Chapter 10

Skeleton and Joints

Points to be studied:

10.1 Human skeleton system
10.2 Major parts of human skeleton system
- Axial skeleton
- Thoracic skeleton
- Appendicular skeleton

10.3 Major joints of our body
10.4 Muscles
10.5 Movement in certain animals

You must have seen colourfully kites in the sky and must have flown kites also have you ever thought that if kite's thin wooden spikes will removed, what will happen? The size and shape of the kite may be contorted and that would not have flown. These twigs prepare the framework of kite. Similarly, our body is also needed a framework to provide a certain shape and size of our body. In the absence of it, our body will neither walk nor can act. How this structure is made up? Let's know-

10.1 Human Skeleton System:

Observe Fig 10.1 carefully and answer the following questions:

- What is illustrating in this picture?
- What are visible in this picture?

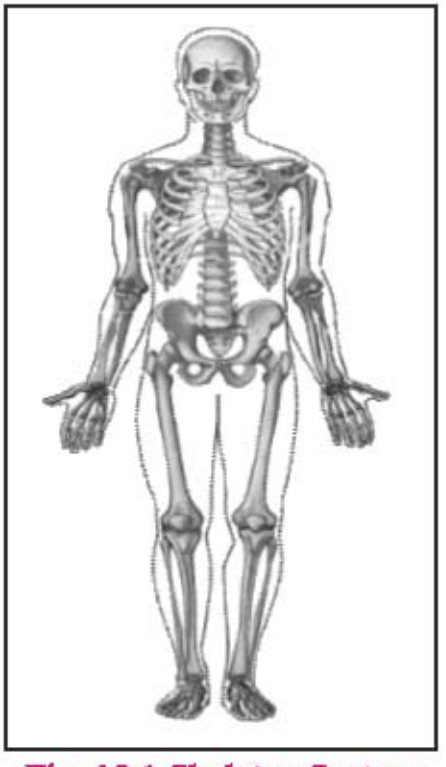


Fig. 10.1 Skeleton System

It is our body's skeletal system. It has bones, Cartilage, joints etc. It makes frame work of our body. This skeletal system of the body performs the following important functions.

Functions of skeleton system:

(i) It provides framework and support to the body.

(ii) Provides protection to body's internal organs against external shocks.

(iii) The skeleton system provides movement of body or parts of the body with the help of muscles.

(iv) It strengthens the body.

What is the skeletal system?

What are the main bones of the skeleton?

A frame work composed of Bones and cartilage is called skeleton system.

10.2 Major parts of skeleton system

We can categorize human skeleton system into three major parts:

(i) Axial skeleton

(ii) Thoracic skeleton

(iii) Appendicular skeleton

(i) **Axial skeleton:** Its shape is like a question mark ?. It mainly includes bones of the skull, upper and lower jaw bones with teeth and ring shaped 33 vertebrae from which vertebral column is formed.

Vertebral column:

Move your hand on the back of your friend. What is experience? You feel a hard bone in the middle of back from neck to below the waist.

Bone from the neck to below the waist is called back bone. It consists of 33 small bones called vertebrae. All these vertebrae connected to each other and form a vertebral column which also called as back bone.

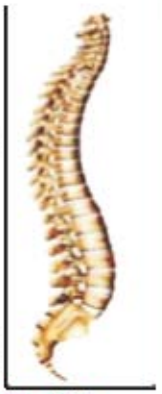


Fig 10.2
Vertebral Column

(ii) **Thoracic skeleton:** It is a basket like structure of 12 pair of hockey sticks like bones which is called ribs. The body's vital organs such as the heart, lungs, etc. are protected in it.

Fig. 10.3: Ribs

(iii) **Appendicular Skeleton:** It mainly involves the bones of hand and legs, pectoral and pelvic girdle.

(A) Bones of hand

(B) Bones of leg

(A) **Bones of hand :** the following are the major bones of the hand &

(i) Humerus

(ii) Radius and Ulna

(iii) Wrist bones

(iv) Bones of Palm, digits and thumb

(i) **Humerus :** You press the middle portion between your elbow and shoulder. What is experience? A rigid and strong bone is felt. Bone between our elbow and shoulder is humerus. Its longest middle section called the shaft.

Tell by looking at the picture, to whom lower and upper end of this bone attached?

(ii) **Radius-ulna :** Press the bones between your wrist to the elbow and feel. How many are these in numbers. Two bones are located here. The first one towards the outside of arm and second one towards the inside the arm are respectively called radius and ulna. The end towards the elbow of this bone is attached to humerus and its lower end to wrist bones.

