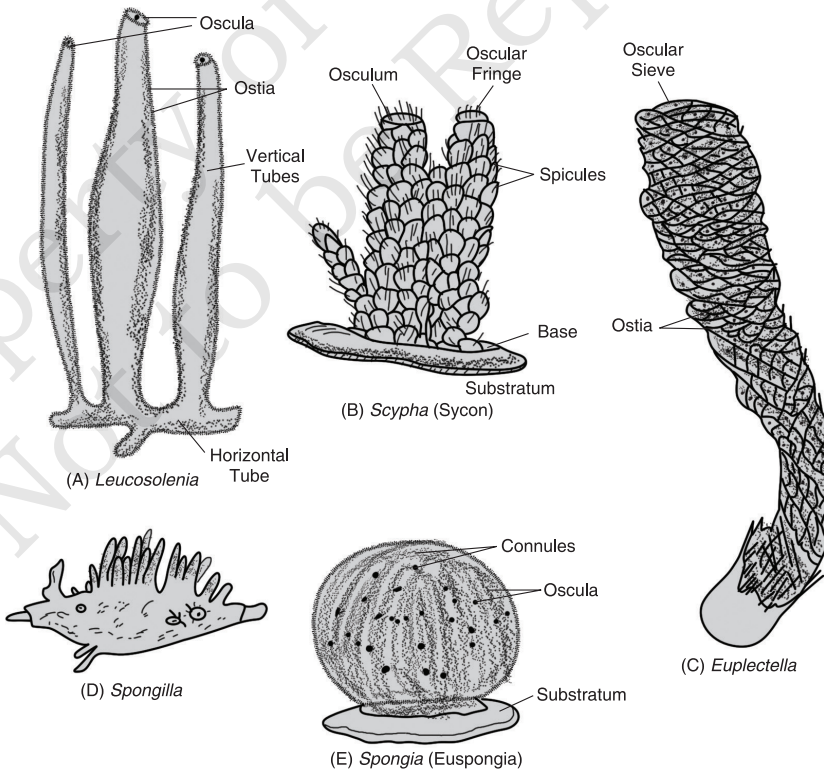
Multicellular animals differ greatly in their shape and size. The simplest animals like sponges do not have true tissues, but in other multicellular animals similar cells operate collectively and become specialised functionally to form tissues. A number of tissues may work together as an organ and a group of organs working together forms an organ system. All organ systems work in an over all cooperation which enables the organisms to live as an unique individual entity. Thus animals show different levels of organisations and body plans. They show cellular, tissues, organs or organ system level of organisations.

- (i) **Cellular level:** The body consists of cells arranged in loose aggregates. *e.g.*, sponges.
- (ii) **Tissue level:** The cells are arranged into tissues and show some division of labour - *e.g.*, (cnnidarian (coelenterates) like *hydra*).
- (iii) **Organ level:** The tissues are grouped to form organs. *e.g.*, platyhelminthes (flatworms) like tapeworm.
- (iv) **Organ system level:** Organs are associated to form functional systems in the body. *e.g.*, annelids, arthropods, molluscs and chordate animals.

**3.1. GENERAL CHARACTERISTICS OF SOME ANIMALS**

**3.1.1. Sponges**

Sponges are the simplest multicellular animals with a hollow tube like body. They are mostly marine, but a few occur in lakes and ponds. They are sedentary (found attached to rocks or bottom of the water body). Sponges have a water transport or **canal system**; Water enters through minute pores called ostia, in the body wall into a central cavity, from where it goes out through a large opening called osculum at the top.



**Fig. 3.1.** Some common sponges

The canal system is responsible for food gathering, respiration and excretion. Therefore the canal system is called ‘the lifeline of the sponges’. Their body wall consists of 2 layers of cells (i) the outer **dermal layer** or **pinacoderm** and (ii) the inner **gastral layer** or **choanoderm**. The gastral layer is made up of specialised flagellated cells called **choanocytes (collar cells)**. Between the two layers is a jelly like **mesoglea** that contains amoeboid cells. Their body is supported by a skeleton made up of calcareous or silicious **spicules** or spongin fibres made of protein. They are hermaphrodite (bisexual) and reproduce sexually as well sexually.

### 3.1.2. Hydra

*Hydra* belongs to phylum **coelenterata (cnidaria)** of kingdom animalia. It occurs in clear and cool fresh water ponds, lakes, streams *etc.* Most of the time it remain attached to stones, vegetation and other objects by means of its basal end. Some times it more about in water in different ways like floating, looping somersaulting and gliding. Its body consists of an elongated tube with closed base and single opening called **hypostome** or **mouth** at upper end, and bears 6–10 finger like projections called **tentacles** for catching prey (food) and locomotion. The body wall of *hydra* consists of two layers, the outer **epidermis** and the inner **gastrodermis**. Between them is present jelly like material called **mesoglea**. The epidermis contains **cnidocytes** or **stinging cells** that act as organs of defence and offence. It is hermaphrodite (bisexual) and reproduce asexually by budding and sexually by gametes produced by testis and ovary present at the body wall.

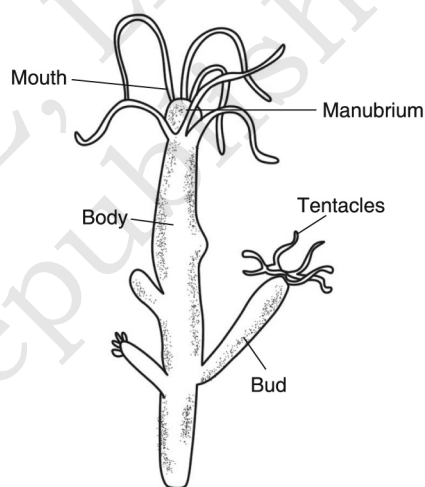


Fig. 3.2. *Hydra*

#### ACTIVITY 3.1

**Draw and label the parts of *Hydra* from the specimen/chart and state the functions of each of the labelled part.**

#### Procedure:

Draw a neat and labelled diagram of *Hydra* from the specimen/chart and label its hypostome, tentacles, testes and ovaries.

1. **Hypostome.** is an opening at oral end, for the intake of food and elimination of wastes.
2. **Tentacles.** help in capture of prey (food) and locomotion.
3. **Testes.** are the male reproductive organs and produce spermatozoa (sperms) for sexual reproduction.
4. **Ovaries.** are the female reproductive organs and produce ova for sexual reproduction.

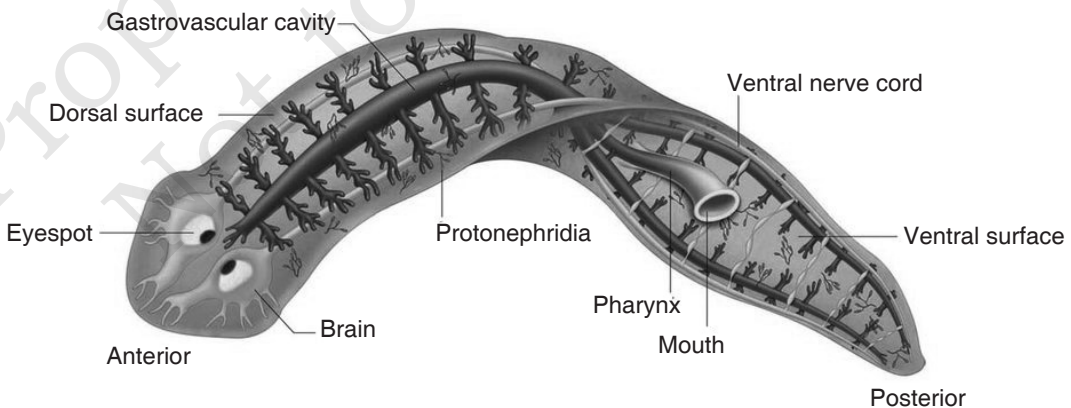
### 3.1.3. Worms

Worms are invertebrate animals that typically have soft, slender elongated bodies of these three common types of worms are; the flatworms, roundworms and segmented worms. Many of the worms occur as parasite in man and is a cause serious health hazards in human population.

#### **Flatworms**

Flatworms have dorsiventrally flattened body. They belong to phylum platyhelminthes. Many of them occur as endoparasites in humans and other animals.

- (i) **Planaria:** *Planaria* is a free living aquatic flatworms and has a dorsiventrally flattened body, which is thin, soft and leaf like. It is a acoelomate animal *i.e.*, without any body cavity. Its elementary canal has only one opening for intake of food as well as elimination of wastes. It has two eye spots (photoreceptors) at the anterior end to detect light. It has extra ordinary ability to regenerate entire body from any fragment of the body.



**Fig. 3.3.** Planaria

(ii) **Fasciola (liver fluke):** *Fasciola histolytica* is a common endoparasite which occurs in bile ducts of sheep, goat and sometimes other vertebrates including humans. It causes serious disease called **liver rot**. It is somewhat triangular flat, leaf like having an oral and ventral sucker to attach to the bile duct. It complete its life cycle in two hosts *i.e.*, sheep/goat/humans (primary host ) and a snail (secondary host). Human acquire infection by eating raw vegetables contaminated with parasite larvae.

