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HUMAN ANATOMY AND PHYSIOLOGY – I

UNIT 2

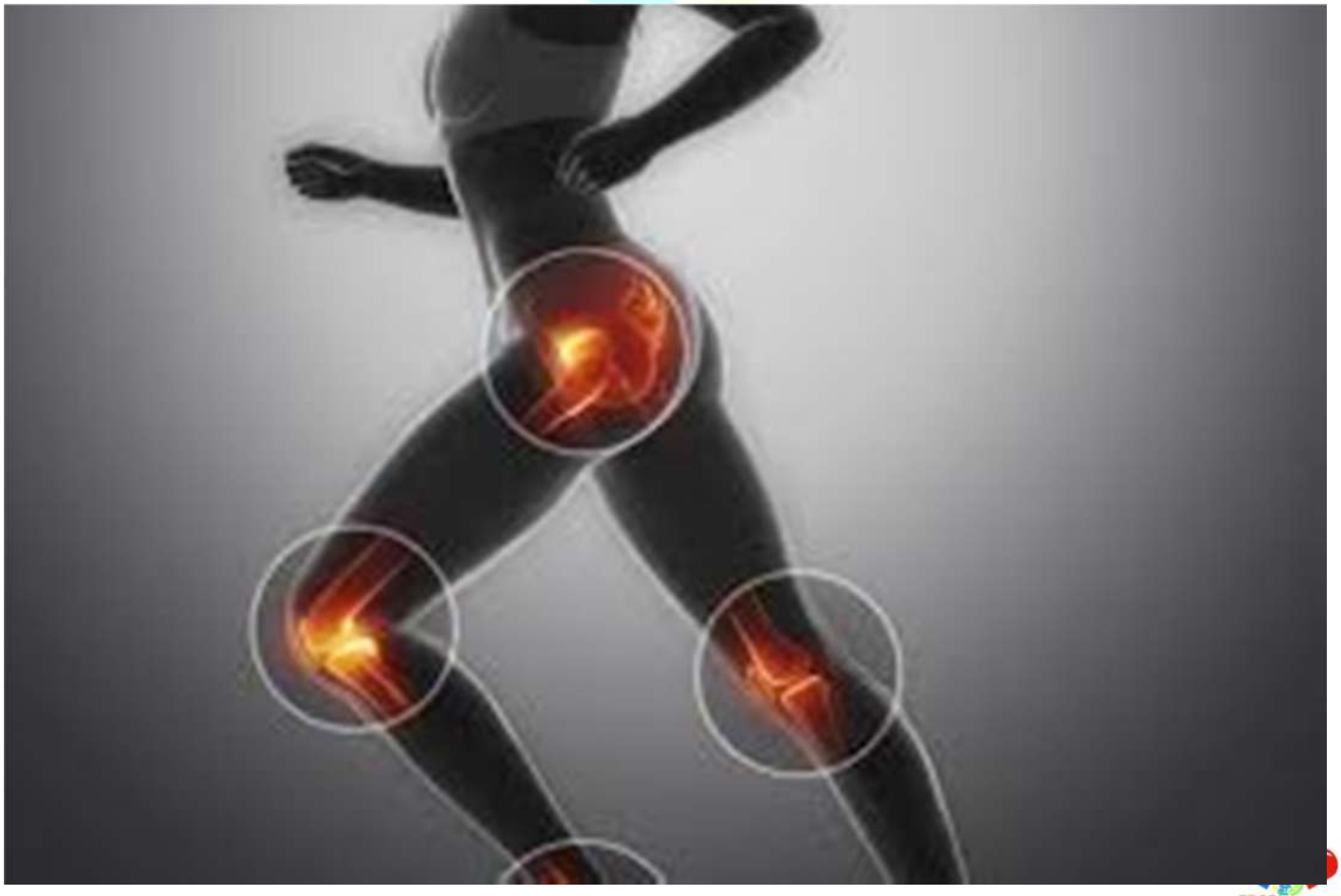
TOPIC :

- **Joints**

  Structural and functional classification, types of joints movements and its articulation

Joints

- The site where more than two bones meet to carry out the movement is known as a joint or articulation', More than 100 types of joints are present in the human body.
- These Joints are attached such that they perform different movements, as required.
- There are movable and non-movable joints in the body.
- Only the movable joints allow different kinds of movements.
- The structure of the joint is the governing factor for the type, direction, and degree of movement.
- The joints serve a dual purpose, i.e., holding of bones together as well as allowing skeletal movement, The hyoid bone present in the neck is the only one which does not articulate with any of the bones.



Classification of joints

→ Joints are classified structurally (based on their anatomical characteristics) and functionally (based on the type of movement they produce).

Structurally joints are of 3 types:

1. Synovial joints: The bones forming the joint have a synovial cavity and are united by the dense irregular connective tissue of an articular capsule and accessory ligaments.

