

السنة الثانية – الفصل الثاني

الجهاز الحركي والجلد

Skin and Locomotor System (Musculoskeletal System)

(500281)

(6) Credit Hours

Objectives:

By the end of this course, the student should be able to :

1. Describe the orientation of the body in the anatomical position.
2. Relate the common names of the corresponding anatomical descriptive terms of various regions of the human body.
3. Define the anatomical planes and sections used to describe the human body.
4. Describe the structure and function of bones, joints, ligaments and skeletal muscles.
5. Analyze the movements of individual joints and the body as a whole.
6. Describe the development of muscle and bone tissues.
7. Describe the microscopic anatomy of bones, ligaments, muscles and skin.
8. Mention skin manifestations of systemic diseases.
9. Describe the properties of muscle proteins.
10. Outline the steps involved in the muscle contraction.
11. Describe the structure and functions of neurons and nerve supply of muscles and bones.
12. Describe mechanisms of movement and its control.
13. Mention pathologic disorders of skin, muscles, bones and peripheral nerves.
14. List drugs used in the treatment of diseases of the skin, muscles and bones.
15. Take proper history and perform clinical examination of the Musculoskeletal system.

Content summary:

	<u>Lectures</u>	<u>Practical (including tutorials)</u>
Histology	06	04
Physiology	08	-
Anatomy of Upper limb	10	08
Anatomy of Lower limb	10	08
Anatomy of the abdominal wall, Muscles of the head & neck & spine	06	04
Embryology of limbs & spine	02	-
Pathology	08	-
Microbiology	05	-
Biochemistry	02	-
Pharmacology	03	-
Clinical Examination	06	-
Total		90 Contact hours

Contents:

Anatomy of Upper limb:

(10) lectures:

1. Introduction (Anatomical Terms, Bones of Upper Limb)
2. Pectoral Region & Axilla
3. Axilla & Scapular Region
4. Shoulder Joint, Sterno-Clavicular & Acromio- Clavicular Joints
5. Upper Arm

6. Cubital Fossa / Forearm ant.
7. Forearm Ant. Comp.
8. Forearm Post. Comp.
9. Hand
10. Joints & Nerve

(8) practical

1. Bones & pectoral region
2. Axilla
3. Axilla/ Scapular region
4. Upper arm
5. Forearm & Hand
6. Forearm & Hand
7. Joints
8. X - Rays

2- Anatomy of Lower limb

10 lecture:

1. Bones of lower limb
2. Gluteal region (1 ½ h.)
3. Ant. Compartment of thigh (1 ½ h.)
4. Ant. Compartment of thigh / cont.
Medial comp. of thigh
5. Popliteal fossa (1 ½ h.)
- Hip joint -
6. Ant. and Lat. Comp. of leg (1 ½ h.)
7. Post. Comp. of leg
8. Sole of foot
Joints of lower limb (1 ½ h.)
9. Joints of lower limb/cont. (1 ½ h.)
10. Nerve injuries

(8) Practical

1. Bones of lower limb
2. Gluteal region
3. Ant. Compartment of thigh
4. Medial & post. comp. of thigh
5. Hip joint & Popliteal fossa
6. Leg compartments
7. Leg / cont. of sole
8. Joints of L.L.

Anatomy of the abdominal wall

Muscles of the Head & Neck & spine

(6) Lectures (4) Practical:

1. Anatomy of anterior abdominal wall & diaphragm (2 lectures), (1 practical)
2. Anatomy of thoracic wall (1 lecture, 1 practical)
3. Anatomy of the muscles of head & neck & spine (3 lectures, 2 practical)

Embryology of limbs & spine :

(2) Lectures:

1. Embryology of limbs
2. Embryology of spine

Histology :

(6) Lectures, (4) Practical:

1. Histology of skeletal muscles & cartilage (2 lectures, 1 practical)
2. Histology of bone (1 lecture, 1 practical)
3. Histology of ossification (1 lecture, 1 practical)
4. Histology of skin (2 lecture, 1 practical)

Physiology :

Physiology (8 hours)

Nerve & Muscle

Excitable tissue

Membrane physiology & the basis of excitability

Transport of materials across membranes

Modalities of transport

- Diffusion through membrane
- Factors that affect diffusion
- Osmotic pressure

- Osmolarity

- Tonicity

Role in living cells

Active transport

Primary

Secondary

Role in living cells

Vesicular transport

Transport through cellular sheet

Resting membrane potential & its relation to physiology properties of biological membranes.