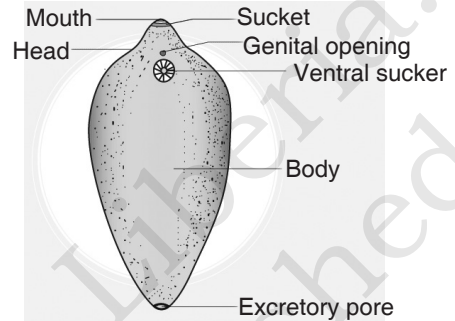


Fig. 3.4. Fasciola

(iii) **Schistosoma (Blood fluke).** It is an endoparasite which lives in hepatic portal veins and some other blood vessels of human beings. It is unisexual but the male carries the female permanently in the **gynaecophoric canal** formed by the infolding of the body on the ventral side. It's life cycle completes in two hosts—the human and the snail. It damages the liver and causes disfunctioning of kidney. This disease is called **Schistosomiasis**. It's larvae may enters the human body through skin during bath in ponds, rivers and canals.

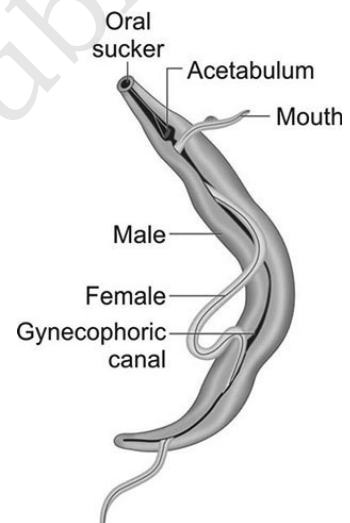


Fig. 3.5. Blood fluke

(iv) **Taenia (Tapeworm):** *Taenia solium* (the pork tapeworm) is an endoparasite of small intestine of man (primary host). It's larvae occur in the muscles of pig (secondary host). It belong to phylum platyhelminthes (flatworms). It has a white ribbon like body consisting of three regions—a small **head** or **scolex** with hooks and suckers for attachment, a short **neck** and long **strobila** of hundreds of segments called **proglottids**. The worm is firmly attached to the

intestinal wall of the host by the hooks and suckers. It absorbs digested food from the host's intestine through general body surface. The pig get infected by swallowing faeces of infected person. Humans acquire infection by eating improperly cooked pork. Tapeworm causes the disease called **taeniasis**, which is characterised by abdominal pain, indigestion, vomiting, constipation and loss of appetite.

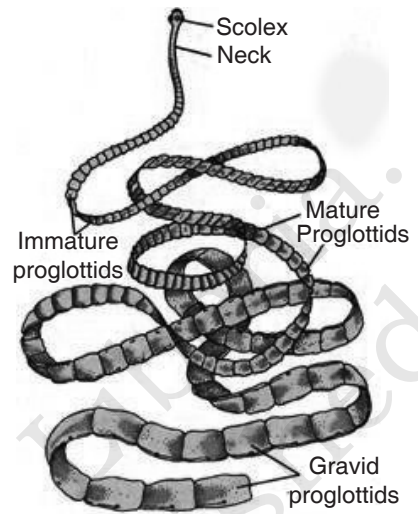


Fig. 3.6. Tapeworm

### Roundworms

The roundworms belongs to phylum **Aschelminthes**. Their body appear circular in crosssection hence called roundworm. They may be free living or occur as parasite in plants, and animals including humans.

#### (i) *Ascaris* (The giant intestinal roundworm)

***Ascaris lumbricoides*** a common intestinal parasite of man especially children. It has a cylindrical body with tapering ends. The anterior end of the body has a terminal triradiate mouth surrounded by three lips. A little behind anterior end, there is a small excretory pore. The adult worms are sexually dimorphic. Males are smaller than females. Infection occurs by taking raw vegetables or water contaminated by eggs of worm. Children may get infection who ingest soil contaminated with the eggs of worms. The parasite causes the disease called **ascariasis** which is characterised by weakness, anaemia, impaired digestion and colic pain. The parasite may block the intestine and prove fetal.

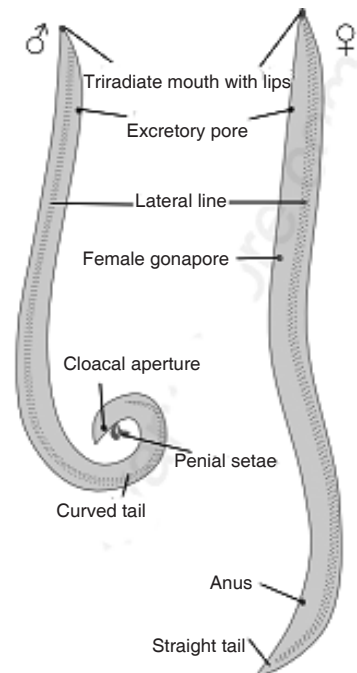


Fig. 3.7. *Ascaris*

(ii) **Ancylostoma** (Hook worm)

**Ancylostoma** commonly called **hookworm** is a parasite of human intestine. Hookworms are unisexual with sexual dimorphism. The male are about 8–10 millimetre long, while the female is bit longer *i.e.*, about 10–13 millimetre in length. The anterior end of both male and female is curved dorsally like a hook with terminal mouth. The posterior end of female is tapering but expended like an umbrella called **copulatory bursa** in males. Hookworm infection result into extensive injury to the intestinal wall and loss of blood, leading to acute anaemia. In children it retards the growth. Infection is more prevalent where people more base foot. All anthelmintic drugs are useful for treatment of hookworm infection.



Fig. 3.8. Hookworm

(iii) **Wuchereria** (Filarial worm)

*Wuchereria* commonly called filarial worm, lymph vessels and lymph glands in people in tropical and sub-tropical countries. The worms are thin and long thread like. *Culex* and *Aedes* mosquitoes serve as carrier and intermediate host. The carry the larva (microfilaria) and transfer the same in human body during bite. In case of heavy infection of the parasite block lymph circulation, resulting into enormous swelling of legs, arms, mammary glands and genital organs. This condition is called **elephantiasis**. The anthelmintic drugs are used to treat the disease.

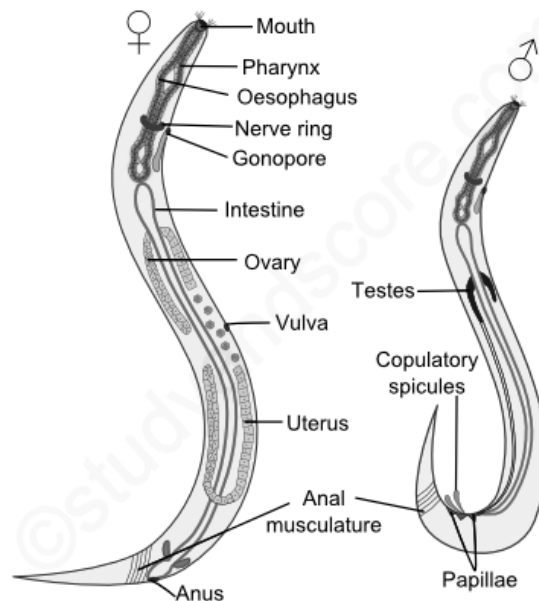


Fig. 3.9. Filarial worm

**(iv) Trichinella** (Trichina worm)

*Trichinella* or trichina worm is a parasite leading to a disease called **trichinosis**. It infects rodents, pigs, a wide variety of carnivorous animals and humans. In humans trichinosis is caused by eating raw or undercooked pork. It causes abdominal discomfort, nausea, diarrhoea, vomiting, fatigue and fever. The infection of the parasite can be treated with anti-parasite medicines.

### 3.1.4. Prevention of Intestinal Worm Infections

To prevent intestinal worm infections, regularly wash your hands with soap after using the toilet. Wash your hand properly with soap before preparing or eating food. Wash fruits and vegetables before use. Wash your hands and take bath after handling a pet.

#### **Segmented Worms**

The segmented worms belong to phylum **Annelida**. Their body surface is distinctly marked into ring-like segments (annulus-like rings) **segments** or **metameres**. Hence, they are called segmented worms.

- (i) Pheretima** (The Earthworm): Earthworm is found in moist or damp soil which is rich in humus. It lives in burrows but comes out of burrow during night or during rainy season when burrows get filled with water. The body of earthworm is cylindrical elongated and divided into about 100–120 segments called **metameres**. It feeds upon the decaying organic matter (such as plants leaves and other debris) present in the soil. It passes out faecal matter in the form of heaps of pellets called **worm castings**. It respire through moist skin and show creeping type of movements with the help of contractile muscles present in its body wall. The worm is hermaphrodite (bisexual) but copulation takes place between two earthworms resulting in cross fertilisation. Earthworms make the soil porous and increase its fertility through nutrient rich worm castings. Therefore, they are called **nature's ploughman**.



### ACTIVITY 3.2

#### Study of external features of Earthworm.

Visit an agricultural field or a garden on a rainy day (when the earthworms are out of their burrows).

Find out a earthworm and try to understand its external features like segments, and its way of movement.

Draw its diagram on your notebook.

### ACTIVITY 3.3

Dissect an earthworm and study its internal features. Bring a earthworm in your biology laboratory from an agricultural field or a garden on a rainy day (when the earthworm are out of their burrows). Dissect it in a dissecting tray, by giving a longitudinal cut with the help of a scissor. Study and make diagrams of its digestive system, and reproductive systems on your notebook.

- (ii) **Hirudinaria** (Leech): Leech is an ectoparasite found in fresh water ponds, streams and rivers. It is **sanguivorous** *i.e.*, feeds on blood of cattles and man. A single meal can last for over a year. It creeps by looping with the help of muscles and suckers, and swims by undulation of the body. It is hermaphrodite (bisexual) and oviparous (lays eggs).

