Open Vocational Education Programme
Course Code: 449

# *Certificate Course in* COMMUNITY HEALTH

## (Training Programme for Health Workers)

**1**

## *Basic Life Sciences*

**NATIONAL INSTITUTE OF OPEN SCHOOLING**
**(An autonomous organisation under MoE, Govt. of India)**
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# Certificate Course in Community Health (Basic Life Sciences – 449)

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# From the Chairperson's Desk

Dear Learners,

You are welcome at NIOS.

It's a matter of great pleasure that you have enrolled yourself in public health course of NIOS to become a skilled health worker. You have the study material of this course in your hand. It clearly highlights the importance of health for all of us. It also signifies the role of a health worker in public health.

This syllabus is divided into three parts. In the first part, the composition of the human body, physiology, immune system, cleanliness, eradication of common diseases and home remedies, nutrition, yoga etc. are included. It also includes chapters on quality life style, healthy eating habits, standard of living, and how we can make them better.

Maternity and infant health is second part of the syllabus, which includes health care in pregnancy, care of a woman during and after delivery, breast feeding and different national health programmes carried by the government. The problem of increasing population and its solution is also addressed under family welfare programmes.

In the third part of the course, information on contagious diseases, various diseases related to the life style, preventive measures, emergency management and methods of first aid are given. Subsequently, you shall learn about health treatment measures of such diseases. You are also expected to spread awareness on preventive measures related to such ailments, among the masses.

Learners, since health service is a responsibility, hence you would have to take the course very seriously. This study material would be meaningful only when you study it heartily and use it for the welfare of the society. A list of do's and don'ts for health worker is given in the very beginning of the text books. Read them again and again, and follow them. It is important to have sound knowledge and a good experience before giving health related treatment. Maharishi Charak also said in this context 'it is better to consume poison than to give someone treatment without knowledge and experience'. After getting training related to community health, you would not only be able to render service in the rural areas but also be able to work with doctors as a skilled health worker in various hospitals and nursing homes of the country. You would also be able to refer the patient to the concerned doctor after giving him/her the first aid in case of emergency.

To maintain the quality standard of this study material, a team of skilled, experienced and famous doctors had tried to understand the problems especially in the rural context. Your suggestions are also cordially invited to make this study material better.

I congratulate you to continue your study through NIOS. Now you are the proud and privileged member of NIOS community. After studying the course, you shall render valuable services to the community at large, particularly in the preventing health problems in the rural part of the country.

**Prof. Saroj Sharma**
**Chairperson**
**National Institute of Open Schooling**

# A Word With You

Dear Learners,

I welcome you at National Institute of Open Schooling. By taking admission in the professional programme of this institute, now you have become member of the world's largest open school system. I am sure you would feel happy while studying as a student under professional programme at National Institute of Open Schooling. Before you commence the learning and training of this study material, I would like to give some useful advice. At National Institute of Open Schooling, we properly understand that you are different from other students. I comprehend that amongst you, some of you must have enriched personal experiences as well. This course shall not only make you skilled health worker, but shall also add to financial stability and social prestige. Most importantly its your vibrant energy and enthusiastic spirit, which made you take admission in this course.

This study, material has been developed in such a way that you do not need a teacher to teach the curriculum. It is advisable to be in touch with your affirmed professional institute to get study material and the information about examination programme, also obtain practical training at your study centre. These centres will provide you proper skillful training which is essential for getting proficiency in any professional course content.

Under the National Rural Health Mission, the Ministry of Health and Family Welfare, GoI, from time to time carries laudable programmes, with the aim of providing effective and accessible health facilities for the rural masses. Our national goal is "Health for Everyone". With the rapid increase in the population, poverty, lack of education, as well as shortage of doctors in the rural areas, comes a constant realization that there is a need to provide formal training to the such prospective students among the masses, who can extend significant contribution to the rural hospitals and health centres. At the same time they can also provide appropriate consultation, even timely first aid to the affected rural masses.

Also, if the need may arise, such trained health workers, can even play multifaceted active role in national health programmes at the respective state level.

I hope this course would provide you an important platform to work in the health sector and would be beneficial. On behalf of National Institute of Open Schooling, I wish you a bright future.

**Dr. P.K. Chauhan**

**Programme Co-ordinator**

**National Institute of Open Schooling**

## Do's for the Health Worker

1. Understand the disease properly and enhance your knowledge, information in the health sector or hospital by being regular in touch with the doctors.

2. Follow the rules to prevent the disease, and tell people also about it.

3. Reveal the reality of various superstitious traditions, which is different from medical science.

4. Inform the masses about the basic rules of health defence. Stay away from various addictions and inform the masses as well about the harmful effects of such addictions.

5. You are a worker in the medical field, hence perform your duty as a community health worker in your medical institute or society.

6. Skilled health workers can give optimum help to the patient but in the case of serious and complicated diseases, work only by doctor's advice.

7. You are in the health service sector hence render selfless service to the masses. By doing so, you may realize both desired monetary gains as well as prestige.

8. Delivery and surgery are complicated services requiring intense experience, support, and study. Hence, assist surgeons and doctors.

9. Before giving health advice to someone, first study concerned person's eating habits and life style thoroughly.

10. In emergency, a health worker should be prompt in giving first aid according to the training. If needed, refer the patient to the concerned doctor.

## Don’ts for the Health Worker

1. Do not be in a haste to start treatment by partial understanding of the illness. Take regular advice by the doctor.
2. Do not violate prevention rules.
3. Do not use blind superstitious methods in curing process which are different from the methods prevailing in medical science.
4. Actively inform people about the harmful effects of intoxication.
5. Do not consider yourself as a doctor as it needs more in depth study and experience. Do not be in a delusion that you know a lot. Fulfill your responsibility of community health care worker.
6. In serious condition, do not give medicine or injection to the patient without prior advice of the doctor. It can be harmful for both, the patient and your prestige.
7. Do not indulge in any such activity which brings disgrace to the medical service.
8. Do not attempt unusual delivery or surgery on your own. It can be dangerous for the patient’s life.
9. Always remember not to give improper advice.
10. Except from the training given to the health care worker, do not indulge in any other medication work.

# Certificate Course in Community Health

# COURSE CURRICULUM

**Course Title:** Certificate Course in Community Health

**Level of the Cource:** Certificate

## INTRODUCTION OF THE COURSE

Two third population of India lives in rural area and have no access to proper health care facilities. The alma mater declaration of 1978 declared health as a fundamental right, and the attainment of highest possible level of health as a most important worldwide social goal. It also emphasized that such realization requires action from other social and economic sectors, in addition to the health sector. "Health for All" is the national goal and priority. There is an urgent need to provide para-professional health workers amongst the community itself, to provide simple preventive and curative health services including family planning, under the community workers scheme. The government launched Jan Swasthya Rakshak (Community Health Worker) Scheme to train 5,80,000 Health Worker on recommendation of Srivastave Committee in 1977. This Health Worker Scheme (1977) labelled as Communioty Health Volunteers in 1980 was re-labelled as village Health Guide in 1981. Due to population explosion, poverty, illiteracry and many other causes, the National Goal of "Health for All", has not reached up to its target level. There are many areas/sectors not only in rural but also in urban India, where:

- There are no fully developed medical facilities.
- According to population density, there are no doctors in sufficient numbers.
- No proper facility is available during emergency especially during night. There is also absence of trained and knowlegeable personnel to guide or refer emergency cases to the city hospital.
- Absence of trained personnel to guide the community on family planning, measures of prevention of diseases, and hygiene, health environment, polio prevention and AIDs etc.

Therefore there is an immediate need to prepare health work forces, who can assist, provide appropriate care/ service to the community in the rural sectors, hospitals, nursing homes and health clubs etc. These skilled personnels, at least one from each village/mohalla will be trained through this Vocational Training Programme-Jan Swasthya Rakshak (Community Health Worker) Scheme. These trained persons shall work in the

community as a multitasking health worker they shall work as facilitators for creating health awarness, knowledge of healthy environment, health and hygience, first aid, prevention of diseases and provide appropriate treatment in emergency situations.

Thus, it is expected, that all these gaps can be filled through the trained health workers under this programme.

## OBJECTIVES

After completion of this programme, a trainee should have:

- Basic knowledge on human anatomy and physiology;
- Understanding on health, hygiene and nutrition;
- Knowledge on communicable diseases, life style diseases and common non-communicable diseases including emergency measures and prevention of diseases;
- Practical knowledge on first aid pharmacy and drug reactiion;
- Ability to provide the guidance on maternal and child health care, including family planning and immunization.

## JOB OPPORTUNITIES

The programme aims to train and prepare skilled health workers. These trained persons will work in the community as a health workers as well as facilitators for creating health awareness, knowledge of healthy environment, health and hygiene and first aid, and assist in getting appropriate treatment for the patient in emergency situations.

After completing this course, the trainees shall have job opportunities as an assistant/health worker in hospitals, nursing homes, and health centre.

**Course Duration:** 1 year

**Eligibility Criteria:** 10th pass

## SCHEME OF STUDY

| Theory | Practical/Training |
|---|---|
| 40% | 60% |

| Programme | Duration | Essential Contact Hrs | Total Study Hrs |
|---|---|---|---|
| Certificate Course in Community Health | One year | Essential contact hrs for practical including related theoretical instructions/demonstration | 400 |

## COURSE CONTENT

**Subject-01:** Basic Life Sciences

**Subject-02:** Maternal and Child Health Care (Including family welfare and immunization)

**Subject-03:** Prevention and Management of Diseases and Emergency

## DETAILED SYLLABUS

### Subject-1: Basic Life Sciences

### Lesson-01: Human Anatomy and Physiology

- Role of human anatomy and physiology
- Our body
- Cell and tissues
- Organization of human body
- Organ and organ system
- Cavities in body
- Brief description of systems
  - Integumentary system
  - Skeletal system
  - Muscular system
  - Respiratory system
  - Digestive system
  - Cardio-vascular or Circulatory system
  - Excretory system
  - Nervous system
  - Glandular system
  - Reproductive system
  - Sense Organs

### Lesson-02: Our Body and Immune System

- Immune system
  - Types of immunity
  - Natural immunity
  - Acquired immunity

### Lesson-03: Health and Hygiene

- Concept of health
- Factors effecting health
  - Personal hygiene
  - Exercise
  - Rest and sleep
  - Posture
  - Home care and hygiene

### Lesson-04: Prevention of Common Diseases and Home Remedies

- Prevention of common disease
- Home remedies for common diseases
  - Major precautions for preparing herbal medicine at home
- General disease that occurs in children and their home remedies
  - Pain in throat
  - Earache
  - Stomachache
  - Fever

### Lesson-05: Nutrition

- Our food
  - Functions of food
- Nutrition and nutrients

  - Protein
  - Carbohydrate
  - Fats
  - Minerals
  - Vitamins
  - Water
  - Dietary fibre
- Food groups
- The balance diet
  - Food pyramid
  - Nutritional requirements
- Lack of nutrients

### Lesson-06: Yoga and Health

- What is yoga?
  - Importance of yoga
- Asthang yoga
  - Yam
  - Ahimsa – non-violence
  - Satya – truth
  - Asteya – non-stealing
  - Brahmacharya (celibacy)
  - Aparigrah
  - Niyam – rule
  - Sanctity
  - Satisfaction
  - Austerity

- Self-study
- Ishwar pranidhan
- Asana – Postures
- Pranayama
- Pratyahar – Control of senses
- Dharana – Concentration
- Dhyana – Medication
- Samadhi

- Yogasan and initial practices
  - Principles (siddhant) of yogaabhyasa
  - Important yogasanas
  - Surya Namaskar (Sun Salutation)
  - Pranayama and its practice

**Lesson-07: Management of Diseases through Yoga**

- Yoga and life
  - Principles of yoga therapy
  - Basic principles of yoga therapy
- Therapeutic aspects of yoga
  - Yogic management for respiratory problems
  - Yogic management for digestive disorders
  - Management of high blood pressure and heart diseases
  - Yogic management of back pain
  - Yogic management of cervical spondylitis
  - Management of musculoskeletal disorder gout or arthritis
  - Management of diabetes through yoga
  - Management of anxiety and depression through yoga
  - Yogic practice for ladies

## Subject-02: Maternal and Child Health Care

### Lesson-01: Pregnancy and Care of Woman in Pregnancy

- Puberty
- Menstrual cycle
  - Ovarian changes
  - Uterine changes
- Physiological changes during pregnancy
- Sign and symptoms of pregnancy
- Routine of woman during pregnancy
- Various investigations of pregnant woman
  - Physical examination
  - Steps of abdominal examination
  - Lab investigation
  - Assessment of risk in pregnancy
  - Prenatal screening
- Care of pregnant woman
  - Nutrition during pregnancy
  - How much work should be done in pregnancy?
  - Rest in pregnancy
  - Exercise in pregnancy
  - Personal hygiene

### Lesson-02: Woman's Care during the Perinatal and Postpartum Period

- Labour: An introduction
- Signs of true labour
- Assessment of woman after arrival in the labour room
- Assessment of the status of mother and child during delivery

- Preparation of woman for delivery
- Preparation for delivery
- Third stage of delivery
- Immediate care of the newborn
- Care of the newborn baby
- Breast feeding
- Postpartum care of the mother

### Lesson-03: Breast Feeding

- First and foremost milk after delivery (Colostrum)
- Advantages of breast feeding and disadvantages of bottle feeding
- Specific conditions where breast feeding is contraindicated
- Good breast feeding techniques
- Common feeding problems and their prevention

### Lesson-04: National Health Programme

- National health programmes
  - National vector borne disease control programme
  - Prevention and control of non-communicable diseases (diabetes, CVD and stroke)
  - Revised national TB control programme (RNTCP)
  - Universal immunization programme
  - Reproductive and child health programme (RCH)
  - National family welfare programme (NFWP)
  - National aids control programme
  - National cancer control programme
  - National iodine deficiency disorder control programme
  - National blindness control programme
  - National programme for prevention and control of deafness

- National leprosy eradication programme
- School health programme
- National rural health mission (NRHM)

## Lesson-05: Family Welfare Programme

- Importance of family welfare programmes
- Need for family welfare programmes
- Family planning
  - Temporary methods
  - Permanent methods
- Temporary methods
  - Male condom
  - Female condom
  - Diaphragm
  - Vaginal sponge (available in the form of today)
  - Intra uterine contraceptive device (IUCD)
  - Oral contraceptive pills (Hormonal contraceptives)
  - Subdermal implants
  - Hormonal vaginal ring (Only progesterone ring)
  - Centchroman pill (Saheli)
- Permanent methods (Sterilization)
  - Male sterilization
  - Female sterilization
- Post coital contraceptive (Emergency contraceptive)
- Cafeteria approach
- Birth spacing between two children
- Medical termination of pregnancy (MTP)

### Lesson-06: Duties and Responsibilities of the Health Worker

- Duties of the health worker
- Responsibilities of the health worker
  - To make road map of the area
  - Survey of homes
  - Duties and responsibilities of a health worker in prevention of diseases
  - Duties and responsibilities of a health worker in curing the diseases

## Subject-03: Prevention and Management of Diseases and Emergency

### Lesson-01: Communicable Disease – 1

- Communicable disease
  - Mode of transmission of communicable disease
- Control of communicable diseases
- Communicable diseases
  - Chicken pox
  - Measles
  - Polio
  - Diarrhoea
  - Cholera
  - Pneumonia
  - Tetanus
  - Rabies
  - Fever in communicable diseases

### Lesson-02: Communicable Disease – 2

- Parasitic diseases
  - Dengue
  - Malaria

- Leprosy
- Tuberculosis
- Diptheria
- Pneumonia
- Food poisoning
- Venereal infection
  - Syphilis
  - Gonorrhea
  - Aids
- Some parasitic infections
  - Amoebiasis
  - Hook worm (Encylostoma duodenale) infestation
  - Ascariasis (Round worm)

**Lesson-03: Preventive Measures**

- Origin of disease – it's root cause and associated causes
- Causes of origin of disease and it's control
  - Active immunization
  - Passive immunization
  - National immunization schedule
  - Prevention by chemo-prophylaxis
  - Protective mask
- Different routes of transmission of infection
- Direct contact route
- Prevention of diseases in the hospital
- Food supplementation
- Rehabilitation

- Prevention of diseases
- Personal hygiene
- Quarantine

### Lesson-04: First Aid

- General and necessary information
- Emergency conditions
  - Shock
  - Electric shock
  - Hypothermia
  - Chill-blens or frostbite
  - Anaphylaxis
  - Foreign body in trachea
  - Dog bite
  - Earache
  - Foreign body in the ear
  - Bleeding from wound
  - Foreign body in the nose
  - Bleeding from the nose
  - Internal haemorrhage
- Bandages

### Lesson-05: Life Style Diseases

- Coronary heart disease
- Hypertension
- Paralysis (stroke)
- Diabetes
- Obesity
- Cancer

### Lesson-06: Drug and Drug Reactions

- What is pharmacy?
- Antiseptic and disinfectant
- Drug reactions
- The drugs and materials to be present with health worker

### Lesson-07: Emergency and its Management

- Emergencies conditions
  - Drowning
  - Heat stroke/Sun stroke
  - Burning
  - Snake bite
  - Fever
  - Convulsions
  - Abdominal pain
  - Head injury
  - Fracture
  - Poisoning
  - Care of a paralysed patient

## EVALUATION AND EXAMINATION SCHEME

| Paper | Theory | | | Practical | | | Total |
|---|---|---|---|---|---|---|---|
| | External Assessment | | Internal Assessment | External Assessment | | Internal Assessment | |
| | Max. Marks | Time (Hrs) | Max. Marks | Max. Marks | Time (Hrs) | Max. Marks | Max. Marks |
| Basic Life Sciences | 70 | 3 | 10 | 100 | 4 | 20 | 200 |
| Maternal and Child Health Care | 70 | 3 | 10 | 100 | 4 | 20 | 200 |
| Prevention and Management of Diseases and Emergency | 70 | 3 | 10 | 100 | 4 | 20 | 200 |

## PASSING CRITERIA

| S.No. | Subject for the trade test | Max. Marks in Theory | Minimum % required for passing | Minimum marks required for passing |
|---|---|---|---|---|
| 1. | Theory (including Internal Assessment) (Internal Assessment–30) | (70 +10) × 3 = 240 (Written Test Paper –210) | 40% | 96 |
| 2. | Practical (Including Internal Assessment) Internal Assessment–60) | (100 + 20) × 3 = 360 (Practical Test –300) | 60% | 216 |

**Note:**
- In theory, a trainee should secure 40% marks in aggregate including Internal Assessment.
- In practical a trainee should secure 60% marks in aggregate including Internal Assessment.

## PROCEDURE FOR INTERNAL CONTINUOUS ASSESSMENT

### Theory

3 Tests of 10 marks each to be conducted after every 45 days — Total Marks = 30

### Practical/Training (Internal Assignments)

Assessment will be done by maintaining progress card of each candidate, indicating assessment of each practical/experiments. — Total Marks = 60

**Course Fee:** As per prospectus

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1

# HUMAN ANATOMY AND PHYSIOLOGY

Our body is a complex group of various structural levels; it starts with atoms, cells, tissues, organs and organ systems connected together to form human body. Chemically, human body is a functional form of various bio- chemical structures, in which atomic units of various elements function together biologically. The elements like carbon, hydrogen, oxygen, nitrogen, phosphorus and sulphur are mainly present. Cell is the smallest unit of the body. Do you know our body is made up of cells? Yes, our body is made up of innumerable cells. These cells can be seen with the help of microscope.

In this lesson you will learn how a group of cells form tissue, tissues make up organs and organ make up organ system. The organ system collectively perform the specific functions like blood circulation, respiration, digestion and absorption.

## OBJECTIVES

After studying this lesson, you will be able to:

- define Human Anatomy and physiology;
- explain the function and structure of the cell;
- explain the function and structure of tissue, organ and organ system;
- explain the circulation of blood, digestion and absorption of food;
- explain the respiratory system, excretory system, nervous system and reproductive system etc.

Notes



## 1.1 ROLE OF HUMAN ANATOMY AND PHYSIOLOGY

The study related to structure of human body is called human anatomy. For example, heart is cone shaped structure; its cavity is divided into four chambers. Its structure can be seen by naked eyes and it can be examined minutely with the help of microscope. We see heart is cone shaped with our naked eyes. While on examining the minor parts of heart with the microscope, we come to know that it is made up of mainly heart muscle cell.

Physiology is the study of the function of human body (in simple terms it tells what the body parts do and how they work). For example, heart supplies the blood to various parts of the body. Heart can do this by its constant contractions and relaxations. In this way human Anatomy and Physiology are inter related to each other.

## 1.2 OUR BODY

Our body is a structure with bones, nerves, muscles, arteries, veins, fat tissue, skin and internal parts like heart, liver and lungs etc. The study of all these structures in body is called Anatomy. The study related to function of various parts of human body including sense organs is called Physiology. A building is built by laying brick over brick, in the same way human body is formed. The study of human body and Anatomy starts with study of structure and function of cell. You can say a cell is a structural and functional unit of living organism. A group of cells together form tissue such as muscles and bones; and a group of tissues form organs like lungs, liver, and they do specific functions. A group of organs collectively forms physiological system such as digestive system, respiratory system and many such systems together form the human body. **Cell is the smallest structural and functional unit of the human body.** It is also called building block of life. It can be seen by the help of microscope. To understand the human body and physiology in a better way it is essential to gain knowledge of the smallest unit of body (cell).

## 1.3 CELL

Human cell has three parts namely:

1. Nucleus
2. Cytoplasm
3. Cell Membrane

**Nucleus:** It is found in center of the cell and controls the function of the cell. It has 23 pairs of chromosomes out of these 22 are autosomes and one pair is sex

chromosome (X and Y). Chromosome contains granular structure called gene. Every gene plays an important role in determining body traits. Each gene is formed of ribonucleic acid or deoxyribonucleic acid. Nucleus play important role in cell reproduction.

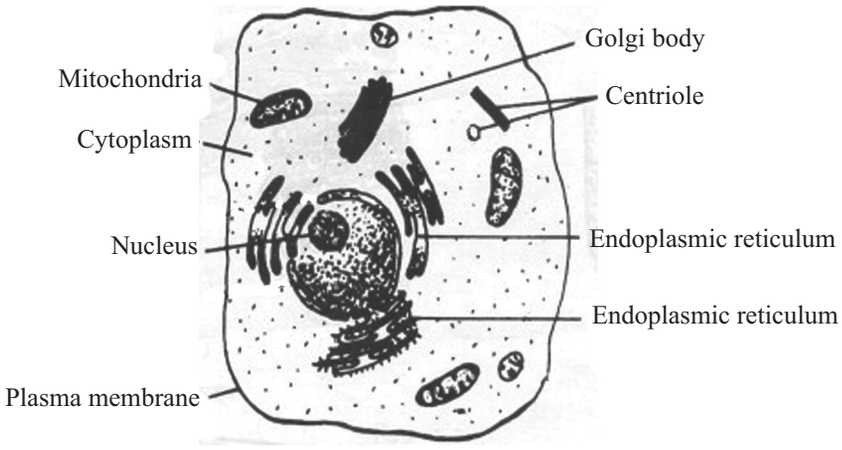



**Fig. 1.1: Cell structure**

**Cytoplasm**: It is a semi solid jelly like structure present around the Nucleus. It contains innumerous super microscopic particles.

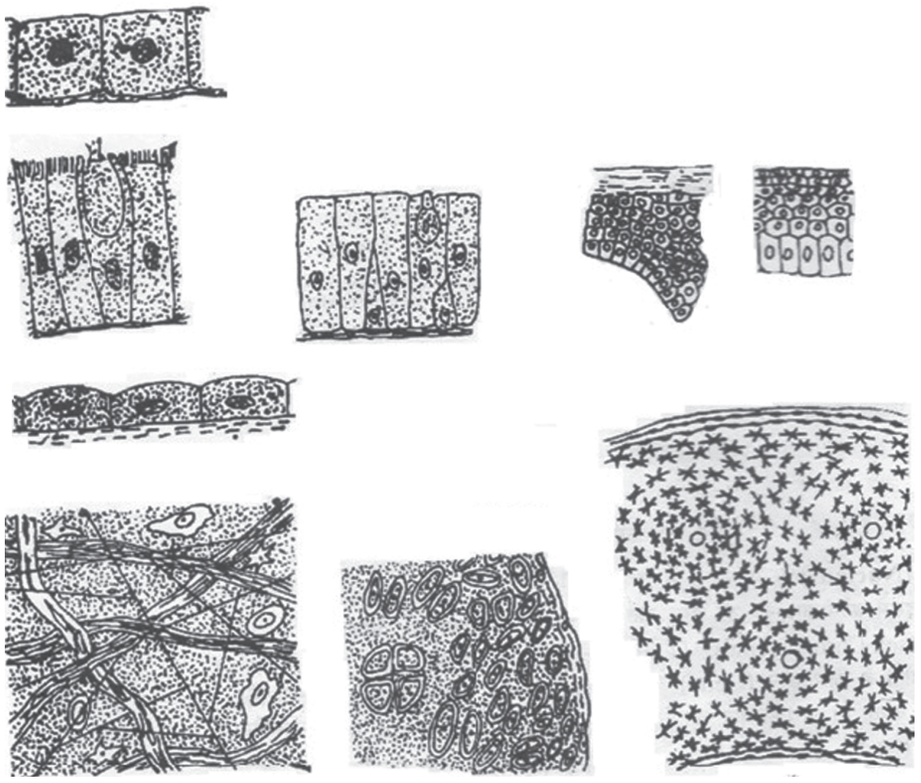
**Cell-membrane:** It is the fine envelope which is present around the Cytoplasm. Cell needs food for its development. It gets fat, protein and carbohydrates as its food from its surrounding. It also needs oxygen. It excretes the carbon dioxide and waste material out of the cell membrane.

**Tissues:** A group of cells performing the specific function is called tissue. Various types of tissues are mentioned below:

1. Epithelial Tissues
2. Connective Tissues
3. Muscular Tissues
4. Nervous Tissues.

1. **Epithelial tissues:** It forms the inner and outer cover of the body. For example: skin and mucus membrane.

2 **Connective tissues:** As the name suggests, it connects various tissues and provides supports such as 1. Blood 2. Bone 3. Cartilage 4. Fat tissue.



(a) (b) (c)

**Fig. 1.2: Cell structure**

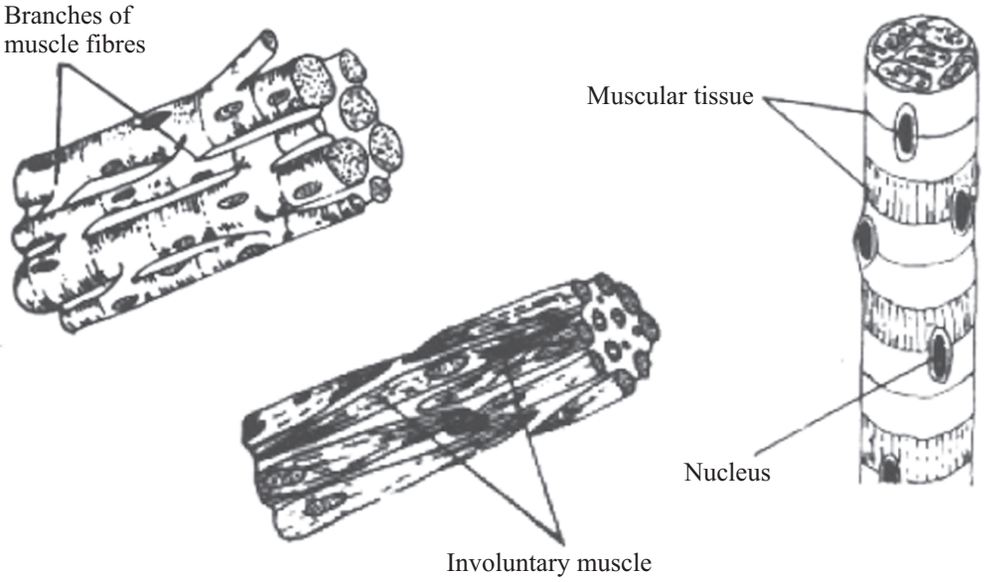



**Fig. 1.3: Types of tissue**


3. **Muscular Tissues:** This tissue has ability to contract and therefore helpful in movement of body.

4. **Nervous Tissues:** The unit of nervous system tissue is called a neuron. It is a special kind of tissue which is responsible for conduction of messages.

## 1.4 ORGANIZATION OF HUMAN BODY

Human body has an axial and appendage part. Axial part contains head, neck and trunk. The trunk is divided into three parts Thorax, Abdomen and Pelvis. Appendage parts contain upper and lower limbs. Look at the human body skeleton, here you can observe the bones present in various regions of the body.

**Head** contains face. Its bones form the skull. Skull has a cavity named cranial cavity, which lodges brain. You know that in that area, other main organs are ear cavity, eye socket, nasal cavity, mouth cavity, larynx etc. Eye ball is placed in bony cavity which is known as orbit and it keeps eye safe.

**Neck** includes cervical part of vertebral column (formed by 7 cervical vertebra and inter vertebral disc), muscle, blood vessels, voice box, wind pipe, thyroid glands and food pipe.

**Thorax** extends down from the root of neck. The bony framework of the thorax consists of the 12 thoracic vertebrae along with the intervertebral disc on the back, 12 pairs of ribs and the sternum (breastbone). Sternum is a flat bone which forms the front wall of thoracic cavity (chest cavity). Ribs are connected with the vertebrae on back and with sternum on front by joints. The upper seven pair ribs are attached directly to the sternum by costal cartilages and are called true ribs. Eighth, ninth, and tenth pairs are called false ribs as they do not join the sternum directly but are connected to the cartilage of seventh rib. Eleventh and twelfth pair ribs are floating ribs, as they are connected only with the vertebral column not with sternum. There are muscles in between the ribs which are called intercostal muscles. Thoracic cavity is separated from abdominal cavity by a fine dome shaped muscular-tendinous structure, named diaphragm. Diaphragm and intercostal muscles are essential for respiration.

Do you know the main organs present in thoracic cavity? These are two lungs, heart, wind pipe, esophagus and thymus gland. Lungs present in both sides and remaining organs are present in the middle part, which is called mediastinum cavity. It includes major blood vessels.

**Abdomen** and pelvis are continuous and form abdomino-pelvic cavity. Upper part is abdomen which starts from diaphragm and goes down to the pelvic inlet (brim of pelvic cavity). In the posterior side it is connected with the lumbar part of spine

and it has 5 lumbar vertebrae and in between vertebrae inter vertebral disc is present. Try to feel the front and sides of abdomen. You will find that it is made of muscles and skin. But there is thick layer of fat in abdominal wall. The major organs in abdomen are- stomach, intestine, liver, gall bladder, pancreas, spleen, adrenal gland, kidney and urinary duct. Abdominal aorta and vena cava are placed posteriorly in front of spinal cord.

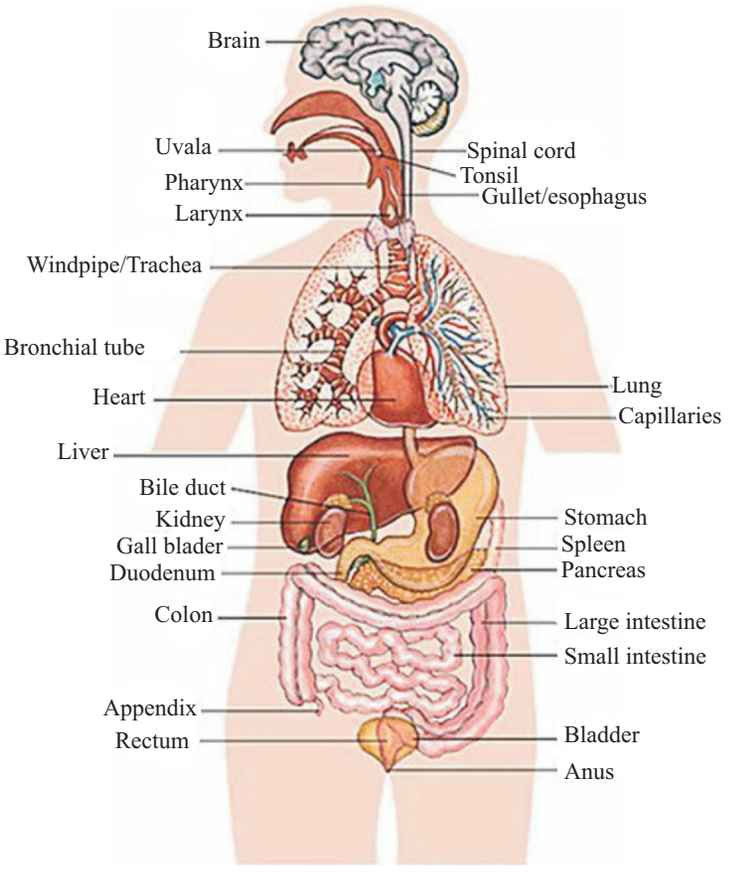



**Fig. 1.4:** Human body internal organs

If you see the Fig. 1.5 you will notice that abdomen is divided into 9 regions (quadrant) with the help of two vertical and two horizontal imaginary planes. This kind of division is helpful to explain the placement of various organs more specifically. Vertical bases are-

1. **Right lateral plane** and 2. **Left lateral plane**, these are also called as mid clavicular planes. These two planes divide the abdomen into three vertical regions. Two horizontal (polar) planes are 3. **Vertical transverse plane** and 4. **Trans tubercular plane**. These two polar planes help in the building of 9 regions (along with mid clavicular planes) of abdomen.

The names of upper three areas are – **right hypochondrium, epigastrium** and **left hypochondrium**. In center line we have **right lumbar region, umbilical region** and **left lumbar region**. The last three quadrants are **right iliac fossa, hypogastrium and left iliac fossa**.

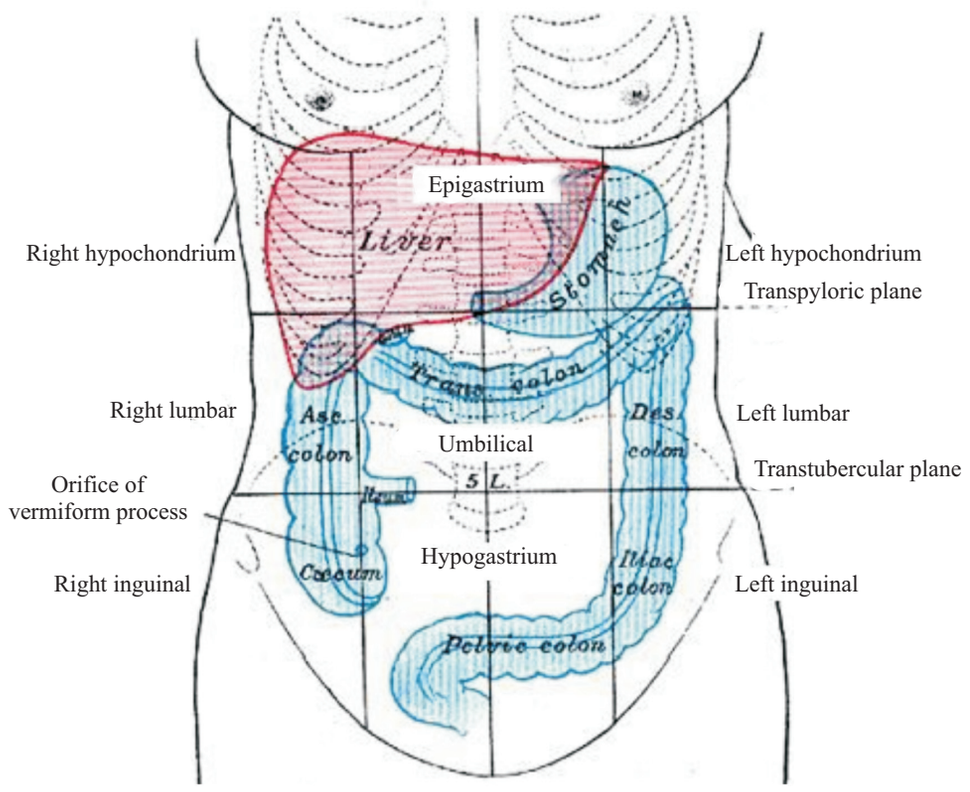



**Fig. 1.5:** Nine quadrants of abdomen

**Pelvic** cavity is surrounded by pelvic bone. Its lower part is covered with the muscles which forms pelvic diaphragm. It includes coils of large intestine (sigmoid colon, rectum and anal canal) internal reproductive organs, urinary bladder, and distal ureter.

## 1.5 ORGAN AND ORGAN SYSTEM

Organ is a group of tissues that perform a specific function like heart, kidney and liver etc. A group of organs which performs a specific function is called organ system. There are ten systems present in our body.

1. Integumentary system

2. Skeletal system
3. Muscular system
4. Respiratory system
5. Digestive system
6. Circulatory system
7. Urinary system
8. Glandular system
9. Reproductive system
10. Nervous system

All the systems are identical in male and female except reproductive system. Apart from the above mentioned systems, there are sense organs in human body. They are:

1. Eye
2. Ear
3. Nose
4. Tongue
5. Skin

Human body can be divided into 6 parts.

