



UNIT IV

CHAPTER 9

Locomotion and Movement

Types of joints

- Joints are essential for all types of movements performed by the bony parts of the body.
- The joints are points of contact between bones.
- Sometimes they are playing a protective role in the process.
- Force generated by the muscles are used to carry out the movement through joints which helps human functional activity of daily living and ambulation.
- The joint acts as a fulcrum of a lever.

(i) Fibrous joints or Synarthroses:

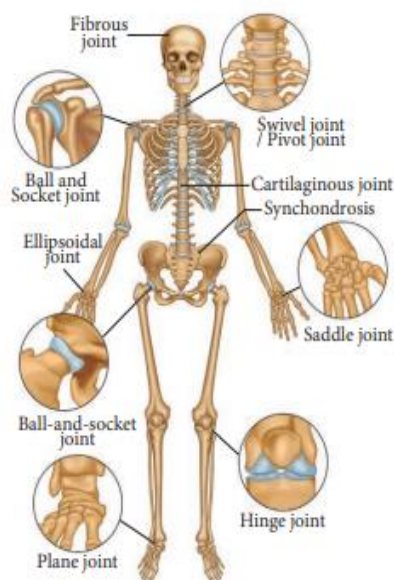
They are immovable fixed joints in which no movement between the bones is possible. Sutures of the flat skull bones are fibrous joints.

(ii) Cartilaginous joints or Amphiarthroses:

- They are slightly movable joints in which the joint surfaces are separated by a cartilage and slight movement is only possible.
- E.g., Joints of adjacent vertebrae of the vertebral column.

(iii) Synovial joints or Diarthroses joints:

- They are freely movable joints, the articulating bones are separated by a cavity which is filled with synovial fluid.





Pivot joint	between atlas and axis
Plane/gliding joint	between the carpals
Saddle joint	between the carpal and metacarpal
Ball and socket joint	between humerus and pectoral girdle
Hinge joint	knee joint
Condylod or Angular or Ellipsoid	between radius and carpal

Disorders of muscular and skeletal system

(a) Disorders of muscular system

Myasthenia gravis: An autoimmune disorder affecting the action of acetylcholine at neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscles.

Acetylcholine receptors on the sarcolemma are blocked by antibodies leading to weakness of muscles.

When the disease progresses, it can make chewing, swallowing, talking and even breathing difficult.

Tetany:

- Rapid muscle spasms occur in the muscles due to deficiency of parathyroid hormone resulting in reduced calcium levels in the body.

Muscle fatigue:

- Muscle fatigue is the inability of a muscle to contract after repeated muscle contractions.
- This is due to lack of ATP and accumulation of lactic acid by anaerobic breakdown of glucose

Atrophy:

- A decline or cessation of muscular activity results in the condition called atrophy which results in the reduction in the size of the muscle and makes the muscle to become weak, which occurs with lack of usage as in chronic bedridden patients.

Muscle pull:

- Muscle pull is actually a muscle tear.
- A traumatic pulling of the fibres produces a tear known as sprain.
- This can occur due to sudden stretching of muscle beyond the point of elasticity.
- Back pain is a common problem caused by muscle pull due to improper posture with static sitting for long hours.

Muscular dystrophy:

- The group of diseases collectively called the muscular dystrophy are associated with the progressive degeneration and weakening of skeletal muscle fibres, leading to death from lung or heart failure.



- The most common form of muscular dystrophy is called Duchene Muscular Dystrophy (DMD).

b) Disorders of skeletal system

Arthritis and osteoporosis are the major disorders of skeletal system.

1. Arthritis:

- Arthritis is an inflammatory (or) degenerative disease that damages the joints.
- There are several types of arthritis.

(i) Osteoarthritis:

- The bone ends of the knees and other freely movable joints wear away as a person ages.
- The joints of knees, hip, fingers and vertebral column are affected.

(ii) Rheumatoid arthritis:

- The synovial membranes become inflamed and there is an accumulation of fluid in the joints.
- The joints swell and become extremely painful.
- It can begin at any age but symptoms usually emerge before the age of fifty.

(iii) Gouty arthritis or gout:

- Inflammation of joints due to accumulation of uric acid crystals or inability to excrete it.
- It gets deposited in synovial joints.

2. Osteoporosis:

- It occurs due to deficiency of vitamin D and hormonal imbalance.
- The bone becomes soft and fragile. It causes rickets in children and osteomalacia in adult females.
- It can be minimized with adequate calcium intake, vitamin D intake and regular physical activities.

Benefits of regular Exercise

Exercise and physical activity fall into four basic categories.

Endurance, Strength, Balance and Flexibility.

- Endurance or aerobic activities increase the breathing and heart rate.
- They keep the circulatory system healthy and improve overall fitness.
- Strength exercises make the muscles stronger.
- They help to stay independent and carry out everyday activities such as climbing stairs and carrying bags.
- Balance exercises help to prevent falls which is a common problem in older adults.
- Many strengthening exercises also improves balance.
- Flexibility exercises help to stretch body muscles for more freedom of joint movements.



Regular exercises can produce the following beneficial physiological changes:

- The muscles used in exercise grow larger and stronger.
- The resting heart rate goes down.
- More enzymes are synthesized in the muscle fibre.
- Ligaments and tendons become stronger.
- Joints become more flexible.
- Protection from heart attack.
- Influences hormonal activity.
- Improves cognitive functions.
- Prevents Obesity.
- Promotes confidence, esteem.
- Aesthetically better with good physique.
- Over all well-being with good quality of life.
- Prevents depression, stress and anxiety.
- During muscular exercise, there is an increase in metabolism.
- The O₂ need of the muscles is increased.
- This requirement is met with more oxygen rich RBCs available to the active sites.
- There is an increase in heart rate and cardiac output.
- Along with balanced diet, physical activity plays a significant role in strengthening the muscles and bones.