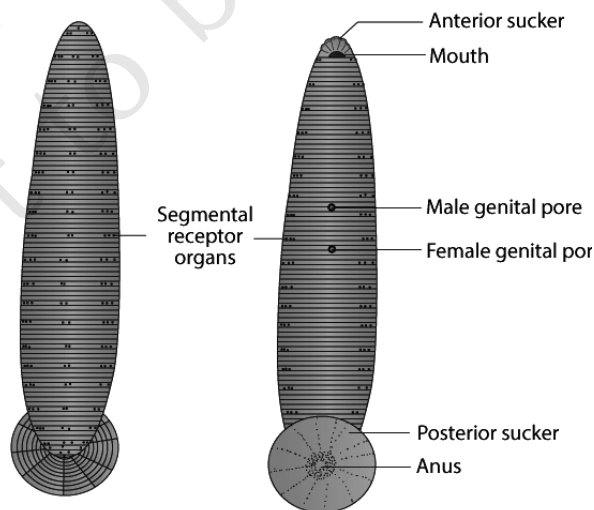


Fig. 3.10. Leech

## 3.2. HUMAN REPRODUCTIVE STRUCTURES

### 3.2.1. Reproduction

Reproduction is essential for the continuation of a species. All living beings reproduce. Different organisms reproduce in different ways. Plants reproduce through seeds. Humans and animals such as cow, dog and cat reproduce by giving birth to their young ones. There are various organs in a body that help in reproduction. These organs form the reproductive system of that organism or living being.

The human reproductive system is different in males and females. They have different organs for reproduction. Males produce sperms and females produce ovum. Sperms fuse with the ovum to produce an egg. Egg develops into a new individual. Let us study the reproductive system of the humans.

### 3.2.2. Female Reproductive Organs

The female reproductive organs are divided into external and internal organs.

#### *External Organs*

The external structure of female reproductive organs include mons pubis, labia majora, labia minora and clitoris.

#### **Mons Pubis:**

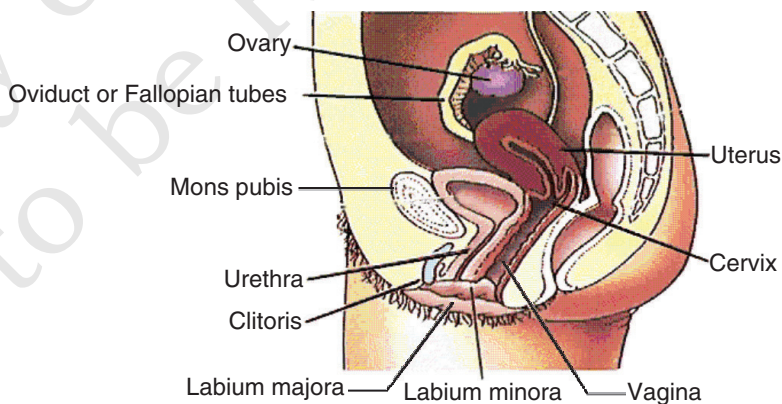
This is known as the pubic area. It is the area on which pubis hair begin to grow at puberty. It protects the pubic bone during intercourse.

#### **Labia majora:**

The labia majora are a pair of rounded folds of skin.

They enclose and protect the other external reproductive organs.

**Labia minora:** The labia minora lie just inside the labia majora and surrounds the openings to the vagina. This skin is very delicate and can become easily irritated and swollen.



**Fig. 3.11.** External and internal organs of female reproductive systems

**Clitoris:** The clitoris is a tiny finger-like structure. The two labia minora meet at the clitoris.

### ***Internal Organs***

Internal female reproductive organs include vagina, uterus, ovaries and fallopian tubes.

**Vagina:** The vagina is a muscular tube that opens to the outside of the body. Through vagina the sperm enter the female reproductive system. It is also passage through which the baby comes out of the uterus.

**Cervix:** The lower part of the uterus is called the cervix. Cervix has small opening that expands during childbirth. It also allows menstrual blood to leave a woman's body.

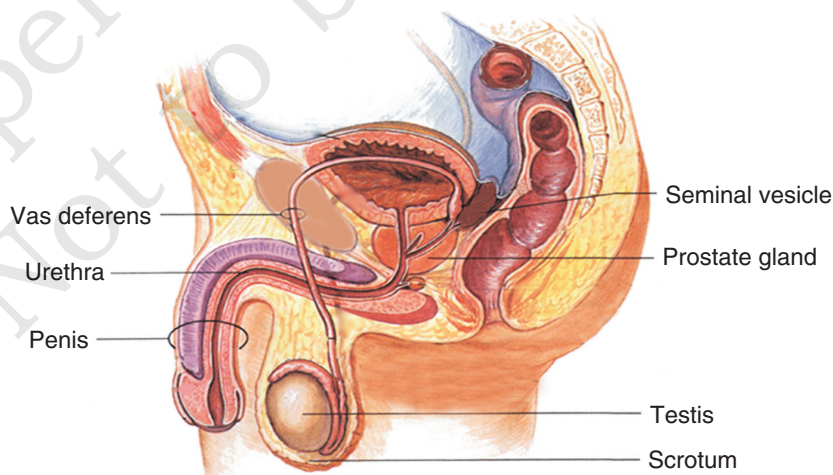
**Uterus (womb):** The uterus is a hollow, pear-shaped organ. It is also called **womb**. It is where an embryo grows until its birth.

**Ovaries:** The ovaries are located one on each side of the lower abdomen. The ovaries produce eggs and hormones.

**Fallopian tubes (oviducts):** These are narrow tubes that are attached to the upper part of the uterus. They help ova (egg cells) to travel from the ovaries to the uterus. Fertilization of an egg by a sperm normally occurs in the fallopian tubes.

### **3.2.3. Male Reproductive Organs**

The male reproductive system of humans consists of some external and internal organs shown in Figure 3.12.



**Fig. 3.12.** External and internal organs of male reproductive system

### ***External Organs***

The external male reproductive organs consist of penis and testes.

**Penis:** The penis is a long muscular structure. It transfers sperms into the vagina of female body.

**Testes:** The testes are located outside the abdominal cavity within a pouch called **scrotum**. Sperms are produced in testes.

### ***Internal Organs***

The internal male reproductive organs include vas deferens, urethra, seminal vesicles and prostate gland.

**Vas deferens:** The vas deferens is a long, muscular tube. The sperms pass through the vas deferens and mix with fluids produced by sex glands.

**Urethra:** The urethra is a long tube inside the penis. It provides a common pathway for the flow of urine and semen.

**Seminal vesicles:** The seminal vesicles are sac-like pouches. These attach to the vas deferens near the base of the bladder. These produce a sugar-rich fluid (fructose) that helps the sperms to move.

**Prostate gland:** The prostate gland is located below the urinary bladder in front of the rectum. The prostate gland contributes additional fluids to nourish the sperm.

### ***Myths and Misconception about Reproduction***

1. Infertility is typically the woman's fault.
2. Woman can't get pregnant after 35 years of age.
3. Using birth control measures can cause infertility.
4. If a man ejaculate, he is not infertile.
5. Infertility can't happen in young men and women.
6. The use of contraceptive pills make you gain weight.

## **3.3. HUMAN LIFE CYCLE**

### **Life Cycle of Human**

The following are the different stages of development in the human life cycle

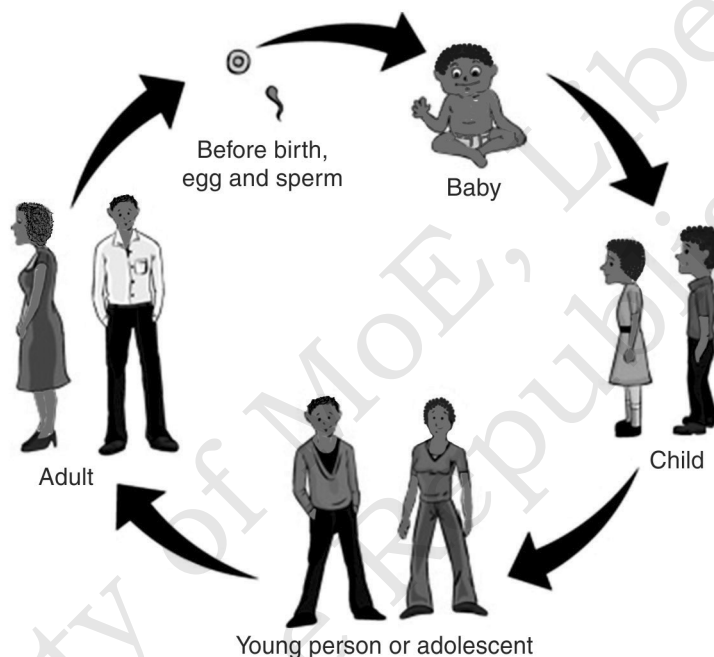
1. **Foetus:** The sperm from the adult male human and the egg from the adult female human form a zygote inside the uterus of

the female. Over time, the zygote develops and forms an embryo. Initially, the embryo looks like a cluster of cells, but after eight weeks, the embryo resembles the human body and is called a foetus. During this stage, the foetus is entirely dependent on the female for breathing, eating and other kinds of resources.