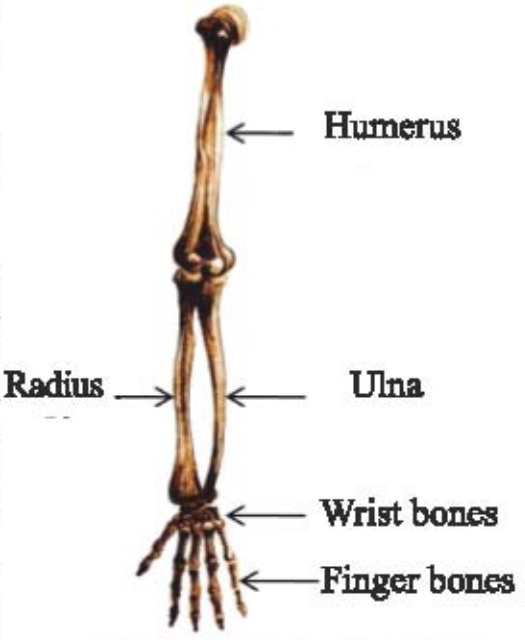


Fig. 10.4 : Bones of hand

(iii) **Wrist bones:** Stretch palm of your hand on the table upperside down. The place where radius ulna bone is attached to palm is called wrist. Wrist is consists of eight small bones called metacarpals.

(iv) **Palm, digits, thumbs bones:** There are five bones in palm. Our fingers and thumb also have bones which is called carpals and thumb bone respectively. Each finger has three bones and thumb has two.

Let's understand hand's bones numerically, by following table:

Table 10.2: Parts of hand and name and number of bones find inthem

S.N.	Name of parts of hand	Name of bone	Number of bones
1	from elbow to shoulder bone (above the Elbow)	Humerus	01
2	From elbow to wrist (from elbow downward)	Radius (outside the body) ulna(body inwards)	02
3	wrist bones	Carpals	08
4	Palm bones	Meta carpals	05
5	Finger bones	Carpals	03x4=12
6	Thumb(hand) Bones	Thumb bone	02

(B) Bones of the leg:

Bones of the leg are as follows -

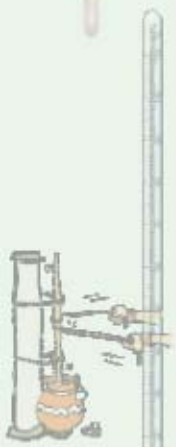
(i) Femur

(ii) Tibia-fibula

(iii) Ankle bones

(iv) Foot, fingers and bones of thumb

(I) **Femur:** Moving hand along the knee to hips and experience its length. As well as find out its position that where is articulated its upper and lower end. Based on experience to fill the table -



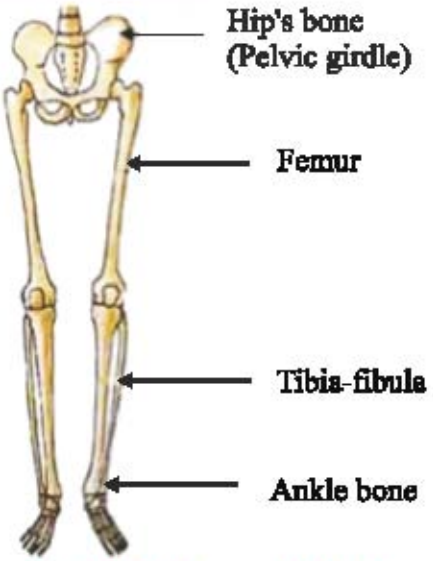


Fig 10.5: bones of the leg

Table 10.3

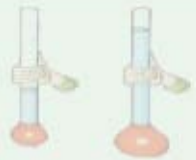
S.N.	Questions related to touch experience	Probable answer
1-	Position	In between knee and hip
2-	Length	
3-	articulation of upper end	
4-	articulation of lower end	

It is an upper bone of leg called as femur. It is the longest and strong bone of body. Its lower end is articulated with Tibia fibula and upper with hip bone.

(ii) **Tibia-fibula :** Experience by touching the middle portion along the knee to ankle. and with the help of figure 10.5 fill the following table 10.4 -

Table: 10.4

S.No.	Questions related to touch experience	Probable answer
1-	How many bones in this portion?	02
2-	Where the upper end of these bones is articulated?	
3-	Where the lower end of these bones is articulated?	



Tibia fibula is found in between the ankle and the knee. It consists of two bones tibia and fibula. Tibia is located inside and Fibula towards the outside.

(iii) **Ankle bones:** Look at your ankle. Are you looking bones? Ankle consists of seven bones which form heel.