- Upper extremities – 2
- Lower extremities – 2
- Trunk – 1
- Head, neck and face – 1

To acquire the higher knowledge regarding different parts of body, various words are used in anatomy. Out of that some common terms are mentioned below:

**Superior (cranial):** Towards the head end of the body or at the higher place.

**Inferior (caudal):** Away from the head or below the head area.

**Ventral or anterior**: Near the front of the body.

**Dorsal or posterior**: In the back part of body.

**Medial**: In the center or mid line of the body. Imagine the midline as dividing the body into two halves left and right.

**Lateral:** To the side of or away from the middle line of the body.

**Proximal**: Near to the trunk or attachment point of the body.

**Distal**: Away from the trunk or the attachment point of the body.

## 1.6 CAVITIES IN BODY

1. **Cranial cavity:** Brain resides in Cranial Cavity.
2. **Spinal Cavity:** Spinal cord is located in here.
3. **Thoracic Cavity:** Contains heart, lungs and large blood vessels.
4. **Abdominal Cavity:** Encloses stomach, most part of intestine**,** kidney, liver, gall bladder, pancreas and spleen.
5. **Pelvic cavity:** Includes urinary bladder, rectum and internal organs of reproductive system.

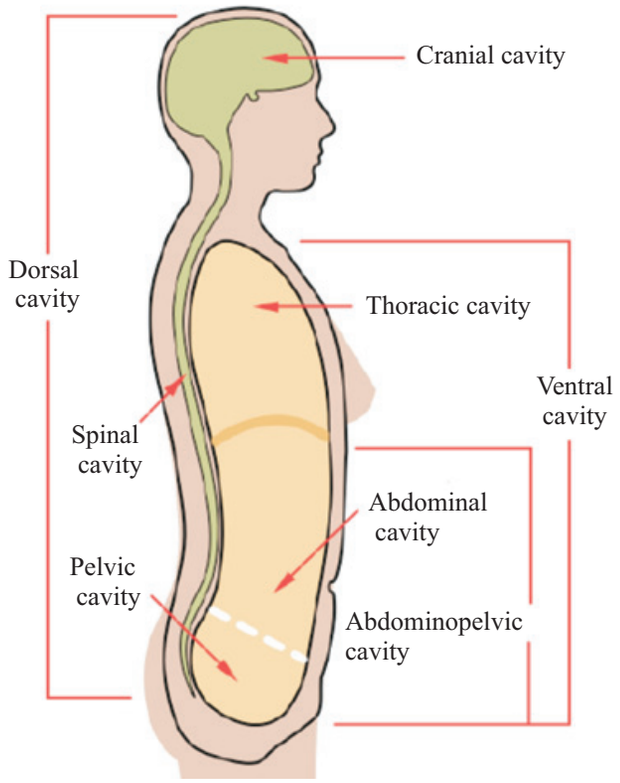



**Fig. 1.6:** Body cavity

## INTEXT QUESTIONS 1.1

**Fill in the blanks**:

1. A group of tissues together forms .....
2. The various systems are formed by .....
3. ..... is important in cell for reproduction process in the cell.
4. ..... system is different in male and female.
5. Heart, lungs, large blood vessels are included in ..... cavity.

## 1.7 BRIEF DESCRIPTION OF SYSTEMS

### 1.7.1 Integumentary System

Integumentary system includes skin and its accessory organs such as hair, sweat glands, fat glands, sebaceous glands and nails. In skin there is an outer skin called epidermis which is made up of Epithelium. The deeper layer is called dermis. It is made up of connective tissue and it includes blood vessels, nerves, hair follicle, sweat and sebaceous glands.

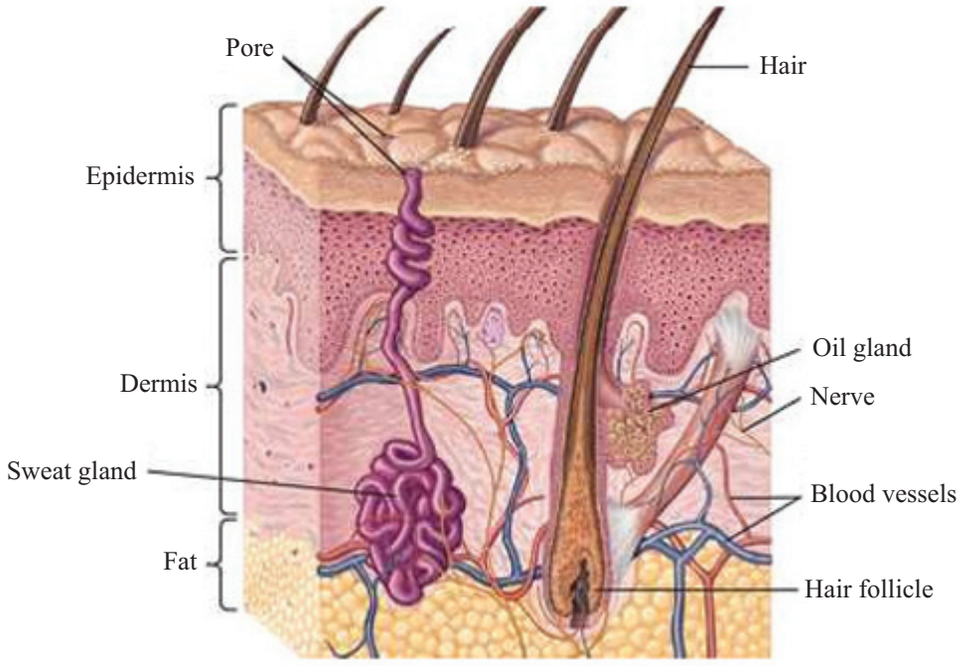



**Fig. 1.7:** Skin (Microscopic section)

**Functions:** After having the brief knowledge about structure of skin, we will discuss its function. You can see that skin covers the outer layer of body, which protects from hazardous substance. It also works as a barrier for the entrance of microorganism in the body. Skin has sweat glands which secrets sweat. As sweat contains many waste products for this reason sweating also helps in excreting waste product. Skin is also helpful in controlling the body temperature, with the production of sweat, which is evaporated from the surface of the skin and thus resulting in cooling off the body. And it is also a sensory organ which has receptors for touch, temperature, stress and pain, which make us aware of our environment.

### 1.7.2 Skeletal System

The framework of bones is called skeleton. They are of two types

1. **Axial Skeleton:** Formed by the skull and vertebral column with ribs and sternum.
2. **Appendicular Skeleton**: Formed by the pectoral girdles, pelvic girdle, upper limbs and lower limbs and pelvis.

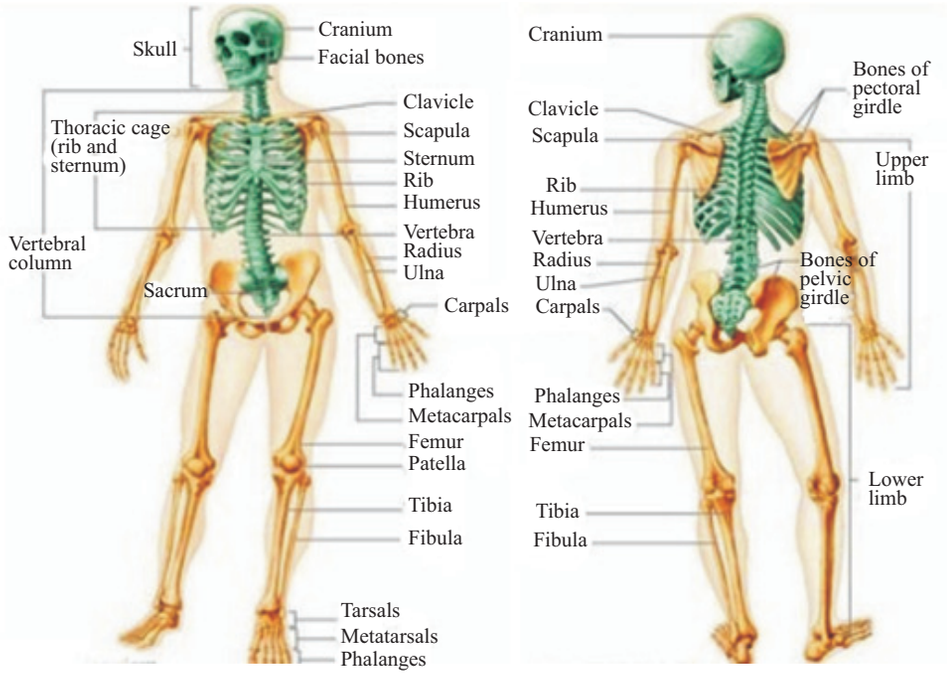



**Fig. 1.8:** Human skeleton

We have 206 bones in our body. **Bone** is a living tissue which is capable of changing its structure according to the stresses it bears.

Notes



**Table 1.1: Regional classification of bones**

| Region of skeleton | Number of bones |
|---|---|
| **Axial skeleton** | |
| Skull | |
| Cranium | 8 |
| Face | 14 |
| Auditory ossicles | 6 |
| Hyoid | 1 |
| Vertebrae | 26 |
| Sternum | 1 |
| Ribs | 24 |
| **Appendicular skeleton** | |
| **Pectoral girdle** | |
| Clavicle | 2 |
| Scapula | 2 |
| **Upper limb** | |
| Humerus | 2 |
| Radius | 2 |
| Ulna | 2 |
| Carpals (wrist) | 16 |
| Metacarpals | 10 |
| Fingers | 28 |
| **Pelvic girdle** | |
| Pelvis bone | 2 |
| **Lower limb** | |
| Femur | 2 |
| Patella | 2 |
| Fibula | 2 |
| Tibia | 2 |
| Tarsal (ankle) | 14 |
| Metatarsal | 10 |
| Toes | 28 |
| **Total** | **206** |


## Composition of Bones

**Organic matter:** It is made up of collagen fibers which comprise of $1/3^{rd}$ of total bone weight and has a thread like structure that provides strength and mass to the bones.

**Inorganic matter:** It comprises of mainly calcium phosphate and a part of calcium carbonate, and traces of calcium chloride, calcium fluoride and magnesium salt. It is $2/3^{rd}$ of total bone weight and provides rigidity and hardness to the bone.

## Functions of Bones

1. Bones provides the support and shape to our body. It transmits the body weight down to ground.
2. Bones work as a lever for muscle action.
3. Skull, spine, and chest cavity protects the brain, spinal cord and internal organ of chest respectively.
4. It provides surface for the attachment of tendons, ligaments, fascia and membrane.
5. Bone marrow produces blood cells.
6. This provides site for reticulo-endothelial system.
7. Bones are the rich site for the storage of calcium and phosphorus. Para nasal air sinuses presented in the bones of skull effects voice tone.

## Classification of Bones

Bones can be classified in various types.

### A. According to Shape

1. **Long bone:** They are longer than they are wide and have a long shaft and two expanded ends. Edges of long bones are smooth and articular. For example, humerus, radius ulna, femur, tibia and fibula. The longest bone in body is femur.

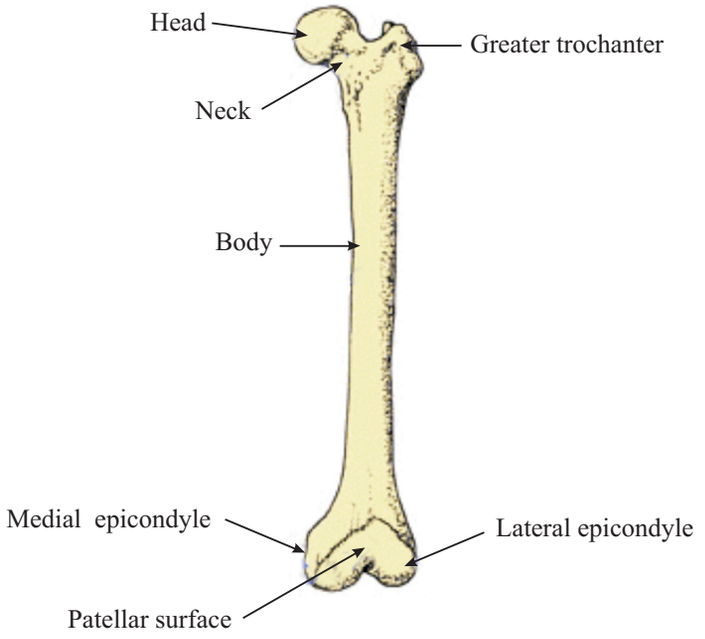



**Fig. 1.9:** Left humerus-frontal view

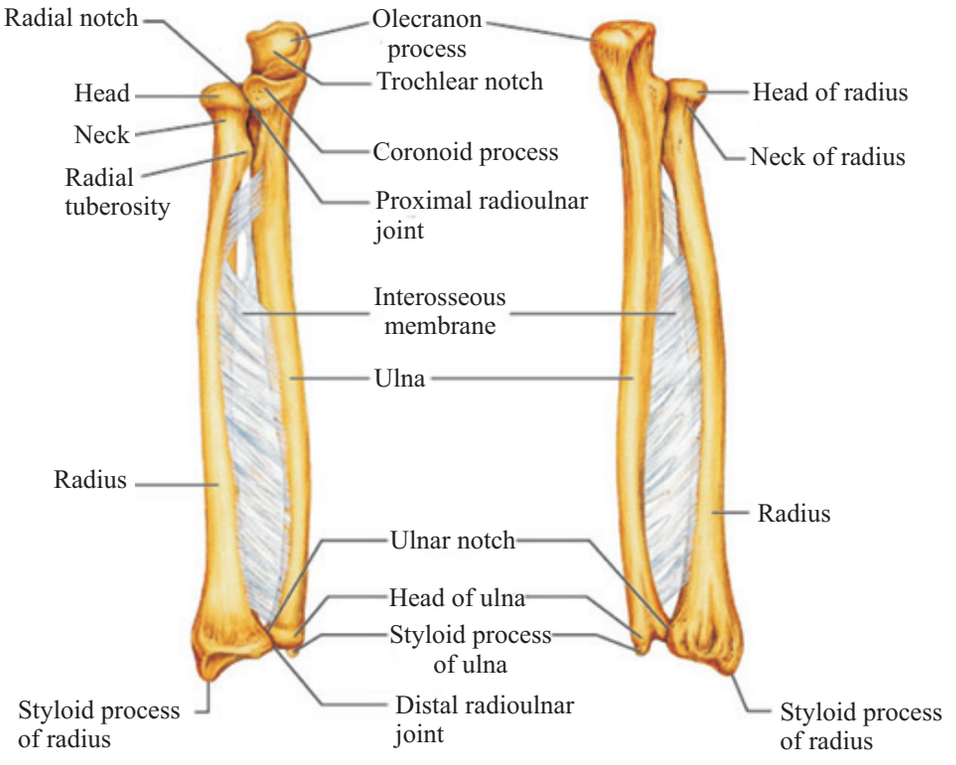
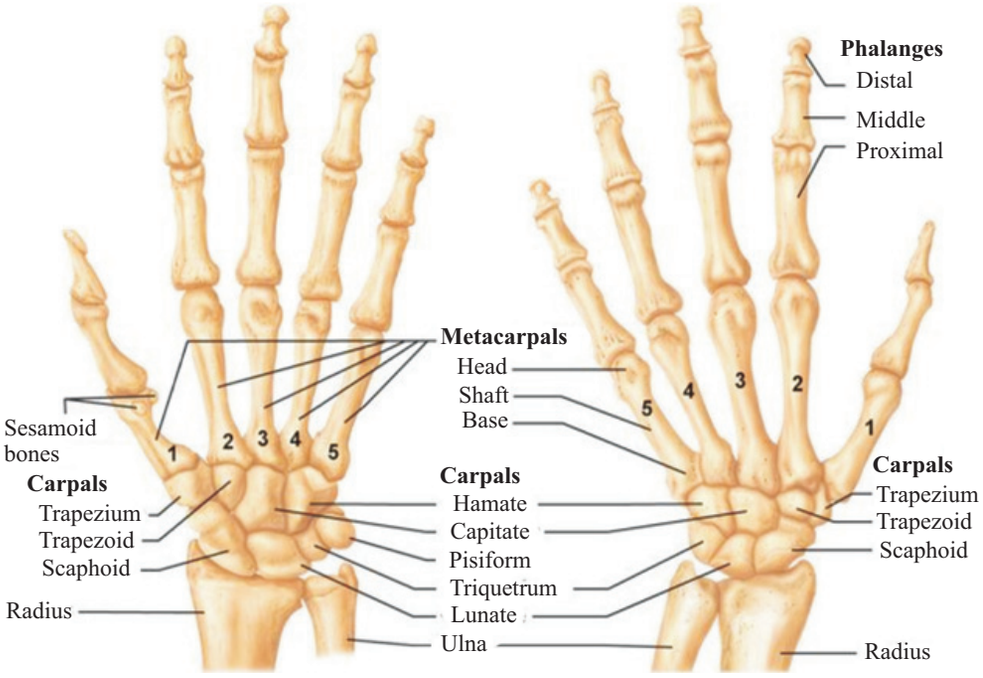



**Fig. 1.10:** Left radio and ulna-frontal view

2. **Short bone:** These have almost same width and length. Example tarsal and carpal bones are short bones.




**(a) Anterior view of left hand** **(b) Posterior view of left hand**

**Fig. 1.11(a):** Bones in left hand palmar surface

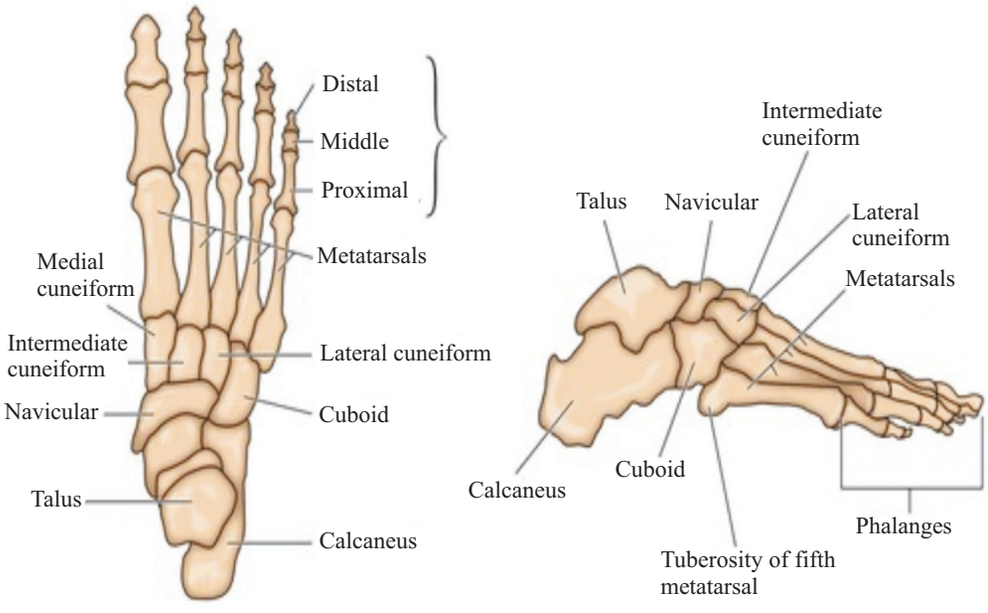



**Fig. 1.11(b):** Bones in dorsum of foot and toes

3. **Pneumatic bone**- These are irregular bones with the presence of large air spaces in these which make them light in weight and help in resonance of voice portion of skull example – maxilla

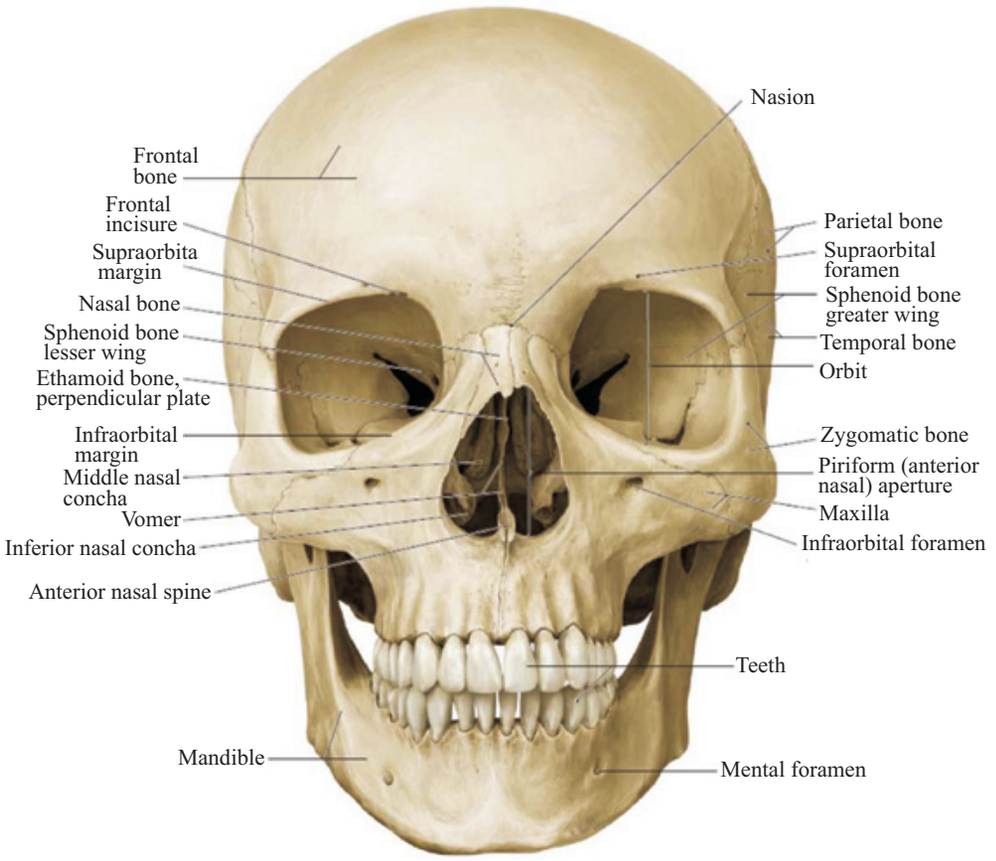



**Fig. 1.12:** Skull: frontal view (norma frontalis)

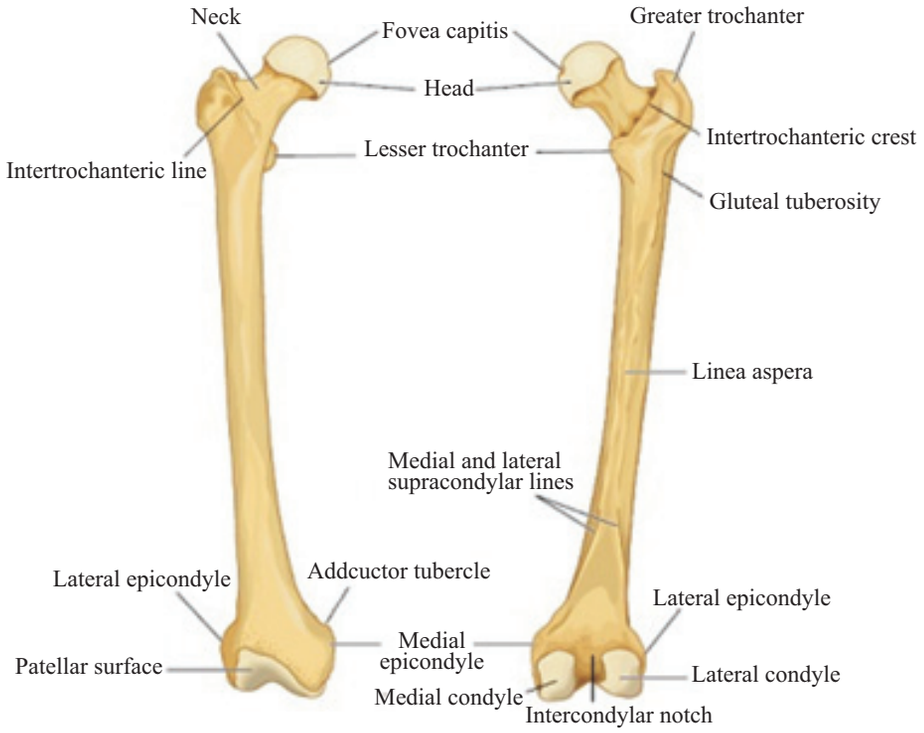
4. **Flat bone:** They are flat in appearance. Example of flat bones are scapulla, iliac region of hip bone the sternum (breast bone), ribs, and many skull bones.

5. **Irregular bones**: such as vertebrae.

6. **Sesamoid bones**: These bones are like the sesame seed and develop in tendon. Such as pisiform bone and knee cap bones. They have no periosteum and ossify after birth. Sesamoid bone function to protect tendons from stress and they also minimizes the friction.

## B. Regional Classification

1. **Bones of Axial skeleton**: These bones form the axial skeleton of the body such as skull, spinal cord and chest cage.
2. **Bones of Appendicular skeleton**: These bones form the appendicular skeleton of the body such as bones of upper and lower limbs.




(a) Anterior view (b) Posterior view

**Fig. 1.13:** Right femur

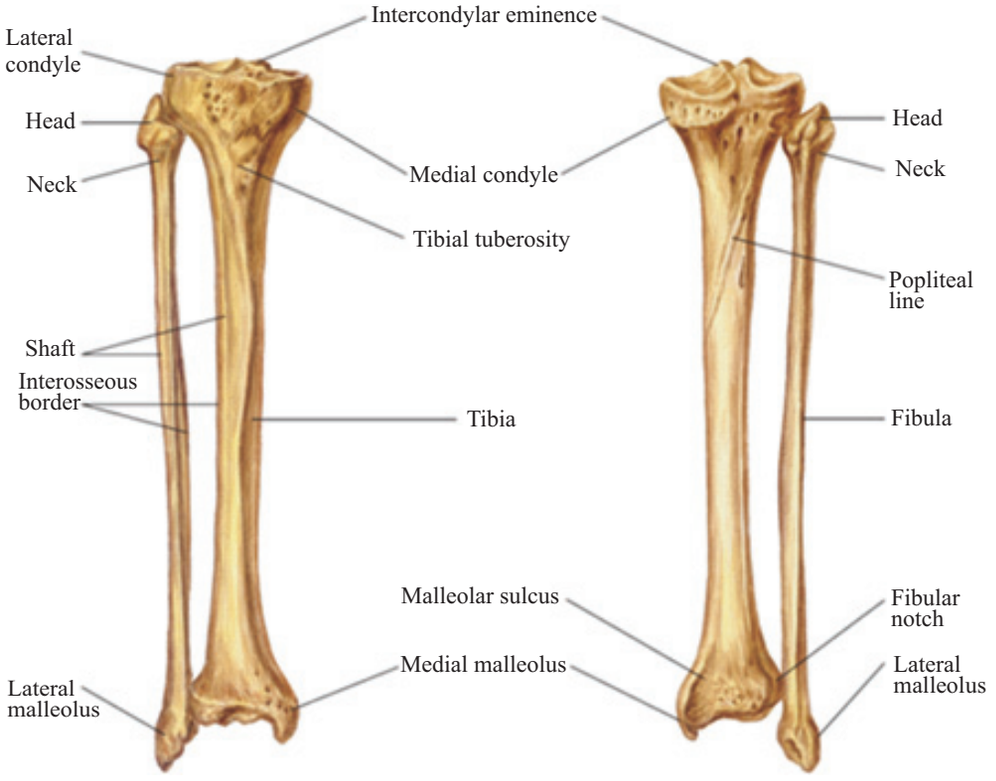
## C. Developmental Classification

1. **Membranous bones**: Ossify in membrane such as bones of vault of skull and facial bones.
2. **Cartilaginous bones**: Ossify in cartilage such as bones of thoracic cage.
3. **Membrano-cartlaginous bone**: Ossify partly in membrane and partly in cartilage. Examples – clavicle, mandible, temporal

## D. Structural Classification

1. **Compact bones:** These bones are dense in texture but very porous. These can be seen well in comparison to long bones. Example in the diaphysis of long bones.

2. **Cancellous or spongy bone**: The part of bone where there is more empty space and less bone tissue. Example end (epiphysis) of long bone.




(a) Anterior view (b) Posterior view

**Fig. 1.14:** Tibia and fibula

## INTEXT QUESTIONS 1.2

1. Fill in the blanks and multiple choice questions.
   (i) The longest bone in body is .....
   (ii) The number of bones in body is .....
   (a) 206 (b) 270 (c) 180 (d) 170
   (iii) Which of the following is long bone?
   (a) Sternum (b) Ribs (c) Fibula (d) Sacrum
2. What are the functions of bones?

.....

### 1.7.3 Muscular System

There are about 500 muscles in our body. Muscles perform all movements of our body. There are two types of muscles present in our body.

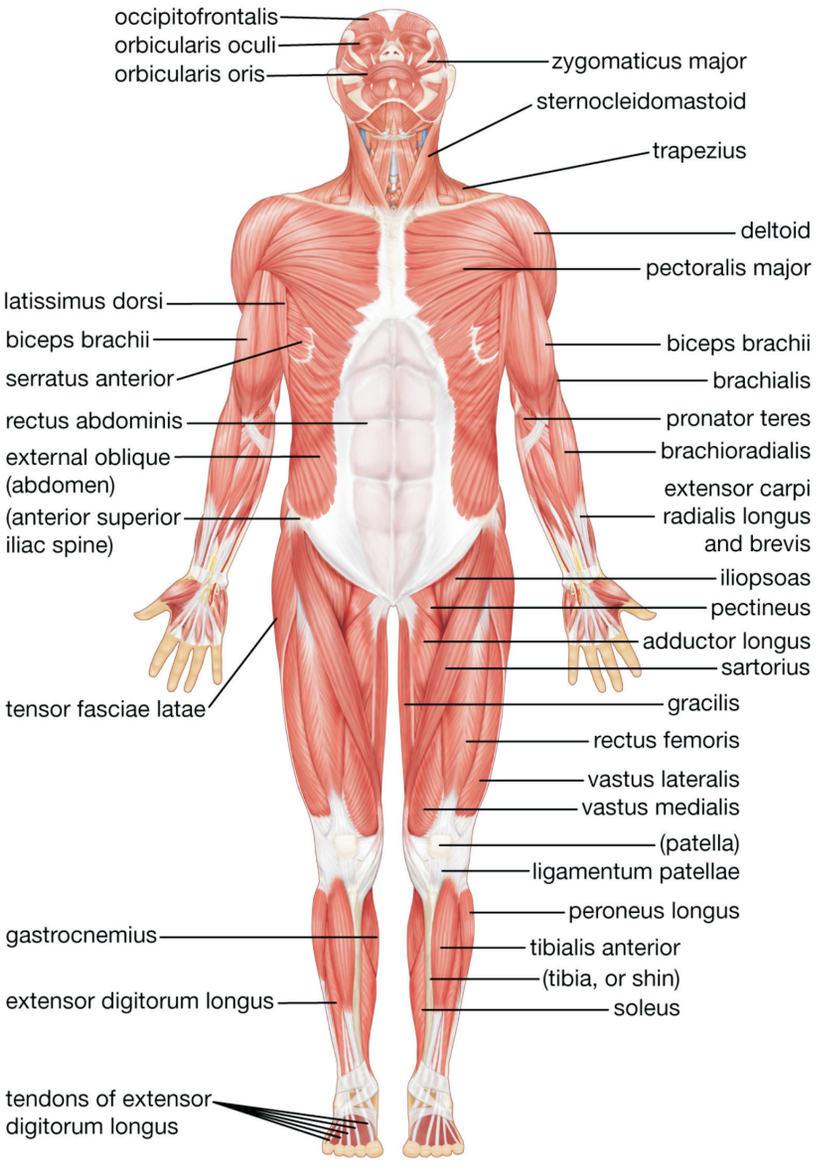



**Fig. 1.15:** Muscles in human body

1. **Voluntary:** The muscles which controlled by conciously are called voluntary muscles. For examaple skeletal muscle.

2. **Involuntary**: The muscles which are not controlled by conciously, for example movement of heart and intestinal muscles.

All the muscles work with co- ordination. When flexor muscle contracts, then extensor muscle will relax. The edges of some skeletal muscle are joint with some bones. They help in all the movement of body.

1. Upper limb muscles: such as biceps, triceps, deltoid (shoulder), flexors of fore arm, extensor muscle of fore arm and hand muscle.
2. Lower limb muscles: Gluteal muscle, quadriceps, hamstring etc. Muscle of leg- flexor leg muscles and extensor leg muscle, muscles of the foot.
3. Muscles of the Abdomen.
4. Muscles of Respiration.
5. Muscles of Mastication.
6. Muscles of Face.

## Functions of Muscles

1. Provide shape to body.
2. Carry out all the body movements possible.
3. Muscles perform the internal functions of the body. Such as digestion, circulation and urination etc.
4. Muscles provide safety to the internal organs such as abdominal muscle.
5. Muscles store glycogen, which is used during muscle movement for energy.

**Neuro-muscular junction**: It is a site of chemical communication present between nerve fiber and a muscle cell in the center part of muscle, which is controlled by brain. Motor nerve enters the central part of a muscle from where the movement of the muscle is controlled by brain.

## INTEXT QUESTIONS 1.3

**Fill in the blanks.**

1. There are ..... muscles in our body.
2. Bicep is the muscle of ..... limb.
3. Hamstring is the muscles of ..... limb.
4. Deltoid is present in the .....
5. ..... muscle is controlled by will.
6. Muscles stores ..... which is used for energy.

### 1.7.4 Respiratory System

The cell and muscles need oxygen for survival that is supplied by respiratory system. We inhale oxygen present in air and release carbon dioxide while we exhale. This process is made possible through respiratory system. It has following parts.

1. Nose
2. Pharynx
3. Larynx
4. Epiglottis
5. Larynx
6. Trachea
7. Bronchi
8. Bronchioles primary, secondary and tertiary
9. Atria
10. Alveolus

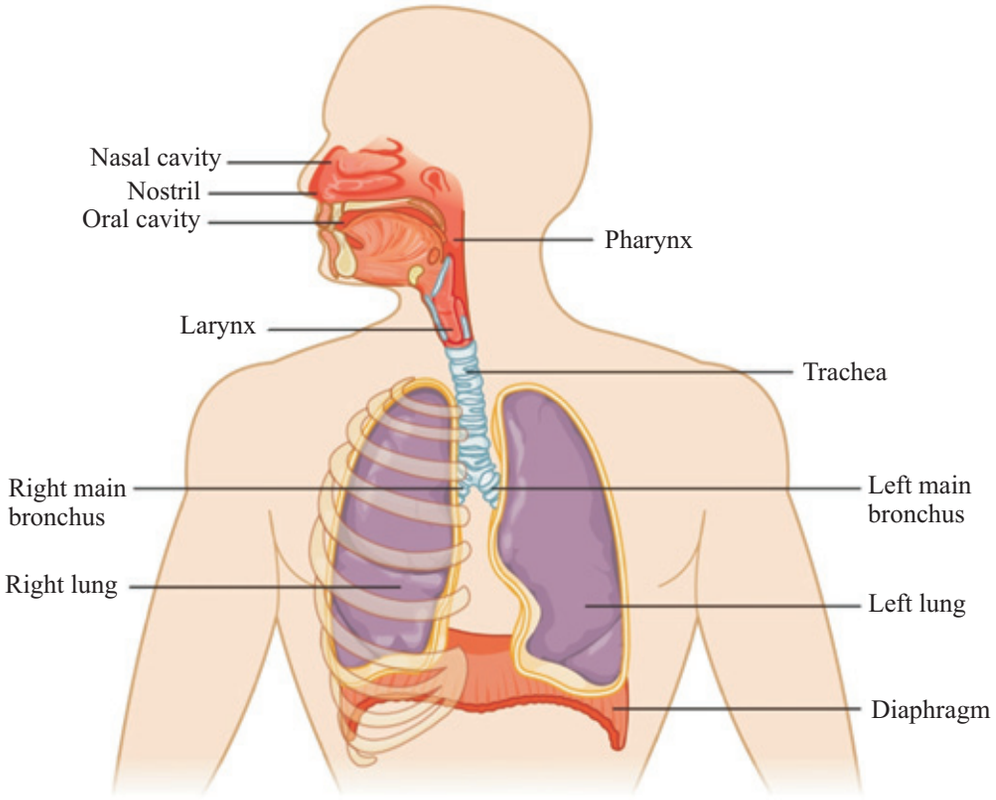



**Fig. 1.16:** Respiratory tract

**Nose**: Air enters through nose. If the nose gets block, then air enters through mouth as well. Nose has two nasal openings. Nose has receptor for smell which helps in smelling. Hair found inside the nose filters the air during breathing process. The sinus bones present around the nose are called paranasal sinuses. Swelling (inflammation) at the internal part of nose is called rhinitis or cold.

**Pharynx (Throat)**: Common passage for both air and food, which is present posterior to nose and mouth. Eustachian tube from each ear (middle part) enters to pharynx.

**Epiglottis**: It is a flap like structure which gets closed during swallowing. It covers the larynx that leads to the lungs. This way food and water is prevented to get into the lungs.

**Larynx**: It is a voice box which is situated at the point of junction of pharynx and trachea. Vocal cords produce sound vibrations in larynx, which is controlled by the various muscles of larynx. It also provides the passage for air flow.

**Trachea (Wind pipe)**: It is a 10-11 cm long tube also called as wind pipe. It is present below larynx and inside thorax. In mid thoracic cavity it splits into two bronchi.

**Bronchi**: The trachea splits into two tubes termed as right bronchus and left bronchus. The hilum is the entry point on each lung for bronchi and is divided into many branches in lung.