- 2. Infancy:** After around nine months, the foetus is fully developed to be born. This stage in human development marks the period from birth to age one. Infancy is the earliest part of childhood, where the infant grows in size and shape. During this stage, infant requires a lot of attention as they are completely dependent on their mothers. Infants develop their behaviour, physiology and cognition. Gradually, the infants learn to suck, swallow and cry if they are in an uncomfortable situation. Since infants are unable to speak, crying is their way of communicating. The mother tends to breast feed her infant during this stage.
- 3. Childhood:** Here, a child is of age three to six years and is crawling for mobility. In this stage, the child crawls and eventually learns to walk, talk, eat independently, and become more aware of their surroundings. The child is more social and active during this period and intrigued to learn new things.
- 4. Adolescence:** Here, the child is of age from nine to thirteen years and this period marks the beginning of adolescence. In this stage, the child grows into an adolescent, through a period called puberty. Puberty occurs during the initial stages of their teenage years, and that's why adolescents are also called teenagers. In this stage, the teenager grows rapidly and physical changes begin to appear. These changes include hair growth, structural changes in body shape, voice cracking in adolescent males, breast growth in adolescent females and so on.  
The behaviour pattern also changes, as they are more independent in performing daily tasks.
- 5. Adulthood:** Human beings who are between the age of 20 to 60 years are known as adults. Here, human beings are sexually mature and capable of reproducing. The body is fully developed by now, and the adult gains experience and responsibility. Adults have full mental and social development by this stage.
- 6. Old age:** When an individual reaches 60 or 65 years of age, they are called old people. This period starts from 65 years of age, until the end of their lives. During this stage, the intestine absorbs

fewer nutrients from food sources. The physical capabilities of doing tasks are also reduced and they again depend on external support to do things.

The behaviour of old people in this stage varies, depending on the immunity and lifestyle of the human. The average life expectancy of human beings varies from 70 to 85 years. But this also changes depending on their lifestyle.



**Fig. 3.13.** The Human Reproductive Cycle

### 3.3.1. Sexual Desire (Libido)

Sexual desire is an emotional and motivational state characterised by an interest in sexual objects or activities.

Sexual desire is said to be influenced by androgens (testosterone) in men and by both estrogen and progesterone in females. Sexual desire is typically higher in men than in women, with testosterone thought to account for this difference. Desire for sex is based on a complex interaction of many things like intimacy, physical and emotional well being, experiences, lifestyles and your current relationship.

#### ***How to Control Sexual Desire***

- Avoid tempting situation by engaging in physical activities

- Avoid pornography
- Do not participate in sexual jokes.
- Discourage personal revelatory conversation with the members of opposite sex.
- Object immediately if someone else touches in an appropriate way.
- Do not look at images, watch videos or read stories that are of sexual nature.
- Avoid eye contact with people of the opposite sex and avoid touching at all cost.
- Stay as far away from the company of those who are likely to trap you in sexuality.
- Interrupt the link of sexual thoughts as soon as they arise in your mind.

### 3.3.2. Male and Female Sexual Responses

#### ACTIVITY 3.4

Discuss the following questions with your elders:

What is sexual excitement? What happens to male and female body during sexual excitement? Make a report on it and present to the class.

What happens to our bodies when we get turned on sexually? You can be comfortable with the way your body responds as you get sexually excited. What happens to the male and female body during sexual excitement? Sexual excitement usually begins in the brain. That is, your brain responds to a sensual thought or image, or having a feeling of closeness or affection towards a partner (Fig. 3.14). It also responds to the touch of a partner by sending signals to the rest of your body, especially the genital area. The process of male and female sexual response is quite similar:



**Fig. 3.14.** Couple

- Muscle tension increases.
- Heart rate quickens and breathing is accelerated.
- Skin may become flushed (blotches of redness appear on the chest and back).

- Nipples become hardened or erect.
- Blood flow to the genitals increases, resulting in swelling of the woman’s clitoris and erection of the man’s penis.
- Vaginal lubrication begins.
- The woman’s breasts become fuller and the vaginal walls swell.

**3.3.3. Sexual Stimulation (Physical or Mental) For Physical Response**

**ACTIVITY 3.5**

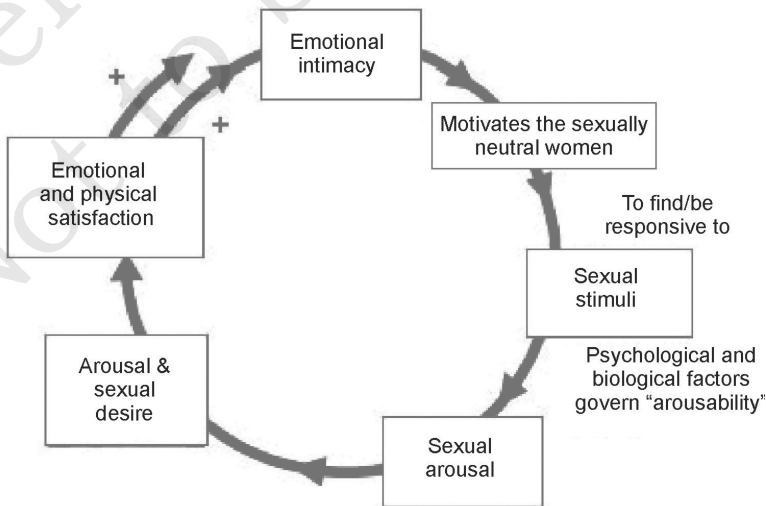
**Using dictionary or Internet, find out meaning of the following words:**

- (a) Desire                      (b) Arousal                      (c) Excitement

Also discuss how male and female response to sexual stimulation through these stages.

The first stage of sexual response is desire. **Sexual desire** involves a strong want for sexual stimulation. This phase may be referred to as physical attraction and longing. Sexual desire involves a mental response to a number of different stimuli. Sight, sound, touch, smell and taste can stimulate to sexual desire.

Desire is a mental response that may or may not be expressed, either verbally or through actions or behaviour. **Sexual excitement** is the second phase of the sexual response. Sexual excitement is a physical reaction to sexual desire.



**Fig. 3.15.** Stages of sexual response





thickened lining of the uterus along with its blood vessels are shed off. This causes bleeding in women which is called **menstruation**. The first menstruation that begins at maturity is known as **menarche**. It occurs at the age of 10 or 12 years.

Menstruation occurs once in about 28 to 30 days. The cycle of changes taking place in ovaries and uterus every 28 days and marked by the menstrual flow is called **menstrual cycle**. At 45 to 50 years of age, the menstrual cycle stops. The stoppage of menstrual flow is called **menopause**.

Initially, menstrual cycle may be irregular. It takes sometime to become regular.

### 3.4.1. Phases of Menstrual Cycle

The entire duration of a Menstrual cycle can be divided into four main phases:

- 1. Menstrual phase (day 1–5):** As the egg has not been fertilized, the thick uterus is not needed. It breaks down and is gradually lost through the vagina. This is called menstruation.
- 2. Follicular phase (day 1–13):** Inside the ovary a follicle (fluid-filled sac that contains immature egg) develops. The uterus lining is prepared.

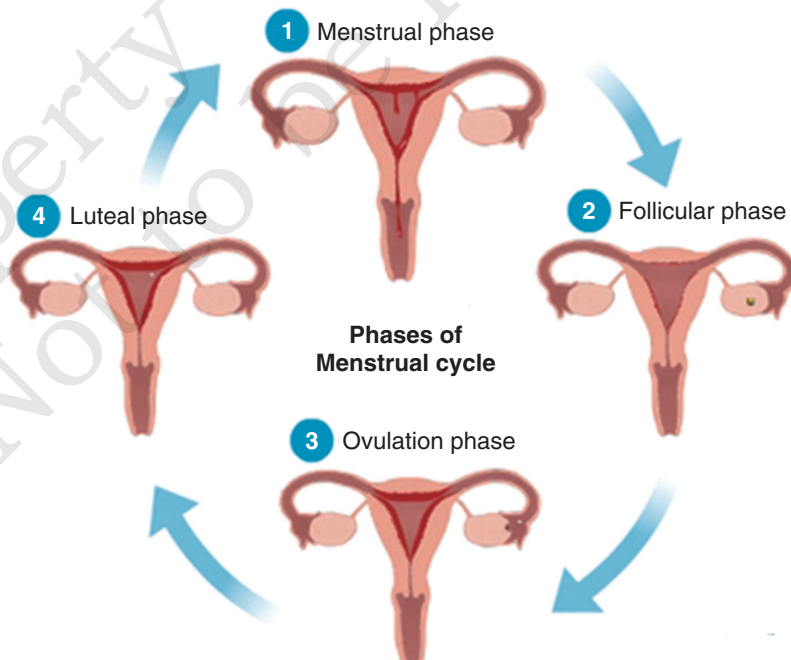


Fig. 3.16. Phases of Menstrual Cycle

3. **Ovulation phase (day 14):** The follicle bursts, releasing an egg from the ovary.
4. **Luteal phase (day 15–28):** The follicle turns into a *corpus luteum* (hormone secretory structure that develops in an ovary after an egg has been discharged). The lining of the uterus becomes more vascular (has many blood vessels) and is ready to receive the embryo if the egg is fertilized.

### 3.4.2. Menstrual Hygiene

Maintenance of sanitation is very important during menstruation. A girl/woman should observe the following point to maintain menstrual hygiene.

- Take bath and clean herself regularly.
- They should use sanitary napkins or clean home made pads to soak the menstrual fluid.
- The napkin should be changed after every 4–5 hours or as per requirement or need.
- The used napkins/pads should be disposed off after properly wrapping it in used papers/newspapers etc.
- The used napkins or pad should not be thrown or disposed of in toilets or in the open areas.
- After handling the napkins/pad, hands should be washed properly with soap.