(iv) **Bones of foot, fingers and toes:** Foot has five bones, called the metatarsals. There are three bones in each finger of leg and two in toe. Let's Come, understand different types of bones in a leg and its number by a following table 10.5 -

Table : 10.5

S.N.	Name of the part of leg	Name of Bone	Number of bones
1	The bone between the knee and hip	Femur	01
2	The bone between the knee and ankle	tibia fibula, patella	02+01
3	Ankle bones	Tarsals	07
4	Bones of foot	Metatarsals	05
5	bones of foot fingers	Phalanges	12
6	bones of toe	Phalanges	02

- Shoulder's bone is called Pectoral girdle.
- Hip's bone is called as Pelvic girdle.
- They are respectively articulated with bones of our arms and legs.
- These two girdles are the base of our skeleton system.

10.3. Major joints of the body:

You have read that hand, foot and other bones are articulated by other bones at a certain places. The places at which the bones of the skeleton system are connected to each other are called joints. **Joints are of two types -**

(i) Movable joints (ii) unmovable joints

(i) **Movable joints:** joints which provide help in movement of bones, called Movable joints such as joints of knee, ankle, elbow, neck etc.

(ii) **Unmovable joints:** These joints are not movable. Their main task is to protect the body's delicate organs such as skull and chest.

Major movable joints of body:

Following are the major movable joints of our body -

(i) Ball and socket joint

(ii) Hinge joint

(iii) Pivot joint

(i) **Ball and socket joint:** Twist your hands near shoulder. In this type of joint one end of bone is cavity like and other remains rounded. The cavities called as socket and the rounded end as ball. Due to this particular structure of this joint it is called as ball and socket joint.

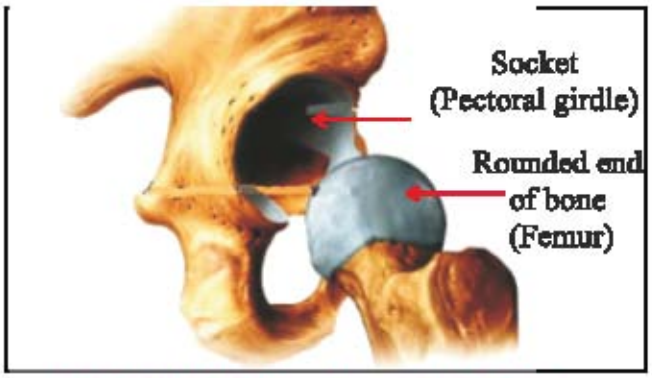


Fig 10.6 :Ball and socket joint

In this joint round headed bone could easily turn around in all directions.

Example- (i) Pectoral girdle and humerus.

(ii) Pelvic girdle and femur.

(ii) **Hinge joint:** Turn around your elbow and knee. Can they move circular? No, they can move in a single direction. You can also compare it with the doors of your home.

In this type of joint rounded end of a bone is implicated in the bone cavity of another. Example - the joint between elbow and knee.

(iii) **Pivot joint:** Turn around your head, what do you experience? It can move left-right, top-bottom up to a certain direction. The joint by which our head is articulate with upper end of the spine is called pivot joint. Due to this joint the lower end of the skull turn around easily right-left, up-down on stable bone of vertebral column.

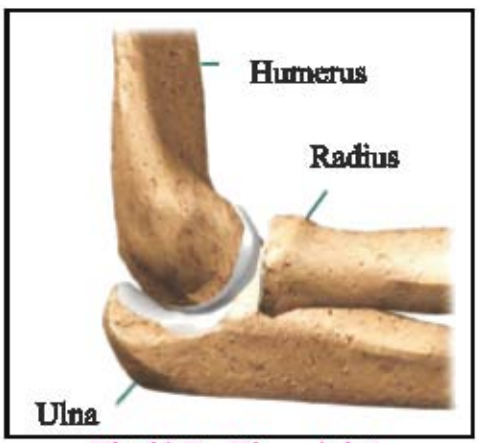


Fig 10.7 : Hinge joint

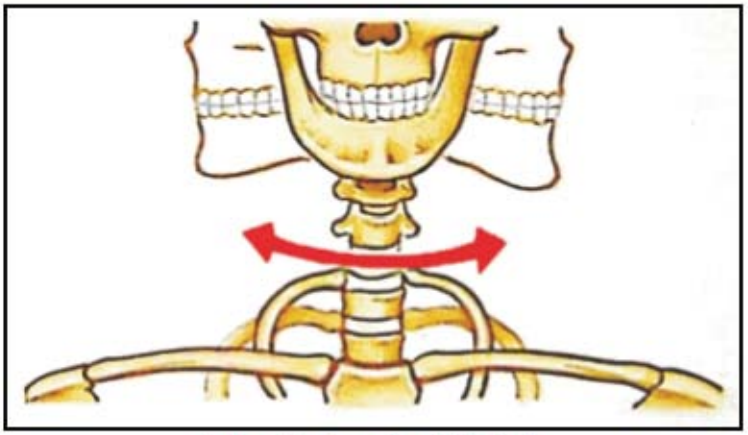


Fig 10.8 : pivot joint

Muscles have an important role in movement of these bones. What are muscles? let us know about it-

10.4 Muscles

It is made up of contractile muscle fibre which has the ability to expand and contract.