**Bronchioles**: These are the smallest branches of each bronchi. These are further divided into sub branches that are called primary, secondary and tertiary branches.

**Atria**: The last part of tertiary bronchious is called atria.

**Alveolus**: It is the minute sac like structure which resembles like a bunch of grapes and is called alveolus. It is lined by single layer of squamous epithelium cell and covered with the network of capillary. Gases exchange at this level. That means oxygen in alveoli is transported to the blood and carbon dioxide released in alveolus by blood capillary.

**Lungs**: These are two pyramid shaped organs in thorax. Right lung has three lobes while left lung has two lobes. Each lung is covered by two layers of epithelium named pleura, which has a fluid within named pleural fluid. This pleural fluid minimizes the friction during respiration.

We respire 18-20 times in every minute.

Respiratory rate increases during high fever, heavy exercise or low oxygen environment.

**Breathing**: It involves intake of oxygen into the body and expulsion of carbon dioxide out of the body. During inspiration, we inhale oxygen and during expiration we exhale carbon dioxide and other waste products. Breathing is the part of external respiration.


**External respiration**: It means gas exchange across the respiratory membrane in the lung. The oxygen present in alveolar air enters the hemoglobin of red blood cell and carbon dioxide goes to alveolar space from red blood cells. In this way blood purifies (oxygenated) in lungs and the process takes place due to the difference of pressure of gases between alveolar air and blood.

**Internal respiration**: It occurs within the cells of the body with the help of oxygen carried in vessels from the heart. It is also called cellular respiration.

### Branches of Bronchial Tree – Line Diagram

Trachea
↓
Primary Bronchi
↓
Secondary Bronchi
↓
Tertiary Bronchi
↓
Bronchioles
↓
Terminal Bronchioles

| Right lung | Left lung |
|---|---|
| **Superior lobe** | **Superior lobe** |
| 1. Apical segment | 1. Apical posterior segment |
| 2. Posterior segment | 2. Anterior segment |
| 3. Anterior segment | 3. Superior lingual segment |
| | 4. Inferior lingual segment |
| **Middle lobe** | **Inferior lobe** |
| 1. Medial basal segment | 1. Superior basal segment |
| 2. Lateral segment | 2. lateral basal segment |
| | 3. Anterior medial segment |
| **Inferior lobe** | |
| 1. Superior segment | |
| 2. Posterior basal segment | |
| 3. Anterior basal segment | |

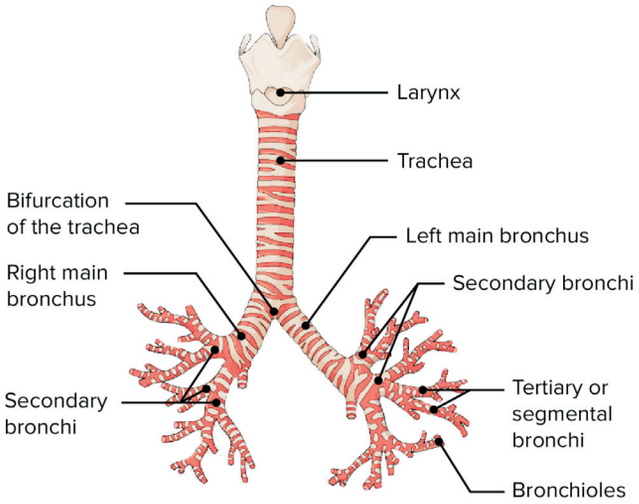



**Fig. 1.17:** Bronchial tree

## Flow of Oxygen in the body

Oxygen enters in the body
↓
By mouth or nose
↓
Pharynx
↓
Epiglottis
↓
Larynx
↓
Trachea
↓
Bronchi
↓
Bronchioles
↓
Alveoli.
↓
(External respiration occurs; oxygen and carbon dioxide are exchanged)
↓
Circulatory System
↓
Cell (internal respiration occurs and exchange of oxygen and carbon dioxide in cell)


## INTEXT QUESTIONS 1.4

**1. Multiple choice questions**:

(a) Exchange of gases takes place in .....

(i) Capillary (ii) Vena cava

(iii) Alveoli (iv) Peritoneum

(b) Lungs are covered by ..... at the outer side.

(i) Peritoneum (ii) Pleura

(iii) Heart covering (iv) Nothing

**2. Fill in the blanks**.

(a) Normally a person breath ..... times in a minute in.

(b) ..... closes while eating and drinking.

### 1.7.5 Digestive System

Digestive system absorbs nutrients, which is used by each cell. The cells of body cannot absorb nutrients from the food we eat. The food needs to be broken down into substance which then can be consumed by the cell. The process of converting the food into usable substance is called digestion. After digestion, nutrients flow in blood stream. The process of absorbing nutrients through the wall of intestine into bloodstream is called absorption. In this way, digestive system has two main functions- digestion and absorption.

### Digestive Track

Digestive system can be seen as a muscular hollow long tube which starts from mouth and ends on anus. This tube is called Alimentary canal and it is made up of many parts.

Food enters in alimentary canal through mouth. Mechanical digestion (chewing) start just after food enters into this track. Salivary gland secretes saliva. Saliva moistens and lubricates the food. The inner layer of food pipe secretes mucus which helps the food to flow downwards.

Pharynx behind mouth cavity which is a passage of food. Epiglottis is a flap which covers the wind pipe on the entry of food or water. By doing this food and water can be prevented from going into wind pipe.

**Esophagus** gets food from pharynx. The wave like movement in esophagus pushes the food and liquid down. This movement is called peristalsis. Stomach, an enlarged portion of alimentary canal, food pipe get food and water from esophagus. The food in the stomach stays until the digestive material chemically breaks the food particles into chyme. Chyme is the creamy semi fluid mixture of partly digested food and gastric juices (digestive juice secreted from stomach).

**Pyloric sphincter** is the ring like muscle and is located between the stomach and the duodenum, which is the first part of the small intestine. Its main function is to regulate the movement of partially digested food (chyme) from stomach to the duodenum. Small intestine is almost 27 ft. long and duodenum is almost 10 to 12 inch long. Duodenum gets juices from liver, pancreas and gall bladder which are helpful in digestion of food. And further break the chyme chemically. Process of digestion is completed with the chemical breakdown of food.

**Small intestine** is a part of alimentary canal where maximum absorption of food takes place. There are several projection like structure called villi in the inner surface of the small intestine. Every villus has many cells which absorbs nutrients from food. The food particles which does not get absorb, passed into large intestine by peristalsis movement of small intestine.

**Large intestine** is continuous with small intestine. The remaining undigested food enters large intestine from small intestine and is stored as stool. Water, minerals and vitamins get absorb in large intestine. It secretes mucus which is helpful in the disposal of waste.

Alimentary canal has 6 to 8-inch-long with **rectum** in the end. It stores the stool. Anus is the last part of food pipe. From here stool comes out of the body.

## Accessory Structures

These are the structures that are helpful in digestion process. These structures are-

(a) Liver

(b) Gall bladder

(c) Pancreas

**Liver:** It is the biggest gland of body and its function is as follows:

1. Production of bile.
2. Destroy the toxins absorbed in small intestine.
3. Stores vitamins.


4. It produces anticoagulant - heparin to prevent coagulation of blood in blood vessels.

5. Production of anti-bodies that provides safety from infections and foreign particles.

**Gall bladder**: It is a muscular bag like organ which stores bile produced by liver. Gall bladder contracts when chyme reaches to duodenum and allows bile to flow into duodenum. Chyme is broken chemically in presence of bile. Bile is useful in the digestion of fat.

**Pancreas:** It produces pancreatic juice which is helpful in chemical breakdown of chyme. Pancreas has islets of langerhans that produce the insulin which controls the use of sugar by the tissues.

**Physiology of digestion and absorption:** The food we eat has carbohydrate, fat, protein, minerals, vitamin, roughage in different quantities and water in a large quantity. Food is chewed and masticated with the help of tongue and teeth. It gets mixed with the saliva which is secreted by salivary gland. Ptyalin present in saliva facilitates the primary digestion of carbohydrate. The stomach receives the food from esophagus. It stays their for 3 and a half hour. The movement of muscular layers in stomach helps mixing the food with gastric juice. The hydrochloric acid produced in stomach destroys the bacteria found in food. An enzyme named pepsin breakdown proteins into smaller peptide. One-liter gastric juice is secreted in 24 hours.

After 3½ hour pyloric sphincter relaxes (opens) and the chyme is passed into the duodenum. Here bile from liver and pancreatic juice from pancreas get mixed with the chyme. The peristalsis of intestine forces food to descends into to jejunum and ileum (part of small intestine). Small intestine has gland in mucus layers which produce intestinal juice. This juice helps in the digestion of food with the help of enzyme present in it. With the activity of enzymes present in various juices carbohydrate breaks into glucose, fat breaks into fatty acids, proteins breaks into amino acids. Mucus layer present in small intestine has villi that absorb these substances into the blood capillary. After that, these metabolites enter into liver through capillary. In liver amino acids are used for the synthesis of protein. Glucose gets converted into glycogen and stored in liver. Remaining part of amino acid, protein, glucose, low fatty acids enters the heart from liver through vena cava. From there these nutrients are circulated through blood circulation in the entire body. Out of it, maximum nutrients are used for generation of energy, where one-

gram protein produce 4 calories, whereas one-gram fat produce 9 calories. Extra fat in the body get collected in the form of adipose tissue.

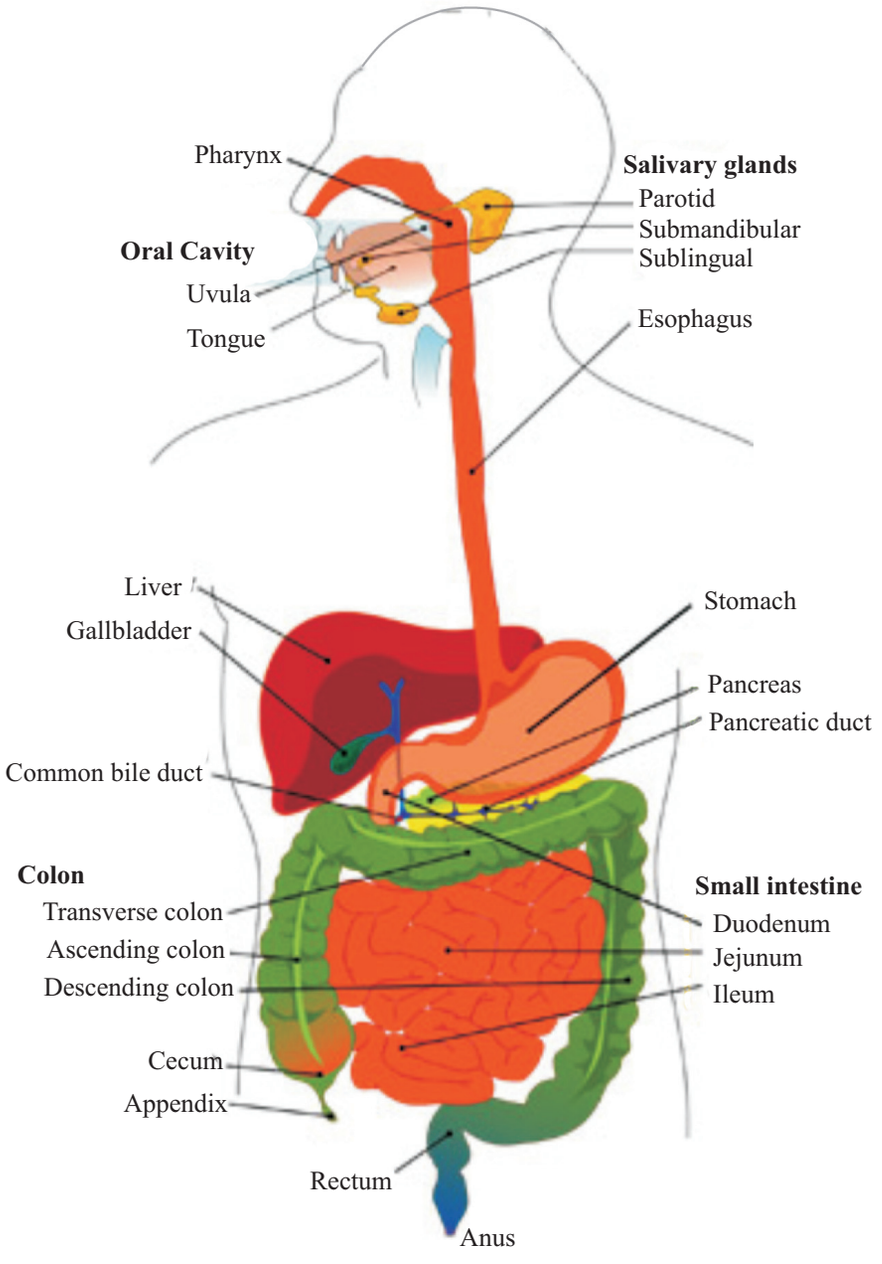



**Fig. 1.18:** Digestive system

The unabsorbed waste products transferred from small intestine to large intestine. Maximum absorption of water takes place in large intestine. Solid waste materials get collected in the rectum in the form of stool. At last, within 24 hours stool comes out from anal canal through anus. It is called defecation.


## INTEXT QUESTIONS 1.5

**Fill in the blanks**:

1. Secretion of bile takes place in .....
2. Bile duct opens in .....
3. Maximum absorption of food takes place in .....
4. Production of insulin is by .....
5. Glucose converts into ..... and gets stored in liver.
6. Maximum absorption of water takes place in .....

### 1.7.6 Cardio-vascular or Circulatory System

Cardio-vascular system includes blood vessels (arteries and veins), heart and circulatory system.

Blood transport nutrients and oxygen to the cells and takes away the waste materials. Blood also has cells produced by lymphatic system. Lymphatic system provides safety from the disease caused by microbes by making them ineffective.

Blood is a fluid connective tissue which is red due to the presence of hemoglobin red blood cells.

Blood has two parts solid and liquid. Liquid part is called plasma. Plasma has 91 percent water and 9 percent solute. Maximum part of solute has plasma protein such as albumin, globulin, and fibrinogen. Apart from the electrolytes such as sodium, potassium, calcium, plasma also has nutrients and vitamins.

In its solid part, red blood corpuscles, white blood corpuscles and thrombocytes are present. Red blood cell is a disc shaped corpuscle which is 7 microns in size. It has a red colored substance which is called hemoglobin. There are around 4 to 6 million red blood corpuscles. Hemoglobin has affinity for oxygen and carbon dioxide. White blood cells are around 5 to 10 thousand per cubic mm of blood. White blood cell is of various kinds, such as neutrophil, lymphocyte, eosinophil, monocyte and basophil. These protect the body against disease. Lymphocyte develops immune capability for our body. Platelet helps in clotting of blood. Blood cells develop in bone marrow. Body has 5 to 6-liter blood. The average life span of red blood cell is 120 days.

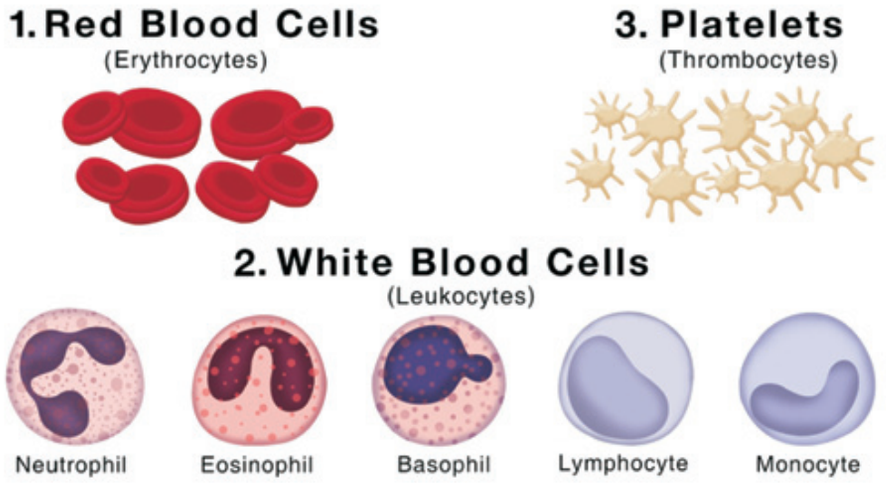



**Fig. 1.19:** Different types of blood cells

## Blood Group

Mainly there are four groups of blood. A, B, AB and O. Other groups are also available such as Rh-positive (Rh+ ) or Rh-Negative (Rh-). Person having O blood group is called universal donor because he can donate blood to all groups of blood. Person having AB blood group is called universal acceptor as he can receive blood from all the donors. When the donor and receiver are of same blood group then their blood is called matching.

## Rh System

Maximum people are Rh positive (around 90 percent) and remaining others are Rh negative. The Rh + person can accept blood from any blood group, whereas Rh –ve person can take blood only from any Rh –ve.

## Functions of Blood

1. **Transportation:** Blood transports oxygen, carbon dioxide, nutrients to all the body parts and removes waste material from the body.
2. **Regulating body temperature:** Maintains the body temperature to 98° Fahrenheit, it also maintains the pH and osmotic pressure.
3. **Protection:** White blood cells destroy bacteria by phagocytosis and thus provide immunity to body.
4. **Clotting:** It also clots blood at the site of injury and thus preventing blood loss.

Normal pattern of differential leucocyte count and function of each white blood are as follows.


**Table 1.2: Differential leucocytes count; and its function**

| Leucocytes | Differential leucocyte Count | Function |
|---|---|---|
| Neutrophil | 60-70% | Phagocytosis |
| Eosinophil | 2-4% | Anti-Allergic |
| Basophil | 0.10% | Produce heparin an anti-coagulant |
| Lymphocyte | 25%-40% | cell mediated and humoral mediated immunity |
| Monocyte | 2-8% | phagocytosis |

## Role of Heart

As per the needs of tissue, circulatory system transport oxygen, nutrients, hormones, antibodies to them. Blood vessels are of three types such as arteries, vein and capillaries. Arteries and veins are big vessels, it has three layers, but capillary are thin, and it has one layer.

**Table 1.3: Difference between arteries and veins**

| Arteries | Veins |
|---|---|
| 1. With exception of pulmonary artery, it provides pure (oxy-genated) blood to all the body away from the heart. | 1. All the vein except pulmonary vein carries impure (deoxy-genated) blood from various parts of the body. |
| 2. Arteries do not have valve. | 2. Vein have valve |
| 3. It has thick muscle layers. | 3. Vein have thin muscle layer. |
| 4. Arteries have high pressure. | 4. Vein has less pressure. |
| 5. Arteries start from heart goes to various parts of body. | 5. Vein starts from various parts of the body and ends at heart. |
| 6. During deep injury blood flows with high pressure from arteries. | 6. During wound blood flows slow from arteries. |
| 7. Arteries are present in deep in body. | 7. Normally veins are present superficially. |

## Heart

Heart is a muscular organ which is situated towards the left side of chest and between the two lungs. It is covered with two layers of pericardium. The pericardium contains fluid known as pericardial fluid. This liquid works as a lubricant.

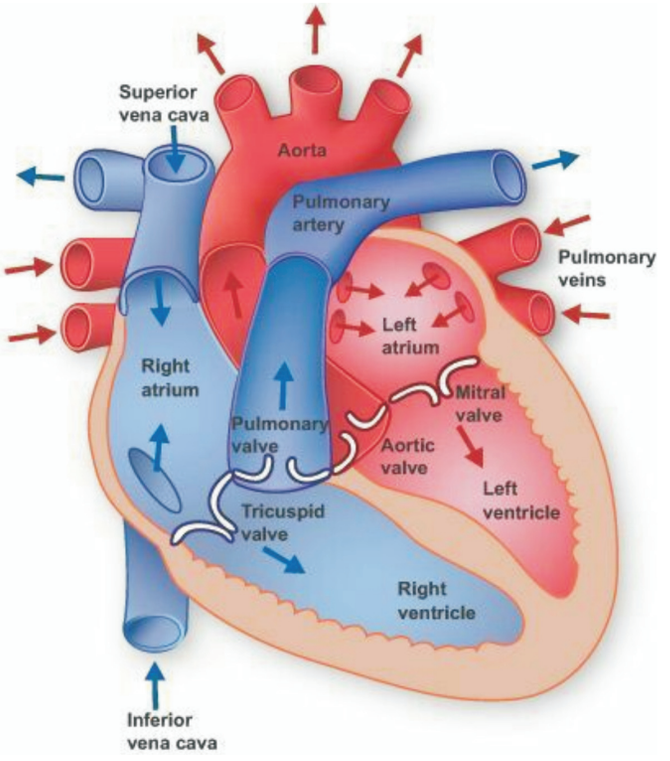



**Fig. 1.20:** Heart with major blood vessels

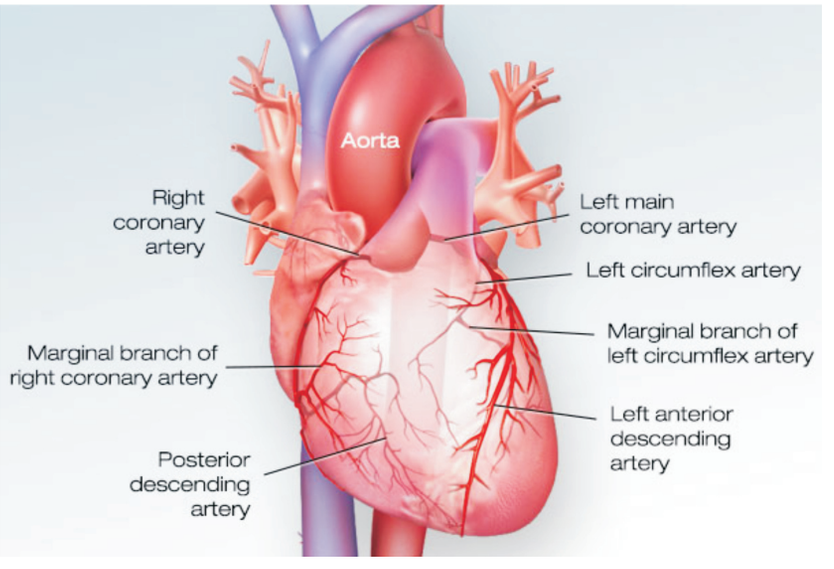



**Fig. 1.21(a):** Internal view of heart arrows show direction of flow of blood

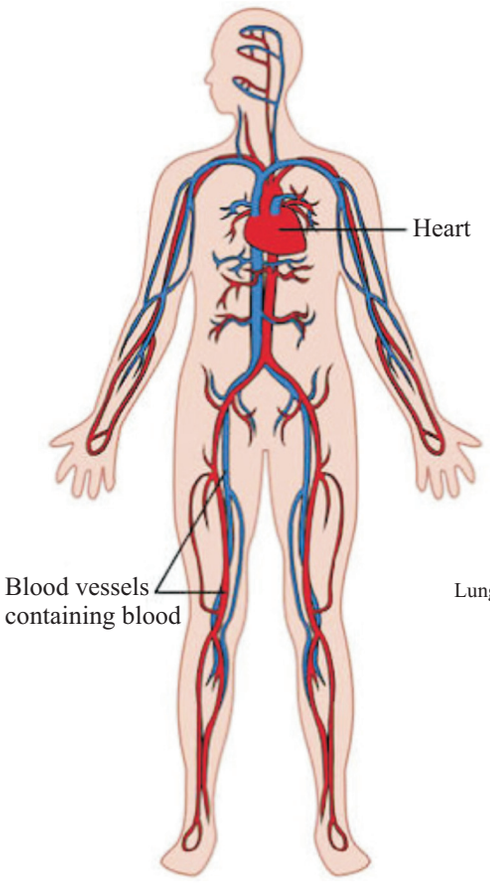



**Fig. 1.21(b):** Cardio-vascular system include heart blood vessels

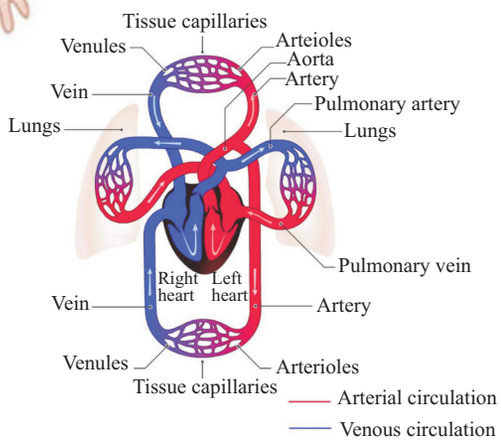



**Fig. 1.21(c):** Pulmonary and systemic and circulation

Heart has four chambers they are- right atrium, right ventricle, left atrium and left ventricle. Superior vena cava and inferior vena cava transmit venous blood into right atrium. Blood enters from right atrium into right ventricle through the open tricuspid valve. From right ventricle, blood enters into lungs through pulmonary artery. The movement of blood from heart to lungs and vice versa is called pulmonary circulation. From left atrium blood enters into left ventricle through atrio-ventricular valve. Here it enters into aorta through aortic valve and by various branches of aorta it circulated in the various part of body. This whole process is called cardiac cycle.

Heart beats about 70-80 times in a minute. Heart beat can be felt at wrist due to pulsation of radial artery. Heart beat increases after exercise and high fever. Heart pumps 200 ml blood per beat that means 16 liter per minute.

Two branches of aorta called right and left coronary artery supply blood to the heart. Heart attack occurs if there is any obstruction in these arteries.

## Functions of Heart

1. It pumps oxygenated blood to arterial system from there it sends blood to the cells and tissues.
2. Collects the deoxygenated blood from venous system.
3. After that it again pumps the blood to lungs for oxygenation.

### INTEXT QUESTIONS 1.6

**1. Fill in the blanks and multiple choice questions.**

1. Heart has ..... chambers.
2. Right Atrio ventricle valve is called .....
3. Vein except ..... transport ..... blood.
4. Artery except ..... transport ..... blood.
5. ..... is the largest artery of circulatory system.
6. Arteries and veins are types of .....

(i) Glands (ii) Capillary (iii) Blood vessels

### Flow chart showing blood flow in the body.

Right atrium
↓
Through tricuspid valve
↓
Right ventricle
↓
Through the pulmonary semi-lunar valve
↓
Pulmonary artery
↓
Lung
↓
Alveoli (exchange of oxygen and carbon dioxide)
(External respiration)
↓


Pulmonary veins
↓
Left atrium
↓
Mitral valve
↓
Left ventricle
↓
Aortic semi-lunar valve
↓
Aorta
↓
Body
↓
Arteries
↓
Arterioles
↓
Capillaries
↓
Cells, Tissues (exchange of oxygen and carbon dioxide)
(Internal respiration)
↓
Venules
↓
Veins
↓
Superior or inferior vena cava
↓
Right atrium

### 1.7.7 Excretory System

The process of getting the waste product expelled out of the body is called excretion and it is done with the help of excretory system. It is done in three ways. Waste gases get out of the body by expiration through lungs. Liquid waste gets out from skin in the form of sweat, and in the form of urine from kidney, solid waste

gets out from rectum. Maximum excretion is done by the kidney. So, it is also called as urinary system. This system includes two kidney, two ureters, urinary bladder and urethra.

## Kidney

Kidneys are a pair of bean shaped organ which are present behind stomach on the either side of vertebral column. Their size is 4×3×2 inch. Kidney has two poles, upper pole, lower pole, two borders and two surfaces. A gland named adrenal gland is present on the upper pole of kidney.

Pure blood enters into kidney through renal artery via aorta. Blood filters here and after that travels back to heart via renal vein to inferior vena cava. Kidney is covered on outer surface by layer of fatty tissue called as renal capsule. Kidney can be seen in two parts on longitudinal section. Outer part is called cortex and inner part is called medulla.

## Cross section of kidney

(a) Cortex (b) Medulla (c) Renal artery

(d) Renal vein (e) Pyramid (f) Ureter

**Fig. 1.22:** Structure of Kidney


Cortex and Medulla comprise around one million of nephrons. Nephron is functional unit of kidney and they produce urine.

Nephron is made up of these parts:

- Glomerulus: it is a bunch of capillaries
- Bowman's capsule: it's a cone shaped structure.
- Proximal Convoluted Tubule
- Loop of Henle
- Distal Convoluted Tubule
- Collecting Tubule

The basic functional unit of kidney is nephron.

## Function of Kidney

1. Production of glomerular filtrate
2. To regulate the balance of water and electrolytes.
3. To maintain the pH level of blood.
4. To maintain the level of calcium in body.
5. Production of renin
6. Production of erythropoietin

## Ureter

Urine produced by the kidney flows to urinary bladder through ureter. Ureters are the long tube around 25 cm long, starting from pelvis of kidney and goes to posterior surface of the urinary bladder. Peristaltic movement helps urine to push down into the bladder. At the lower end of ureter, there is mucous fold which works as a valve and stops the back flow of urine especially at the time of contraction of bladder.

**Urinary bladder**: It is a elastic distensible bag which can collect 200 to 400 ml of urine. It is placed behind symphysis pubis in pelvis. There are three openings on the floor of bladder – two from ureter and one uretheral opening. The inner part of the bladder is covered with the mucus layer and when bladder is empty it has numerous folds called rugae.

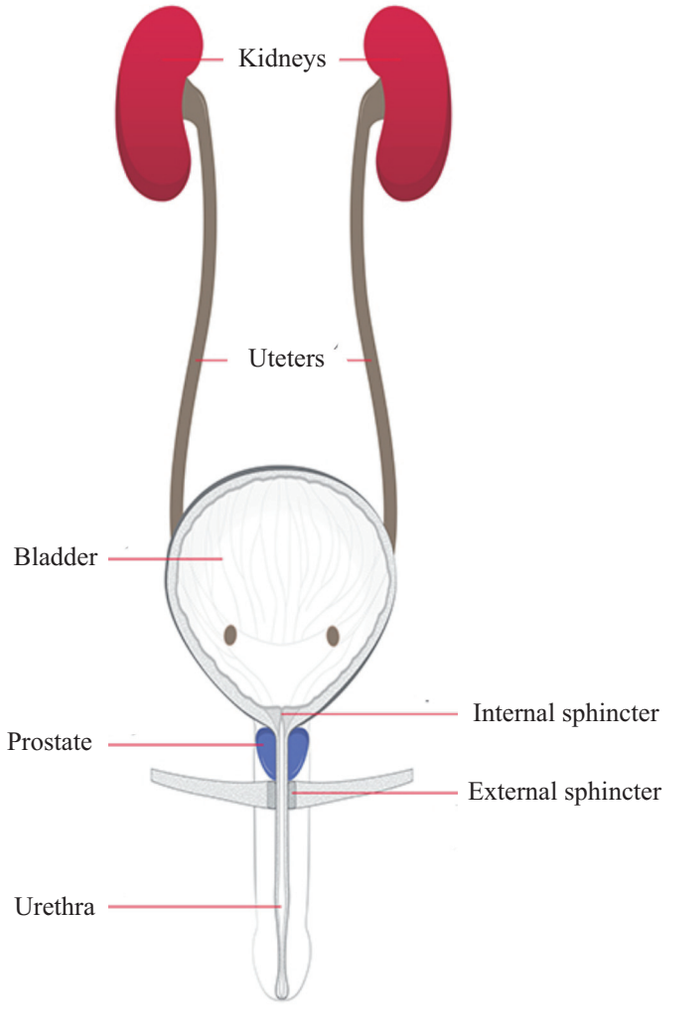



**Fig. 1.23:** Urinary system (male)

**Physiology:** Impure blood circulates in the network of capillaries of glomerulus and gets filtered by bowman capsule (cup like sac) through the filtration membrane. The filtrate (the fluid that has passed through the membrane) passes to proximal convoluted tubule followed by loop of henle and then to distal convoluted tubule, where solutes and some water needed for the body are reabsorbed. Remaining filtrate material combines with ion to form urine. Thus drop by drop urine is collected in the various parts of medulla, which passes out of the kidney through the renal pelvis into the ureter and finally down into the urinary bladder. After collection of 300 to 500 ml of urine in bladder, we feel urge to urinate. During urination the valves in bladder opens to allow urine to flow out of the body. This process is controlled by brain. Urine has soluble waste such as urea, uric acid, creatinine, sodium, potassium and calcium etc. We urinate around 1.5 liter urine daily.

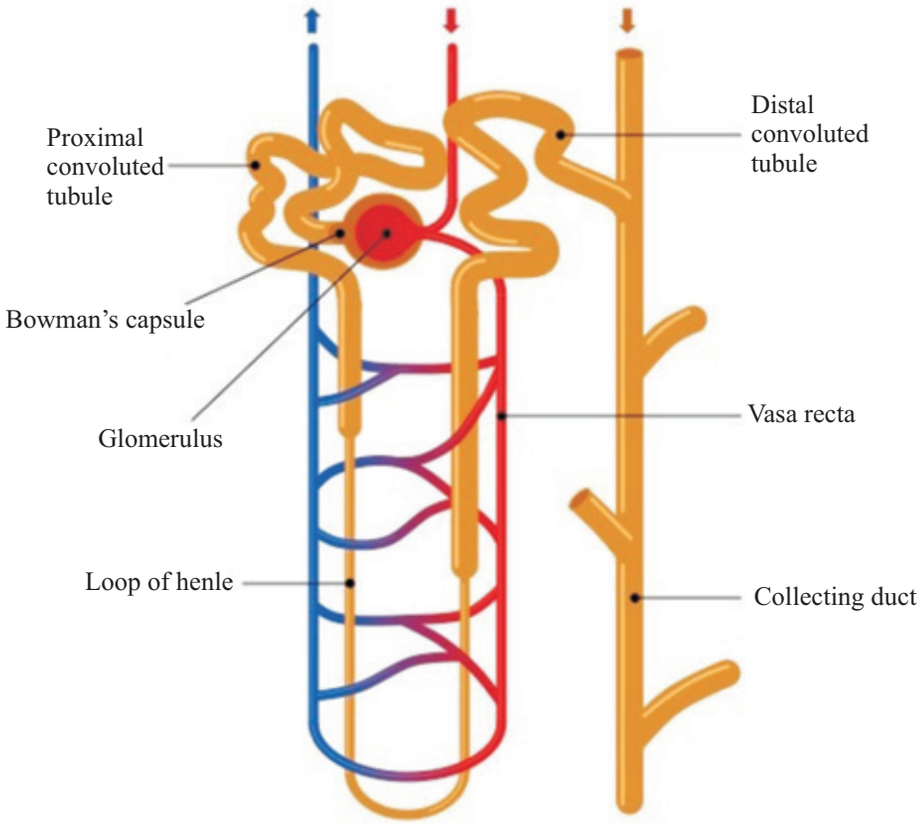



**Fig. 1.24:** Labelled picture of nephron

## INTEXT QUESTIONS 1.7

**1. Fill in the blanks.**

(a) Nephrons are found in the .....

(b) Bowman capsule is a part of .....

(c) After travelling through ureter, urine collects in .....

(d) Kidney ..... the blood.

(e) Ureter is almost ..... cm long.

(f) We urinate almost ..... liter urine in a day.

### 1.7.8 Nervous System

Nervous system is composed of cells called neuron specialized for conduction of impulse an excited state and produce response accordingly. It controls all the functions of the body.

It has two parts.

1. **Somatic nervous system**

   It also has two parts.

   (a) Central nervous system which includes brain and spinal cord.

   (b) Peripheral nervous system- which includes nerves and ganglia outside the brain and spinal cord.

2. **Autonomic nervous system**

   It also has two parts.

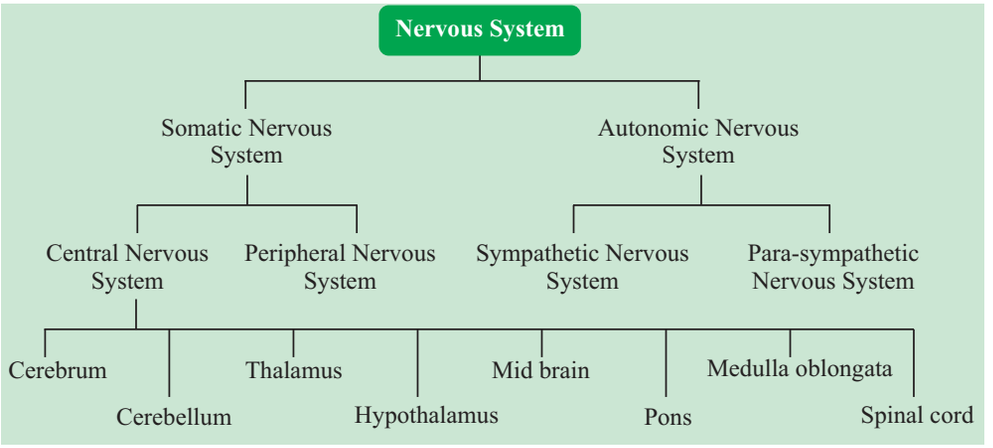
   (a) Sympathetic nervous system

   (b) Para-sympathetic nervous system.

### Central nervous system has following parts.

1. Cerebrum
2. Cerebellum
3. Thalamus
4. Hypothalamus
5. Pons
6. Medulla oblongata
7. Mid brain
8. Spinal cord

Autonomic nervous system controls all the activities of internal organs.