## 3.5. PREGNANCY AND STIs PREVENTIONS

As the embryo gradually develops, an organ called **placenta** is formed. Placenta is disk-like organ in the lining of the uterine wall. It is through the placenta that the embryo receives nutrients and oxygen from the mother. The embryo is connected to the placenta by a tube called the **umbilical cord**.

By eight weeks, the embryo starts showing the human features and is referred to as foetus. The period during which a woman carries a foetus in her womb is known as *pregnancy*. It is around 280 days, or 9 months, in humans.

### *Signs of Pregnancy*

- Menstruation stops during pregnancy. This is the first sign of pregnancy.

- Feelings of breast swelling and tenderness are also commonly associated with early pregnancy.
- Other possible early pregnancy symptoms are mood swings, fatigue, loss of appetite, general body weakness and frequent urination.

### 3.5.1. Abstinence

#### ACTIVITY 3.6

Use internet and library to collect informations about what is abstinence. Why abstinence is considered a 100% effective contraceptive method? Once you have the results, go through the text to enhance your knowledge.

**Abstinence** simply means total avoidance of sex. This method is especially good for the youth who are into relationship and are not yet married.

With abstinence, no barriers or pills are necessary because the person is not having sex. Moreover, you are totally free from risk of STDs (sexually transmitted diseases). Abstinence is the most reliable and safe method of birth control and is 100% effective. Abstinence is chosen by women and men for a number of reasons. These are:

- Honour of personal, moral, or religious beliefs.
- Wait until they are married.
- Pursue school, career, and other activities.
- To avoid pregnancy and sexually transmitted diseases.

### 3.5.2. Common Myths about Contraceptives

#### ACTIVITY 3.7

**You have talked or heard about indulging in sex and being pregnant. Have you come across statements like:**

- You cannot get pregnant the first time.
- It is harmful to take emergency pill to many times.
- You cannot get pregnant if you are in menstruation period.

Discuss on these and state whether according to you these statements are true or false.

Give reason to support your answer.

There are a number of contraceptive methods that are highly effective in preventing pregnancy. There are many myths related to birth control effects. These are:

- “*You cannot get pregnant if you are on menstruation period*”. There is a common misconception that a woman cannot get pregnant while on her period. This is simply untrue. It is possible to get pregnant while a woman is on period. This usually takes place when a woman has a cycle that is very short and where ovulation occurs very close to the start of their period. It is at this point that a woman’s egg reaches maturity and she can become pregnant.
- “*You cannot get pregnant the first time*”. Regardless of whether, it is the first time, sperm can fertilize an egg.
- “*The pill/injection/coil will stop me from having children when I am older*”. All methods of hormonal contraception are reversible. There are no long term effects on a woman’s fertility if she has used a hormonal method of contraception. The Intra-uterine device (IUD) stops working as soon as it is removed.
- “*It is harmful to take the emergency pill too many times*”. It is safe to take emergency pills as many times as needed. There will be no negative effects on your body or fertility.

### 3.5.3. Importance of Use of the Contraceptive Methods

#### ACTIVITY 3.8

Use internet and library to collect informations about the importance and use of the different forms of contraception in birth control. Prepare a report and discuss your findings.

People have used contraceptive methods for thousands of years. Today, we have many safe and effective contraceptive methods available to us. Contraception helps prevent unintended (unwanted) pregnancies, space out births and protect against STDs, including HIV/AIDS.

There are different contraceptive methods each with unique advantages.

- **Barrier methods** prevent sperm from entering the uterus. These methods are removable. These are an option for women who cannot use hormonal methods of contraception. The types of barrier methods include male and female condoms, and spermicides. In addition to prevent pregnancy, male and female condoms protect against sexually transmitted diseases (STDs).

- **Hormonal methods** of birth control use hormones to regulate or stop ovulation and prevent pregnancy. Hormones can be introduced into the body through various methods, including pills, injections, and implantable rods. Depending on the types of hormones that are used, these pills can prevent ovulation. It also thickens cervical mucus, which helps block sperm from reaching the egg.
- **Permanent or surgical methods** include tubal ligation and vasectomy. These provide long-term contraception for those who have completed their families, and do not want to have any more children. **Sterilization** is a permanent form of contraception that either prevents a man from releasing sperm or prevents a woman from getting pregnant. These procedures usually are not reversible.

### 3.5.4. Types of Contraceptive Methods

#### ACTIVITY 3.9

Using internet or library, acquire knowledge about various contraceptive methods used for unintended pregnancy. Make a report on these methods and present to the class.

There are different types of contraception. The effectiveness of contraceptive methods is measured per '100 woman years'. In other words, if a hundred women use a method of contraception for a year, how many of them would end up pregnant. By choosing to use contraception, men can protect their wives from having too children too quickly.

There are lots of contraceptive methods (Fig. 3.17) to choose from.

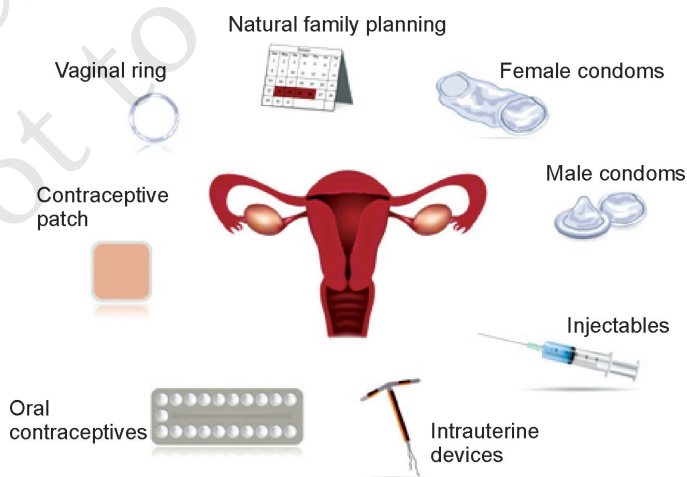


Fig. 3.17. Various contraceptive methods

### 3.5.5. Use of Condoms

#### Male Condoms

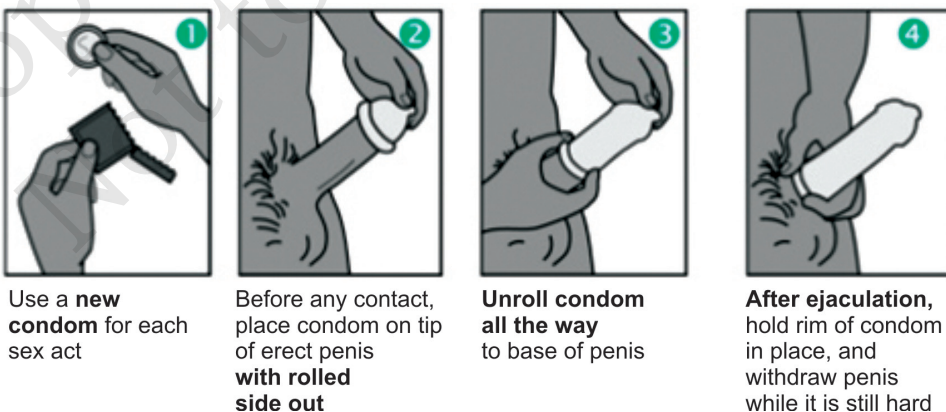
#### ACTIVITY 3.10

- Take a male condom and a dowel stick (to represent a penis) with diameter of about 3 cm.
- Practise putting a condom into a dowel stick. Follow the steps mentioned in the text.
- Discuss advantage and disadvantage of this contraceptive method.

The **condom** is a thin, waterproof of rubber that is placed on an erect penis before sexual intercourse. This prevents against direct contact between the penis and the vagina. This covering prevents to keep sperm from entering a woman's vagina.

These steps are to be followed when using a condom.

- A new condom must be used (Fig. 3.18) every time for sexual intercourse.
- The wrapper is carefully removed. Do not use scissors or your teeth because condom could be punctured.
- The condom must be put on an erect penis before intercourse begins.
- If the condom tears during intercourse, withdraw the penis immediately.
- Hold the rim of the condom and remove it carefully so that the sperm does not spill out.



**Fig. 3.18.** Use of a male condom

### ***Effectiveness***

When used correctly, a male condom is about 98% effective.

### ***Benefit (Advantages)***

- The benefit of using a condom is that it prevents pregnancy.
- It is also a barrier against sexually transmitted diseases (STDs).

### ***Disadvantages***

- It can interrupt intercourse.
- Sheath may tear and get damaged during intercourse, allowing semen to go through.

### ***Possible Side Effects***

- There are no known serious short or long-term side effects associated with the use of condoms.
- A person may experience mild irritation in or around the vagina or penis.
- Itching, redness, rash, and swelling of genitals may happen after condom use.

### ***Female Condom***

#### **ACTIVITY 3.11**

- Arrange a test tube (to represent a vagina) and a female condom.
- Practise inserting a female condom into the test tube as described in the text.
- Also discuss the advantage (benefit) and disadvantage (side effect) of this contraceptive method.

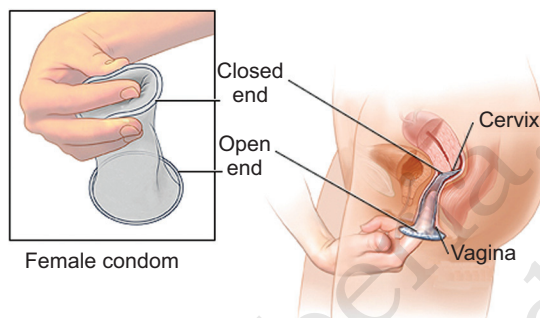
The female condom is thin sheath made of **polyurethane**. It has two plastic rings—a loose smaller inner ring at the closed end and a fixed larger outer ring at the open end. The female condom must not be used together with the male condom because friction could cause them to tear.