Eg : Sutures of skull, teeth in sockets

2. Fibrous joints: There is no synovial cavity and the bones are held together by dense irregular connective tissue.

Eg : Intervertebral discs, pubic symphysis

3. Cartilaginous joints: There is no synovial cavity and the bones are held together by cartilage.

Eg : Knee, elbow, shoulder joints

Functionally joints are classified as one of the following types:

- **Synarthrosis (syn = together):** These are immovable joints. Which have no Movement Eg : Skull sutures
- **Amphiarthrosis (amphi = on both sides):** These are slightly movable joints. Which have less movement Eg : Intervertebral discs
- **Diarthrosis:** These are freely movable joints. All diarthroses are synovial joints. They have a variety of shapes and permit several different types of movements. Eg : Shoulder, hip, elbow

Synovial Joints (Freely Movable Joints)

→ Synovial joints are the most common and most movable type of joint in the human body. They are characterized by the presence of a fluid-filled synovial cavity between the articulating bones, allowing free movement.

Types of Synovial Joints

1. Ball and Socket Joint

A ball and socket joint consists of a rounded head (ball) of one bone fitting into a cup-like cavity (socket) of another bone, allowing movement in all directions (multiaxial).

- **Movement**: Flexion, extension, abduction, adduction, rotation, circumduction
- **Examples**: Shoulder joint, hip joint

2. Hinge Joint

A hinge joint allows movement primarily in one plane, much like the motion of a door hinge. It permits flexion and extension only.

- **Movement**: Flexion and extension (uniaxial)
- **Examples**: Elbow joint, knee joint, ankle joint

3. Pivot Joint

A pivot joint allows for rotation around a single axis. One bone rotates within a ring formed partly by another bone and partly by a ligament.

- **Movement**: Rotation (uniaxial)
- **Examples**: Atlantoaxial joint (between the first and second cervical vertebrae), radioulnar joint

4. Saddle Joint

A saddle joint involves bones that have both concave and convex areas, fitting together like a rider sitting on a saddle. Allows motion in two planes.

- **Movement**: Flexion, extension, abduction, adduction (biaxial)
- **Example**: Carpometacarpal joint of the thumb (base of thumb)

5. Condyloid (Ellipsoidal) Joint

A condyloid joint (also called an ellipsoidal joint) is formed where an oval-shaped condyle of one bone fits into an elliptical cavity of another bone.

- **Movement**: Flexion, extension, abduction, adduction, circumduction (biaxial)
- **Examples**: Wrist joint, metacarpophalangeal joints (knuckles)

6. Plane (Gliding) Joint

A plane joint (gliding joint) has flat or slightly curved surfaces that slide over each other. It allows limited movement in multiple directions.

- **Movement**: Sliding or gliding motions (non-axial)
- **Examples**: Intercarpal joints (wrist), intertarsal joints (ankle)

Types of Joint Movements

There are generally four types of joint movements:

→ **Gliding:** One of the simplest motions existing between two adjacent surfaces is the gliding motion. The process of gliding takes place when the surface of a flat bone glides over the other bone, in either to and fro motion or by moving side by side, without any angular or rotary motion.

→ **Angular:** In this type of movement, the angle formed between the two adjacent bones is either decreased or increased. Some common types of angular motion

→ **Rotation:** This type of movement occurs when a bone turns along its own axis. This movement is commonly seen in the atlas and axis vertebrae, and the joints of shoulder and hip.

→ **Circumduction:** Circumduction is the movement (of a limb or eyes) in a circular direction (i.e. 360)

Disorders of Joint

Some of the common joint disorders are

1) Rheumatoid arthritis,
2) Gout,
3) Bursitis,
4) Joint dislocation, and
5) Osteoarthritis.

Rheumatoid arthritis

→ Rheumatoid arthritis is progressive a inflammatory, musculoskeletal disorder which affects multiple joints, connective tissues, muscles, tendons, and fibrous tissues Joint Dislocation

→ Joint dislocation is a condition in which a joint slips out of its place, when bone ends shift from their normal positions. Joint dislocation results in its functions loss.

→ The degree of severity depends on site of joint dislocation as different joints have different healing power.

Causes

1)Severe blow, fall, or any other trauma affecting the joint,
2) Disease or defective ligaments, and
3) Rheumatoid arthritis.

Signs and Symptoms

The affected joint will be:

1) Visibly deformed or out of place,
2) Very painful,

Osteoarthritis

- Osteoarthritis or degenerative arthritis is a common disease of joints that involves inflammation, pain, and degeneration of joints. The word osteoarthritis derived from Greek words where osteo means bone, arthro means joint, and itis means inflammation. It is also known asdegenerative joint disease or arthrosis or wear and tear (in common language). Osteoarthritis results due to deterioration of cartilage, present around joints for their protection and support.

Causes

1) Hereditary/genetic,
2) Injury,
3) Inflammatory diseases or disorders,
4) Tendonitis (inflammation of tendon sheaths) and bursitis,
5) Injury of protective caps of cartilage covering the bone ends,

Signs and Symptoms

Osteoarthritis can occur in any joint. However, the most commonly affected areas of the body include the hands, fingertips, knees, hips, spine, typically at the neck or lower back. Any joint can be affected with osteoarthritis, but thefrequently affected areas are hands, fingertips, knees, hips, spine, typically at the neck or lower back. The common symptoms of osteoarthritis are:

1) Pain,
2) Tenderness (discomfort when pressing on the area with your fingers),
3) Stiffness, and
4) Inflammation.
5)The pain and inflammation of and surrounding area increases as the condition of Osteoarthritis advances