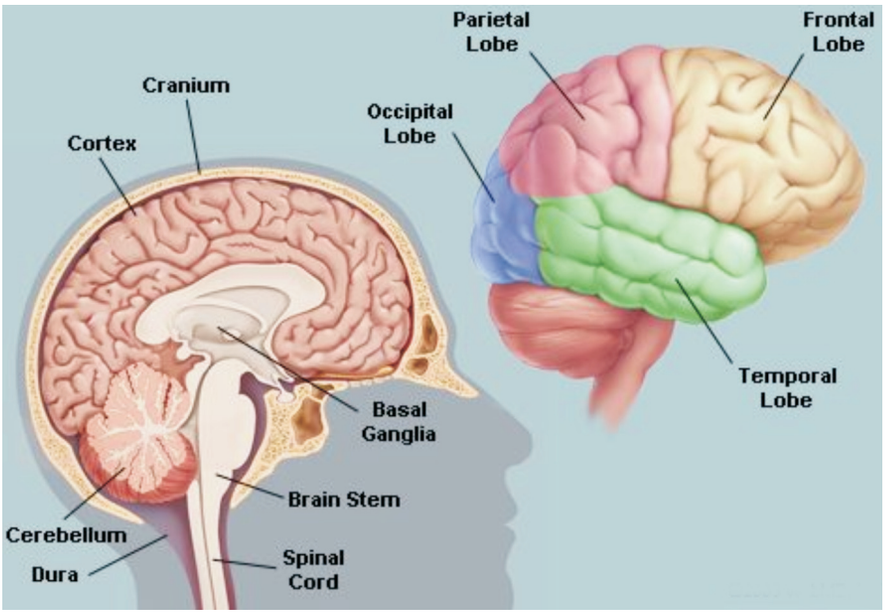
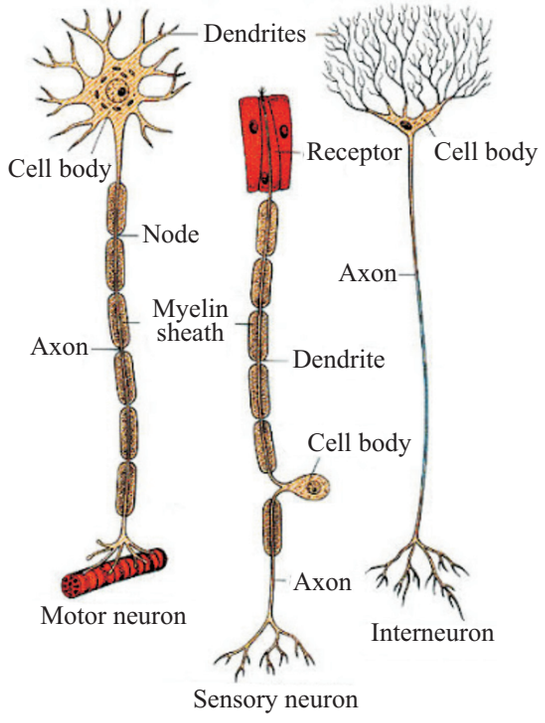



**Fig. 1.25:** Brain




(a) Motor neuron (b) Sensory neuron (c) Inter-neuron

**Fig. 1.26:** Neuron

All the parts of central nervous system and peripheral nervous system work together to relaying the messages to the brain. Each message is taken to the specific area of the brain by the specialized specific nerve cell. Neuron is the basic functional unit of nervous system. It has three main parts: dendrites, axon and cell body. Dendrite – several projections from cell body which receive message and axon is a long slender projection that conduct message away from the cell. Each specific neuron has specific path which leads to the brain a specific message and brain interprets the message and responds accordingly. This response can happen any part in the body. For example act of hearing due to sound waves within ears, act of seeing the objects due to light rays received by the eyes. Thus, we can listen, see, taste, feel pain, pressure and cold. The various part of brain performs various tasks control all the systems of the body and has memory stored as well.

## INTEXT QUESTIONS 1.8

**1. Fill in the blanks.**

(a) Basic unit of nervous system is .....

(b) Brain and peripheral nervous system works together to send messages ..... brain.

(c) Central nervous system includes brain and .....

### 1.7.9 Glandular System

The glands that secrete hormones are used by the other parts of body. In the body these glands are of two types.

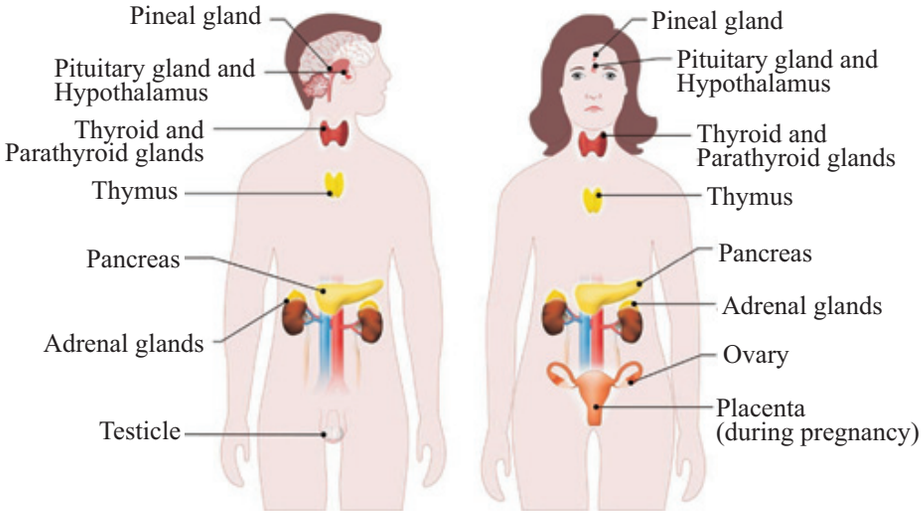



**Fig. 1.27:** Glands in male and female


**Table 1.4: Exocrine glands and endocrine glands**

| Exocrine Glands | Endocrine Glands |
|---|---|
| It has ducts which open in the epithelial surface of other organs. | These glands are without ducts. Secretes hormones directly in the blood circulation. |
| For example: | For example: |
| Saliva from salivary gland | Pituitary gland |
| Secretion from pancreas | Thyroid gland |
| Bile from gall bladder | Parathyroid gland |
| Milk from breast | Pancreas gland |
| Sweat from sweat gland | Testes gland |
| Sebum from sebaceous gland | Adrenal medulla gland |
| | Adrenal cortex gland |

## Glands

**Table 1.5: Table showing endocrine glands, hormone and their function**

| Gland | Hormone | Function |
|---|---|---|
| Anterior Pituitary | Growth hormone | Stimulates the growth of body tissue |
| | T.S.H (thyroid stimulating hormone) | Stimulates release of thyroid hormone |
| | FSH (follicle stimulating hormone) | Stimulates gamete production |
| | ACTH (adreno-corticotropic hormone) | Controls secretion of hormone of adrenal cortex. |
| | LH (luteinizing hormone) | Stimulates androgen production by gonads. |
| | Prolactin | Controls the secretion of breast milk |
| Posterior Pituitary | ADH (anti diuretic hormone) | Controls diuresis. |
| | Oxytocin | Stimulate the contraction of uterus during childbirth |
| Thyroid | Thyroxine | Controls the rate of metabolism |
| Parathyroid | Parathyroid hormone | Controls the metabolism of calcium and phosphorus |
| Pancreas | Insulin from the islets of langerhans | Essential for the use of glucose by cell |
| Ovaries | Estrogen and Progesterone | Development and maintenance of female genital organs. |
| Testes | Testosterone | Development and maintenance of male genital organs. |
| Adrenal medulla | Adrenaline | Keeps body ready in fight mode. |
| Adrenal cortex | Corticoids | Protect the body from stress and infections. |

The secretion of these glands can be divided into two groups.

External secretion secreted out of the body, to a nearby organ.

Internal secretions are hormones from endocrine (ductless glands) which are carried to all parts of the body through the blood and lymph systems.

Hormones control the functions like growth, metabolism, muscle contraction, reproduction and many other processes which are mentioned in above table.

## INTEXT QUESTIONS 1.9

**Fill in the blanks**.

1. Thyroxine is secreted by .....
2. Insulin is secreted by .....
3. Bile is stored in .....
4. Hormone which controls the rate of metabolism is .....
5. Full form of ADH is .....
6. ..... hormone is essential for the development and maintenance of male reproductive system.

### 1.7.10 Reproductive System

In most of the animals, there are male and female cell which unite to reproduce. Likewise human also has male cell - sperm and female cell called ovum that fuses after sexual intercourse to reproduce.

### Female Reproductive System

The main function of female reproductive system is to produce ovum for fertilization and accomodate the developed fetus. After fertilization, fetus develops in mother's uterus for 9 months or 40 weeks. Female reproductive system includes following organs.

1. Ovaries
2. Fallopian tube
3. Uterus
4. Vagina

Ovaries are two oval shaped structures (present on either side of uterus) which are situated near the lateral wall of uterus. It generates female gamete or ovum and a hormone named estrogen. Ovum gets mature in every 28 days and received by the fallopian tube.

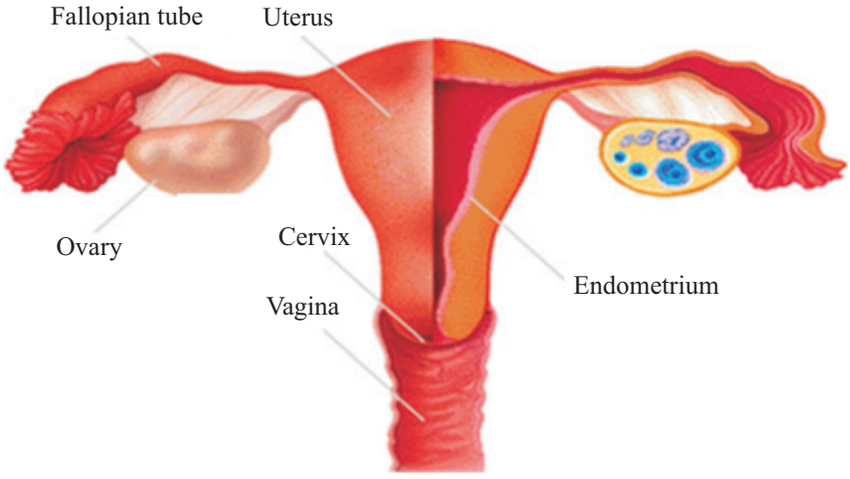



**Fig. 1.28:** Female reproductive organ

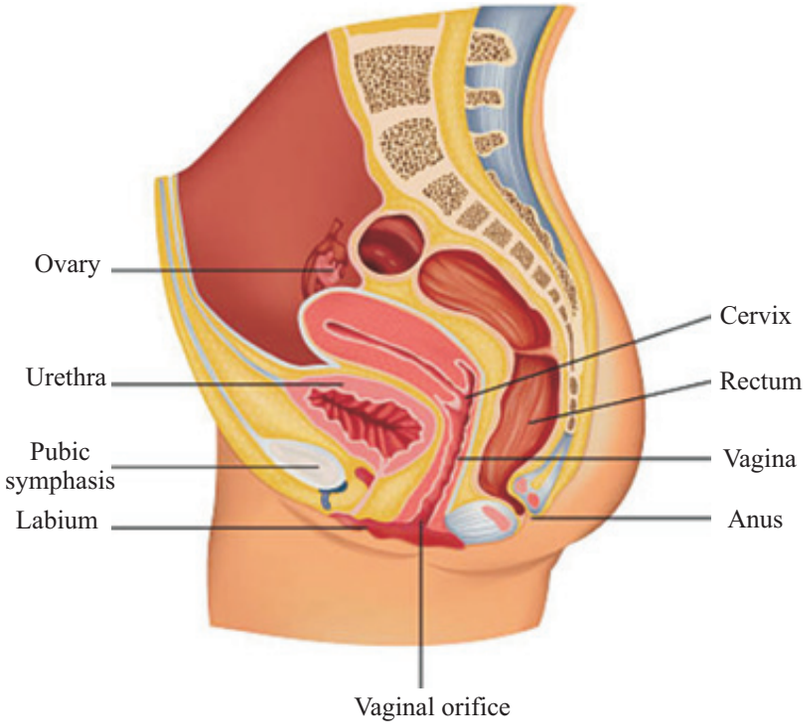



**Fig. 1.29:** Female reproductive organ (lateral view)

**Ovaries**: These are a pair of almond shaped structures that are situated on either side of vertebra in abdominal cavity.

Each ovary is attached with the meso-ovarian ligament to the posterior surface of broad ligament.

## Functions

1. To produce ovum
2. Female hormone to secret estrogen and progesterone

   These hormones
   - Control secondary sexual characters
   - Controls growth and development of fallopian tubes, uterus, and genital organs.
   - Controls menstrual cycle.
   - Controls change and development in mammary glands.

**Fallopian tubes**: One pair of these tubes extend from uterus to ovaries, each can be divided into three parts.

1. **Infundibulum:** It is a funnel shaped structure lysing close to the ovary. The opening of its peritoneal cavity is called osteum. Fimbriae are finger like projection that surrounds ovary. Infundibulum collects ovum and transports in peritoneum cavity.
2. **Ampulla:** The middle dilated part where fertilization takes place.
3. **Isthmus:** The last part which opens uterus and kept in position by mesentery. It has a thick muscular wall which shows peristalsis that propel the ovum downwards.

**Uterus**: It is pyriform muscular organ present in the pelvic region of female. Its upper part is called body and narrow lower part is called cervix. Thick uterus wall has three layers- inner layer is endometrium, middle layer is myometrium and outer layer is perimetrium. The inner layer of uterus is highly vascular. Uterus harbours embryo by nurturing it providing oxygen and nutrients and removing carbon dioxide and waste.

**Vagina**: It is female copulation chamber. Neck of uterus is on the upper part of vagina. Vagina connects the uterus to the outside. Female have different passage for urine and vagina. In virgin state hymen the thin piece of mucosal tissue that partially covers the external vaginal opening.


**Vulva**: The external part of female genitalia. It has an orifice of vagina, labia majora, labia minora, clitoris and bartholin gland. Around the opening of vagina there are 2 sets of skin folds. The inner set, called the labia minora are small and hair less. The outer set, the labia majora, are larger with hair. Labia minora meets to form a fold or small hood of skin beneath this is clitoris. Clitoris is highly sensitive erectile tissue which is similar to the penis of male.

**Bartholin's gland**: It is also known as greater vestibular glands. They are the beans shaped glands which are found just inside the opening of vagina – one on each side. These glands produce mucus like fluid that act as lubricant during physical contact.

**Menstruation**: In female, blood and mucosal tissue are discharged around every 28 days from about the age of 12 to 46 years. This discharge lasts for 2 to 8 days (normally 4 to 6 days) and before and after this discharge, many unpleasant symptoms are produced such as headache and nausea. No doubt menstruation or periods are the signs of production of ovum and hormonal changes in female. During this period female needs to wear pad or tampon (an absorbent to be kept in vagina), if mensurating woman wants to save her clothes from getting stained.

**Egg production**: Each ovary has cell group that are called follicles, which has immature eggs. When the girl is about 12 years these eggs start maturing at the rate of one in every 28 days. At the time of birth, a girl child has 3,50,000 immature eggs. Between puberty and menopause only around 375 eggs get mature. When the egg is mature, then it burst out from the ovary and this procedure is called ovulation and then it passes into the fallopian tube leading down from that ovary to the uterus.

## Menstruation Process

If the egg is not fertilized by a sperm, it begins to degenerate 24 to 48 hours after leaving the ovary and eventually out of the body in the normal flow of fluid from the vagina. But meanwhile the uterus has been preparing to receive a fertilized egg. Hormone have caused the lining of the uterus to thicken and to excrete a fluid so that the fertilized egg could be nourished while implanting itself. When no fertilization occurs, further hormones stimulation causes the thickened lining to crumble and discharge along with a little blood through the vagina. This process is called mensuration.

## Normal Menstruation Cycle

**Day 1 and onwards**: Pituitary gland starts producing a stimulation hormone named as follicle stimulating hormone. This hormone helps in maturation of follicle. A new ovum (egg) starts maturing in a follicle.

**Day 4 and onwards**: Follicle produce estrogen (E) as soon as it is made, it stimulates uterine wall and breast growth, halts FSH production. Pituitary gland gets triggered to produce Luteinizing hormone.

**Day 12 and onwards**: Luteinizing hormone is responsible for rupturing of follicle. The matured egg leaves the ovary and follicle develops into corpus luteum. This structure releases progesterone and estrogen.

**Day 14 and onwards**: Progesterone make the uterine wall ready for the fertilized egg and stops the production of luteinizing hormone. If the egg does not fertilize, the corpus luteum shrinks away. This leads to decrease level of estrogen and progesterone, which causes the onset of uterine wall shedding (period) – 28th day of menstruation. And this cycle is again started.

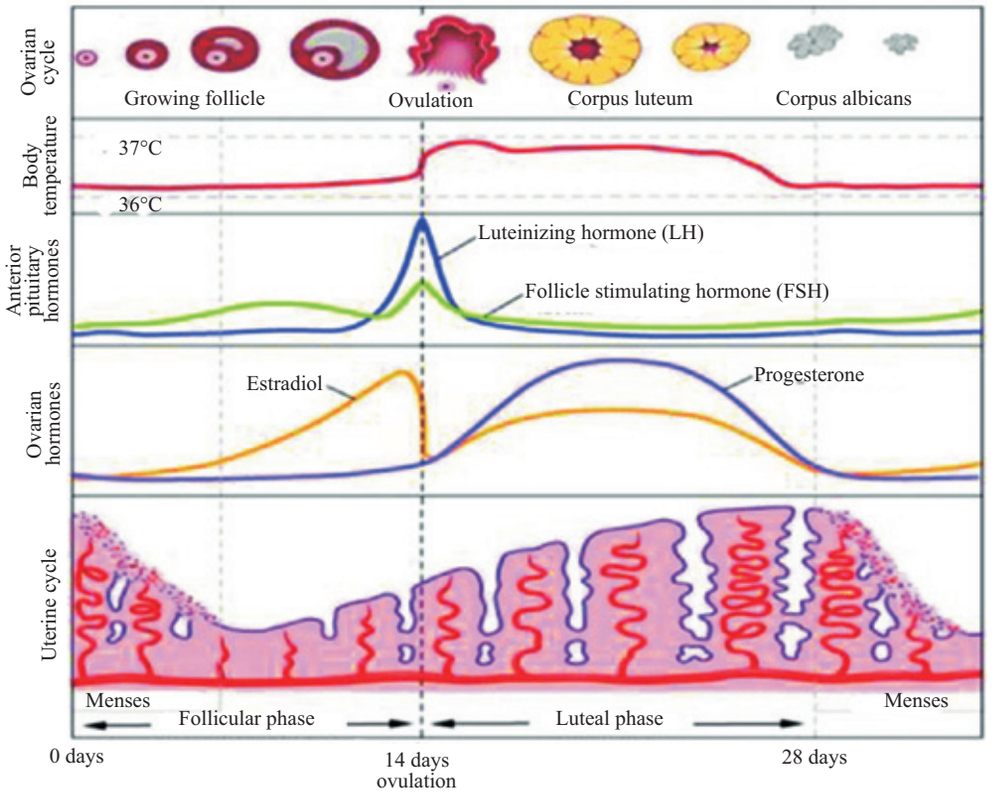



**Fig. 1.30: Menstrual cycle**

## Male reproductive system

This system includes:

- Testis
- Epididymis

- Vas deferens
- Ejaculatory duct
- Seminal vesicles
- Prostate gland
- Bulbourethral Gland
- Urethra
- Penis

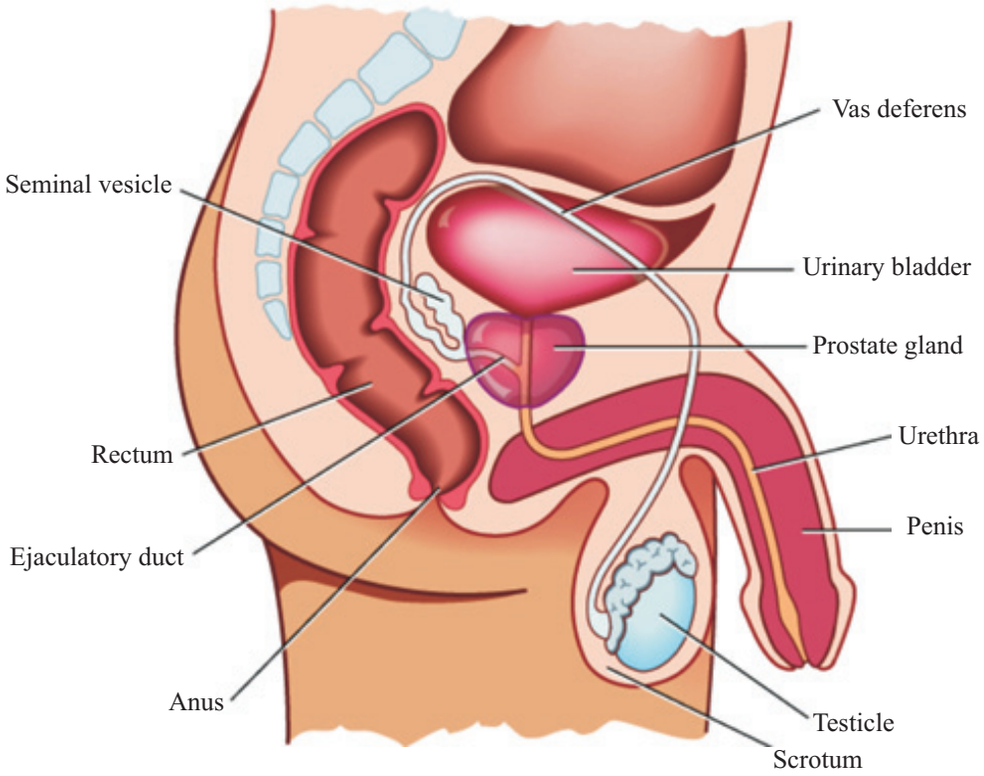



**Fig. 1.31:** Male reproductive system

**Testis:** These are two oval shaped male organs that produce sperm and hormone testosterone. Testosterone is the primary male sex hormone. Each testis is made of tightly coiled structures called seminiferous tubule. Among tubules are cells that produce testosterone and sperms.

**Epididymis**: It is long mass of tightly coiled tube. It is around 20 feet long. It is on and with the male reproductive system. Its head end is connected with the seminiferous tubules and the tail end is continued as vas deferens.

## Functions

1. Its sperm move from the testes, through the epididymis, and into the vas deferens prior to mix with various secretions at the time of ejaculation.
2. It stores the sperm prior to ejaculation.
3. It contributes in seminal fluid.

**Vas deferens**: It is18-inch-long muscular duct that transport sperm from the tail of epididymis to the ejaculatory duct.

**Ejaculatory duct**: The vas deference unites with the duct of seminal vesicle to form ejaculatory ducts.

**Seminal vesicles**: It is a pair of convoluted pouches which secretes vicious fluid called seminal fluid. This fluid forms the major part of semen. It contains fructose and prostaglandins.

**Prostate gland:** It is an unpaired accessory gland which is situated just below the bladder. The urethra passed through the small hole in the centre of prostrate. In elderly male prostate gland enlarges which squeezes the urethra and causes urine retention.

## Functions

1. Prostate gland is responsible for making the prostatic fluid, a liquid that forms the large part of semen along with seminal fluid and sperm cells.
2. The prostatic fluid is slightly alkaline which counteracts the acidity of vagina and protect the sperm from damage. Also, when prostate contracts during ejaculation, it closes off opening between the bladder and urethra, thus preventing urine to pass while ejaculation.
3. It increases the sperm motility.

**Bulbo-urethral gland**: It is pea sized two small glands located on the sides of the urethra just below the prostate gland. It secretes alkaline mucus like fluid.

**Urethra**: It is a tube within the penis, is the common passage for semen and urine. It begins from bladder, passes through prostate gland and penis, ending at the external urethral opening.

**Penis**: It is the copulatory organ by which sperm is deposited into the female vagina. It is made up by three cylindrical cells, and every layer is covered by the mucus cover. These are clubbed together in skin cover.

**Urethra**: A tube within the penis is the common passage for semen and urine.

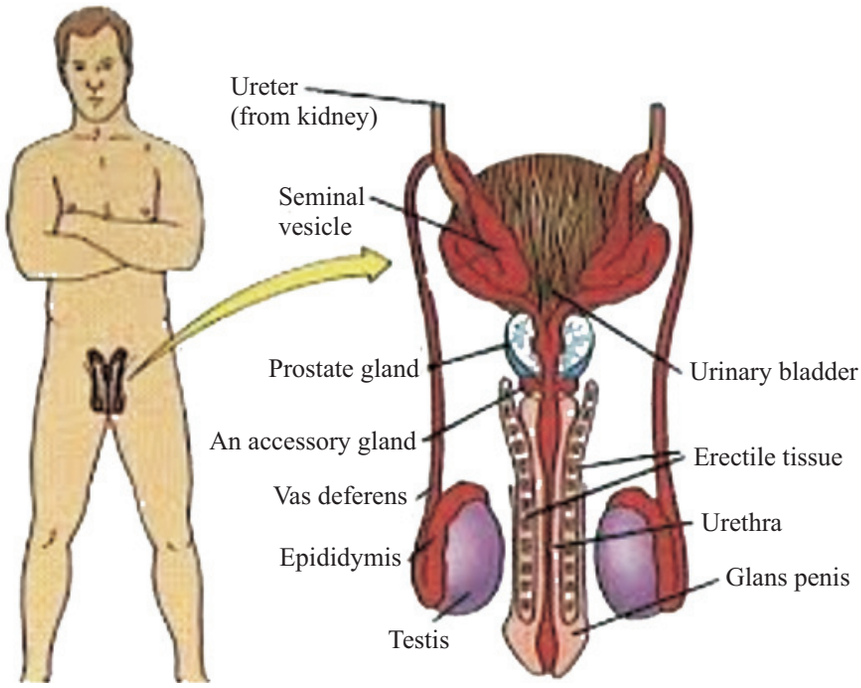



**Fig. 1.32:** Male reproductive organs

## INTEXT QUESTIONS 1.10

**Fill in the blanks**:

1. Fertilization of ovum takes place in .....
2. Vas deferens is the continuation of .....
3. Production of sperm takes place in .....
4. Production of eggs takes place in .....
5. A female gonads are .....

### 1.7.11 Sense Organs

Our body has special **senses** like vision, hearing, taste and smell and the general senses like touch, temperature, (hot and cold), pressure, and feeling of pain. We can see by our eyes, can listen by our ears, can taste with our tongue and can smell with our nose, and general sense we can sense by the skin of our body.

The brief description of the senses is as follows:

**Eye**: Eyes give us vision. We see different object with the help of our two eyes. Eye is a ball shaped sense organ which is placed in eye orbit. Eye lid and eyelashes provide safety to eyes. Tears secreted from lacrimal gland help the foreign objects to be washed out of the eyes.

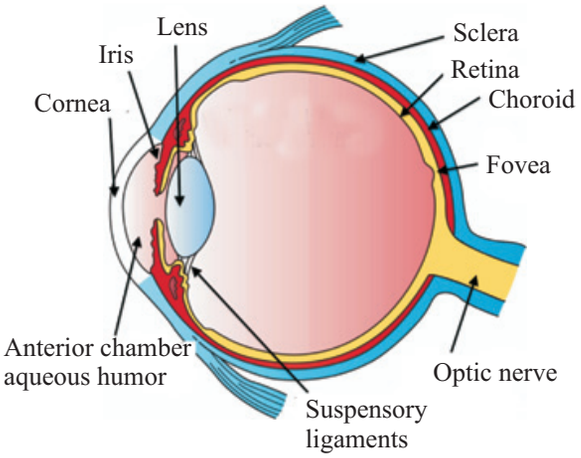



**Fig. 1.33:** Eye

**Layers of eyes:** Sclera or white of the eye is the outer most part of the eye. The front part of sclera is covered by transparent membrane is called cornea. The choroids middle layer of eye is pigmented layer, so that light rays can be stopped from scattering retina, the inner most layer of eye is retina and is responsible for vision.

**Optic nerve:** situated at the back of the eye, receives a picture and sends it to the brain from interpretation.

**Ear:** In our body there are two ears one on each side of the face. Ears provide us sense of hearing and equilibrium. Ear is divided into three parts.

**External ear:** It includes auricle, ear canal and ear drum.

**Middle ear:** It is an airy space which includes three small bones that amplifying sound waves.

**Inner ear**: It consists of cochlea and semicircular canal. Cochlea changes sound wave to electrical signals (nerve impulse). This allows brain to hear and understand sound. Semicircular canal is helpful in maintaining the balance of body.

**Organ of taste**: The receptors present in the tongue help us feel the taste and these receptors are called taste buds. Taste buds can feel five types of taste such as sweet, sour, salty, bitter and umami (meaty). The umami is the recently discovered taste.


**Sense of smell**: There are receptors for smell in the nasal cavity inside the nose, which receives all types of smell. Olfactory nerve receives smell sensation from olfactory epithelium and sends it to brain for interpretation.

**General sense**: General sense are found all over the body. These are different from the general senses like sight, hear, taste, and smell.

**Pressure sense**: The receptor for pressure are present in subcutaneous tissue layer beneath the skin.

**Temperature sense**: Heat and cold receptors are the thermal receptors which respond to hot and cold feeling and send messages to the brain by nerves for its interpretation.

**Sense of touch**: We can feel the touch by the tactile corpuscles. These corpuscles located in the dermis layer. The tip of tongue, finger tip and toes are very sensitive.

**Sense of pain**: Pain is the most protective sense as it indicates that there is something adverse in body. Pain receptors situated in skin, muscle, joints and internal organs. When there is injury in any part of body, pain receptors send information about that to the brain.

## INTEXT QUESTIONS 1.11

**Fill in the blanks**:

1. Sensation of smell is provided to the brain by .....
2. Experience of taste by tongue is due to .....
3. We can feel the pain in skin by the presence of .....
4. Image, seen by the eyes are experience on .....

## WHAT HAVE YOU LEARNT

In this lesson you have learnt:

- Our body is a complex setup of various structural stages, which starts with atom, molecule and compound and cells, tissues, organ and systems together develop human body.
- On a chemical level, human body is a structural and functional form, where various bio-chemical work together to perform different function of operation. Hydrogen, oxygen, nitrogen, phosphorus, and Sulphur are the main in these compounds.

- Anatomy is the science concerned with the structure and forms of organism. The science related to human body structure is called human anatomy.
- Physiology is a study of the functioning of body parts and to know what and how the body parts function?
- Cell is the smallest structural and functional unit of body.
- Human cell is made up of nucleus, cytoplasm and cell membrane.
- Group of tissues that perform specific function are called organ.
- Group of organs that perform specific function are called system. There are 10 different systems in our body.

  1. Integumentary system
  2. Skeletal system
  3. Muscular system
  4. Respiratory system
  5. Digestive system
  6. Circulatory system
  7. Excretory system
  8. Glandular system
  9. Reproductive system and
  10. Nervous system

- Body has various organs such as heart, lung, stomach, liver, kidney, brain and reproductive system.

## TERMINAL QUESTIONS

1. Describe respiratory system with the help of sketch.
2. Draw a clear sketch of heart and describe blood circulation system.
3. Describe digestive system in detail.
4. Describe the functions of liver.
5. What do you know about excretion? How the waste product does go out of the body with urine?
6. What are the functions of ovary? How does fertilization process takes place?


## ANSWERS TO INTEXT QUESTIONS

### 1.1

1. Organ
2. Specific organ
3. Nucleus
4. Reproductive
5. Thoracic

### 1.2

1. (i) Femur (ii) (a) 206 (iii) (c) Fibula
2. Gives shape and support to the body.

### 1.3

1. 500
2. Upper
3. Lower
4. Shoulder
5. Voluntary
6. Glycogen

### 1.4

1. (a) (iii) Alveoli (b) (ii) Pleura
2. (a) 18 to 20 (b) epiglottis

### 1.5

1. Liver
2. Duodenum
3. Small intestine
4. Pancreas
5. Glycogen
6. Large intestine

### 1.6

1. Four
2. Tricuspid valve
3. Pulmonary arteries, oxygenated
4. Pulmonary vein, deoxygenated
5. Aorta
6. (iii) Blood vessels

### 1.7

1. Kidney
2. Nephron
3. Urinary bladder
4. Filters
5. 25 cms
6. 1.5 litres

Notes



**1.8**

1. Neuron
2. Towards
3. Spinal cord

**1.9**

1. Thyroid
2. Islet of langerhans in pancreas
3. Gall bladder
4. Thyroxine
5. Anti diuretic hormone
6. Testosterone

**1.10**

1. Fallopian tube
2. Epididymis
3. Testes
4. Ovary
5. Ovary

**1.11**

1. Olfactory nerve
2. Taste buds
3. Pain receptors
4. Retina

# 2

# OUR BODY AND IMMUNE SYSTEM

In the previous lesson, we have learnt about body, various body organs and fluids. To perform various functions of the body and to have the ability to do work, it is necessary to be healthy. There are various factors that affect our health and some of the main factors are – food, water, environment etc. There is another important factor which affects our health i.e. our body's resistive ability or immunity.

You will be shocked to know that there is already a system (immune system) in our body which protects our body from various diseases. Until this system does not get weak, we remain healthy.

In this chapter, you will read about immune system and also how it fights against various diseases to keep us healthy.

## OBJECTIVES

After studying this lesson, you will be able to:

- tell about immune system and immunization;
- shed light on health and immune system;
- tell the difference between two types of immunity (natural and acquired);
- describe about various components and functioning of natural immunity;
- tell about the ways to get acquired immunity.

## 2.1 IMMUNE SYSTEM

What is immune system and how does it fight against various diseases to keep us healthy? Let us try to understand.

We come in contact with a number of pathogenic factors daily. Our body has the ability to fight against a number of factors. **A system that protects our body, provides ability to fight against diseases, is called immune system.** This system includes certain cells, tissues, glands and fluids.

This system works to fight against the attack of pathogen in our body. It is often observed that people whose immune system works properly remain healthy and that whose immune system does not work properly becomes unhealthy.

Let us now try to understand the concept of immunity:

## Immunity

**The body's ability to protect itself from external factors including life threatening diseases is called immunity.**

### 2.1.1 Types of Immunity

It is of two types:

**A. Natural Immunity**

**B. Acquired Immunity**

### A. Natural Immunity

All persons possess natural immunity right from the birth. This type of immunity inherited from our parents. This is one type of immunity which protects us from microbial attack.

### Various components of natural immune system:

### 1. Skin and mucus membrane

Skin acts an external barrier and protects body by restricting the entry of microbes.

### 2. Hydrochloric acid in stomach

Hydrochloric acid present in the stomach kill microbes which enter with food

### 3. Blood

Blood is a part of circulation system which transports food, oxygen, water and all-important things to cells and brings out all waste products produced from them and excretes. In this blood, heart and blood vessels are involved.

Human blood is fluid connective tissue. This is a biological life supporting fluid where life of a person depends on it. All the functions of the body depend on blood.

## Blood components

1. Plasma
2. Water
3. Plasma protein – albumin and globulin
4. Fibrinogen

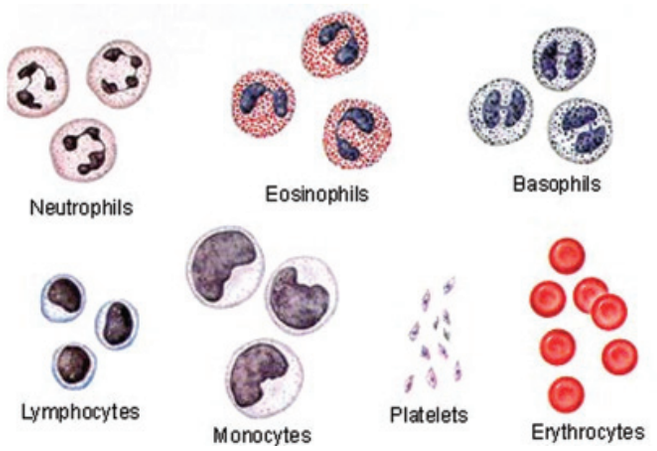



**Fig. 2.1:** Blood Cells

**Globulin:** Globulin is the 36 percent of the total plasma protein. They are divided in 3 categories based on structure and functions – alpha, beta and gamma. Alpha and beta globulins are produced by liver and helps in transferring fats soluble vitamins to reach from one place to other. Gamma globin or immunoglobin work as an antibody which protects the body by preventing diseases like measles, tetanus, poliomyelitis. They are 5 types IgA, IgD, IgE, IgG and IgM.

**White blood cells:** White Blood cells of neutrophils and monocytes protect the body from invading bacteria. It has phagocytic power. By this power it kills the bacteria & foreign bodies. That's why it is called phagocytes. Lymphocytes produce antibodies which protect our body, and these don't have ability to kill bacteria.

## INTEXT QUESTIONS 2.1

**Fill in the blanks:**

1. Immunity is of ..... types.

2. Every individual possess ..... type of immunity by birth.
3. ..... will protect entering of microbes in our body.
4. In the liver ..... and ..... globulins are produced.
5. ..... globulin works as an antibody in our body.