These steps must be followed when inserting a female condom.

- Hold the female condom with the open end hanging down. The ring at the closed end must be compressed between the thumb and middle finger.



- The woman stands with one foot on a chair. The closed end is slipped into the vagina as far up as possible.
- The small inner ring will hold the sheath inside the vagina. Put the index finger inside the sheath until the inner ring is felt and then push the inner ring inside the vagina (Fig. 3.19).



**Fig. 3.19.** Use of a female condom

The female condom keeps sperm from getting into her vagina.

### ***Effectiveness***

When used correctly all of the time, female condoms are 95% effective.

### ***Benefits (Advantages)***

Like the male condom, the female condom is the only contraceptive that protects a woman from both a pregnancy and STDs.

### ***Disadvantages***

- It can only be used once.
- It can be expensive.

### ***Possible Side Effects***

The female condom may also cause discomfort during insertion, a burning sensation, itching or a rash.

## **3.6. SUBSTANCE (DRUG) ABUSE (ALCOHOL OR OTHER DRUGS)**

Substance abuse is the medical term used to describe a pattern of using a substance (drug) that causes significant problems or distress. This may be missing work or school, using the substance in dangerous situations, such as driving a car. It may lead to substance-related legal problems, or continued substance use that interference with friendships, family relationships, or both. Substance abuse, as a recognized medical brain disorder, refers to the abuse of illegal substances, such as marijuana, heroin, cocaine, or methamphetamine. Or it may be the abuse of legal

substance, such as alcohol, nicotine, or prescription medicines. Alcohol is the most common legal drug of abuse.

### 3.6.1. Common Drugs

#### ACTIVITY 3.12

Name of some common drugs are given below. Write their effects due to excessive consumption. Copy and write in your exercise book.

Common drugs	Effects of excessive consumption on human health
Alcohol	1. 2.
Marijuana	1. 2.
Tobacco	1. 2.

Alcohol, tobacco, and marijuana are the most commonly used drugs among young people. Tobacco and marijuana smoke both contain harmful chemicals which are absorbed when inhaled.

#### **Alcohol**

Alcohol (ethanol or ethyl alcohol) is the ingredient found in beer, wine and that causes drunkenness (Fig. 3.20). Alcohol is a legal, sedative drug which changes the way we feel. Pure alcohol is a colourless, odourless and inflammable fluid. Alcohol as a drug does not contain any nutrients for the body. Alcoholic beverages have been used in many societies for many purposes.



Fig. 3.20. Say "No" to alcohol

#### **The effects of excessive alcohol are as follows:**

- Brain cells may be destroyed and memory is seriously affected (Fig. 3.21).

- Heavy drinking can lead to crime and accidents.

### HOW ALCOHOL ATTACKS THE BRAIN

A guide to the sequential damage alcohol inflicts on neural tissue

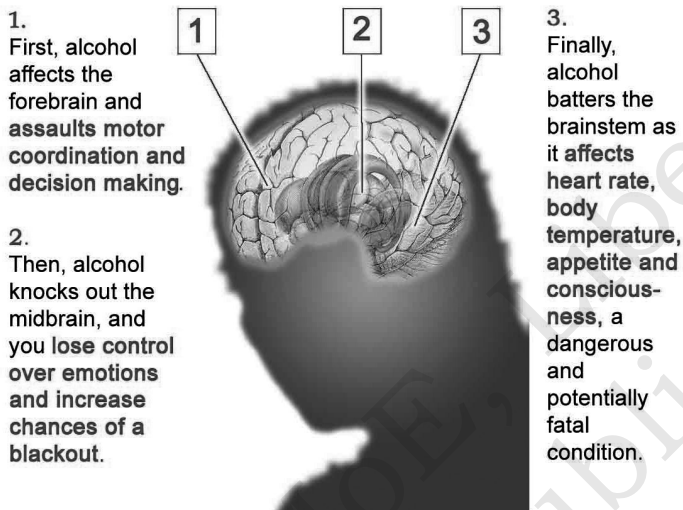


Fig. 3.21. Effects of alcohol in the brain

- **Liver damage:** Alcohol causes destruction of liver cells, leading to cirrhosis. Cirrhosis is scarring of the liver that involves the formation of scar tissue destroying the normal shape and function of the liver (Fig. 3.22). Liver is also the main place in your body where alcohol is broken down.

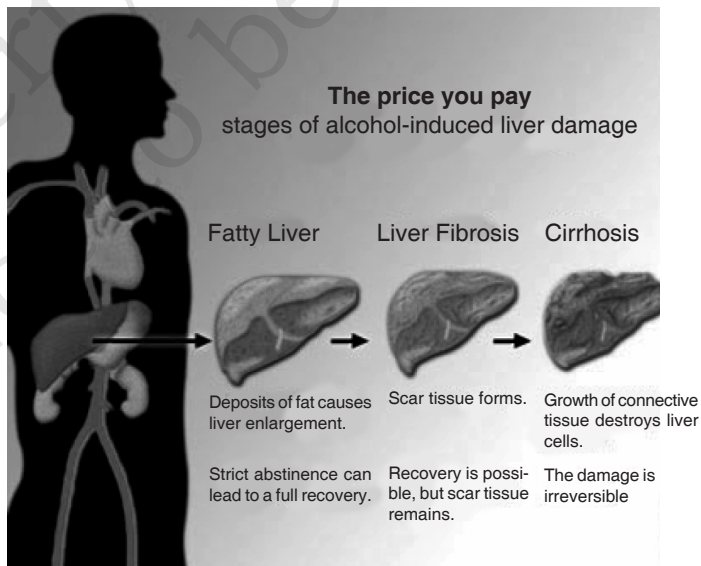


Fig. 3.22. Stages of alcohol-induced liver damage

- Enlargement of the heart, hence becoming less powerful.
- Alcoholic pregnant mothers often have small babies with below normal intelligence
- (Children have heart defects, distorted faces and poor eyesight) (Fig. 3.23).

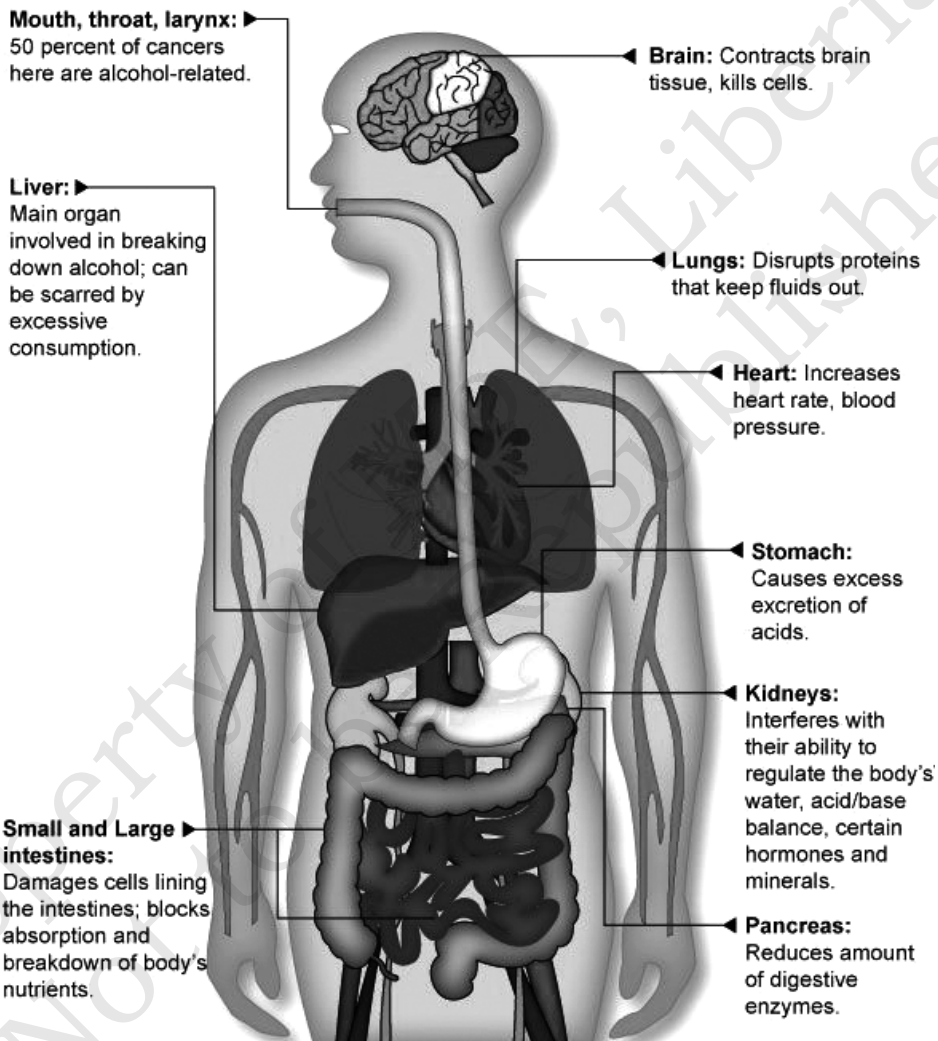


Fig. 3.23. Health impacts of excessive alcohol consumption

### Ways of Avoiding

- Adjust your attitude so that quitting is made easier.
- Be ambitious, but reasonable. If you are very heavy drinker, you must first slow down to avoid withdrawal symptoms.