Let's do -

Stretch your hand in front of your body. Now close your palm and stretch straight and bring closed palm near your shoulder. Look, middle portion of your

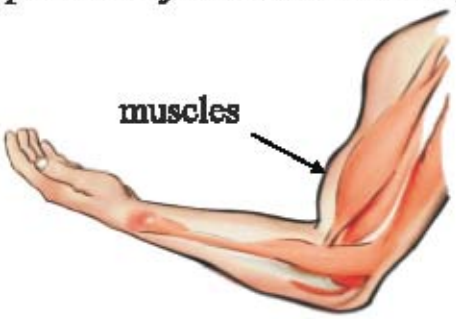


Fig 10.9: Contraction of muscles

elbow and the shoulder, bulging out and remain stretched.

For movement of any bone, two muscles work together. When a muscle contracts, bone is stretched in that direction and other muscle comes in a resting stage. For the movement of bone in opposite direction previous shriveled muscles get loose and relaxed muscles shrinks. Both the type of muscles works simultaneously for body movement.

Movement in bones is caused due to relaxation and contraction of muscles.

10.5 Movements of some other animals

S.N.	Animal name	Type of movement	Helpful in movement	Diagram
1	Earthworm	creep	Earthworm moves by expansion and contraction of muscles of the body.	
2	Snail	creep	snail creep and moves with muscular foot	
3	Cockroach	Walk/fly	In cockroaches the body and legs are covered with hard cover. The thoracic muscles are attached to the three pairs of legs and two pairs of wings who helps cockroaches in flying and walking by which he moves from one place to another.	
4	Bird	Fly/walk	In birds muscles are firm and bones are hollow due to which they are lighter. Both of them (muscles and bones) together help birds in flying.	
5	Fish	swim	Fish is a linear in shape. Annuluses are formed on both the side of its body due to movement of muscles. As a result fish moves by swimming in the water.	
6	Snake	creep	Snakes creep on the ground by making rings in alternate order on both the side of its body. Several bones and its associated muscles push the body forwards that the snake is in motion	

Jaipur Foot

Jaipur Foot is also known as Jaipur leg. It is worn down the knee. It is prepared by the high-quality rubber. Dr. P.K.Sethi of Sawai Man Singh Hospital, Jaipur (India) perceived problems of the disabled, suggest to ShriRam Chandra Sharma for making the Jaipur Foot.

Bhagwan Mahaveer Viklang Sahayata Samiti established by Devendra Raj Mehta help the disabled by fitting Jaipur foot free of charge to needy persons.

Jaipur foot related other information:

- Jaipur foot works like a normal limb.
- It looks like a normal limb.
- No adverse effect of water and moisture on it.
- This shoe can be worn with or without shoes.
- Generally a Jaipur Foot serves for three years.
- It is very light in weight.

What Have You Learnt

1. Animals move from one place to another by different ways.
2. Human skeleton system is made up of bones and cartilages.
3. There are many bones in the human skeleton - bones of hands, leg's bones backbone etc.
4. Human skeleton system have two types of joints for example - movable and fixed joints
5. Joints- (i) Ball-socket joint (ii) hinge joint (iii) pivot joint
6. Insects, birds, animals, aquatic organisms move differently.

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Exercises

Choose correct option -

1. What's the longest middle section of Humerus is called?
   (a) Shaft (b) girdle
   (c) joint (d) carpal ( )
2. Number of bones in thumb of hand.
   (a) 1 (b) 2
   (c) 3 (d) 4 ( )

Fill in the blanks -

(i) There are..... bones in our palm.
(ii) Shoulder bone is called as.....
(iii) Each finger of hand and leg has ---------- bones.
(iv) Muscles have a capacity of .....and .....which help in movement.

Short answer type question

(i) Tell about Radius-ulna bone.
(ii) From which bones the front and back end of femur is articulated with ?
(iii) Tell about pelvic and pectoral girdles.
(iv) How many vertebrae are found in vertebral column?

Long answer type question

(i) What is a skeleton system? Draw a labeled diagram and describe functions of skeleton system?
(ii) What is a Joint? Describe any two joints by a labeled diagram?
(iii) What is a muscle? How they help in movement? Describe by a labeled diagram?

Activity:

1. Prepare a list of bones of skeleton system on chart and demonstrate in a classroom.
2. Prepare charts of diagrams of hand and leg's bones.
3. Demonstrate the mechanism of joints in a classroom.

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