## 4. Lymphatic system

The **lymphatic system** is a network of tissues and organs that help the body to get rid of toxins, waste and other unwanted materials. The two functions of lymphatic system are as follows:

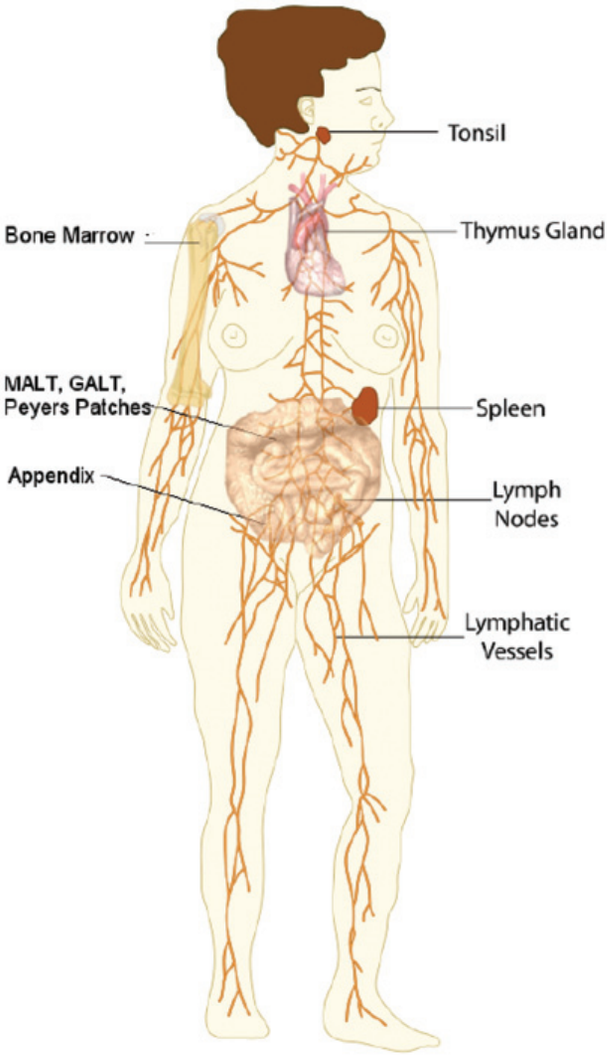



**Fig. 2.2:** Immune organs in human body


1. The primary function of the **lymphatic system** is to transport **lymph**, a fluid containing infection-fighting white blood cells, throughout the body, which kills infection causing microorganism and foreign bodies.

2. It protects our body for producing long term immunity against microorganism and foreign bodies.

### 5. Lymph nodes

**Lymph** vessels carry lymph fluid throughout the body. In between the flow, there are small bean seed shaped structures seen on the way. These nodes are mostly present in neck, under arms, thorax, abdomen and small amount are seen in back side of knee joint.

### Role of lymph nodes in the immune system

- Lymph nodes work as a filter, in this node's lymph is filtered. At this point it acts as barrier and stop dangerous foreign bodies & infectious microbes.
- Lymph nodes produce a special type lymph cell called lymphocyte and it has a capacity of killing cells. It produces antibodies & antitoxins which kills microbes.
- For circulatory system lymph nodes produce new lymphocytes.

### 6. Spleen

The spleen is an organ in the upper left part of the abdomen, behind the fundus of the stomach and just below the diaphragm. The spleen is commonly fist-shaped, purple and about 4 inches long.

### Role of spleen in immune system

It acts as a filter for blood and also helps in production of lymphocytes and monocytes.

Old red blood cells, platelets and white blood cells are stored here. It detects faulty red blood cells. Spleen can pick out any micro-organisms (like bacteria or viruses) in our blood thus helps to fight certain kinds of microorganisms. It helps our body fight with infection.

## INTEXT QUESTIONS 2.2

**Match the following below:**

| A | | B | |
|---|---|---|---|
| 1. | Neutrophils and monocytes | (i) | B-lymphocytes |
| 2. | Lymphatic system | (ii) | Flat gland extended horizontally |
| 3. | Lymph nodes | (iii) | White blood cells |
| 4. | Spleen | (iv) | Removal of dead red blood cells, platelets and microorganism |
| 5. | Phagocytic cells | (v) | long term protection against pathogens and foreign bodies |

### 7. Thymus gland

The thymus is located in the upper mediastinum of the chest region and behind the sternum. The thymus gland is a soft pinkish-brown lymph gland containing lymphoid tissue.

### Role of thymus gland in immune system

The **thymus** has a key role in the development of an effective **immune system** as well as an endocrine function.

1. The **Thymus** produces T-cells and they play major role in maintaining body's immune system.

2. In the embryonic stage the thymus gland produce lymphocytes and helpful in production of antibodies. In new born baby thymus gland is comparatively larger in size and helps in production of antibodies and protects from pathogens by initiating immune system. The size of thymus grows rapidly from childhood phase to adult and is more active in childhood phase.

### 8. Tonsils

The **tonsils** are nodules of lymphoid tissue enclosed in the capsule of connective tissue.


### Role of tonsils in immune system:

1. The lymphatic system and lymph of tonsils bring lot of lymphocytes in there. These lymphocytes are responsible for killing pathogens. Most of the infectious microorganism are destroyed on the pharyngeal surface by the lymphocytes.

2. Presence of plasma fluid in tonsil indicates the formation of antibodies in them.

## B. Acquired immunity

The immunity developed during person's lifetime is called Acquired or Artificial immunity. It is not present since birth. It is learned. The learning process starts when a person's immune system encounters foreign invaders and recognizes non-self substances (antigens). Then, the components of acquired immunity learn the best way to attack each antigen and begin to develop a memory for that antigen. Acquired immunity is also called specific immunity because it tailors its attack to a specific antigen previously encountered. Its hallmarks are its ability to learn, adapt, and remember.

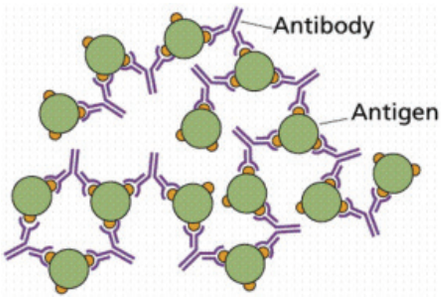



**Fig. 2.3:** Immume system

Acquired immunity takes time to develop after first exposure to a new antigen. However afterward, the antigen is remembered, and subsequent responses to that antigen are quicker and more effective than those that occurred after the first exposure.

Adaptive immunity can be acquired during either 'naturally' (by infection) or 'artificially' (through vaccination).

1. **Natural acquired immunity through infection:** Naturally acquired active immunity occurs when a person is exposed to a live pathogen, develops a primary immune response, which leads to immunological memory for later life. For example, a person suffered with measles infection will develop antibodies for his later life and he won't get this infection again.

2. **Artificial acquired immunity through Vaccines:** Artificially acquired active immunity can be induced by a vaccine, (a substance that contains antigen). When vaccine shot is given it works by training the immune system to recognize and combat pathogens, either viruses or bacteria present in it. A vaccine stimulates a primary response against the antigen without causing symptoms of the disease. They prepare the body to fight disease without exposing it to disease symptoms. When foreign invaders such as bacteria or viruses enter the body, **immune** cells called lymphocytes respond by producing antibodies.

### Immunization programme

You will be aware of different vaccines and their immunization schedule offering by government especially for pregnant ladies and children. They are available for free of cost at all the primary health centers and other government hospitals.

## INTEXT QUESTIONS 2.3

**Tick true or false of the following:**

1. At the time of birth, size of thymus gland is small when compared to adults. ( )
2. The main function of thymus gland is to produce T-cells ( )
3. The presence of plasma cells on the layer of tonsils shows formation of antibodies. ( )
4. Lymph cells produce antigen protein cells in our body. ( )
5. Vaccines are passive, which does not produce diseases and acts like antigen or foreign body to our body. ( )

## WHAT YOU HAVE LEARNT

In this lesson we learnt about how keeping our body healthy will helpful in maintaining all systems to function properly. Many factors like food, water, lifestyle, pollution etc are responsible in maintaining of our health. Along with these factors immunity or immune system also plays an important role in maintaining of health.

Our body is already protected from various diseases and infections by a system called immune system. Until and unless immune system gets weak in our body, we are not affected with diseases.


We learnt about role and importance of immune system in protecting the diseases and also learned about its 2 types – Natural and acquired immunity.

We also learned about various factors related to natural immunity like skin, secretions of stomach, blood, lymphatic system, lymph nodes, spleen, tonsils and thymus gland, their anatomical structure and functions with respect to their role in immune system. Also studied regarding acquired immunity and its 2 methods of acquiring immunity.

## TERMINAL QUESTIONS

1. What is immunity? Brief about immune system?
2. Write the difference between natural and acquired immunity? Brief about natural immunity?
3. Discuss in brief about role of globulins in immune system?
4. Write down the important functions of spleen?
5. What is artificial immunity and write any two methods of acquiring artificial immunity?

## ANSWERS TO INTEXT QUESTIONS

### 2.1

1. 2
2. Natural immunity
3. Skin and mucus
4. Alpha and beta
5. Gamma

### 2.2

1. (iii)
2. (v)
3. (i)
4. (ii)
5. (iv)

### 2.3

1. False
2. True
3. True
4. False
5. True

Notes

# 3

# HEALTH AND HYGIENE

The good health is important for everyone to be happy and to maintain the capacity of our day to day work. There are many factors which affect our health. Out of them, some main factors are balance diet, clean water and clean environment effect positively on our health where as, other factors such as dirty water, diseases by caused by micro-organisms and dirty environment draws negative effects on our body.

You must have heard from your grandparents or mostly aged persons that to stay healthy you have to follow some specific rules. Every day you have to follow some specific work such as cleaning teeth, taking bath, taking healthy food on time and regular exercise etc. Have you ever thought why you are told to do such things? What will happen if you do not take bath every day? What will happen if you sleep late at night? What will happen if you do not take nutritious food? Do you imagine that how your body will look if, you only keep eating and do not work? How do you know that your body is healthy or not? What signs/parameter would you see for this? We will discuss about all these important things in this chapter.

## OBJECTIVES

After studying this lesson, you will be able to:

- define the health and its aspects;
- describe the physical, mental and social aspect of health;
- recognize the signs/parameters of good health and can enlist them;
- describe the importance of health and health science.


## 3.1 CONCEPT OF HEALTH

You want to do a number of tasks everyday but sometimes you do not find yourself as healthy to do all the tasks. Everyday in the morning when your family members are ready to go for their work or school, there are so many works to do at that time. Someone needs breakfast, your sister needs to iron her shirt, your brother wants his shoes to be polished and such a number of tasks. Your mother tries to do all these tasks at her best, at that time you also want to help her but your body is too weak that you do not have energy to bear the extra burden. This shows that your body can work properly only if you are healthy.

Health is an important subject for all. You must have heard the famous proverb – 'if you have life you have the world'. If you are healthy, you can enjoy maximum potential of your life. We have to do some efforts and need to develop some good habits in order to get a good health.

Health is the commonly used word, which is defined in different way by different people. What do you think about in this matter? It is only a bodily health or it is only the absence of disease. Come, first of all let us know about the definition of health.

### Definition of Health

According to World Health Organization (WHO), "the meaning of health is state of physical, mental and social well being not merely the absence of disease. i.e. smooth functioning of body and mind. A person having good health is more enthusiastic, full of energy and more proficient in work. Apart from this, can you able to tell why is it important to enlist the signs of good health. Yes, you are thinking right, if you will be aware of the signs of good health, you can recognize a healthy person. Now, we shall study these signs of good health in detail.

### Symptoms of Good Health

To know the symptoms of good health, we have to examine all the aspects – physical, mental and social.

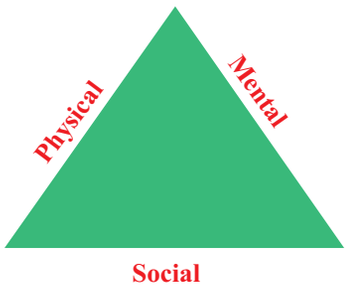



**Fig. 3.1:** Health triangle

Notes



(a) **Physical health :** A person with a good health having:

- full of energy and more enthusiastic.
- good body structure.
- normal weight and height according to age.
- all sense organs are working properly.
- neat and clean skin.
- bright eyes.
- texture of hair is good and shiny.
- breath should be fresh.
- digestion system is good and,
- good sleep.

It is easy to know and to describe physical health. If a person is conscious and active than he is said to be physically healthy.

**(b) Social health:** A person having good social health:

- behave well with the neighbourhood.
- shows good etiquettes.
- helps others.
- fulfill responsibilities with others.

If a person live confidently with others in the society then, he is said to be socially healthy.

**(c) Mental health:** A person having good mental health is:

- control emotions.
- take care of the necessities of others.
- confident for his capabilities and
- stay away from the unnecessary stress, curiosity and tensions.

***A person is mentally (psychologically) healthy if he is calm and tension free. Physical social and mental health are interrelated with each other.***


You would be surprised to know that these three aspects are interrelated with each other. Have you noticed that your brother irritates more when he is ill? He is more annoyed than normal days. Why it happens? During illness, his bodily energy gets down and gets desperate as he unable to do the task, which he want to do. That is why he gets annoyed, cries, shouts and quarrels. Have you ever heard that because of excess stress people get high blood pressure or being in tension every time causes ulcer in stomach.

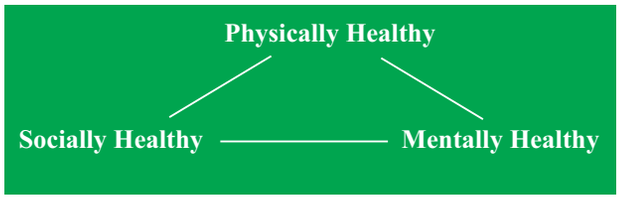



**Fig. 3.2:** Dimensions of health

In this way you have seen that any change in aspects of health, may it be social, mental or physical can also effect other aspect. All the three aspects are interrelated with each other and to be called healthy personal health should be good in all the above three aspects.

## INTEXT QUESTIONS 3.1

**Choose the correct answer:**

1. A person is healthy if he is .....
   - (a) Physically and mentally healthy.
   - (b) Mentally and socially healthy
   - (c) Physically and socially healthy.
   - (d) Physically, mentally and socially healthy.
2. Mentally healthy people has .....
   - (a) Confidence.
   - (b) Energy.
   - (c) Ettiquates
   - (d) Good appetite.

Notes



3. Whether the sentences written below are right or wrong.
   (a) Health means absence of disease.
   (b) Sense organs work properly in a person who is physically healthy.
   (c) Stress relief means good mental health.
   (d) If a person helps others then it is a sign of good social health.
4. Mention any four specialities of a person having good health.

.....

.....

.....

.....

## 3.2 FACTORS EFFECTING HEALTH

In the beginning of the chapter, we read what our elders tell us to do every day? Do you remember what they used to tell us?

Now we will study all those factors which can affect our health.

- Personal hygiene.
- Exercise.
- Rest and sleep.
- Condition.
- Hygienic environment of house.
- Our food habits.
- Environment and clothes.
- Safety measures at home and while playing.
- Effect of smoking, drinking and narcotics.

Now we will discuss about all these factors in details.

### 3.2.1 Personal Hygiene

Personal hygiene means to keep yourself neat and clean. Every day you do some task to keep yourself clean. Can you make a list of these tasks? Yes. Some of these are going for defecation, cleaning teeth, taking bath, keeping eyes clean, combing hair etc. you must understand that all these tasks are a part of personal hygiene.

1. **Regular defecation**: Recall the childhood days, why your mother pressurized you to go for defecation every days? Because your body gets free from the waste products by the excretion of excreta and urine. Your house has a toilet, but many people do not have this facility and they have to go out in the fields or open place for defacation. You must keep some points to remember while using toilet.

   (a) **Always wear footwear**: It is very important to have footwear while going to the toilet as germs and dust would not get on your feet and you'll not get infected.

   (b) **Use clean water in clean mug:** After defecation, use only clean water in clean mug. Dirty water has germs which are harmful and they may spread diseases. Can you tell what will happen if clean water is used in dirty mug? Clean water would also get dirty. So make sure, that mug is also clean along with the clean water. If you clean mug daily with cleaning powder, it would always be clean and you would be safe of infections.

   (c) **Clean the hands after defecation**: Wash your hands with soap after defecation and not with wet soil of ash. Why it is necessary? Because by washing hand with soap, the dust and germs get washed. while washing your hands, make sure your nails are also cleaned. Imagine what happens if you eat with dirty hands?

**Why wet soil should not be used for washing hands? Because mud has germ and filth dirt which causes diseases.**

2. **Wash hands before meal**: When you take meal with dirty hands, you also consume dirt with meal. This filth is filled with germs that causes diseases. This is the reason why your mother always say to wash hands with soap and water before meals.

**Fig. 3.3:** Precautions while defecation

**Fig. 3.4:** Personal hygiene

3. **Taking bath regularly**: Bathing doesn't mean only to pour water on your body. A good bath means to wash your body properly with soap and water and clean it. After a good bath it is also necessary let your body dry with clean towel. If you do not use clean towel to dry your body then your skin will get dirty again. Watch your skin carefully, can you see the tiny holes in your skin? These are called pores and your skin breathes through these pores. When dirt is collected on your skin then pores get closed. The germs found in the dirt attack the skin and your skin is suffered with boils and pimples (skin problems). So, to get rid of these germs and related diseases, it is necessary take regular bath and keep your skin clean in summers as well as in winters.

**Fig. 3.5:** Correct way of bathing

4. **Brush your teeth daily**: Have you ever stood near a person who has bad breath? Don't you feel like to turning your face to the other side? According to you, what can be the reasons of bad breath in a person? Bad smell is due to dirty teeth. If teeth are not brushed properly then the particles of food get trapped in between the teeth. Bacteria come to eat that trapped food and also attack on the teeth. Shortly, teeth loses their shine and become pale and starts bad breath. Now you can understand why it is necessary

to clean the teeth everyday. You must remember that you should use good brush to clean your teeth, which is soft and must not harm the teeth and gums. For the proper care of teeth, it is important to clean the mouth with normal water after every meal. This process save your teeth from decaying and your teeth remain healthy. For teeth, sweet food is more harmful in comparison to salty food. That is why your mother prevents you eating excess of sweet foods such as chocolates, ice cream, pastry. Intake of milk in proper amount helps teeth to become strong and healthy.

**Fig. 3.6:** Brushing of teeth

5. **Wash hair, keep eyes, ears and nails clean:** Have you ever noticed what would be the condition of hair if you do not comb them daily? In this condition the hair get tangled and it is difficult to comb them. Your hair will be filthy and lifeless if you do not wash them for some time. Lice can also be born in them. To get rid of all these problems, you should comb your hair regularly so that their brightness and softness is remains. What will happen if you do not wash your eyes? The eye shit would get collected on the corner of the eyes and it would be sticky. Flies would sit on these sticky eyes and cause infection. You will rub your eyes because of this infection and your eyes will become red. Clean your eyes with clean and cold water regularly and keep them clean and bright.

   Your ear gets closed with yellow coloured wax. So this wax should be removed from the ears. Condition of deafness may occur because of blockage of ears. So the wax must be removed. Remove the wax carefully.

Do not use pointed pins for removing wax. Your ear drum could be damaged. Do not pour any kind of oil without consultation with a doctor. Filth get collected in the long nails. Have you ever noticed how dirty it looks when there is dirt in the nails. There may be germs in this filth which can go into your stomach while eating with your hands. You know very well that these germs can make you ill. So what should you do? You should keep your nails short and clean.

**Activity:** Take 10 children in your neighborhood. Examine their nails, teeth, hands, hair, clothes, shoes etc. and try to assess how many children are clean. Record the information in the given format.

| Name | Cut nails | Clean teeth | Washed clothes | Clean hair | Clean clothes | Polished shoes |
|---|---|---|---|---|---|---|
| Ritesh | Yes | Yes | Yes | Yes | Yes | yes |

### 3.2.2 Exercise

Suppose you want to clean your kitchen and store in a same day, how would you feel after doing such a heavy work? You shall feel very tired specially pain in hands. Why does it happen? It is because you have used your hand muscles more which are not usually used, and this is the reason that after some time your body starts aching.

Exercise means to make all the muscles of the body active so that it remains fit and healthy.

Way to get, benefit of exercises:

1. Systematic.
2. Regular.
3. Practiced properly.

It is important to keep in mind that sick and vulnerable people do not do heavy exercises, so that their disease is further aggravated. You know that excess fat is collected in your body tissues. Exercise helps to eliminate it. Can you imagine how you will become, if this fat is not abolished through exercise. During exercise, all the organs of the body start functioning smoothly. Have you ever noticed how your feet start shaking after you have walked. Do you feel hungry after exercise? Exercise makes you physically and mentally healthy and also prepares for other work. Now can you tell why exercise is important to us?

Yes, exercise is important because it:

1. Helps to reduce fat from the body.
2. Ensures better digestion and respiration.
3. Increases mental activity.
4. Enhances physical activity.
5. Person feel more diligent.

**Fig. 3.7:** Skipping

**Fig. 3.8:** Yog

According to you what is the best way of exercise?

1. You can play a game of your choice.
2. You can do swimming.
3. You can go for a walk or jogging.
4. You can do yoga, rope jumping (skipping) and cycling.

You can choose any way of exercise according to your interest. Exercise can be in the morning. It depends on your convenience but keep remember the best time for the exercise is early morning, at that time air is fresh and pollution free. When you breathe in this air you feel fresh all the day.

### 3.2.3 Rest and Sleep

Although regular exercise is essential for maintaining health, at the same time relaxation and sleep are equally important. It is necessary to relax the fatigue muscles. Do you remember what happens to you after lot of laundry work in single day. Your hands start paining and you get tired. At that time, you feel that you will no longer be able to do any work else. But after taking rest for sometimes, you feel agile and start doing something. When you work your body consumes oxygen that gives you energy. When this oxygen is used by the body, some waste are produced which are collected in muscles. Normally, when these wastes are produced, the origin of these wastes becomes more rapid than the excretion of these wastes. Therefore, it begins to be collected in the muscles. Due to this you feel fatigue.

**Fatigue is the disability of working efficiently or it is the lack of ability of working.**

When you sit or take rest at that time your body gets time to release these wastes and your muscles get active again. In this way sleep not only provides rest to your muscles but also gives rest to your mind.

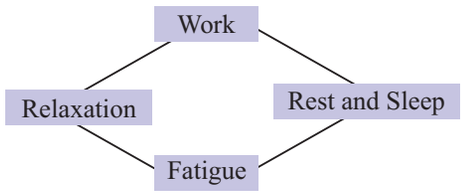



**Fig. 3.9:** Importance of rest and sleep in fatigue

Not every person needs the same amount of sleep. You may have noticed very young babies sleep more than you or your parents. A person who works hard throughout the day needs more sleep than the other person who works much less throughout the day. Can you say why?

### 3.2.4 Posture

Have you noticed that some people keep their back straight sitting and walking is better posture upright and some people bend their back while walking. Which of these position is better?

**The way of sitting and walking of a person is called the posture.**

If you are unable to keep your body in a position to stand or sit, your physical posture is wrong. If you sit or stand bending your back, it adds extra pressure to your abdominal limbs and chest. You may also have a tilted spine problem that may


result in a complaint of back pain. Thus, you may have understood how important the right posture is to stay healthy. Remember the right posture is important not only to sit or stand, but also while doing household work. Do you know what is the right posture?

**The correct posture is when doing a task that requires the use of a minimum amount of energy.**

For e.g. The right posture of standing in which the head, neck, chest, abdomen can remain balanced on each other in a straight line.

**Activity:** Prepare a list of your family members who do not have a proper posture while walking or sitting on a desk. Tell them how to maintain the right posture.

| Name | Relation with you | Analysis of activity | Imperfection in posture | Advice for right posture |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

### 3.2.5 Home Care and Hygiene

The English word 'hygiene' is come from the Greek word *hygia,* which means *goddess of health*. Health science can be defined as science and art to preserve and improve health. Health science is related to all those factors which are responsible for healthy life. Health science aims to make healthy life possible with environment. This belongs to both individuals and communities. It is very important to understand a person that being clean and cleanliness is very important to be healthy.

### Personal Hygiene

**P**ersonal hygiene means the cleanliness of our body. Normally it is related to individual health. In a broader way it is mean to secure and enhance health. Individual factors of hygiene includes cleaning, sleep, food, water, exercise, work and care of sensitive and specific organs and also depends on environmental factors, such as proper ventilation, temperature of environment, proper light, and individual factors like taking bath daily, clean undergarments and wearing foot wears, and also depends on some social factors such as work conditions, family life and good social friends.

Notes



Personal hygiene not only apply to cleaning external body and clothes but also apply to cleaning all the essential factors like teeth, hair, nose, eyes, hands and legs for prevention of disease. And if you want to be healthy, you need to pay attention to all of them.

Hygiene includes all the things we get in our contact. Such as:

1. Rising up early in the morning, washing hands before meal, use of soap to remove infection, regular defecation habit, all these habits helps to keep the external physical body.

2. Intake of Proper nutrition, healthy food, balanced diet and eating dust free, raw food and vegetables make our internal body system healthy.

3. There should be a balance between relaxation and activity. Regular balanced exercise keeps the muscles fit and organs easily remove the waste out of the body.

4. Regular exercise maintains the weight of a person and keep the digestive system proper. Mental activity is an essential solution to keep mind and body healthy.

5. Thousands of males and females feel their health is good even though they do not defecate properly, they have bad breathe, their tongue don't remain clean and many other symptoms of self-poisoning exist. It is quite right to say that constipation is the cause of many various diseases. So it should be prevented not with heavy medicines and medicinal powders but we should regularize food and exercise properly. In short, we should follow health rules.

6. To sum up, simple living and high thinking is the key to good health.

## Environmental Hygiene

Environmental hygiene is a subsidiary branch of physiology that explains how our body reacts to the environment and its pollution. We live in the midst of microbes and patients. For example, if there are no mosquitoes in the atmosphere, there would be no malaria and filarias kind of diseases. Diseases such as smallpox, cholera, TB, can be eradicated through good disinfectants and by natural means. The main reason for the spread of diseases in rural areas is unsafe disposal of human waste. Many diseases spread by the germs that are found in human waste. These germs spread in water, food and cooking place.


In order to avoid this situation and to maintain proper environmental hygiene, the following things need to be remembered and followed:

1. Toilets should be constructed and used on a large scale.
2. If this is not possible, people should go to places for defecation which are alloted for it and that should be far away from the accommodation, roads, playgrounds and water sources.
3. After excretion, the stool should be covered from the soil at the same place.
4. Babies and children also have the same harmful germs in their stool, so their stool should also be cleaned immediately.
5. Toilets should be washed regularly and kept covered and cleaned.
6. Animal feces should also be kept away from homes and water sources.
7. Cattle dung should be used in a gas plant or collected in a manure pit or used for fuel.
8. After excretion or after the baby's excretion, clean them, thereafter hands should be washed by soap.
9. If soap is not available in the village, some people rub the mud in the hand and clean the hands with water. This does not serve the purpose because there are too many germs in the mud or soil.
10. Use always soap and clean water to wash hands.
11. Children keep putting their hands into mouth very often, so it is necessary to wash the hands of children again and again especially before eating.
12. Whenever the child smears his face, his face should be washed every time. This helps to keep flies away from the baby and prevent eye skin infections.

## Food Hygiene

Food hygiene is an important factor for maintaining good health. If the basic rules of hygiene are not followed or disregarded while buying and preparing food, the problem of food poisoning may suddenly arise severely.

## Hygienic Kitchen

1. Bacteria need food, moisture and time to increase their number, so we should keep our kitchen clean and dry and food should be kept covered.
2. The remains of food should not be left around and the portions of food that fell on the floor should be cleaned.

3. Frequently empty the dustmin having lid.
4. Pet animals should be kept away from the food and kitchen.

**Fig. 3.10:** Kitchen

**Fig. 3.11:** Use of dustbin with lid

With the help of all these measures, germs such as flies, cockroaches can be prevented from spreading the disease.


## Hygienic Food

1. Wash your hands with soap and water before touching the food.
2. If you are having mucus or having water or sneezing from the nose, use cloth or handkerchief to avoid the spread of germs and then wash hands again before touching the food.
3. Vegetables should be carefully washed so as to separate the soil present in them as it can contain bacteria or parasitic eggs.
4. Thoroughly clean the knife first to cut the food items before cooking.
5. Clean the fridge regularly to flush out all the foods in the refrigerator and clean all the elements including shelve with warm soap water. Soda bicarbonate and lukewarm water solution is a good cleaner and washing with this solution will not smell inside the refrigerator.

## Clean Water

1. Many diseases are water-borne; to maintain good health adequate water should be consumed from safe tube-wells or deep hand pumps. Water does not provide calories or vitamins but is very essential for the body functioning and internal cleaning.
2. Water should be boiled upto 15-20 minutes for the use of babies and it should be kept in the sterilized bottle. Make this water cool before drinking it. It is very essential for the children who have not yet developed the immune system. The places where clean water supply is available and drinking water is used, the well should be properly covered. The place where boiling is not possible, there a pill of chlorine should be added in 10 liter of water. After half an hour this water is ready to drink. But we should not use this water after 24 hours. And again this process of clean water should be repeated.

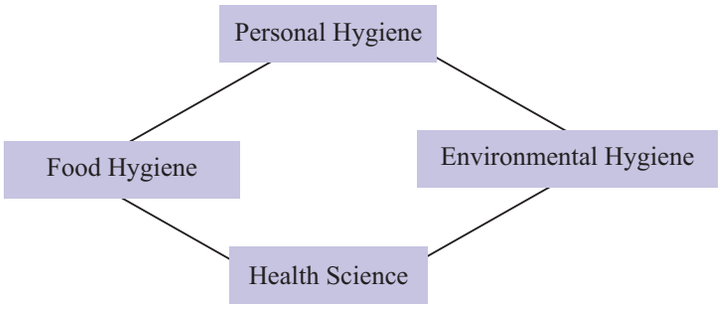



**Fig. 3.12:** Different aspects of health hygiene

Notes

## INTEXT QUESTIONS 3.2

**1. Fill in the blank with correct word.**

(a) Skin should be kept .....

(i) Wet

(ii) Soft

(iii) Dry

(iv) Clean

(b) To keep the teeth clean ..... brush them.

(i) Morning

(ii) At night

(iii) early morning

(iv) after every meal

(c) To keep our teeth strong and healthy .....

(i) Eat chochlate

(ii) Eat ice cream

(iii) Drink adequate milk

(iv) Drink water

(d) Exercise make you .....

(i) Fat

(ii) Active

(iii) Skilled

(iv) Functional

(e) Exercise should be .....

(i) Regular

(ii) Not continuous

(iii) Stress full

(iv) Tiresome


(f) Rest provides ..... to tired muscles

(i) Sleep

(ii) Stress

(iii) Hygiene

(iv) Active again

**2. Fill in the blanks:**

(a) Fatigue is the ..... of body working.

(b) The way of sitting and walking of a person is called .....

## WHAT HAVE YOU LEARNT

In this lesson, we learnt that good health is important for everyone to achieve happiness and maintain their work potential. There are many factors affecting our health. The main factors, such as balanced diet, clean water and clean environment which has a positive impact on our lives. Whereas, other factors such as impure water, diseases caused by bacteria and polluted environment have a negative impact on our health. According to world health organization, '*health means the state of physical, mental and social well being not merely the absence of disease. i.e. the smooth function of both the body and the brain.* A person with good health is more enthusiastic, full of energy rich life and more efficient at work.

Change in any aspect of health such as social, mental or physical aspects also affect other aspects. All the three aspects are interrelated. To be called healthy, personal health should be good in all the aspects.

We have discussed meaning of natural health and personal health and their importance which are essential for the healthy life. You have well understood that by coordinating, cooperation and proper planning, we can improve our health levels and save the country from the epidemics and increase the life span of people.

## TERMINAL QUESTIONS

1. Mention in detail about some important factors of environmental hygiene?
2. Mention the definition of health and describe the factors that are affecting it.
3. Mention the fact that physical, mental and social health are interrelated?

## ANSWERS TO INTEXT QUESTIONS

### 3.1

1. (iv) physical, social and mental health
2. (i) self confidence
3. (i) wrong (ii) Right (iii) right (iv) right
4. 1. energied
   2. All the organs work smoothly
   3. freedom from unnecessary stress and tensions.

### 3.2

1. (a) clean
   (b) after each meal
   (c) drink adequate amount milk
   (d) active
   (e) regular
   (f) active again
2. (a) disability
   (b) condition

Notes

4

# PREVENTION OF COMMON DISEASES AND HOME REMEDIES

In the last lesson, we have read about health and hygiene and we come to know that how different factors affect our health in today's life, as a result of change in lifestyle and food habits which leads to many diseases.

Due to interrupted environmental systems such as air pollution, water pollution, noise pollution, greenhouse effect are responsible for the diseases of the lungs, heart, skin, ear, nose and throat etc. Due to this degraded environment, there is an increase of 0.5 degree centigrade global temperature and 1 centimeter sea level each year respectively therefore, we must take steps to control raised global temperature by plantation, preserving water and controlling the level of pollution. In addition to the above, production & use of insecticides and chemical fertilizers is to be reduced. It is a major requirement of the present time that in order to preserve the environment we need to make changes in our lifestyle to maintain health through foods by natural resources. We all have to go back to our roots by adopting our traditional methods and in this an efficient health worker can play an important role.

In this lesson, we will discuss about if you find unhealthy person, how can we prevent from commonly occurring diseases and how to keep the entire family and society healthy and advice tips for Home Remedies.

## OBJECTIVES

After studying this lesson, you will be able to:

- aware about common diseases among people regarding prevention and treatment;

- treat common diseases with the help of locally available drugs in rural areas;
- create awareness about the prevention of disease and the promotion of good health;
- secure the climate of your area by planting medicinal and aromatic plants;
- understand the responsibilities of a good health worker, and further they are utilized for social welfare.

## 4.1 PREVENTION OF COMMON DISEASE

- When we don't feel hungry, thirsty, feel like not interested in anything, bodyache, then we should think that these symptoms are due to some reason.
- It is very important for a health worker to know the symptoms of these diseases such as – cold, cough, sore throat, vomiting, diarrhoea abdominal pain, pain in ear, migraine etc. if so, how can we become healthy by taking home remedies. By taking attention towards home remedies we can stay heallthy at home.

  **The health worker should suggest the following precautions in order to prevent diseases transmitting from water, parasites or fungus etc.**

- **Wash your hands with soap and water before meals:** There are more harmful bacteria present in the inner surface of our hands and fingers, which should be cleaned and washed away from hands before every meal.

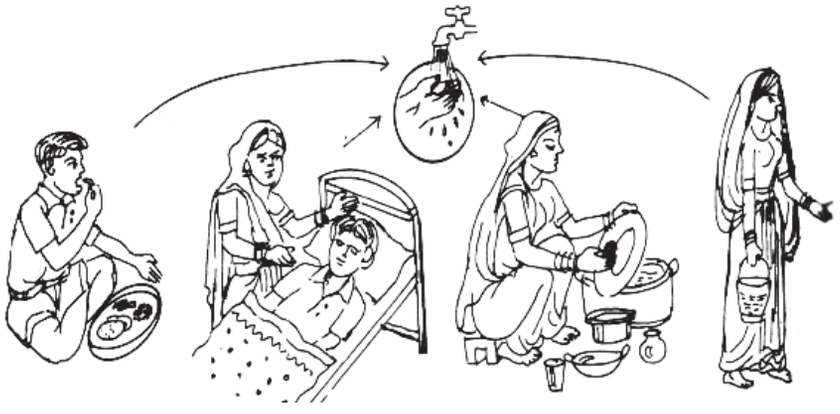


**Fig. 4.1:** Clean your hands before and after doing these activities

- **Use of clean utensils to keep food**: There are harmful bacteria and germs purse dirty utensils, so it is necessary to clean the utensils. The flies sit on

the utensils and infect them with their mouth. Mosquitoes pollute the utensils with their mouth and feet.

- **Do not take excess water while food intake:** The digestive enzymes which secretes during intake of food gets diluted if excess amount of water taken while eating. But after completion of food if water is taken it helps in condition like constipation and obstructiobn in water.
- **Use of clean water or boiled water for drinking**: Water borne diseases like diarrhoea, dysentry, jaundice occur due to presence of virus, bacteria, parasites in dirty/infectious water.
- **Store the drinking water in a copper/steel tumbler with a lid**: Copper utensil destroys germ, whereas the smooth surface of the steel does not allow germs to stay and can be cleaned easily.
- **Do not put hands in drinking water:** The microorganisms enter into drinking water through hands.

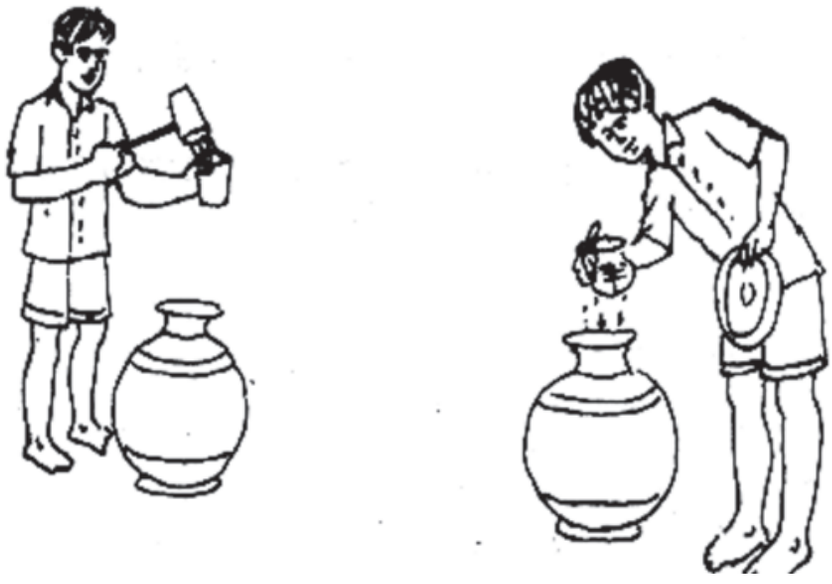


**Fig. 4.2:** Do not put hand in drinking water

- Keep your food in a clean place. By doing this we can prevent food from dust particles and flies .
- Cover the cooked food with a lid.
- Use mosquito net while sleeping, so that one can prevent diseases like malaria, dengue and chikungunya.