- Do not feel that just because you are having guests over you need to offer them a beer, wine, or cocktail. It is perfectly fine to offer people tea, lemonade, coke, or the like.
- In the initial stage, reduce the quantity of alcohol intake.
- Eating a meal before drinking will reduce your interest for drinking. It will also make it harder to get drunk.

### ***Marijuana***

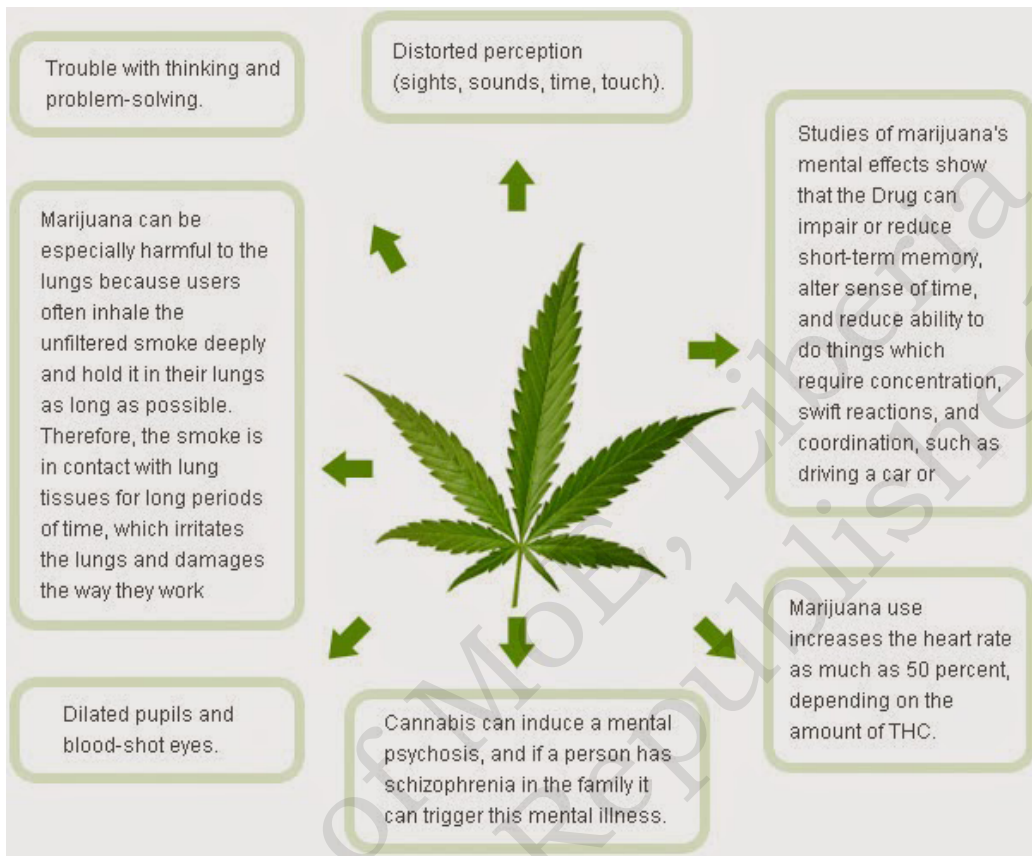
Marijuana (Fig. 3.24) is one of the most abused drugs in the world. Marijuana is made from the dried leaves, flowers, stems, and seeds from the hemp plant, *Cannabis sativa*. People smoke marijuana in handrolled cigarettes (*joints*) or in pipes or water pipes (*bongs*). They also smoke it in *blunts*—emptied cigars that have been partly or completely refilled with marijuana. To avoid inhaling smoke, more people are using vaporizers. Vaporizers pull the active ingredients (including THC) from the marijuana and collect their vapour in a storage unit. A person then inhales the vapour, not the smoke.



**Fig. 3.24.** Marijuana

### ***The Effects of Excessive Consumption of Marijuana***

- Marijuana smoke irritates the throat and lungs, causes coughing, and is associated with symptoms of bronchitis.
- The heart normally beats about 70 to 80 times a minute. But using marijuana can double that rate. This increased rate can put a lot of stress on the heart.
- Marijuana smoking during pregnancy causes long-lasting harm to the exposed child's memory and other brain functions.
- Its excessive use affects the development of the foetus nerves and brain.
- The toxins in marijuana are also carried in breast milk and can be passed to her growing baby.
- The excessive use of marijuana may cause higher risk of developing mental illnesses like psychosis or schizophrenia (Fig. 3.25).



**Fig. 3.25.** Effects of Excessive consumption of Marijuana

### ***Ways of Avoiding***

- Tell your trustworthy friends and family members what you are doing, and ask for their support in quitting.
- Instead of using, devote your new free time to a hobby or sport.
- Change your morning routine. Try getting up a little earlier or later, having something different for breakfast, or showering at a different time.
- Change your work or school routine. Go to work or school by a different route, sit in a different seat if you can, and eat something different for lunch.
- A medical doctor (MD) or doctor of osteopathy (DO) can prescribe medications designed to help you ease off of marijuana.
- Look at different modalities. There are several modalities, or types of therapy, that might be appropriate for pot addiction.

## Tobacco

### ACTIVITY 3.13

Make a poster indicating why tobacco consumption is not good. Relate your findings on the basis of your research. Make points and present your findings in class. Also arrange for an awareness campaign to make people aware of tobacco's side effects.

Tobacco is a green, leafy plant that is grown in warm climates. After it is picked, it is dried, ground up, and used in different ways. It can be smoked in a cigarette, pipe, or cigar (Fig. 3.26). It can be chewed (called smokeless tobacco or chewing tobacco) or sniffed through the nose (called snuff). Nicotine is the chemical that makes tobacco addictive or habit forming.



### The Effects of Excessive Consumption of Tobacco

- **Smoking** is the leading **cause** of Chronic obstructive pulmonary disease (**COPD**) (Fig. 3.27). COPD is characterized by a longstanding (chronic) obstruction to air flow

### Chronic Pulmonary Obstructive Disorder

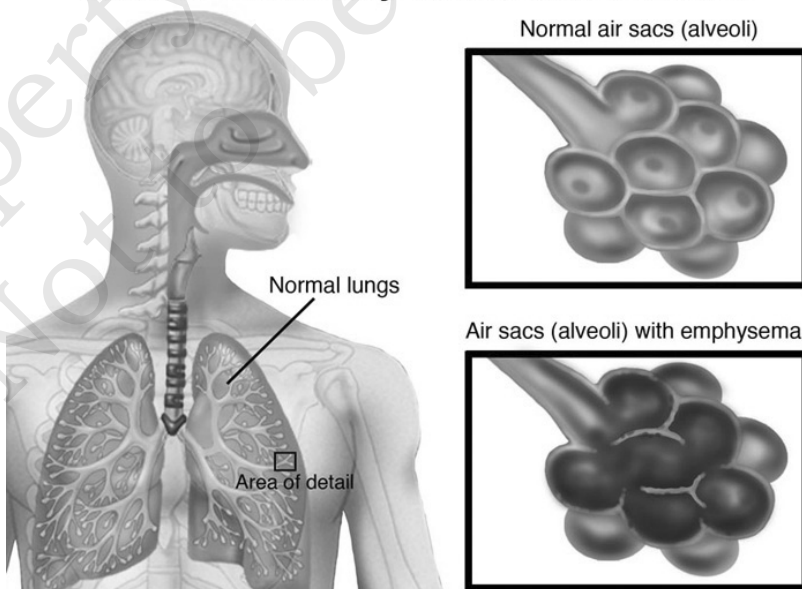


Fig. 3.27. COPD due to tobacco

out of the lungs. It can take different forms and have different symptoms. **Smoking** damages the air sacs, airways, and the lining of lungs. Injured lungs have trouble moving enough air in and out, so it is hard to breathe. Things that make chronic obstructive pulmonary disease (**COPD**) symptoms worse.

- Lung cancer is the most common form of cancer caused by smoking. More than 80% of cases of lung cancer are due to smoking (Fig. 3.28). Cigarette smoke contains many chemicals. These chemicals interfere with the body's method of filtering air and cleaning out the lungs. The smoke irritates the lungs and leads to overproduction of mucus. It also paralyzes the cilia—tiny hair-like structures that line the airways and clean out dust and dirt. Paralysis of the cilia means mucus and toxic substances accumulate, resulting in congestion of the lungs.

