**Grand Assignment**

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**Subject : Biomechanics & Ergonomics Instructor : Dr. M .Shahzeb khan (PT)**

**Q1:** Explain “Biomechanics of Articular cartilage”

Ans:

" **Biomechanics of Articuler cartilage"**

"Articuler cartilage is a layer of connective tissues with very unique visoelastic properties".

**Functions of Articuler cartilage:**

1. The main function of Articuler cartilage is to lower the friction of articulation and facilitate the transmission of load by smoothing and lubricating the surfaces.
2. Articuler cartilage rolls or slides the surface during motion.
3. Distribute joint load over a wide area during the stress sustained by contacting joint surface.

4. Articuler cartilage also decrease peak stress on subchondral bone.

**Properties:**

1. Cartilage does not work as shock absorber.
2. Articuler cartilage is very thin.
3. It's capacity is negligible as compared to muscle and bone.

**Composition:**

* Chondrocytes \_ 10 percent
* Collagen. \_ 10\_30 percent
* Water. \_ 60\_80 percent

**Types:**

There are three different types of Articuler cartilage.

**1. Hyaline cartilage:**

It is smooth and glassy cartilage.

Located at long bones and growth plates.

**2. Fibro cartilage:**

Fibro cartilage is a dense.

It is located at intervertebral disk and meniscus.

**3. Elastic cartilage:**

It glassy and opaque.

It is located at epiglottis and eustachian tube.

**Q2:** Explain “Biomechanics of Tendon and Ligament”

**Ans:**

**"Articulation of Tendon and Ligaments"**

**Ligaments:**

"Ligaments connect bone to bone".

* Ligaments consist of mostly bundle of elastic molecules in to elastic fiber with some bundle of collegen.
* Ligaments are more elastic as compared to Tendon.
* It offers less tensile stress.
* It originates and inserts in bone.

**Functions of ligaments:**

1. The main function of ligament is to attache bone to bone.
2. Ligaments give a right position to the bone and joint.
3. They also function in propoiception.

**4.** Collectively joint capsule and ligaments stabilize the joint.

**Anatomy:**

* + Similar to tendon in hierarChical structure.
  + Fibroblasts.
  + Higher percentage of proteo glycen matrix than tendon.
* Collagen fibers are slightely less in volume fraction and organization than tendons.

**Tendons :**

* Tendons connect muscle to bone .
* Tendon consist of bundles of collagenus fibers arrange in parallel they are arrange in this way to form cords.
* Have great tensile strength.
* Less elastic than ligaments.
* Originates at muscle crosses at least one joint and insert in bone .

**Functions:**

1. Tendons carry tensil force from muscles to bones.
2. carry compressive force when wrapped around bone like a pulley.
3. Propoiception
4. Secondary function storage of energy.

.**Anatomy:**

* **It** contains taype 1 collagen fibrils.
* They contain fibroblast cells that are arranged in parallel.
* Itcontain proteoglycen matrix.

**Composition of tendon and ligaments:**

* Fibroblasts
* Water
* Solids
* Collagen
* Type 1
* Elastin

**Injuries in tendons and ligaments:**

Most common injuries of tendons and ligaments occur due to high stress and overuse.

Tendons which suffer high xhances of injuries are;

Rotator cuff tendons(shoulder).

Achilles tendon(leg).

**Flexor** tendon (hand).

Ligaments which suffer high chances of injuries;

Anterior cruciate ligament(knee).

Ankle ligament (calcinofiboler ,anterior talofibuler,deltoid).