Notes



- Place a holy basil (tulsi) plant in the house to keep the surrounding & micro environment clean.
- Plant neem trees at your home to keep the environment healthy.
- Do not use polythene bags because they spread pollution.
- Do not consume fruit juices and sugarcane juice extracted in an unhealthy conditions in the market. This type of juice cause health problems such as jaundice, diarrhoea, vomiting, food poisoning etc.
- Do not eat rotten, cut, pruned fruits kept in an open place for a long time because they are having parasites come from flies and dust.
- Do not eat food above the capacity because it may leads to obesity.
- Chew the food properly for easy digestion.
- Before eating the fruits and vegetables it should be washed so we can protect our food from bacterial infections.
- Do not eat non-seasonal fruits and vegetables because they contain a heavy amount of harmful pesticides and preservatives.

## 4.2 HOME REMEDIES FOR COMMON DISEASES

The health worker can advise the treatment of common diseases while sitting at home. The treatment can be done as follows:

1. **Steam inhalation in cold and flu:** By taking steam inhalation the nose and nostrils will relax. Precaution should be taken from too hot water.
2. **Throat pain relief:** During the change in season especially the winter season, swelling in the tonsil occurs which leads to pain in the throat and it becomes difficult to consume semi-solid food. It can be treated by gargling decoction (kadha) of Basil. Take 10 leafs of basil and boil in 250ml of water for 5 to 10 minutes on low flame and add a pinch of salt in it. It is also helpful in tonsillitis, hoarseness of voice and sore throat.

   Take prepared decoction twice a day in the morning and evening and for complete cure. This decoction should be used by 50 ml, 3 to 5 times a day. This treatment can also be used for any types of infection in the throat.

**Fig. 4.3:** Recipe of khada/preparation of kadha (decoction)

- Sometimes the normal voice can not be generated because of the infection in the throat and high pitch volume . Boil 5 leaves of guava in 200ml of water and use it for 3 to 4 times in a day for 2 days.
- If you drink cold water or any other beverage, then your throat gets infected. Take mulethi twice a day for 2 to 3 days or more problem will be treated/cured.

3. **Malaria:** Malaria is a common disease in the rainy season or humid areas, it can be treated with black basil leaves. Boil 20 leaves of basil in one cup of water and consume it for 3 times a day for complete treatment. Continuing this process for 5 to 7 days will reduce fever. high grade fever can be treated with kanja (le-aquata) 10 leaves kadha.le- aquata is the best antipyretic medicine. If not getting relief after 3 days of fever, consult a doctor.

4. **Viral fever:** This fever can be treated with indian basil, french basil and cloves decoction (kadha). Take 10 leaves each in 3 cup water and boil it low flame for 5 to 10 minute. Decoction can be taken for 5 to 7 days, thrice a day.

5. **Tooth ache:** To relieve the pain take the juice of vajradanti flower or apply clove oil and holy basil leaves juice on the teeth.

6. **Ear ache:** Treat the outer ear with hot dry cloth and contact the doctor if there is no relief in pain.

7. **Conjunctivitis:** In the rainy season, the conjunctiva and eyeball gets inflammed, the eyes become red and pain is also present. This problem can be treated by putting the drops of pure rose water in the eye. Put 5 rose flower petals in a cup of water and boil it until the water becomes half, keep it in the refrigerator, use this mixture three times a day for the complete treatment.

8. **Bite or Injury:** Put the basil leaves juice on the part of bite or injury, place it 3 times a day and bind the bandage.

9. **Abscess:** For the treatment of abscess make paste of calendula or marigold leafs and apply it on abscess.

10. **Jaundice:** It is treated by root of Boerhavia diffusa (Punarnava) takes 5 gm of fresh Punarnava root, makes a paste by pouring some amount of water until it becomes soft paste. Extract juice from this paste. Use it once a day for complete treatment. Juice of complete plant of phyllanthus niruri (Bhumi amalaki) is also used in jaundice. If there is no improvement in fever for 3 days then immediately consult a doctor.

11. **Diarrhoea:** For treatment of Chronic diarrhoea use juice of 5 leaves of a guava 3 times a day for 2 days only.

12. **Sciatica:** Take Nycthanthes arbor rustic (Harshringar) 100 leaves and 1 flower of a palash tree are kept boiling in 1 litre of water under low flame until it becomes ¾ of the amount. Filter this decoction and keep it in the fridge. According to the severity of disease, give this decoction 2 teaspoon twice a day for more than one month.

13. **Arthritis:** To control arthritis or pain use Ashwagandha (Withania somnifera) powder 1 spoon once a day for 1 month.

14. **Urticaria:** It is a type of allergic reaction in skin, pain in skin, roughness and itching. Many red spots appear on skin where itching occurs. It occurs due to pollution and fungal infection. Boil 250 gm of fresh basil leaves in 1 litre of water for 10 minutes. Mix this solution in a bucket of water and wash the affected area 2 times a day. It will be used for 2 -3 days.

15. **Diabetes:** It is related to abnormal function of pancreas due to which obstructions occur in carbohydrates, protein, fat metabolism. Today due to high consumption of carbohydrate, low physical work, this disease have become very common. Consuming 1 spoon of aloe vera juice and juice extracted from 10 leaves of Aegle marmelos (Belapati) given twice a day regularly for a month can control diabetes.


16. **Dysentery:** It is an infectious disease. Its main symptoms are severe diarrhoea with blood. To get relief in such a situation mix 2 teaspoon of Isabgol powder and 1 small spoon of Basil seeds and 1 small spoon of Acacia nilotica (Babool). 50 gm of fresh curd is mixed with above powder and taken twice a day for 7 to 30 days according to severity with light food.

17. **Sinusitis:** For inflammation affecting the epithelium of sinus, boil 10 eucalyptus leaves and tulsi leaves in the steam vessel and use twice a day for 1 week.

18. **Migraine:** (Being affected by a part of the head due to periodic health this disease can be avoided by eating the fruits of mulberry (shahtoot) during the season). Take mulberry juice twice or three times a day it gives relief. By applying the paste of malti flowers gives relief in the headache.

19. **High Blood Pressure:** Once a day, it can be controlled by consuming a lump of Garlic or half a teaspoon of garlic powder. High B.P. can also be controlled by taking a small spoon of powder of Ashwagandha root. High B.P. can also be controlled by the 2-5 flowers of sadabahar daily. Fruit Juice contains abundant potassium which is helpful in regulating blood pressure.

20. **Cancer:** Cancer is a fatal disease that should be treated under the supervision of a specialist doctor. It is believed that carotenoids and lycopene are protect from cancer. A skilled Health worker may advise the patient to consume yellow and red fruits such as oranges, grapes, papaya, tomato, carrot spinach, cauliflower, plum etc. is found in abundance amount of carotenoid and lycopene.

Drinking every morning tea without milk and prepared with (20 leaves) a day basil leaves helps in cold, malaria, dengue, sinusitis, T.B., viral fever, joint pain, skin problem. It is a good antioxidant.

### 4.2.1 Major Precautions for Preparing Herbal Medicine at Home

- Use healthy plant to prepare raw drugs
- Wash plant with clean water
- Plants use for preparing medicines should be grow under natural condition or cultivated by organic process.
- Plants should be obtained from a clean place.
- decoction should be prepared only in stainless steel utensils with fresh water not in copper, iron and bronze utensils.

## INTEXT QUESTIONS 4.1

**1. Fill in the blanks:**

(a) Carotenoids and lycopene provide potassium against .....

(b) Sadabahar flower controls .....

(c) Episodic attacks of headache is called .....

(d) Ashwagandha is used to control .....

**2. True and False:**

(a) Drinking water during meals is good for health. ( )

(b) Malaria causing mosquitoes can't be stop by using mosquito net ( )

(c) Overeating can cause Jaundice ( )

(d) Decoction of Basil leaves, lemon juice and cinnamonum tamala can be used to cure cough and cold. ( )

## 4.3 GENERAL DISEASE THAT OCCURS IN CHILDREN AND THEIR HOME REMEDIES

Proper growth of a child hampers if a person is having disease. Some diseases are general while some diseases play an important role in increasing mortality rate in children below 5 years of age. For healthy growth of a baby, a health worker or mother must have basic knowledge about some concepts of health and use of first aid.

The following treatments to treat various diseases are mentioned below:

### 4.3.1 Pain in Throat

Pain in throat, cough, cold or tonsillitis are pre symptoms.

- **Causes:** Viral or bacterial infection can cause irritation or pain in the throat.
- **Symptoms:** Child can complain that he is having difficulty swallowing from some days. If tonsil size is increased and glands are swelling with smell in breath then it can be tonsillitis. This problem is not commonly found in children below 1 year of age, but in school going children due to contact with new bacteria it occur frequently.


## Home Remedies

To deal with the problem of pain in the throat, make sure that Vitamin - C should be abundant in your diet. Sprout pulses, Amla, lemon, orange, malta, sweet orange and guava contains Vitamin – C. This is very important in maintaining a healthy immune system as well as fatty acids found in vegetables and fish oil.

1. Vitamin: Vitamin C deficiency increases sensitivity of infection. Orange, lemon, amla, hisalu and guava are excellent sources of vitamin C.
2. The supply of iron elements as spinach, jaggery, liver, sesame seeds and whole wheat roti can also be helpful, because it is also necessary for the production of Antibodies.
3. In situations if the child is suffering from throat pain, consumption of yellow and orange fruits and vegetables is beneficial, such as carrots, papaya, pumpkin, green vegetable e.g. spinach, chaulai, soya, fenugreek etc. In these beta carotene is found, which the body converts into vitamin A and this vitamin is important for throat pain, healthy eyes, and mucus membrane.
4. If Anyone taking antibiotics will get benefit from eating curd. At the completion of the course of medicine, it is helpful in the replacement of extracellular bacteria and this bacteria is an important source of vitamin B which gets destroyed because of the course of medicines.
5. Add some drops of ginger juice in one teaspoon of honey and also add a part of the fresh garlic unit. Take this mixture two or three times in a day and this mixture should not be given to infants less than 6 months.
6. Make a few drops of lukewarm mustard oil or seasame oil and massage it with a light hand around the child's neck and throat at night and cover the neck with a warm cloth so that the neck is not exposed to air.
7. Hot liquids: Children are more likely to have lukewarm drinks. A teaspoon of honey in one glass of hot milk is good for health.
8. Gargling with luke warm water to soothe the throat. Cure from throat pain should do gargeling from luke warm water having half table spoon salt.

**Note: Throat pain equates to three-four days, if its symptoms last for more days, consult the doctor immediately, as it may be the earliest symptoms of glandular fever, mumps etc.**

### 4.3.2 Ear Ache

We hear from the ears and it maintains the balance of the body i.e., it prevents us from falling down. But ears, are easily damaged and if it gets infected then pain in the ear radiate towards face also.

Notes



## Causes

The ear ache is commonly caused by cough and cold infection. There are secretions accumulated in the back side of ear drum. The problem of ear infection in children under 5 years of age is common because the ear connecting the middle ear to the nose has a small & straight Eustachian tube resulting in frequent ear problems.

Now- a -days, a possible connection has been detected between bottle feeding and ear pain in infants. When the child drinks milk from the mother's breast, exercise of oral muscle while sucking breast leads to opening of the Eustachian tube and this connects the nasopharynx with the middle ear and the excess fluid gets drained/ cleared. In the case of drinking milk from bottle where the nipple is not properly holded inside the mouth and active sucking is not necessary in bottle feeding which leads to small amounts of this will enter the middle ear and it becomes infected easily. This leads to redness, pain and itching in the middle ear. This infection requires early treatment otherwise may lead to permanent deafness.

## Symptoms

Pain in the ear, poor digestive system, ear discharge and fever are some symptoms of infection in ear.

## Home Remedies

The ear is a self- cleansing organ and protects from the dust, external elements and infections by secreting glands are protected by ear wax.

1. Keep the child in a relaxed comfortable position. Give them liquid in an excessive amount.
2. Use nasal decongestant.
3. Pouring some drops of glycerine in the ear also benefits.
4. Pain gets relieved by applying hot water bottles or warm cloth fomentation near or around the ear.
5. Garlic oil or olive oil are also helpful.
6. Only clean the outer ear, not the inner ear. Use cotton or clean clothes for cleaning of ears.
7. Lying position leads to increased ear pain, keep the child's head under the support.


8. Diet can affect the function of the ear, food rich in vitamin-A and vitamin-B are helpful in repairing the cells of ear, and also give strength to the auditory system. Vitamin-A is found in liver, beta carotine is found carrots, mango, and spinach and thiamine is found in whole wheat bread and spinach also found thiamine.

9. Avoid dairy products.

**Note: Never ignore ear problems. Whenever you are experiencing dizziness; if you feel partial deafness or ear pain consult the doctor immediately.**

### 4.3.3 Stomach Ache

Babies with days or months old often suffer from stomach pain. Normally it starts after birth and last for 3 months.

#### Cause

Through the various studies we explain various factors such as bloating in the colon, less or more amount of milk, milk allergies and parental stress. According to National Child Birth Trust, milk feeding mothers eat dairy proeducts in huge amount, their babies are more likely to get stomach aches.

#### Symptoms

Sudden pain in the stomach which is usually noticed due to constant crying of the baby.The child repeatedly raises his feet forward the chest from which he gets tension in his stomach. It takes time to calm the symptoms when the infant passes gas or stool.

#### Home Remedies

In the case of stomach ache, it is important for the health worker or the child's parents to know that such a condition is very common and it does not cause any severe condition to the children so the condition of all children gets cured. commonly, stomach ache or intestinal problems occurs in healthy children. They eat well and sleep well normally. Their weight increases normally and they do not show any sign of illness. They do not require any treatment medication or injection. The child can be calm with a music such as swinging, rotating into the rocking chair. One conventional treatment 'gripe water' or fennel (sauf) water.

While a breast feeding child is in a wrong position, the air enters into the child's stomach along with the milk; in such conditions, burping should be done to remove

Notes

air from the stomach. After feeding the child, he should be kept lying on the left side instead of right side, so that leftover air in the stomach gets passes.

During abdominal pain, keeping the baby in the lap directly in the middle of the knees or lying on a hot water bottle slapping on his back with a light hand can also make him more comfortable.

### 4.3.4 Fever

The average temperature of the human body is 37°C/98.6°F. The temperature of the baby's body varies widely at different times in a day. It is the minimum in the morning and it increases in the evening.

Many children having 1° F above or below to the normal temperature.

Baby is considered to have fever when his temperature goes higher than his normal temperature. The fast pulse also shows that the child is unhealthy. The pulse rate in newborn is 100-150/min. At the age of one 100-120/min and at 5 years 80-90 per minute.

#### Symptoms

Fever is a sign that indicates that the body is fighting with infection. Fever is not a disease. It is normal and other symptoms such as perspiration shivering, getting thirsty, nausea, itching and it comes with diarrhoea.

#### Home Remedies

Temperature of the baby's body can increase intensively. Higher temperature i.e. more than 30°C/102°F indicates the severity of a disease. Doctors treat the disease; not the high temperature and their parents feel that their child is ill so they must be given medical attention. The baby's fever can be reduced by giving paracetamol or by putting the wet strip on the body parts. Rise in temperature will decrease the energy of the body and destroy vitamins and nutrients. Therefore in the case of higher temperature the child needs more calories than normal days. Although in every 1°C rise in temperature above normal level; metabolism goes up to about 7%. As a reaction to increased temperature the body starts to sweat due to which there is a shortage of fluid in the body.

If a baby is suffering from fever then we should increase liquid diet to save them from deficiency of fluid in the body. Fruit juices, lemon and honey in water can be given at every 1 hour interval. If the child is not suffering from diarrhoea or


vomiting then they should be given light and nutritious food like khichdi, daliya etc. In such a situation children may feel like eating a home-made soup, custard or mashed banana.

1. During fever the child's appetite often decreases and it becomes difficult for him/her to eat. If the child has diarrhoea or vomiting problems then he should not be feed for 1 or 2 meals so that his system has an opportunity to recover.
2. Extra clothing should be removed from the body and bed so that body can be exposed.
3. Also reduce the room temperature.

**Note: If the fever persists for more than 3 days with the condition of stiffness of neck, rashes etc. It would be better to contact the doctor. Raise of temperature is one of the methods used by the body for infection.**

## INTEXT QUESTIONS 4.2

1. How does throat infection occurs from unhealthy food?
2. What are the 2 main functions of the ear?
3. Write True or False:
   (a) Vitamin A is important for a healthy mucous membrane.
   (b) Ear infection is not common in children under 5 year.
   (c) Stomach pain in babies can be measured by blood test or therapeutic investigations.
   (d) After feeding and burping the babies, make them lie on their left side to avoid discomfort.
   (e) Clothing should be removed from the body in order to reduce the body temperature of the baby.
4. Fill in the blanks:
   (a) Human normal body temperature is ..... in °C or ..... in °F.
   (b) Normally stomach pain starts from ..... of the body and stabilizes at ..... of the body.

(c) Food poisoning problems can arise if we neglect basic rules of health science during ..... and .....

(d) Yellow, orange fruits and vegetables have ..... and they give ..... to which our body converts into .....

## WHAT HAVE YOU LEARNT

- In this chapter, we learned that as a result of change in lifestyle, and food habits a large number of diseases are arising.
- Destroyed ecosystems like air pollution, water pollution, noise pollution, green gas effect lung, skin, heat, ear, nose and throat etc related diseases.
- Due to this declining nature global temperature and ocean water level is rising by 0.5°C and 1 cm per year.
- We should take essential steps towards planting more trees, conserving water and controlling pollution level, also use of insecticide in production and chemicals should be prohibited.
- In today's time, it's necessary to change our lifestyle and follow food habits according to traditional manners to preserve our ecosystem and look after our health by natural means. A health worker can play an important role in it.
- For health worker, it's necessary to know that these symptoms of unhealthiness arises due to disease like cough, throat irritation, vomiting, diarrhoea, abdominal pain, ear ache and migraine can occur. Health worker should council the patients regarding precautions for health from water,parasites, fungus etc.

  In this chapter we learned about how to cure some diseases from natural remedies or herbal medicines.

## TERMINAL QUESTIONS

1. How can you maintain good health from home remedies?
2. Which important trees and plants should be implanted in our house? What is there importance in health care.


3. Which important precautions should be taken in order to take food during health conditions?

4. How can you control malaria, dengue, arthritis and sciatica from herbal medicine?

5. How can you treat diarrhoea, Sinusitis and hypertension from herbal medicine?

## ANSWER TO INTEXT QUESTIONS

### 4.1

1. (a) Cancer (b) Hypertension
   (c) Migraine (d) Hypertension
2. (a) False (b) False
   (c) False (d) True

### 4.2

1. As unhealthy foods contain less nutrients to fight against infections.
2. To maintain the proper functioning of the hearing and equilibrium of the body.
3. (a) True (b) False
   (c) False (d) True
   (e) True
4. (a) 37°C or 98.6°F (b) Born, three months
   (c) Purchase, store in room (d) Vitamin C, Beta keratin, Vitamin A.

# 5

# NUTRITION

You have already read about various parts of the body system and their physiology. Good health is necessary to keep all the activities of the body smoothly and to perform various functions. Do you know that food plays a major role in maintaining good health? Yes, food plays an important role in maintaining good health, in prevention and treatment of diseases. The child's physical structure/ growth begins in the mother's womb with the intake of food rich in various nutrients; these various nutrients present in the food helps the human body to produce tissues, glands and senses to keep healthy. Therefore, food provides all essential nutrients and is the most important factor in the formation of our body and maintenance of health.

In this lesson, we will learn about food, different types of nutrients and balance diet. Along with these, we also learn about diseases which occur due to lack of nutrients in the food.

## OBJECTIVES

After studying this lesson, you will be able to:

- brief about important functions of food;
- describe about Nutrition and importance of different nutrients and their sources;
- understand the concept of Balance diet;
- know about different diseases occur due to deficiencies in nutrients and home remedies to prevent such diseases.


## 5.1 OUR FOOD

The word 'Food' denotes the substance that we eat as well as that nourishes our body. In this solid, semisolid and liquid are present. Similarly for any substance to be called as food, it should possess two important characteristics -

1. The substance should be eatable.
2. That substance should nourish our body.

Have you ever thought why food is basic necessity for us? Food is necessary because it contains all essential elements that provide energy needed to keep our body run smoothly. Proper diet will produce good effects and regulates our health. Thus, food is essential to protect from physical damage and help in growth. Food is the group of the edible substances present in a certain amount. Do you know that the proper food/diet also act as a preventive medicine? Regarding the diet, the famous medical person 'Hippocrates' has said that "let food be used as medicine and medicine be use as the food". Our food should be a complete & natural. The food which is obtained from the fresh fruits, raw vegetables directly from nature, fresh milk, curd, honey etc are much beneficial for maintenance of health. This food is also very important in maintaining physical, mental & spiritual balance. The diet which gives happiness and strength to the body by providing complete nutrition is called nector (amrut) diet. Such diet is said to be tasty, energetic and long life provider.

### 5.1.1 Functions of Food

There are mainly three functions of food. They are:

#### 1. Physiological Function

There are four physiological functions of food. It provides strength, builds body, protects against disease and regulates physical process. Now we will discuss them in detail.

(a) **Food provides us Energy:** Every person needs energy to work. Energy is needed regularly for us to work inside and outside the house and to do various tasks. This energy comes from the food you eat. Even at the time of resting also, you need energy. Can you tell by which means you can feel this within your body? Various senses are present in the body and are always employed to feel us. For example, the heart circulate blood to the body, the stomach remains actively in digestion of food, the lungs to breathe air etc. All these organs require energy to carry out their functions and food provide them with energy.

(b) **Food is helpful in building the body:** Have you ever thought that how a small child develops into an adult? Our body is already made up of thousands of small cells; to support the further development of the body there needs formation of newer cells. Food is essential to build these new cells. Due to injury, cells gets destroyed or damaged and the construction of new cell is required and for this work food is important.

(c) **Food provides protection from diseases:** The foods we eat give us strength to fight the insects and bacteria that causes disease.

(d) **The food controls the body's functions:** Regulatory functions refer to the role of food in controlling physical process. For example, our body temperature remains 98.4°F or 37°C. Similarly our heart remains to beat 72 per minute. The excretion of Wastes from our body is also regulated. All these functions are regulated by the food we eat.

## 2. Psychological Function

All of us have emotional needs like security, love and care; for example how do you feel when your mother makes your favourite food or dish? You feel that she loves you and takes care of you. The food you obtained seems to be reward. Similarly some foods we eat like khichdi or boiled food are associated with disease conditions; usually we eat them on such conditions. Disease is an unpleasant condition, hence the food given in this situation also relate to unpleasant conditions.

## 3. Social Function

There is an important social meaning of eating and sharing meals with any other person. It reflex social acceptance. Food festivals are also integral part to every region of the world. Food is also been served on special occasion such as child birth, marriage and birthday, the food also have special significance and meaning in religious perspective.

### INTEXT QUESTIONS 5.1

1. What do you mean by food?

.....

.....

.....

.....


2. List main functions of foods?

.....

.....

.....

.....

## 5.2 NUTRITION AND NUTRIENTS

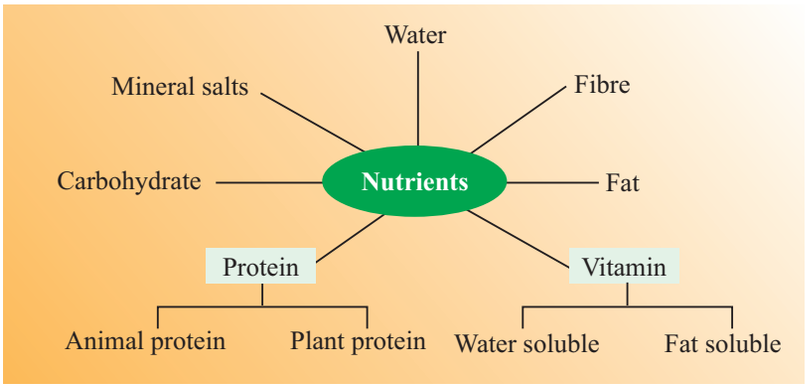
Nutrition is the process through which body receives nutrients and other substances from the food we eat; they get digested, transported & finally used by our body and unwanted materials produced during this process are destroyed. Therefore, nutrient food has socio - economic and physiological relations with the body.

Nutritional food is science in which nutrient and other elements have their impact in maintaining the health and disease.

Nutrition depends on food and they play an important role in treating the diseases. Primary cause of disease and habit of taking less nutrient foods make the body weak or cause lack of immunity in the body. Inside our body, the natural healing mechanism is present which prevents our body against various diseases. But they do work only when they get proper amount of all essential nutrients.

### Nutrients

The food we eat has many bio - chemical essential products in it. These bio-chemical products are called nutrients. These are unseen products for rejuvenation which is important to make the body healthy. These nutrients have different names.



Notes



## Preservation of Nutrients

The process by which nutrients are preserved during cooking and preparing food is called preservation of nutrients. With the help of some common procedures, we can preserve the nutrients.

1. Before cutting vegetables they should be washed, so that the mineral salt and vitamins present in them are not destroyed. Foods should not be washed more than require.
2. During peeling of vegetables, it should be kept in mind that deep peeling should not be done as it may remove underneath vitamin and minerals.
3. Before cooking vegetables they should be cut into big pieces because if they are cut in small pieces, the nutrients get lost.
4. If vegetables are supposed to cook in water, than it is better to cook them in boiling water.
5. For cooking food, water should be used as per the need, if any water is left, don't discard it. Use it to cook other food products.
6. During cooking food, don't use baking food.
7. During cooking food, use of lemon juice or tamarind helps in preserving vitamins.
8. While cooking rice, use the required amount of water that is absorbed during cooking process.
9. Food should be cooked in such utensils whose lid closes well. Most of the nutrients get destroyed, when you cook food without lid.
10. Food should not be cooked more than requirement because most of the nutrients get destroyed.
11. Use the cooking methods to conserve nutrients present in food.

Come, now let us know about these nutrients, where do we get them from and what are their important functions in our body?

### 5.2.1 Protein

Protein is formed with the combination of carbon, hydrogen, oxygen, nitrogen, phosphorus and sulphur elements.


| Functions of proteins | Source |
|---|---|
| 1. Necessary for the construction of new cells in the body<br>2. Helps to make old and damaged cells healthy.<br>3. Wound healing<br>4. Required for the production of blood enzymes and hormones.<br>5. Provides energy to work. | Animal source: meat, egg, chicken, milk, cheese, curd.<br><br>Plant source: Vegetables, all cultivated cereals, peas, soya bean, peanuts and almonds. |

Proteins obtained from animal source are called animal protein and the proteins obtained from plants are called plant proteins. An adult person needs 1gm of protein per kilogram of body weight.

Can you now assess the amount of protein need for yourself and other members of your family?

**1 gm of protein provides 4 kilo calories.**

### 5.2.2 Carbohydrate

Carbohydrates are the mixture of chemical elements: carbon, hydrogen and oxygen.

**1 gm of carbohydrate generates 4kg/cal.**

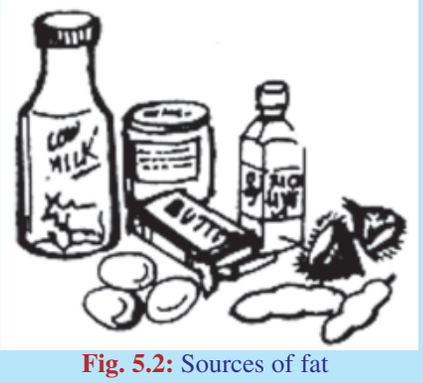
**Fig. 5.1:** Source of carbohydrate

| Functions of carbohydrate | Source |
|---|---|
| 1. Provides energy<br>2. Protein is isolated to perform other important critical functions.<br>3. Increases body weight.<br>4. Makes the food tastier. | Grains like wheat, rice, bajra (millet), Jowar, potato, sweet potato, sweet products like sugar, honey, jaggery. |

Some foods provide carbohydrates in the form of starch such as grains, potato, sweet potato, etc in the body. Whereas some of the food items provide carbohydrates in the form of sugars such as sugar, jam, jaggery, etc. An adult person requires 400-420 gm of carbohydrate per day.

### 5.2.3 Fats

Carbon, hydrogen and oxygen are organic compounds of fat.

| Functions of Fats | Sources |
|---|---|
| 1. Provides energy: Fat is the important source of energy.<br>2. Fat helps in the synthesis of fat soluble vitamins such as vitamins A, D, E and K.<br>3. Helps keep our body warm.<br>4. Makes the food tastier.<br>5. Protects sensitive organs such as heart, liver and provides padding to our skeleton and muscles. | Milk, butter, peanut oil, coconut oil, vegetable oil, egg, liver and meat.<br>  <br>**Fig. 5.2:** Sources of fat |

Just like protein, the fat obtained from living organisms is called animal fat. Fat derived from plants is known as vegetable fat. Animal fat increases the chances of cardiovascular diseases.

**1 gm of fat provides 9 kg of calories.**

Although fats provide more energy than carbohydrates, you consume less fat in a day. In this way fat is the main source of energy in your body. When fat is consumed in excessive quantity, it makes you fat. Due to excessive intake of fatty food the abdomen bulges. A person needs only 20-30gms fat per day.

### 5.2.4 Minerals

Minerals are found in all tissues and fluids of the body. Calcium and phosphorus are found in our bones and teeth. Iron is a mineral which is found in the RBCs in the form of haemoglobin. Minerals are also available in the form of salts in the food.

The two main characteristics of minerals:

(a) Minerals do not provide energy

(b) Minerals are not destroyed when cooking food.

Many minerals are necessary for our body but in this lesson we will only study some of them.

Calcium and phosphorus are called micro and major minerals because they are present in large quantities in the body especially in bones and teeth.

Common functions of minerals are:

1. Maintaining or controlling water balance in the body.
2. Muscle contraction
3. Normal functions of cells
4. Blood clot
5. Normal functioning of nervous system
6. Growth and development of bones and teeth
7. Prevention against nutrition related disease such as Rickets, anemia etc.

## Calcium

### Function

1. Calcium helps in developing your bone and makes it strong.
2. It makes your teeth healthy and strong.

**Fig. 5.3:** Sources of calcium

3. It helps in the clotting of the blood. When you are injured you bleed, you must have noticed that after sometime the blood stops bleeding and a hard layer forms on it which is called a blood clot. Calcium is required for formation of blood clot.

4. It helps in the movement of muscles.

### The Source

1. Milk and milk products such as curd, lassi, cheese, butter and ghee are the best sources of calcium.

2. Green leafy vegetables such as spinach, fenugreek, curry leaf, green coriander are good sources of calcium.

### Iron

It is an important mineral salt. This is needed for the formation of red blood cells in our body.

### Source

Iron element can be found in the followings:

1. Green leafy vegetables like – spinach, mustard, leaves, fenugreek, mint etc.
2. Liver, heart, kidney and egg yolk.
3. Jaggery, rice flakes.
4. Dates and pomegranate.

You should take high amount of iron in your daily diet.

**Fig. 5.4:** Sources of iron

### Iodine

Iodine is important for the good functioning of thyroid gland can perform many functions in our body.

### Sources

(a) Sea food like fish, sea weed.

(b) Crops growing in iodine richs oil.

(c) Iodinized salt (salt rich in iodine).


**Fig. 5.5:** Sources of iodine

## INTEXT QUESTION 5.2

**Choose the correct answers:**

1. Main use of protein in our body:
   (a) Provides energy (b) Growth and development
   (c) makes the food tasty (d) Increases weight
2. Choose the incorrect sentence among the following:
   (a) Calcium increases the taste of the food.
   (b) Calcium makes the bones and teeth strong.
   (c) Milk is a good source of calcium.
   (d) Calcium helps in blood clotting.

### 5.2.5 Vitamins

Vitamins are the substances which are present in very small amount in our daily diet and these substances are very important for the normal functioning of our body. Body does not produce vitamins so, it is necessary to take them in our daily diet. On the basis of their solubility in fat and water, they are divided into two types:

1. Vitamins which are soluble in fats are known as fat soluble vitamins. They are vitamin A, D, E and K.
2. Vitamins which are soluble in water are known as water soluble vitamins. They are vitamin B group and C.

To make the body functioning properly, we need to take small amount of vitamins in our daily diet. Now we will see what vitamin does inside our body and from where we get these vitamins (source):

| Vitamin | Functions | Sources |
|---|---|---|
| A | • Vitamin A is needed to see in dim light i.e Helps in night blindness.<br>• Helps to maintain skin healthy.<br>• For proper growth and development. | Vegetables, fruits (especially yellow coloured), milk, paneer, egg yolk, butter, green leafy vege-tables, liver.  |

| | | |
|---|---|---|
| B complex | • helps in utilizing energy for our body. | Pulses, Wheat, rice etc. |
| C | • Helps in maintaining digestive system healthy.<br>• Every cell of our body needs Vitamin C because it keeps them joint together.<br>• Keep the teeth & bone healthy. | Fruits, leafy vegetable, potato, sprouted chana, guava and amla are its important source.  |
| D | • makes our teeth and bone strong with the help of mineral phosphorus and calcium. | Fish oil, milk, paneer, butter, ghee etc. Formation of vitamin D occur when our skin comes in contact with sun light.   |
| E | • Protect from destroying of the tissue.<br>• It is an antioxidant. | Found in all pulses and grains. |
| K | • Mainly work in blood coagulation. | Green leafy vegetables. |

### 5.2.6 Water

Water is not a nutrient, but is very essential for our body.

1. It is very helpful for our body cells to perform their functions.
2. It is very helpful in digestion and helps in providing nutrients to all the body cells.
3. Water is helpful in maintaining the body temperature. In summers, our body's heat comes out in form of sweating.
4. Water is helpful in expel toxins out in the form of urination. Each person should drink 7 to 8 glasses of water everyday.


### 5.2.7 Dietary Fibre

Dietary fibre is also called Roughage, which are the indigestible carbohydrates present in the food. These fibres are present in the foods from plant origin only. There are many types of fibres- they are water soluble and water insoluble. When the food is processed the fibres, vitamins and minerals also gets destroyed.

Can you think of such kind of foods? Now we will discuss about these. Rice which has brown coat called browny rice. But the rice we eat is white in colour. When rice go on it is through complete process, it destroys the covering on it and the rice becomes white. Fibres and some vitamins also get destroyed during this process. Can you tell some more such examples?

You use wheat flour everyday. Some people make chapattis, after sieving the wheat flour only. This separates grain from flour and flour becomes smooth and clean which is not at all good for health.

In our body, fibres play very important functions, it helps stools/faeces bulky and soft and makes body fresh and light. Fibre foods need to chew for longer period and it provides satiety.

The more intake of fibre food helps from constipation, piles, large intestinal cancer, diabetes and obesity.

### Rich Fibre Diet

1. Whole wheat flour, porridge and mixed grain flour.
2. Fruit like: guava, apple, pineapple and banana.
3. Chana, rajma, Beans and all whole pulses.
4. Vegetables like peas, Beans, carrot and green leafy vegetables.

## 5.3 FOOD GROUPS

You have already learned about nutrients, their function and the source of food from where it is obtained. Now you would like to know about group of foods? On the basis of different type of foods and their functions, they can be divided into three groups which is shown in table given below.

| Function | Nutrients | Foods source |
|---|---|---|
| Energy giving food. | Carbohydrates and fat. | Grain, fat and sugars. |
| Food which help in the development of body. | Protein | Dates, milk, flesh and chicken |
| Food which help in Maintaining and protecting body. | Vitamin and minerals. | Fruits and vegetables. |

Notes



We have large variety of foods available and it is not possible for us to study each and every type of food variety in detail. That is the reason we have divided these foods into groups for easy understanding. These groups are divided on the basis of the nutrients found in food. So let us learn about various food groups.