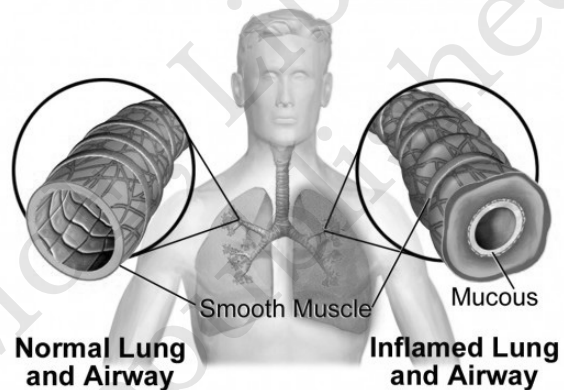


Fig. 3.28. Lung infection

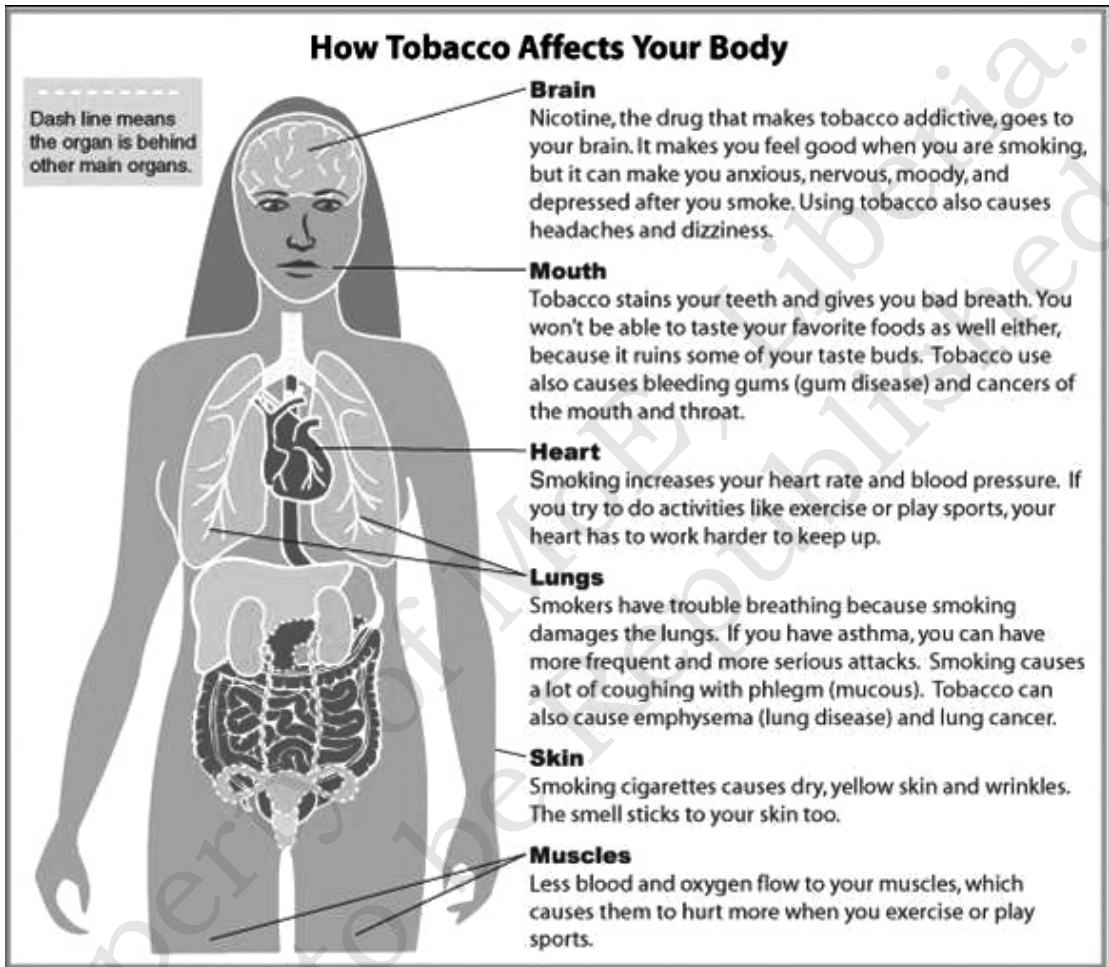
- Carbon monoxide, nicotine, and other substances in tobacco smoke can trigger symptoms of coronary artery disease. Coronary heart disease, the most common condition, occurs when blood vessels of the heart are narrowed or blocked, starving it of blood. It can cause chest pain (also known as angina), shortness of breath and a heart attack, which may result in sudden cardiac death.

### **Ways of Avoiding**

- Write a happy ending to the story. After you think about the harm chewing tobacco has caused you and your reasons for wanting to quit, write about how your life will look when you have successfully kicked the habit.
- Quitting smokeless tobacco requires a deeply personal commitment in eliminating tobacco from your life.
- If your partner or children have been imploring you to quit, you may find that the idea of regaining your health for their sake.
- Make a firm commitment to quit on your chosen date, then mark it on your calendar and let anticipation build.



- Discuss your feelings of anticipation, excitement and fear with someone who can help you sort through the emotions. These come with making such a big life decision. (Fig. 3.29).



**Fig. 3.29.** Effects of tobacco in human body

### SELF EVALUATION

**Do these exercises in your notebook.**

- (i) These contain harmful chemicals which are absorbed when inhaled.
- |                           |                    |
|---------------------------|--------------------|
| (a) Tobacco and marijuana | (b) Water and Milk |
| (c) Both (a) and (b)      | (d) None of these  |

- (ii) \_\_\_\_\_ is the ingredient found in beer, wine and that causes drunkenness. (Alcohol/Milk)
- (iii) Alcohol causes destruction of liver cells, leading to cirrhosis. True/False
- (iv) \_\_\_\_\_ is one of the most abused drugs in the world. (Biscuit/Marijuana)

## SUMMARY

- A number tissues may work together as an organ and a group of organs working together forms an organ system.
- Sponges are the simplest multicellular animals with a hollow tube like body.
- Therefore the canal system is called ‘the lifeline of the sponges’.
- Their body is supported by a skeleton made up of calcasions or silicious **spicules** or spongin fibres made of protein.
- The body wall of **hydra** consists of two layers, the outer epidermis and the inner gastrodermis.
- Many of the worms occur as parasite in man and is a cause serious health hazards in human population.
- The anterior end of the body has a terminal triradiate mouth surrounded by three lips.
- To prevent intestinal worm infections, resulting wash your hands with soap after using the toilet.
- Earthworms make the soil porous and increase its fertility through nutrient rich worm castings.
- Reproduction is essential for the continuation of a species. All living beings reproduce. Different organisms reproduce in different ways.
- Males produce sperms and females produce ovum. Sperms fuse with the ovum to produce an egg. Egg develops into a new individual.
- The embryo is connected to the placenta by a tube called the umbilical cord.
- Abstinence simply means total avoidance of sex. This method is especially good for the youth who are into relationship and are not yet married.

- Contraception helps prevent unintended (unwanted) pregnancies, space out births and protect against STDs, including HIV/AIDS.
- The condom is a thin, waterproof of rubber that is placed on an erect penis before sexual intercourse. This prevents against direct contact between the penis and the vagina.



## GLOSSARY

**Sponges:** Sponges are the simplest multicellular animals with a hollow tube like body.

**Planaria:** Planaria is a free living aquatic flatworms and has a dorsoventrally flattened body, which is thin, soft and leaf like. It is a acoelomate animal *i.e.*, without any body cavity.

**Worms:** Worms are invertebrate animals that typically have the soft, slender elongalid bodies of these three common types of worms are; the flatworms, roundworms and segmented worms.

**Trichinella:** Trichinella or trichina worm is a parasite leading to disease called trichinosis.

**Pheretima:** Earthworms is found in most or damp soil which is rich is human.

**Hirudinaria:** Leech is an ectoparasite found in fresh water ponds, streams and rivers.

**Mons Pubis:** This is known as the pubic area. It is the area on which pubis hair begin to grow at puberty. It protects the pubic bone during intercourse.

**Cervix:** The lower part of the uterus is called the cervix. Cervix has small opening that expands during childbirth. It also allows menstrual blood to leave a woman's body.

**Ovaries:** The ovaries are located one on each side of the lower abdomen. The ovaries produce eggs and hormones.

**Testes:** The testes are located outside the abdominal cavity within a pouch called scrotum. Sperms are produced in testes.

**Urethra:** The urethra is a long tube inside the penis. It provides a common pathway for the flow of urine and semen.

**Clitoris:** The clitoris is a tiny finger-like structure. The two labia minora meet at the clitoris.



## EXERCISES

### I. Multiple choice questions.

- The segmented worms belong to the animal group.
  - Platyhelminthes
  - Aschelminthes
  - Annelida
  - Arthropoda
- Hydra belongs to animal phylum
  - Porifera
  - Coelenterata
  - Platyhelminthes
  - Annelida
- Human disease elephantiasis is caused by
  - Wuchereria*
  - Ascaris*
  - Taenia*
  - Trichinella*
- This causes destruction of liver cells, leading to cirrhosis:
  - Alcohol
  - Tobacco
  - Marijuana
  - None of these
- The excessive use of marijuana may cause higher risk of developing
  - mental illnesses like psychosis or schizophrenia
  - liver damage
  - lung cancer
  - high fever
- Lung cancer is the most common form of cancer caused by
  - washing
  - cooking
  - smoking
  - watering

### II. Fill in the blanks.

- \_\_\_\_\_ beverages have been used in many societies for many purposes. (Coffee/Alcoholic)
- \_\_\_\_\_ is also the main place in your body where alcohol is broken down. (Kidney/ Liver)
- Marijuana smoke \_\_\_\_\_ the throat and lungs. (irritates/relieves)
- Tobacco is a green, leafy plant that is grown in \_\_\_\_\_ climates. (cold/warm)

**III. Very short answer questions.**

1. State that excessive alcohol consumption can cause liver damage.
2. Describe the effects of excessive marijuana consumption.
3. What are the ways of avoiding marijuana? Give three points.
4. State that tobacco smoking can cause chronic obstructive pulmonary disease (COPD).

**IV. Mark the statements True (T) or False (F)**

- (a) Different drugs have different dangers associated with them.
- (b) Alcohol is an illegal, sedative drug which changes the way we feel.
- (c) Nicotine is the chemical that makes tobacco addictive or habit forming.

**PROJECT WORK**

Make a poster showing effects of excessive use of alcohol and marijuana on human health. Also aware the people that these can also harm the people causing crime and accidents.