## Five Foods Group

| Food Groups | Food products | Main nutritional elements |
|---|---|---|
| Cereals and their products | Rice, wheat, maize, bajra, barley, raji, rice, jowar, wheat flour etc. | Carbohydrates, protein, Vitamin B, iron element, fibres. |
| Pulses and legumes | Chana dal, black grous, green gram, lentils, peas, Rajma, Soyabean, Legumes etc. | Carbohydrates, Protein, Vitamin B, Iron, Fibres. |
| Milk, egg and Meat products | Milk, Curd, Butter, Paneer, lassi, chicken, liver, fish, Egg | Protein, Fat, Vitamin B, Calcium, Vitamin A, protein. |
| Fruit and vegetables | Fruit and vegetables like: Mango, guava, tomato, orange, papaya, banana, apple, carrot, watermelon, pumpkin | Vitamin A, C, fibres. |
| | Green leaf vegetables: Bathua, Spinach, Sahajan, Sarso and Fenugreek leaves and fruit like Amla and Pomegranate. | Vitamin A, Calcium, Iron, Fibres |
| | Other vegetables: Brinjal, ladyfinger, Onion, Canliflower, Potato, Capsicum, beans etc. | Carbohydrates and fibres. |
| Fat and Sugars | Fat-butter, ghee, oil, ground nut oil, mustard and coconut oil | Carbohydrate, Fat |
| | Sugars: Sugar jaggery, honey, carbohydrate, fat. | Carbohydrate. |

All types of foods like rice, wheat, raagi, bajra, maize etc. provides some amount of nutrients like carbohydrate, protein, vitamin B, iron element and fibres but all pulses possess good amount of proteins, carbohydrates and Vitamin B. In the same way fruits and vegetables have good amounts of vitamins and minerals. In milk, egg and meat excess amounts are present. That is the reason if we eat food items in replace of other foods from the same group we get almost same amount of nutrients from them. To get more knowledge we need to learn more about food groups.


## INTEXT QUESTIONS 5.3

1. Among the following which one is fat soluble vitamins:

   (a) Vitamin A (b) Vitamin B

   (c) Vitamin C (d) Vitamin D

2. Write down the related vitamins corresponding to food items

   1. Amla ( )
   2. Carrot ( )
   3. Grains ( )
   4. Egg ( )
   5. Fish oil ( )
   6. Green leafy vegetables ( )
   7. Sprouted pulses ( )
   8. Skin exposure to sun rays ( )
   9. Milk ( )
   10. Butter ( )
   11. Bottle gourd (Louki) ( )
   12. Liver ( )

3. Fill in the blanks:

   (a) Vitamin D is produced in the presence of ..... with the help of .....

   (b) The main function of Vitamin A is to keep ..... healthy.

   (c) To keep teeth and gums healthy, we need to take ..... regularly.

   (d) ..... is the vitamin which enhances our appetite.

4. True or false

   1. Fibre is not important in our food. ( )
   2. Banana is a rich source of fibre ( )

3. Before eating the apple we should peel off it's outer layer. ( )
4. Fibres help in preventing cancers. ( )
5. Eating fibre leads to obesity. ( )
6. In tomatoes and grapes we find fibres. ( )
7. Fibres help in increasing bulk of food. ( )
8. If you are not taking fibre then you may lose your weight. ( )

## 5.4 BALANCE DIET

Now you are aware about various food groups. Let us now discuss about the balanced diet. If we include foods from each of the five food groups in our daily diet, then we get required amount of nutrition to our body. This is known as Balanced diet.

The balanced diet is one which has nutritional aspects in sufficient quantity, essential for our body. Some of the nutritional aspects even get stored in our body so that when the food intake is minimum for a shorter period, the body utilizes the stored nutrients.

### 5.4.1 Food Pyramid

In order to select the food type from various food groups, a food pyramid is designed. The pyramid clearly shows that in order to obtain good health, we should


**Fig. 5.9:** Food Pyramid


choose food from each of the five food groups. At the same time, the pyramid also tells us that food category shown at the top of the pyramid, containing fat and sugar should be consumed in less as compared to grains and pulses shown at the lower base of the pyramid.

The food pyramid not only helps us in attaining good health, but also makes it easy to select options and design food plan for a balanced diet.

Using the food pyramid, evaluate the food intake of your family and check whether you are consuming a balanced diet or not. Can you feel the earnest efforts by your parents to provide you a balanced diet? In order to provide you a balanced diet, they plan, buy, prepare, and cook food items from each of the food group.

### 5.4.2 Nutritional requirements

Each individual's nutritional requirements depend on various factors such as age, gender, level of physical activity, metabolic rate, and state of health. For example, a player who burns abundant calories, and a retired pensioner living an easy and comfortable life, both are on opposite planes of energy consumption but both need the balanced diet to maintain a sound health. From age 1 to age 20, our kids experience various changes. Their muscles get strengthened, there is 3 times increase in bone height, and weight increases by 10 times.

Calories requirement in children varies - At the age of 1, a child needs 1200 Kcal every day, whereas at the age 5, everyday 1600K cal is needed. At the age of 16, girls need 2100 k cal, while boys need 2700 k cal every day.

### INTEXT QUESTIONS 5.4

1. What do you understand by the balanced diet?

   .....

   .....

   .....

2. Prepare a list of any four factors on which individual's nutritional requirements are based on?

   .....

   .....

   .....

## 5.5 LACK OF NUTRIENTS

Sometimes people take excessive food, but taking inadequate amount of the balanced diet may increase chances of malnutrition. Imbalanced diet leads to weight gain and even obesity. It even increases chances of high blood pressure, diabetes, heart related ailments, and arthritis, not only in adults but also children.

### Malnutrition

Lack of appropriate quantity of essential nutrients and their improper use, leads to disease related to malnutrition. At first the stored nutrients in our body gets exhausted then the state of malnutrition exists. This state of lack of nutrients can lasts even for weeks. Children are more prone to malnutrition. Common diseases arising due to malnutrition – Protein energy malnutrition (PEM) are Marasmus, Kwashiorkor and Anemia.

### Protein energy Malnutrition

Lack of energy and protein during childhood phase is a worldwide problem. Due to this, kwashiorkor and marasmus arises. In children from low income group, this is commonly seen.

### Kwashiorkor

Its meaning is 'disease of displaced child' - because it is oftenly seen after weaning. Normally it occurs in child when feeding mother becomes pregnant and unable to feed her baby due to lack of nutrients in breast milk. In this period if children are not fed with proper weaning food, i.e., if appropriate amounts of proteins are not given to the child, it leads to delay in growth and development. It usually presents in 1-3 years of age.

**Fig. 5.10:** Child with kwashiorkor disease

### Symptoms

- Main symptom in kwashiorkor is delayed development.
- Loss of appetite, digestive problems, nausea and diarrhoea.
- Hair changes and skin changes, flaky paint dermatosis where skin layers gets removed unevenly.
- Oedema in legs, face and hands is commonly seen.
- Structural and functional changes in the abdomen
- Electrolyte imbalances and reduced hemoglobin is usually seen
- Because of improper management mortality rate of this children is more.

### Marasmus

This disorder occurs due to deficiency in proteins and calories in the diet.

### Symptoms

- Weight loss or unable to gain weight and gradual loss of energy.
- Wastage of muscles and sub cutaneous fat is clearly seen
- Children appears to be like old age persons
- Pigeon shape chest
- Body temperature is abnormal
- Frequent episodes of diarrhoea/loose motions.

**Fig. 5.11:** Child with marasmus disease

Notes



## Dietary intervention

Kwashiorkor and Marasmus are usually seen in children from low income group families. To prevent or cure these kinds of children, substantial amount of carbohydrates, proteins and fats should be given in their diet.

1. The protein mixture - Soyabean, ground nuts, kapaas seeds should be given to child.
2. Food fortified with calories, proteins, vitamins and minerals in liquid base is highly beneficial for children.
3. Milk with ground nut powder, different beans powder, fish, liver, red meat soup can be used. Apart from this raagi halwa, wheat kheer, idli, dosa, sweet potato, potato, porridge, chana laddoo, soup made with green leafy vegetables, powder of sprouted grains, black chana etc foods can be given.

## Anemia

Anemia is a condition in which the percentage of hemoglobin in the blood decreases. For synthesis of red blood cells, one need specific elements in our body like iron, protein, vitamin B12, folic acid, vitamin C, copper etc. Decrease in any of these elements leads to low haemoglobin concentration in blood.

Haemoglobin is specific protein element which carries oxygen to every cell of the body through blood. If this becomes low then oxygen concentration will be decreased in the body.

## Causes

- Decrease in iron levels and haemoglobin is usually seen in girls in puberty and adolescent phase. In completely milk feeding babies also, haemoglobin is low because the amount of iron is low in milk.
- Anemia is likely to occur in conditions like bleeding piles, ulcers, increase in menstrual flow, injury etc.
- Childhood phase, adolescent phase, pregnant women and breastfeeding women, because of demand for growth and development one can see low haemoglobin in them.
- Anemia due to Folic acid deficiency and Anemia due to vit B12 deficiency are less common than iron deficiency anemia.


### Foods useful in this condition

After knowing the condition of Anemia, one should consult a doctor and under their supervision they have to start iron, folic acid, Vit B12 either in tablet form or in injectable form whichever is required. In this condition, one should adopt balanced diet. Eat red meat, chicken, fish, green leafy vegetables like spinach, methi, amaranthus etc. Liver is rich source of iron. Tannins present in the tea will absorb iron so one should not drink tea with iron rich foods. Our body absorbs more iron with non- vegetarian source foods like meat, fish, etc than with vegetarian foods. If vitamin C rich foods are added with Non vegetarian foods the iron absorption will be more. Breakfast rich with grains are good source of iron.

## INTEXT QUESTIONS 5.5

1. Write down the signs and symptoms of Kwashiorkor?

   .....

   .....

   .....

2. Write down any four symptoms/signs of Marasmus?

   .....

   .....

   .....

## WHAT YOU HAVE LEARNT

In this lesson you have learnt about meaning of food, nutrition, nutrition elements, and different nutritional elements, their source and functions. All nutrients are essential and they perform functions coordinating with each other. That is the reason if any one element is not present it may lead to disease or sometimes may leads to death.

Apart from this, you have also learned about the concept of balanced diet, balanced diet with respect to different age group. Now you can able to understand the importance of balanced diet in defensive mechanism to fight against diseases and

to prevent diseases. Our diet should be rich in all essential elements which are necessary for protection of our body.

At the last we have learnt about diseases related to decrease in nutrients in the body. We come to a conclusion that to keep our body's strength and vigor, we need to take balanced food rich in all essential elements.

## TERMINAL QUESTIONS

1. Write down different nutritional elements and its source?
2. What is balanced diet?
3. Compare the signs and symptoms of kwashiorkor and marasmus?

## ANSWERS TO INTEXT QUESTIONS

### 5.1

1. The word 'Food' denotes the substance that we eat as well as that nourishes our body. They may be solid, semisolid and liquid in nature. Similarly for any substance to be called as food, it should have two important characteristic -
   - That substance should be eatable.
   - That substance should nourish our body
2. **Functions of Food**

   There are mainly three function of food.
   - Physiological Function
   - Psychological Function
   - Social Function

### 5.2

1. (b) 2. (a)


## 5.3

1. (a) and (d)

2. 1. Vit C 2. Vit A 3. Vit B and E
   4. Vit A 5. Vit A and D 6. Vit A
   7. Vit C 8. Vit D 9. Vit A and D
   10. Vit A 11. Vit A 12. Vit A D and K

3. (a) sunrays (b) Eyes (c) Vitamin C
   (d) Vitamin B

4. 1. False 2. False 3. False
   4. True 5. False 6. True
   7. True 8. False

## 5.4

1. The balanced diet is one which has nutritional aspects in adequate quantity, essential for our body.

2. Age, gender, level of physical activity, metabolic rate

## 5.5

1. Kwashiorkar -Signs and symptoms:
   - Main sign and symptom in kwashiorkor is delayed development.
   - Loss of appetite, digestive problems, nausea and diarrhea.
   - Hair changes and skin changes, flaky paint dermatosis where skin layers gets removed
   - Oedema in legs, face and hands in commonly seen.
   - Structural and functional changes in the abdomen
   - Electrolyte imbalances and reduced haemoglobin is usually seen
   - Because of improper management mortality rate of this children is more.

Notes



2. Marasmus - Signs and symptoms:

- Weight loss or unable to gain weight and gradual loss of energy.
- Wastage of muscles and sub cutaneous fat is clearly seen
- Children appears to be like old age persons
- Pigeon shape chest
- Body temperature is abnormal
- Frequent episodes of diarrhea/loose motions.

## DO THE FOLLOWING ACTIVITY

Show the students actual food items and ask them to find out nutritional elements in them:

| S.No | Food item shown to students | Identifying nutritional elements by students |
|---|---|---|
| 1. | Milk | Example: Protein |
| 2. | Wheat | ..... |
| 3. | Orange | ..... |
| 4. | Egg | ..... |
| 5. | Carrot | ..... |
| 6. | Yav-barley | ..... |

# 6

# YOGA AND HEALTH

Till now we have studied about our body, health, the factors affecting our health and hygiene. We have understood how these factors affect our health. Exercise is very important to keep ourselves fit. It keeps our bones, muscles, joints and nervous system strong, flexible and healthy.

Practice of yoga makes our body healthy from inside and also keeps the mind calm. Its regular practice protects us from many diseases. It is an art of living a healthy life and also creates a balance between mind and body. Since ancient times it has been a part of our daily lifestyle. We will discuss about yoga, its importance in our lives, various steps of ashtanga yoga and some important yogasanas and pranayamas.

## OBJECTIVES

After studying this lesson, you will be able to:

- understand the meaning of yoga and its importance;
- describe various steps of ashtanga yoga;
- describe the medical importance of different yogasanas;
- explain methods of different pranayamas.

## 6.1 WHAT IS YOGA?

Whenever there is a discussion about yoga then suddenly we start visualizing saffron clad saints. Same people think that yoga is the subject of Saints or Sages and others take it as miracle or supernatural power.

Notes



Generally few yoga poses and pranayam are considered as yoga but these are misconceptions, let us now try to understand what exactly yoga is?

Yoga is an art of living healthy life which creates harmony between mind and body. Yoga is considered very significant according to Indian traditional Knowledge and values. Since the ancient times in India, Yoga has been an integral part of our lifestyle.

Today Yoga is attracting everybody from all around the world.

Maharshi Patanjali has mentioned in his yoga book 'Pantanjali Yog Sutra' that **'तदा द्रष्टुः स्वरूपेऽवस्थानम्'** which means that the main aim of human life is to maintain one's original self and it is also the goal of yoga. The knowledge of yoga explains the meaning of our existence. The meaning of the word 'Yoga' is very broad and extensive. According the Shastras it has many meanings. The General Meaning of Yoga is to 'Unite'. In Sanskrit, the origin of the word yoga is from /A (Yuj) Dhatu. which means uniting us with ourselves i.e. ' Yoga means uniting body with mind, mind with soul and soul with God.'

According to various scholars 'Yoga' word has many meanings or definitions.

Maharshi PatanJali, 'the great yoga inspirer, has started the introduction of yoga with **'अथ योगानुशासनम ( पा.यो.द.1/1 )** which means let us begin the' yoga Vishay shashtr' or discipline of yoga. This means that Maharshi Patanjali has also considered that 'Yoga is the science of discipline.'

**'Yoga is the science of discipline which helps in all round development of body, mind and soul.'**

Yoga is also a spiritual subject which establishes harmony between body and mind. Yoga is an art of living healthy life which helps in both physical and spiritual growth.

There are evidences in Sindhu Saraswati Valley civilization which has history since 2700 BC. Upnishad, Mahabharata and Shrimad Bhagwad Geeta have mentioned Yoga in lots of places.

Shrimad Bhagwad Geeta has illustration of Gyan yoga, Bhakti yoga, Karma Yoga and Raj yoga.


## Definition of Yoga

1. Maharshi Patanjali defined yoga as **'योगाश्चित्तवृत्ति निरोधः' ( पा.यो.द.1/2 )**

   It means prevention of Vrutti of Chitta (Mind). There is always a feeling that our mind mostly remains unstable. This instability in our mind is due to our restless behavior. Vrutti means our behavior. The way we behave with situations or things is our vrutti. The vision of good or nice things develops a feeling of attachment which is a natural phenomenon. This is called unhealthy behavior. And just opposite of it when see bad things happening, feeling bad about it is natural. This is called malicious behavior.

   Every moment now and then, there are ranges of emotions going on inside our head.

   The behavior we develop towards things is due to our previous samskaras and the vishayas (subtle senses) which we are acquiring at present.

   Now the question arises that what are Vishayas ?

   Subtle senses (Vishayas) – are 5 in number – Rasa, Gandha, Sparsha, Shabda and Rupa.

   Kama (lust), krodha (Anger), Lobha (greed), Moha (attachment), Ahankar (Arrogance) and Irshya (jealousy) come under these vishayas. We need continuous practice to stop these vruttis to wander around in order to remove fluctuations of mind. Yoga means that these vruttis come to a state of complete tranquility. This is called **'योग चित्तवृत्ति निरोध'**

2. **'योगः कर्मसु कौशलम।' ( गी 2/50 )** - It means that doing work with efficiency is 'yoga'.

   Lord Krishna has defined Yoga in Bhagwad Geeta that the work must be done so accurately that nothing else is left to do.

   This definition implies that the main intention of Karma is doing good in society. Stealing things, being Jealous, unfair etc. doesn't come under this definition.

3. **'समत्व योग उच्यते।' ( गीता 2/48 )** It means - The state of equality is Yoga

   Lord Krishna stated in Shreemad Bhagwad Geeta, that yoga is a state of equality.

   Generally we have seen that in certain situations we become so happy that we develop ego because of which we change our behavior also. Similarly

in adverse situations we become so sad and hopeless that we start feeling inferior form others. And in both conditions we are unable to control ourselves and become emotional.

In both these favourable and unfavourable conditions one should maintain their peace of mind remain calm and achieve their goal. This is called **'समत्व'** – the state of equality.

### 6.1.1 Importance of Yoga

Exercise is very important to maintain our normal health. The main reason of being unhealthy is lack of exercise and weakness in our body. Exercise improves blood circulation in our body and remove toxins from our blood.

There are many types of exercises like – Aerobics, stretching exercises, yoga asana etc.

Aerobic exercise means inhaling lots and lots of oxygen for e.g: walking, swimming, cycling, running etc. Stretching exercises not only help in relaxation and contraction of muscles but also provide massage to various body parts and glands also. Strengthening and physical exercises are also helpful in maintaining good health.

The most important exercises for muscles and joints is yogasanas.

Yogasana results in peace of mind and a healthy body. This also relieves mental pressure and stress.

## INTEXT QUESTIONS 6.1

**Fill in the blanks below:**

1. The meaning of Yoga is .....
2. ..... **'कर्मसु कौशलम'** (karma sukoushalam)
3. According to Maharishi Patanjali yoga is..... of chitta vruttis.
4. Samatva is.....

## 6.2 ASTHANG YOGA

Astanga yoga is mentioned in Yoga Darshan by Maharshi Patanjali. It is a very important darshan in which all the 8 limbs of Yog Darshan are explained


**'यम नियमासन प्राणायाम प्रत्याहार धारणा ध्यान समाधयोंः ऽष्टावड गनि॥' ( यो.द. 2/29 )**
Yam, Niyam, Asana, Pranayam, Pratyahar, Dharna, Dhyan and Samadhi – These are 8 fundamental paths of yoga. This sutra marks the beginning of Raj yoga.

### 6.2.1 Yam (यम)

The first step of Astang yoga is yam.

**'यम'** means control and discipline. 'yam' is also known as 'Mahavrat'

The word Vrat means the resolution taken as oath or vow.

Yam are 5 in number:

**अहिंसासत्यास्तेयब्रहमचर्यापरिग्रहा यमाः॥ ( पा. यो.द. 2/30 )**

These are:

1. Ahimsa – Non-Violence
2. Satya - Truth
3. Asteya – Non-stealing
4. Brahamacharya – Celibacy
5. Aparigraha – Renunciation

#### 6.2.1.1 अहिंसा (Ahimsa) – Non-Violence

Non-violence means not harming anybody by means of mind, speech or action. Loving everyone, not killing animals, not hurting others, not hating anyone and not harming others in any form are the traits of Non- violence.

#### 6.2.1.2 सत्य (Satya) – Truth

The seeker who walks in the path of truth, speaks of truth and only truth. Truth is deciding things with intelligence, then revealed with speech and lastly expressed with behavior. Truth is expressing oneself as decided by the mind, with good intensions, without any discrimination and conveyed in a polite manner.

#### 6.2.1.3 अस्तेय (Asteya) – Non-stealing

Asteya means not stealing, taking or snatching anybody's right by mind, speech and body in any way.

### 6.2.1.4 (Brahmacharya (celibacy)

**ब्रह्मचर्य = ब्रह्म + चर्य**

Brahamcharya means on the path of Brahma

But its practical meaning is – To abstain from all vishayas.

In yoga it refers to lifestyle characterized by abstinence and maintain purity of body, mind and senses.

### 6.2.1.5 Aparigrah

Aparigrah means non-attachment, non-possessiveness and non-greediness.

Mainly it means not having any indulgence related to the senses i.e. shabda, sparsha, Rupa, Rasa, Gandha. Seeker of Truth and non – violence practitioner cannot do parigraha.

## 6.2.2 Niyam – Rule

Next step after Yam is Niyam.

It is used for purification of self by conduct and discipline. Under these rules we will see how we should treat ourselves.

Niyam are 5:

**शौचसंतोषतपः स्वाधयायेश्वरप्राणिधानानि नियमाः॥ ( पा. योग.द.2/32 )**

1. शौच (Sanctity)
2. संतोष (Satisfaction)
3. तप (Austerity)
4. स्वाधयाय (Self-study)
5. ईश्वर–प्राणिधान (Ishwar Pranidhan)

### 6.2.2.1 शौच ( पवित्रता ) Sanctity

It means sanctity and purity.

It is divided into 2 parts – 1. External purification
2. Internal purification


1. **External purification**: External objects, external environment, our body and lifestyle comes under external purification. Physical cleanliness means keeping ourselves free from disorders, keeping all organs healthy and strong, having simple and healthy diet, and eliminating all the toxins out from the body.

2. **Internal purification**: Internal purification is also important which we ignore in day to day life. Internal purification means 'cleanliness of mind'. We must not have the feelings of jealousy or grudge against others. We must not become selfish. Internal purification comes from avoiding ego, hatred, grudge, jealousy, fear etc.

### 6.2.2.2 संतोष – Satisfaction

**संप्तोषादनुत्तमः सुखलाभः। ( पा. योग. द. 2/42 )**

The happiness that comes from satisfaction is the best happiness. This happiness is equal to salvation pleasure. When someone is happy or satisfied in happy – sad, profit – loss, success-failure, accomplished – unaccomplished, friendly-unfriendly situations he is supposed to have acquired 'Santosh'. Our life should not be filled with greed or attachments but full of eternal satisfaction. A poet has said –

**गोधन, गज धन, बाजिधन, और रतन धन खान।**
**जब आवे संतोष धन, सब धन धूरि समान।।**

### 6.2.2.3 तप – Austerity

'तप' is keeping the mind and senses balanced by following religion and keeping fasts etc. 'तप' is also respecting great men, elders, scholars, etc. keeping purity and simplicity, following celibacy, being truthful and Non-violent is also called tapa.

### 6.2.2.4 स्वाधयाय – Self-study

Adopting the practice of 'स्वाधयाय' in daily life a person is able to understand and know oneself.

### 6.2.2.5 ईश्वर-प्रणिधाान – Ishwar Pranidhan

ईश्वर-प्रणिधाान Means to surrender to God.

The karma of a person done by mind, body and speech is surrendered to the God himself is known as ईश्वर-प्रणिधाान।

Notes



### 6.2.3 आसन ( Asana) – Postures

Asana is the condition or posture of body in which one gets stability and happiness.

'स्थिरसुखमासनम्।' ( पा. योग.द. 2/46 )

Asana is a special type of physical posture that gives stability to the mind and body through stable stretching exercises. One should do 1 Asana for atleast 3 hours or one prahar which is also known as 'Asana siddhi'.

Asanas have 2 fundamental principles

1. Stability
2. Happiness

This means that the effects of asanas are not only physical but also psychological. Every posture must be done smoothly with ease according to person's ability. Yoga is extremely useful for physical, mental and spiritual health benefits.

#### Benefits of Asanas

- Yogasana helps in the exercise of whole body including muscles.
- The body becomes healthy and beautiful
- The lungs become healthy and strong.
- The regular habit of exercise helps in smooth blood circulation.
- It gives energy to the body resulting in stress free, disease free, painless life style.

### 6.2.4 प्राणायाम Pranayama

Pranayama is an art of breathing.

- 'Prana' means life, Respiration, energy and power
- 'Ayam' means expansion, spread, regulation, prolongation, self control and Control
- 'Pranayama' means the practice of breath control.

Maharshi Patanjali has specifically defined pranayama as the practice of breath control i.e. controlling the process of inhalation and exhalation.

तस्मिन् सतिश्वासप्रश्वासयोर्गतिविच्छेदः प्राणायामः। ( पा. योग दर्शन 2/49 )


This means that after a person has acquired a certain posture or asana, then controls his respiration with Pranayam.

With reference to pranayama, ancient book **'घेरण्ड संहिता'** has mentioned

**सहितः सूर्यभेदश्च उज्जायी शीतली तथा।**
**भस्त्रिका, भ्रामरी मूर्छा केवली, चाष्टकुम्भ काः॥ के.स.**

This way 8 types of प्राणायाम (Pranayama) are mentioned

1. नाड़ी शोधान प्राणायाम (Nadi shodhan pranayama)
2. सूर्यभेदी प्राणायाम (Surya bhedhi pranayama)
3. उज्जाई प्राणायाम (Ujjayi pranayama)
4. सीतकारी प्राणायाम ( Shitkari pranayama)
5. शीतली प्राणायाम (Shitali pranayama)
6. भस्त्रिका प्राणायाम (Bhastrika pranayama)
7. भ्रामरी प्राणायाम (Bhramari pranayama)
8. प्लावनी प्राणायाम (Plawani pranayama)

### 6.2.5 प्रत्याहार (Pratyahar) Control of Senses

Distracting oneself from the senses and concentrating or focusing on one point is known as Pratyahar. We can also say that:

Pratyahar is merging of senses in the mind so that one gets control over the senses. It requires regular practice of pratyahar to get full control of the senses.

### 6.2.6 धारणा (Dharana) Concentration

**देशबंधाश्चित्तस्य धारणा। ( पा. योग द. 3/1 )**

Concentrating or focusing of mind in one place is called **'धारणा'** (concentration or single focus). Focusing mind outside or inside the body. Outside body can be god, or any material etc. Inside body can be a body part. etc.

### 6.2.7 ध्यान (Dhyana) Medication

**तत्र प्रत्ययैकलानता ध्यानम्। ( पा. यो.द.3/2 )**

Continuous focus of mind at one place or doing a particular work is called ध्यान. Dhyana is uninterrupted train of thought or in simple words it is a process of continuous concentration.

### 6.2.8 समाधि (Samadhi)

तदेवार्थमात्रनिर्भासं स्वरुपशून्यमिव समाधिः॥ ( पा. योग द. 3/3 )

When continuous and repeated dhyana of particular thing makes the seeker forget everything else it results in 'Samadhi' समाधि.

## INTEXT QUESTIONS 6.2

1. Write the names of 8 parts of Ashtanga Yoga?

   .....

   .....

   .....

2. How many 'Niyams' are there ? Write their names in proper order.

   .....

   .....

   .....

3. What do you understand by 'Brahmacharya'?

   .....

   .....

   .....

4. What is the meaning of 'Ishwar Pranidhan'?

   .....

   .....

   .....

## 6.3 YOGASAN AND INITIAL PRACTICES

It is necessary to follow the yama and the niyama before practicing yogasana.

We have to regulate our conduct, behavior, thoughts and feelings. It is also necessary to refine the brain and body. In order to get full benefit of yoga, one must


practice it regularly because Yoga is a scientific system and that's why it is necessary to do it in a specific way.

If Aasan, Pranayam, Bandha and Mudra are not done following proper procedures we will not get satisfactory results.

### 6.3.1 Principles (Siddhant) of Yogaabhyasa

It is compulsory to understand the principles related to its practice to get the full benefits of Yoga.

#### 1. Time

- The right time to do yoga is early in the morning before taking breakfast and also in the evening on an empty stomach.
- After 3-4 hours of eating food.
- Yoga should be done at the same time each day.

#### 2. Place

- Yoga must be done on the floor, not on bed or bench
- Yoga mat, carpet, sheet etc should be used at home.
- Place where yoga is done should be clean and ventilated.

#### 3. Clothes

- Clothes must be loose, light and comfortable.
- Yoga must be done with minimum clothes on.

#### 4. Environment

- Clean and calm environment.
- There must be no conversations, mental activity or music in the background.

#### 5. Respiration

- Breathing must always be through the nose.

#### 6. Yoga practice

- Yoga practice must be done according to your body's capacity.

It must be done as much as you can do easily.

Notes



### 6.3.2 Important Yogasanas

Acharya Gherand has mentioned about asanas:

आसनानि समस्तानि यावन्तो जीव-जन्तवः।
चतुरशीति लक्षानि शिवेनाभिहिलानि च॥
तेषां मध्ये विशिष्टानि षोडशोनं शतं कृतम।
तेषां मध्ये मर्त्यलोके द्वात्रिंशदासन शुभम॥

It means number of yonis of organisms is equal to the number of asanas. Jeev yoni are numbered 84 Lakhs so Asanas are also 84 lakhs in number. Out of these 84 asanas are considered as main or important. Yogasanas can be divided under these categories

#### 1. Aasanas done in sitting position

Siddhasana, Padmasana, Vajrasana, Simhasana, Gomukhasana, Swastikasana, Hanumanasana, Matsyendraasana, Paschimottasana, Ushtraasana, Kukkutasana, etc.

#### 2. Asanas done in standing position

Garudasana, Tadasana, Vrikshasana, Pad-Drushtmottanasna, Natrajasana, Chandrasana, Utkatasana, etc.

#### 3. Asanas done in supine position

Uttanapadasana, Sarvangasana, Halasan, Karnapeedasana, Baal Garbhasana, etc.

#### 4. Asanas done in prone position

Bhujangasana, Dhanurasana, Makarasana, Shalabhasana etc.

#### 5. Asana done by forward bending

Paschimottanasana, Padahastasana,etc.

#### 6. Asanas done in twisting position –

Katichakrasana, Trikonasana, Tiryak tadasana

#### 7. Asanas done while balancing

Vrikshasana, Garudasana, Tadasana, Mayurasana & Kukkutasana.

## 1. Tadasana

Fig. 6.1

### Procedure

- Stand erect with your feet together, interlock fingers of hands and lift them up above your head.
- Now breathe in and stretch your shoulders, arms, and chest upwards. Raise your heels, making sure your body weight is on your toes.
- Feel the stretch in your body right from your feet to your head. Hold the pose for a few seconds. Then exhale and release. Repeat the asana 5 times.

## 2. Kati Chakrasana (Spinal twist yoga pose)

Fig. 6.2

### Procedure

- Start in samastithi standing with your feet and shoulder wide apart and your weight spread evenly.
- Inhale, raise the arms to the shoulder level.
- Exhale, bring the left hand on the right shoulder, and wrap the right arm around the back, bringing the hand around to the left side of the waist.
- Look over the right shoulder.
- Keep the neck straight as if the top of the spine is a fixed point around which the head turns.
- Hold the position for 2 seconds and inhale, and come to the starting position.
- Repeat on the other side. This will be one round.
- Practice the same for 5-10 rounds.

### Benefits

- Tones the neck, shoulder, waist, back and hips.
- Useful for correcting back stiffness and postural problems.
- The twisting movement induces a feeling of lightness and may be used to relieve physical and mental tension at any time during the day.

## 3. Padmasana (Lotus Pose)

Fig. 6.3

### Procedure

- Sit on the floor and stretch the legs
- Now hold the right leg in both the hands, fold the leg slowly and place it on the left thigh.
- Make sure that the feet touches the navel
- Likewise fold the left leg, hold it with both the hands and place it on the right thigh close to the other
- At this point both the knees should touch the floor and the feet should face upwards.

The spinal cord should be kept straight.

### Benefits

- It calms the brain
- Stretches the ankles and knees.
- It destroys all diseases and awakens kundalini chakra.
- It destroys the stiffness of joints.

### 4. Vajrasana (Thunder bolt Pose)

Fig. 6.4

### Procedure

- Bend your knees and sit on your buttocks
- The sides of your soles should be close together.

- Interlock your big toes.
- Maintain your posture so that your spine and neck are absolutely straight.
- Place your palms on your knees and relax your shoulders.
- Balance your body in this position while taking deep and regular breathes.
- Keep your spine straight
- Keep your eyes open and breathe normally.

### Benefits

- Improves digestion
- Helps in combating constipation and other stomach related disorders like acidity etc.
- It is the best back strengthening yogasana
- Tones the muscles of the hips, thighs and calf muscles.
- Acts as a pain killer for individuals suffering from arthritis.

**Note:** It is the only asana (pose) than can be done after a meal as it promotes digestion.

### 5. Shashankasana (The Hare pose)

Fig. 6.5

### Procedure

- Sit in Vajrasana
- While inhaling, Keep the arms straight and raise them parallel to the thighs and take them above the head with shoulders wide apart from each other.
- While exhaling lower your body starting from the trunk, back and head to ground while keeping the arms straight.

- In final position of shashankasana or Rabbit/Hare Pose the hands and forehead will touch the ground in front of the knees.
- Try to remain in this position while retaining the breath for 5 to 10 seconds if you are doing it for the first time
- Return to the original position slowly by raising the arms above the head while inhaling and keep the head and spine straight
- Now, bring the arms down on thighs with hands before the knees
- Repeat the asana 5-6 times.

### Benefits

- Helps in relieving constipation if practiced regularly.
- It regulates anger and strengthens the nervous system
- Enhances concentration and digestion
- Strengthens the spine by stretching the back muscles

### Precautions

- Avoid in High BP, cardio vascular disease.
- Avoid in slipped disc
- Avoid in osteoarthritis, neck and spine/back injuries

### 6. Gomukhasana (Cow Face Pose)

Fig. 6.6

### Procedure

- Sit in sukhasana or Dandasana
- Now keep the ankle of the left leg near the right hip.
- Cross the right leg above the left thigh, so that both the knees are above each other.
- Now take the left hand behind the back and move the palm upwards.
- Take the right hand straight up on the right shoulder, bend the elbow and bring it to the back of your neck. Clasp the hands behind your back.
- Keep the body straight and breathe evenly.
- Release and change the pose with left leg and hand on top.

### Benefits

- Gomukhasana helps to make the back flexible
- It can remove stiffness of shoulders and back pain
- It helps in treatment of sciatica
- It stimulates the kidney and can help those suffering from diabetes
- Beneficial for lung disorders
- Cures Knee disorders.

### 7. Ushtrasana (Camel Pose)

Fig. 6.7

### Procedure

- Kneel on the Yoga mat and place your hands on the hips.
- Your knees should be in line with the shoulders and soles of your feet should be facing the ceiling.
- Inhale, arch your back and slide your palms over your heels till the arms are straight.
- Do not strain or flex your neck but keep it in a neutral position.
- Stay in this posture for a couple of breaths
- Breathe out and slowly come back to the initial pose. Withdraw your hands and bring them back to your hips as you straighten up.

### Benefits

- Improves eyesight and digestion.
- Relieves the body of lower back ache.
- Improves flexibility of spine and also improves posture.

### Precautions

People suffering from Back injury, Neck injury, High BP, Hernia and Cardiac ailments should not perform this asana.

## 8. Ardha Matsyendrasana (Half Spinal Twist Pose)


Fig. 6.8

### Procedure

- Sit up with the legs stretched out straight in front of you. Keep the feet together and spine erect.
- Bend the left leg and place the heel of the left foot beside the right hip. You can also keep the left leg straight if you want.
- Take the right leg over the left knee.
- Place the left hand on the right knee and take the right hand behind you
- Twist the waist, shoulders and neck to the right and look over the right shoulder.
- Keep the spine erect.
- Hold and continue with gentle long breaths in and out.
- Repeat on the other side.

Benefits

- Makes spine supple
- Very useful in Diabetic patients.
- Increases the elasticity of spine
- Opens the chest and increases the oxygen supply to the lungs.
- It helps to cure slipped disc.

## 9. Paschimottanasana (Seated forward Bend)


Fig. 6.9

### Procedure

- Sit erect, with your legs stretched out in front of you. Make sure that your toes are flexed towards you.

- Inhale and raise your arms above your head.
- Exhale and bend forward. Feel the fold from your hip joints. Your chin should move towards your toes.
- Stretch out your arms, and let them reach your toes. But make sure that you don't stretch too far.Grab your toes and bend your head to touch your legs. Breathe and maintain this position for sometime.
- Inhale, release the position and then lifting your head slightly, come back to normal position.
- Exhale and lower your arms.
- Repeat this a few times.

### Benefits

- Stretches the back and strengthens it.
- Strengthens the digestive system.
- It acts as a stress reliever.
- Removes anxiety, anger and irritability.
- Calms the mind.

### 10. Shavasana (Corpse Pose)

Fig. 6.10

### Procedure

- Lie flat on your back.Place legs comfortably apart.
- Keep your hands on your side with palms open and facing upwards.

- Close your eyes and breathe deeply and slowly through the nose.
- Start focusing on each part of your body starting from your toes.
- Take slow and deep breaths.Relax completely.
- After about 15 minutes roll to one side and sit up.

### Benefits

- Relaxes your whole body.
- Release stress, fatigue, depression and tension.
- Relaxes muscles.
- Cures insomnia, High BP, constipation, diabetes, indigestion

### 11. Uttanapadasana (Raised leg Pose)

Fig. 6.11

### Procedure

- Lie flat on back, keeping the feet together. Your hands should be on the sides with palms facing downwards. Breathe normally.
- Stretch the back and on exhalation, lift the legs to $45^{o}$ or $50^{o}$ from the floor.
- Lift the arms, bringing them parallel to the floor. Both legs and arms should be straight. Remain in this position for 2 to 3 breaths.
- Breathe out and lower your legs to the floor and relax.

### Benefits

- It is beneficial for those suffering from diabetes, constipation, indigestion and nervous weakness.


## 12. Ardha Halasana (Half Plough pose)

Fig. 6.12

### Procedure

- Lie down in shavasana (supine position)
- Join the legs and keep your hands on both sides of your body.
- Slowly breathe in and raise the legs perpendicular to the ground keeping the knees straight.
- Hold and stay in this position for as long as possible.
- Breathe out and lower your legs slowly to the ground.
- After coming back to the normal position, relax for a while.
- Repeat 3-5 times.

### Benefits

- Improves digestion and appetite
- Improves blood circulation
- Cures indigestion, constipation, obesity and urinary disorders.

### Precautions

- People with cardiac problem, back pain and high BP should avoid this asana.

## 13. Sarvangasana (Shoulder stand pose)


Fig. 6.13

### Procedure

- Lie down in the supine position.Exhale.
- Raise your legs slowly upward and bring it to $90^{o}$ from the floor.
- Bring the legs backwards over the head by raising the buttocks up.
- Raise the legs, abdomen and chest so as to form a straight line.
- Place the palms on your back for support.
- Place the chin against the chest
- Maintain the position as long as comfortable
- Slowly return to the normal position
- Repeat it twice or thrice.

### Benefits

- Relieves stress, tiredness
- Good for digestion
- Releases physical and mental tiredness
- Cures headache, insomnia, hair fall. Improves eyesight.


## 14. Bhujangasana (Cobra Pose)


Fig. 6.14

### Procedure

- Lie on the abdomen; rest the chin and arms on the floor. The feet and heels should slightly touch each other.
- Inhale and slowly lift the head, chest and abdomen off the floor while straightening your hands.
- Arch your back as much as you can, tilt your head back and look up.
- Holding the breath remain in this position as long as you feel comfortable
- Exhaling slowly return to the starting position.

### Benefits

- Soothes anger or temper.
- Beneficial for kidney and liver functions.
- Prevents back problems
- Relieves constipation, indigestion
- Helpful in back ache, cervical or lumbar pain

### Precaution

- Hernia patients must avoid it.

## 15. Dhanurasana (Bow Pose)


Fig. 6.15

### Procedure

- Lie on your stomach with your feet hip width apart and arms beside the body.
- Fold your knees, take your hands backward and hold your ankles
- Breathing in, lift your chest off the ground and pull your legs up and back
- Keep the pose stable while paying attention to your breath. Your body is curved as bow.
- After 15-20 seconds as you exhale, bring your legs and chest to the ground.

### Benefits

- Beneficial in back ache, cervical spondylitis
- Stomach related problems
- Strengthens back and abdominal muscles.
- Burns body fat.

## 16. Shalabhasana (The locust pose)

Fig. 6.16

### Procedure

- Lie on the abdomen and place the chin on the floor.
- Rest your arms by the sides with hands pushing under the thighs.
- Inhale and press the palms against the floor, keep the legs straight and raise them as high as possible.
- Holding the breath remain in this position as long as you feel comfortable.
- While exhaling return to the starting position.

### Benefits

- It is useful in treating depression
- Acidity, Anorexia, Indigestion, etc. are relieved.
- Helpful in Ascites and Fistula.
- Leg, Pelvic and back Muscles are strengthened.

## 17. Pawan muktasana (Wind relieving pose)

Fig. 6.17

### Procedure

- Begin by laying on your back with your legs and arms stretched.
- As you exhale, draw both your knees to the chest. Grasp your hands around your knees.
- While holding your hands around legs try to touch knees with your chin.

- Hold this pose for some time.
- Exhale and release the pose
- You can do shavasana after this asana

### Benefits

- It cures constipation, bloating and indigestion
- It strengthens and tones the back muscles
- It helps burn fat in the thighs, buttocks and abdominal area.
- It helps stretch the back and neck.

### Precautions

- People suffuring from hernia, sciatica, chronic back ache, and Pregnant women must avoid doing this asana.

### 6.3.3 Surya Namaskar (Sun salutation)

It is a yoga practice incorporating a sequence of gracefully linked asanas.

The nomenclature refers to the symbolism of Sun as the soul and the source of all life.

**Step 1:** The Pranamasana or the prayer pose

- Start the Surya Namaskara by standing at the edge of your mat.
- Keep your feet together, relax your shoulders.
- Inhale and lift both your arms up.
- Then, exhale and bring your palms in front of your chest in a prayer position.

**Step 2:** Hasta Uttanasana or the Raised arms pose:

- Inhale; lift your arms up and back, making sure your biceps are close to your ears.
- Stretch your whole body from the heels to the tips of the fingers

**Step 3:** Hast Padasana or hand to foot pose or standing forward bend pose

- Exhale and bend forward from the waist to touch your toes with your fingers. Do not bend your knees or spine.
- Inhale while coming back up.

**Step 4:** Ashwa Sanchalanasana or the equestrian pose –

- Inhale and push your right leg back as far as you can do placing the right knee on the floor.
- Bring your left knee towards the left part of the chest and place your palms on the floor on both sides.
- Look up.


Fig. 6.18

**Step 5**: Parvatasana or Moutain Pose:

- Exhale, and lift up your hips and tailbone.
- Your chest must face downwards to form an inverted V.
- Also called 'Adho Mukha Shwaanasana'

**Step 6**: Ashtanga namaskara or the salute with eight parts:

- Gently bring your knees down to the floor and exhale.

- Take your hips back and slide forward such that your chin and chest rest on the floor.
- Raise your buttocks slightly
- You will notice that the hands, feet, knees, chest and chin touch the floor. Eight parts in total.

**Step 7:** Bhujangasana or the cobra pose-

- Now slide your body forward. Raise your chest up in the cobra pore.
- Your elbows must be bent and your shoulders must be placed away from the ears.
- Turn your gaze upwards.

**Step 8:** Parvatasana or the mountain pose-

- Same as in step – 5

**Step 9:** Ashwa Sanchalanasana or the Equestrian pose

- Same as in step -4

**Step 10**: Pada Hastanasana or hand to foot pose

- Same as in step – 3

**Step 11**: Hasta Uttanasana or the Raised arms Pose –

- Same as in step – 2

**Step 12:** The Pranamasana or the prayer pose-

- Same as in step – 1

### Benefits of Suryanamaskar

- It enhances blood circulation in the body.
- It helps to lose weight and also tones your legs and arms.
- The spine becomes extremely flexible.
- It also strengthens your skeletal system.
- It makes skin and hair healthy and youthful.
- It improves memory and enhances the nervous system.


- It reduces stress and anxiety and promotes calmness.
- It keeps stomach, intestine, pancreas, heart and lungs healthy.
- Immunity is increased.

## INTEXT QUESTIONS 6.3

1. What do you understand by 'Suryanamaskar' ?
2. How many poses are there in Suryanamaskar ?
3. Which asan position is the seventh positions of suryanamaskar?

### 6.3.4 Pranayama and its Practice

The aim of pranayama is to balance and control the vital energy in the body. Therefore, pranayama is called the soul of yoga. Yoga is not complete without pranayama. As it is necessary to take regular bath to purify the body, in the same way pranayama is necessary to purify the mind.

1. रेचक **(Rechaka):** Rechaka means to exhale through the nostrils. It should be controlled and slow.
2. पूरक **(Puraka)**: Purak means controlled Inhalation through the nostrils.
3. कुम्भक **(Kumbhak)**: It is the action of controlling and retaining the breath.

### Procedure of Pranayama

Some important points:

1. Clear your nostrils before doing pranayama
2. Sit in meditative poses like Padmasana, Sukhasana, Swastikasana, Vajrasana etc.
3. The spine should be kept straight.
4. The pranayama which induces warmth must not be done in summers and vice versa.
5. The asthmatic, High BP and Cardiac Patients must take proper guidance before practicing pranayama.
6. It must always be done under supervision of yoga trainer.
7. Celibacy is important in Pranayama

## 1. Naadi Shodhana Pranayam

- The name of this pranayama suggests that 72,000 Naadies are purified.
- This pranayama helps in elimination of toxic matter from the Naadis
- It purifies the blood steam and supplies oxygen to our various organs
- It energizes each cell of our body.

### Steps:

- Sit comfortably with spine erect and take normal breaths.
- Lift the right hand, place the index finger and middle finger at the eyebrow centre and close the right nostril with the thumb.
- Breathe in through the left nostril.Press the left nostril gently to close it with ring and little finger.
- Open the right nostril and exhale.
- Now inhale through the right nostril and exhale through the left. This is one complete round of Nadi Shodhan Pranayam.
- You must keep your eyes closed and take long,easy and deep breaths


Fig. 6.19

### Benefits

- It purifies the blood.
- The deep breathing enriches the blood with oxygen.
- This pranayama strengthens the respiratory system and balances the nervous system.


### 2. Sheetli Kumbhak pranayama

- Sit in a comfortable posture, keeping the hands on the knees.
- Extend the tongue and roll up each side to make a channel like a bird's beak.
- Suck the air over the tongue and fill the lungs completely.
- Hold the breath for a while and then exhale gradually through the nostrils.

Fig. 6.20

### Benefits

- It quenches thirst, improves the efficiency of the liver
- Reduces bile and High B.P.
- Increases coolness, and gives peace to the mind.

### 3. Bhastrika pranayama

- Sit in Padmasana with eyes closed.
- Take a deep breath in and then breathe out slightly forcefully. It involves rapid and forceful inhalation and exhalation technique. One inhalation and exhalation makes one round of bhastrika.
- In this inhaling and exhaling should take the same length of time eg. 2.5 seconds to breathe in and2.5 seconds to breathe out.

Fig. 6.21

### Benefits

- It gives strength to lungs
- Helps in curing allergies, asthma, respiratory diseases, tonsils and thyroid problems.
- Gives calmness to the mind.
- Balances the three doshas.
- Purifies the blood.
- Helpful in common cold.
- Strengthens the immune system.

### 4. Bhramari Pranayama

- Sit up straight in a quiet place and close your eyes.
- Place your index fingers on your ears.
- Inhale and then while exhaling press the ear cartilage and make a humming sound.
- You can keep the ear cartilage pressed or press it in and out with yours fingers while making a loud humming sound like a bee.
- You can also make a low-pitched sound but it is better to make a high pitched sound.
- Breathe in again and continue the same pattern 3-4 times.


Fig. 6.22

## Benefits

- Gives instant relief from tension, anger and anxiety.
- It is a very effective breathing technique for people suffering from hypertension.
- Gives relief in headaches, migraines.
- Improves concentration and memory.
- Helps in reducing B.P.

## INTEXT QUESTIONS 6.4

1. Fill in the blanks:

   (a) After having meals, yoga can be done with a gap of..... hours.

   (b) To practice yogasana the place should be..... and.....

   (c) While doing yoga one should wear..... clothes.

2. Which of the following are True or False

   (a) Basically yogasanas are of 84 types ( )

(b) The practice of yoga means just twisting or turning body parts. ( )

(c) A person can daily do yoga at any time of the day. ( )

(d) While doing yoga one should wear tight clothes. ( )

(e) While doing asanas one should breath only through the nose. ( )

## WHAT HAVE YOU LEARNT

In this lesson you have learnt about the actual meaning of yoga. Yoga is an art of living healthy life which creates harmony between mind and body from the ancient time. Yoga is the part of our life style. The General Meaning of Yoga is – 'To unite'. it is an act to establish a concentration with the supreme soul.

Maharshi Patanjali, stated yoga chittavriti Nirodha, it means signs and art to control fluctuation of mind is yoga (पा.यो. 6.1/1)

Shrimad Bhagwad Geeta has illustration of knowledge in yoga, Bhakti yoga, Karma Yoga and Raj yoga. Maharshi Patanjali defined yoga as 'योगाश्चित्वृत्ति निरोधक' (पा.यो. 1/2)

It means prevention of Vrutti of Chitta (Mind).

**'योगः कर्मसु कौशलम।' ( गी 2/50 )** - It means that doing work with efficiency is called yoga.

Lord Krishna has defined Yoga in Bhagwad Geeta that the work must be done so accurately that nothing else is left to do.

**'समत्व योग उच्चते।' ( गीता 2/48 )**

It means - The state of equality is called Yoga

Yam, Niyam, Asana, Pranayam, Pratyahar, Dharna, Dhyan and Samadhi – These are 8 points of yoga.

**'यम'** ( Yama)' are 5 in number-

**अहिंसासत्यास्तेयब्रहमचर्यापरिग्रहा यमाः॥ ( पा. यो.द. 2/30 )**


It means

1. **अहिंसा** (Ahimsa) – Non-Violence
2. **सत्य** (Satya) - Truth
3. **अस्तेय** (Asteya) – Non-stealing
4. **ब्रह्मचर्य** (Brahamacharya) – Celibacy
5. **अपरिग्रह** (Aparigraha) – Renunciation

Jeev yoni are numbered 84 Lakh so Asana are also of 84 lakhs in number.

In this 84 asanas are considered as main or important.

Yogasana can be divided under these categories

1. Aasanas done in sitting position
2. Asanas done in standing portion
3. Asanas done in supine position
4. Asanas done in prone position
5. Asanas done by forward bending
6. Asanas done in twisting position
7. Asanas done while balancing

## TERMINAL QUESTIONS

1. What is yoga? Write down the definitions of yoga?
2. What are the 8 branches of Ashtanga yoga? Describe in brief the first two of them?
3. What is asana? Explain Suryanamaskar in brief.
4. In how many ways yogasanas are classified? Write about them in brief?
5. Write about the methods and benefits of any five asanas?

## ANSWERS TO INTEXT QUESTIONS

### 6.1

1. To unite 2. yogah 3. Prevention 4. yog

### 6.2

**1.** Yam, Niyam, Asana, Pranayam, Pratyahar, Dharna, Dhyan & Samadhi – These are 8 points of yoga.

2. (i) शौच (sanctity)

   (ii) संतोष (satisfaction)

   (iii) तप (Austerity)

   (iv) स्वाध्याय (self-study)

   (v) ईश्वर–प्राणिधान (surrender to God)

3. Brahamcharya means on the path of Brahma

4. The karma of a person done by mind, body and speech is surrendered to the god himself is known as ईश्वर–प्राणिधान

### 6.3

1. It is a yoga practice incorporating a sequence of gracefully linked asanas.

   The nomenclature refers to the symbolism of Sun as the soul and the source of all life.

2. There are total Twelve asanas in Surya Namaskar

3. Bhujangasana or the cobra pose is the seventh pose of Surya Namaskar

### 6.4

1. (a) 3 – 4 hours (b) Clean, hygienic and ventilated

   (c) Light and loose clothes

2. (a) True (b) False (c) False (d) True

# 7

# MANAGEMENT OF DISEASES THROUGH YOGA

You have studied about yoga and health in the previous lesson. You have already understood the importance of yoga in our life. Actually, yoga is an art of healthy living which brings balance between body and mind. Yoga is a very important part of Indian traditional wisdom. Yoga was a part of spiritual practice for ages but it has become a centre of global attraction now. People are looking at yoga as a reliable medical alternative. In recent years many doctors and scientists conducted medical researches which have proved the effectiveness of yoga as an alternative medical therapy. In this chapter, we will study some common diseases caused because of our unhealthy lifestyle which can be treated with regular practice of yoga. Health workers can use yoga as an alternative therapy. Here, we are discussing about the common life style diseases but depending upon the disease and its severity it is advised to consult the doctors or yoga experts before practising yoga for therapy.

## OBJECTIVES

After studying this lesson, you will be able to:

- understand the importance of yogic lifestyle;
- explain the principles of yoga therapy;
- explain the role of yoga in management of common diseases;
- explain the method of yoga therapy for respiratory and digestive disorders;

Notes



- explain the yoga therapy for blood pressure, diabetes and heart diseases;
- encourage people to practice yoga for the management of back pain, cervical pain, sciatica and gout etc.
- will be able to manage stress and depression with yogic kriyas.

## 7.1 YOGA AND LIFE

In ancient period mutual harmony, cooperation and discipline use to govern the life of people but today there is a considerable change in lifestyle of the people. Now-a-days people want freedom from social responsibilities, tradition and culture and want to live life with materialistic success and luxury which is disconnecting them from their true self. Excessive stressful lifestyle, frustration and unhappiness has become the part of life which is the leading cause of psychological disorders.

Can we rid from overcome these diseases? Answer is yes. If you want to lead a healthy and happy life follow yogic lifestyle. Yoga therapy treats not only the symptoms of diseases but also improves the physical, mental, emotional and spiritual health of people practicing yoga. The need of hour is to include yoga in daily routine so that we can prevent various diseases.

### 7.1.1 Principles of Yoga Therapy

In the last 30 years, researches are trying to establish effects of yoga practice on human body. Initially it was difficult for the people of scientific fraternity to accept the positive results of the studies but now the whole world is aware of the therapeutic effects of yoga. The disease attacks the body but the origin of the diseases can be traced in mind. Yoga makes us realize our internal experiences. Yoga is a spiritual science which works as therapy and because of this reason yoga is accepted as an alternative therapy all over the world.

### 7.1.2 Basic Principles of Yoga Therapy

The following are the basic principles of yoga therapy:

- Balance between Psychic energy and Prana energy
- Harmony among Endocrine Glands and Hormone balance.
- Balance in Nervous System
- Elimination of toxins and negativity
- Improvement in immunity of the body


## INTEXT QUESTIONS 7.1

1. Write 2 basic principles of yoga therapy.

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   .....

   .....

2. What are the main causes of psychological diseases?

   .....

   .....

   .....

## 7.2 THERAPEUTIC ASPECTS OF YOGA

### 7.2.1 Yogic Management for Respiratory Problems

There is difference in approach to see the respiratory system between Yogic science and Medical science. For example expelling cough is considered healthy as it helps to remove toxins from the system. There are various practices in Shatkarma for detoxification of cough and phlegm. If the toxin remains in the upper part of respiratory system for long it may cause infection leading to bronchitis or pneumonia.

Now, we will discuss about most important point related to respiration system. Yoga is very effective for some respiratory problems like sinusitis, asthma which can be cured as well. If the patient takes proper guidance from yoga expert and practice yoga, considerable improvement can be achieved within few weeks itself. There is very simple approach in yoga therapy for the treatment of respiratory problems. It is not dependent upon physical level alone rather it is also focused on subtle energy.

### Principles of Yogic Management

1. Expulsion of excess sputum with the help of shatkarma
2. Improves immunity with Surya Namaskar, Pranayama, Shatkarma and other yogic techniques

3. Improvement in respiratory process with the help of pranayama, asana and other yogic techniques.
4. Relaxation of respiratory muscles.

### Important Yogic Practice for Asthma

- **Kunjal**: With the practice of Kunjal Kriya, asthma attack can be prevented.
- **Neti Kriya**: Neti Kriya is a method to remove the blockages of the nostrils. It makes breathing through nostrils easy and is prevent from allergy. For better effects Neti can be done twice in a week.
- **Sukshma Vyayam (Micro Exercises)**: Micro exercises of face, hands and legs.
- **Asana:** Marjariasana, Simhasana, Gomukhasana, Tadasana, Triyak Tadasana, Kati Chakrasana, Hasta Uttanasana, Dhanurasana, Sarvangasana etc.
- **Pranayama:** Kapalbhati, Nadi Sodhan, Bhramari, Yogic Breathing etc.
- **Relaxation:** Shavasana, Yog Nidra

### Note:

1. Don't practice without proper consultation and supervision of yoga expert.
2. These asanas can be useful for bronchitis and migraine headache as well.

## 7.2.2 Yogic Management for Digestive Disorders

Proper digestion and excretory system are the fundamental of good basis health. Impaired metabolism and indigestion are primarily caused by irregularity of digestive system and its ill effects. It is important to improve digestive function and optimize it for the better management of major health issues. It can be a basis to balance Manipur chakra (important energy centre). Eating balanced diet on time is fundamental requirement for good digestion. Sometimes we take excessive or imbalance diet to suppress or suit our negative emotions which will first leads to distruptial in digestion and causing poor health.

It is very important to mention that disorder related to liver is difficult to manage with yoga and diet regulation. Except liver disorders other diseases related to digestive system can be controlled through the practice of yoga and diet regulation and can be treated through yogic kriyas.


## Principles of yogic treatment for Digestive Disorders

- Balancing the digestive fire (Manipur chakra) with higher energy level
- Developing internal contentment so that wrong eating habit and food temptation is controlled.
- Supporting and maintaining the peristaltic movement through asanas.
- Improve the efficiency of excretory mechanism.
- Elimination of toxins with the help of Shatkarma.

## Major Digestive Disorders

1. **Hypoacidity:** This is a condition in which the food eaten by a person will remain in the stomach for some hours and will get fermented, this causes indigestion and discomfect in epigastric region. Vyaghr Kriya is suggested to manage this condition. One should sit in Vajrasana for at least 10 minutes after eating food. In Yoga, asanas related to abdomen, pranayama and relaxation techniques are recommended.

2. **Hyperacidity:** In this condition excess secretion of gastric acid disturbs the digestive process. If this situation remains for long it may lead to gastritis and peptic ulcer. Excessive tea, coffee, smoking, regular intake of heavy food, and stressful lifestyles are main causes of hyperacidity. Relaxation of digestive system is required to overcome this situation and for that purpose shavasana and abdominal breathing techniques are advisable.

3. **Gastric Ulcer:** This situation arises due to excessive competitive condition, compulsive nature, stress and low tolerance power. It leads to slow and steady pain in stomach after eating food especially spicy food. In this situation cold milk, vegetable soup, barley and gram flour sattu etc. help to relieve discomfort.

4. **Duodenal Ulcer:** In this condition unbearable pain is felt around the centre of abdomen and it subsides a little bit after taking food. Drinking cold milk helps to reduce the pain.

## Important Yoga practices

**Asana:** For therapy it is advised to practice easy and comfortable asanas. Once the pain subsides practice micro exercises, some asana related to abdomen like Shashankasana and Vajrasana etc. After that it is advised to practice Surya Namaskar and other standing asanas.

**Pranayama:** Bhramari, Nadi Sodhan and Abdominal Breathing.

**Rest and Relaxation:** Shavasana, Relaxation, OM Chanting and Yoga Nidra

**Shatkarma:** Neti Kriya, Laghu Shankh Prakshalan

**Note: Initially it is important to take rest in these problems. After that learn the correct method of yoga therapy from yoga experts or doctors and practice accordingly. Avoid doing some practices viz. Bhastrika, Kapalbhati, Bhujangasana, Dhanurasana etc.**

5. **Constipation:** Good health, better vitality and disease free life depends upon the elimination of toxins. Constipation is a very common and chronic disorder. Constipation has become a regular part of life for some people because of lack of awareness. This makes the internal system impure as a result one becomes lazy, heaviness sets in mind, energy level goes down and immunity becomes poor. Constipation is not merely physical condition but it is a state of stress.

### Important Practices

- **Asana:** After drinking 2 glasses of water in the morning: Tadasana, Triyak Tadasana, Katichakrasana should be practiced.

  Abdominal Asanas: Uttanpadasana, Padsanchalana/Cycling, Chakrapadasana, Shashankasana, Kagasana.

  Surya Namaskar, Trikonasana, Bhujangasana, Paschimotanasan etc.

- Vajrasana for 10 minutes after eating food.
- **Pranayama:** Nadi Sodhan, Bhastrika, Bhramari.
- **Shatkarma:** Laghu Shankha Prakshalana (Practice on every alternate day initially for 10 days , after that practice once in a week).
- **Dhyana:** Shavasana and practice of silence.

### 7.2.3 Management of High Blood Pressure and Heart Diseases

Blood pressure and heart diseases come under lifestyle disorder. Now-a-days controlling the blood pressure and heart diseases have become a big challenge for health department. In case of any pain in chest or any heart related problem it is advisable to take proper medical help and follow the instructions of the doctors.

Yoga works as an assisting therapy in case of heart disease. Regular practice of yoga can prevent blood pressure and heart diseases. If blood pressure or heart


related problems have been diagnosed it is advisable to consult a heart specialist to regulate it and then follow a proper yoga routine as advised by a yoga expert.

It is important for the health workers to not just advice the patient to do yoga rather ask them to practice yoga under supervision of senior yoga expert. Health worker can communicate the following message to the masses and help the society:

- Yoga can play vital role to cure the disease
- Yoga should be done regularly.
- Yoga should be practiced under the guidance of the yoga expert.
- One should begin practicing with light exercises.
- Heart patients should remain in contact with heart specialist even while practicing yoga.

## Principles of Yogic Management

1. Change in lifestyle and disciplined diet.
2. Practice of Yogasana and Pranayama
3. Balance in emotion
4. Balance in other systems viz. Digestive System, Respiratory System etc.

## Important Yogic Practices

- **Micro Exercises:** Micro exercises for the whole body.
- **Asana:** Shashankasana, Vajrasana, Marjariasana, few abdomen related asanas (Bhujangasana, Pawan Muktasana), Tadasana, Triyak Tadasana, Vrikshasana, Surya Namaskar (under supervision of expert)
- **Pranayama (without Kumbhak):** Nadi Sodhan, Bhramari, Ujjai
- **Shatkarma:** Neti, Laghu Shankh Prakshalan (in case of constipation and acidity problem)
- **Relaxation and Meditation:** Shavasana, Yoga Nidra, Practice of Antarmaun (observation of internal silence)

**Note: Developing the habit of self study, especially the study of divine scriptures and inspirational books are useful for the heart patients.**

### Yogic practice for High Blood Pressure

Generally high blood pressure is an indication of heart disease or poor health of heart due to many reasons. It indicates the existence of some chronic disease in the body. Here is a general yogic guideline for high blood pressure:

- **OM Chanting**
- **Micro Exercises:** Micro exercises of the whole body including eyes exercises.
- **Asana:** Marjariasana, Vajrasana, Gomukhasana, Tadasana, Triyak Tadasana, Katichakrasana, Hasta Uttanasana, Makarasana, Shavasana with abdominal breathing
- **Pranayama:** Nadi Sodhan (alternate breathing- without holding), Bhramari Pranayama (morning and evening for 20-30 breaths)

## 7.2.4 Yogic Management of Back Pain

Back pain is a very common problem mostly found in women. Some studies found that the back pain happens mostly due to muscle weakness and stiffness of muscle and nerves.

It is important to practice yoga under the guidance of yoga expert to improve the working efficiency of the muscles responsible for back pain.

15-20 minutes course to overcome back pain:

- **Asana:** Tadasana, Triyak Tadasana, Katichakrasana, Hasta Uttanasana, Supta Udarakarsasana, Ardh Shalabhasana, Marjariasana, Kandharasana, Bhujangasana etc.
- **Relaxation and Rest:** Shavasana, Makarasana
- **Pranayama:** Bhramari, Nadi Sodhan
- **Meditation:** Shavasana, Laghu Yoga Nidra

## 7.2.5 Yogic Management of Cervical Spondylitis

Nowadays Cervical Spondylitis is becoming very common problem due to busy lifestyle, excessive use of mobile and laptop and long driving etc. Young people are also becoming victims of this problem on a large scale. In this problem one feels stiffness and discomfort in neck and gradually it becomes a permanent problem. Neck movements towards the right, left or up and down becomes painful. Over the


period of time the cartilages becomes weak because of wear and tear, obesity, wrong posture, weak muscles, abnormal pressure and jerk in the spine etc. cause cervical spondylitis. It is also a hereditary disease but still it can be cured if diagnosed on time.

## General Symptoms of Cervical Spondylitis

1. **Neck Pain:** Common symptoms includes pain while sitting or standing for long hours, while sneezing, coughing, laughing and while moving head right left or up, down etc. In most of the cases there can be continuous pain while in some pain may arise suddenly.
2. **Stiffness in Neck:** Sometimes after getting up in the morning we may experience stiffness in the neck which can be painful too. A cracking sound may also come while moving the head and it may even become difficult to move the neck.
3. **Headache:** In this condition pain usually begin from the neck and radiates to the head.
4. **Cervical Myelopathy:** This is a very serious condition of cervical spondylitis which happens due to spinal stenosis (constriction of vertebral column). It leads to lack of muscular coordination, muscle cramps, difficulty in walking and numbness in hands and legs. In some cases ,the patient loses control over passing urine and stools as well.
5. **Cervical Radiculopathy:** This is a serious condition of cervical spondylitis in which patient feels abnormal pain in the lower parts of the hands. Sometimes it causes numbness and weakness in one or both the hands.

**Note: Yoga can play preventive as well as curative effect in the initial stages. Yoga therapy is one of the best treatments for this problem. There is no need of medicine in this condition. Practice should be done under the supervision of senior expert.**

## Important Practices

- **Sukshma Vyayam:** Pawanmukt Series-1 (especially the joint movement exercises), Shakti Bandh Series (Rajjuakarshana and chakki chalasana)
- **Asana:** Tadasana, Triyak Tadasana, Katichakrasan, Marjariasana, Ushtrasana, Kandharasana, Makarasana, Sarpasana, Shalabhasana
- **Pranayama:** Bhramari and Nadi Shodhan
- **Relaxation and Meditation:** OM Japa, Shavasana, Kayasthirasana, Yoga Nidra, Spinal visualization etc.

Notes



### 7.2.6 Management of Musculoskeletal Disorder Gout or Arthritis

This is the swelling of synovial joints and it is most common among disabling diseases. Pain in one or more joints, swelling, redness, heat and difficulty in movement etc. are common symptoms of this disease. When uric acid reaches a higher level and gets crystallized, it starts getting deposited in surrounding joints, tissues and nerves that leads to unbearable pain. Swelling in joint, redness, hot and sensitive joints are symptoms of inflammatory arthritis. The most affected part is the base of the big toe and ankle.

According to yoga therapy metabolic disorder and pranic imbalances lead to gout and arthritis. There are various types of arthritis. Yoga therapy is effective in all types of arthritis. Sedentary lifestyle, mental and emotional stress and unhealthy diet habits (junk food) are main causes of arthritis. Mental stress viz. stress in subconscious mind, suppression of emotions and excessive sensitivity etc. may trigger arthritis.

Generally level of uric acid can be controlled by change in lifestyle. Yoga therapy is capable enough to manage the irreparable damages of the joints. In the initial stage of disease, yoga can cure it completely but if the disease is chronic yoga can help to reduce the dependency on medicine and improve the quality of life. Practice of 20-40 minutes of regular yoga can be good enough to bring drastic improvement in the condition.

#### Principles of Yogic Management

- To develop positivity in life.
- To maintain happy and blissful state of mind.
- To maintain flexibility and mobility of all the joints through micro exercises
- Elimination of toxins like excessive mucus & cough through shatkarma.

#### Important Yogic Practice for Regular Routine

- **Micro Exercises:** Pawanmukta Series (Preventive Series for Musculoskeletal diseases)
- **Asana:** Tadasana, Triyak Tadasana, Katichakrasana, Marjariasana, Hasta Uttanasana, Trikonasana, Naukasana, Chhaki Chalan
- **Shatkarma:** Neti, Kunjal, Laghu shankha Prakshalana


**After Some months of practice**

Surya Namaskar, Shashankasana, Bhujangasana, Paschimotanasana, Ardh Shalabhasana

- **Pranayama:** Abdominal Breathing, Bhastrika, Bhramari
- **Relaxation and Meditation:** OM Japa, Ajapa Japa, Savasana, Yognidra

### 7.2.7 Management of Diabetes through Yoga

Nowadays diabetes has become very common problem which comes under lifestyle disorder. Main causes of diabetes include swelling in pancreas, excessive intake of medicine, excessive mental stress, anxiety and genetic disorders etc.

This disease is a metabolic disorder in which blood sugar level remains high for long time. Some common symptoms of diabetes include: excessive urge to urinate, excessive thirst, excessive hunger, abnormal weight loss, excessive tiredness, difficulty in healing wounds and gradual vision loss etc. If not taken care, it may lead to many chronic diseases viz. Heart diseases, stroke, nephropathy (kidney failure), retinopathy (eye problem), neuropathy (leg ulcer or gangrene) etc. Hence diabetic patients should immediately consult a doctor and start the treatment. It is important to take medicines according to the prescription of doctors and undergo routine test to know the sugar level in the blood.

Yogic lifestyle and regular practice of yoga is very effective for the management of diabetes. One can overcome diabetes with diet regulation and regular practice of yoga. Yoga can have preventive and curative effects in the management of diabetes.

**Note:**

- **Health worker must know that the patients should be referred to doctors at first.**
- **Yoga practice should be done under the guidance of experienced yoga expert.**

**Yogic Practice**

- **Shatkarma:** Laghu Shankha Prakshalana, Kunjal, Jal Neti
- **Asana:** Pawanmuktasana, Vajrasana, Suptavajrasana, Surya Namaskar, Paschimotanasana, Bhujangasana, Shashankasana, Yogmudrasana, Ardhmatsyendrasana
- **Pranayama:** Bhastrika, Nadi Sodhan, Ujjayi.
- **Relaxation and Meditation:** Shavasana, Yognidra, Ajapa Japa, OM Japa etc.

### 7.2.8 Management of Anxiety and Depression Through Yoga

According to psychology depression is a state of emotional sorrow. The person with depression feels helpless and hopeless . He feels hopeless, restless, stressed and shows lack of interest in everything. There are biological, hereditary and psychological reasons of depression. Common reasons of depression include: malnutrition, heredity, hormones, climatic changes, stress, diseases, addictions, unpleasant situation for long and back pain etc. Depression is curable. Hormonal imbalances may cause depression. Sometimes person under depression may commit suicide also. So family and relatives need to take special care and consult a good psychiatrist for proper treatment.

Depression may lead to difficulty in decision making, laziness, lack of interest in entertainment, lack of sleep, restlessness and anxiety. Yoga is very effective in treating depression.

#### Important Yogic Practice:

- Asana: Surya Namaskar, Tadasana, Triyak Tadasana, Katichakrasana, Hasta Uttanasana, Vrikshasana, garjanasana, Dhanurasana, Sarpasana
- Pranayama: Yogic Breathing, Bhastrika, Nadi Sodhana
- Shatkarma: Kunjal, Neti
- Meditation: Japa Yoga (OM Chanting), Shavasana
- Karma Yoga & Bhakti Yoga (Kirtan and Contemplation of the divine)

### 7.2.9 Yogic Practice for Ladies

Marjariasana is very good for ladies in all ages.

#### Yoga for Mensturation (Monthly Cycle) Disorder

**Asana:** Asana related to Shakti Bandha, Vajrasana Series, Surya Namaskar

**Pranayama:** Nadi Sodhan, Bhramari

**Relaxation and Rest:** Shavasana

#### Menopause

**Asana:** Surya Namaskar, Asanas related to Shakti Bandha, Kandharasana, Padmasana, Molbandh, Kapalabhati.

**Pranayama:** Nadi Sodhan, Bhramari

**Relaxation and Rest:** Shavasana, Yog Nidra, OM Japa


## INTEXT QUESTIONS 7.2

1. Write 2 Asanas and 2 Pranayamas recommended for respiratory disorders.

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2. Write 2 fundamental principles for treatment of digestive disorders.

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3. Write 2 important asanas and 2 pranayamas recommended to practice daily to cure back pain.

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4. Write the name of important 2 shatkarmas recommended to practice regularly to manage gout and arthritis.

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5. What are the main causes of depression?

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## WHAT YOU HAVE LEARNT

In this lesson you have learnt that yoga is a biggest boon of Indian traditional wisdom. Yoga has been helping the seeker in spiritual development from the ancient times in India but now it has become a subject of global attraction . Today people are looking at yoga as a therapeutic science.

Yoga is a also system of alternative medicine which can help overcome diseases that are caused by lifestyle disorders.

We have learnt about the principles of yoga therapy and important yogic practices for managing common diseases caused by faulty lifestyle. As a health worker you can use yoga for the management of common diseases but depending upon the severity of diseases it is important to take advise from yoga experts and doctors.

## TERMINAL QUESTIONS

1. Write a short note on the management of digestive disorders through yoga.
2. Explain the yoga therapy for the management of High Blood Pressure and Heart Diseases.
3. What do you understand by depression ? Mention important yogic practices for managing depression.
4. Write short note on the therapeutic aspect of yoga.

## ANSWERS TO INTEXT QUESTIONS

### 7.1

1. Fundamental principles of yoga Therapy
   - Balance in psychic energy and pranic energy
   - Coordination among endocrine glands and balance in hormones
2. Main causes of psychological diseases are excessively busy life and stressful lifestyle.


## 7.2

1. 2 Asana: Tadasana, Triyak Tadasana

   2 Pranayama: Nadi Sodhan, Bhramari

2. 2 fundamental principles for the treatment of improper digestion

   - To maintain the optimum level of Manipura Chakra (Jatharagni)
   - To develop internal peace so that wrong diet habit is controlled.

3. 2 Asanas to cure back pain:Ardha Shalabhasana, Marjariasana.

   2 Pranayama to cure back pain: Bhramari and Nadi Sodhan.

4. 2 names of Shatkarma Kriyas recommended to practice regularly to treat gout and arthritis: Jal Neti and Laghu Shankh Prakshalana.

5. Main causes of depression: Malnutrition, hereditary, hormones, climate changes, stress, diseases, addiction, back pain and unpleasant situations.