Movement of charges particles across membrane

Membranes, capacitance, conductance & current flow

Nerve:

Neurons (parts) & classifications

Supportive cell & function

Nerve action potential:

Event of action potential

Recordings of action potentials (biphasic Vs monophasic)

- ionic basis

- the role of Na⁺ & K⁺ channels (Voltage gated channels)

- the role of other ions

condition along nerve fibers by local current flow

conduction in myelinated fibers

factors that affect velocity of conduction in nerve fibers & classification of nerve fibers

Synaptic transmission:

Release of remitters
Role of Ca⁺⁺

Modulation of membrane potentials by transmitter (receptor gated channels)
Facilitation & inhibition of postsynaptic membranes
EPSP (Excitatory post synaptic potentials) , IPSP (Inhibitory post synaptic potentials)

Presynaptic inhibition
Integration of neural function

Muscle:

Introduction

Skeletal muscle structure muscle, fibers, myofibrils, filaments
Arrangement & composition of contractile proteins in striated muscle contraction

Molecular basis of muscle contraction (sliding theory)
Energetic of contraction

Characteristics of muscle contraction

Mechanics of contraction
Motor unit summation
Tetanization
Muscle fatigue
Sarcomere length – tension relation & muscle length – tension relation
Muscle load – velocity of contraction relation

Electrical activity of skeletal muscle membrane & generation of action potential by Ach.

Excitation – contraction coupling
The role of Ryanodine receptors (foot protein)
The role of Ca⁺⁺ in muscle contraction

Relaxation of skeletal muscle (mechanism)

Adaptation of skeletal muscle to demands
Skeletal muscle pathology (medical students)
Comparison of skeletal, cardiac & smooth muscle.

Pharmacology

(3) lectures:

(2 hours)

1. Drugs for Osteoporosis
2. Drugs for Osteomalacia
3. Drugs for Paget's Disease
4. Drugs for Osteoarthritis
5. Drugs for rheumatoid arthritis
6. Drugs for crystal arthritis (Gout)
7. Drugs for systematic lupus erythematosus
8. Drugs for seronegative arthritis

9. Drugs for musculoskeletal infections

Microbiology

(5) Lectures:

Bacterial infections:

Clostridia perfringens. Staph. Aureus. Strep. Group A
Actinomyces. Nocardia. Rickettsia. Bacterids and others

Viral infections:

Papilloma viruses. Mossuscum contagiosum. Coxsakie viruses
Viral exanthemas. Hemorrhagic fever viruses

Fungal and parasitic infections:

Tinea species. Dermatophytes. Fungi causing subcutaneous infections candida.
Trichinella. Leishmania. Filarial worms. Dracunculus medinensis Arthropods

Biochemistry

(2) Lectures:

Muscle Proteins: structure properties

Actin Myosin interaction

Motility in non-Muscle Cells

Calcium Metabolism

Regulation of calcium Metabolism

Pathology :

Pathology (11 hours) :

1. Introduction and developmental abnormalities

2. Diseases associated with abnormal matrix
(osteogenesis imperfecta)

osteoporosis

Diseases associated with osteoclast dysfunction

Osteopetrosis

Paget disease

Diseases associated with abnormal mineralization

Rickets and osteomalcia

Hyperparathyroidism

Renal osteodystrophy

3. Infections – Osteomyelitis

Pyogenic osteomyelitis

Tuberculous osteomyelitis

Fractures:

Osteonecrosis (avascular necrosis)

4. Bone tumors & tumors like conditions

5. Joints:

Arthritis, osteoarthritis

Rheumatoid arthritis

Seronegative spondyloarthropathies

Infectious arthritis

Gouty arthritis

Skin:

- Histology

- Physiology
- Pathology
- Microbiology
- Examination

Examination of Limbs and spine

Clinical aspects (6 hours)

General guide lines (look, feel, move)

1. Inspection (Look)

a. Inspect joints while static for

- Deforming
- Swelling
- Discoloration
- Muscle wasting
- Skin changes & skin lesions

b. Inspect joints while active

1. Look for:

- Range of movement
 - Quality of movement
2. compare with the other side
3. compare with the examiner joints

2. Palpation (Feel)

Palpate for

- points of tenderness
- temperature
- soft tissue or bony swelling
- look for effusion within the joint
- active movement repeated to detect crepitus or clicks
- special maneuvers for ligaments tears or range of movement...etc.

3. **Move:** active movement (look for range of movement, abn. Movement)

General Examination of Musculoskeletal System:

Start by:

1. Posture:

- a. make sure patient can stand and walk
- b. view the patient from behind and front
- c. view the patient from the side
- d. if the patient has scoliosis, ask him to bend forward with legs straight to differentiate functional from anatomical deformity.

N.b. student should know the types of normal and pathological postures

2. Gait: patient should be stripped as much as possible
observe patient while walking and going upstairs
observe for arm swinging
student should know about types of gait

- a. painful
- b. painless - osteogenic

- Arthrogenic
- Myogenic
- Neurogenic
- Psychogenic
- Prosthetic

Temporo mandibular joints :

1. Ask patient to open his mouth, look for the range of movement.
2. Palpate each joint looking for swelling and tenderness.
3. feel and listen for crepitation.

Neck:

1. inspect neck for range of movement and abnormal posture
 2. palpate for tenderness in the cervical spine and trapezius muscles
 3. test range of movement
- ask patient to touch his chest by the chin, move the chin to each shoulder, move each ear to corresponding shoulders, put his head back.

Hands:

1. inspect for swelling, redness nodules deformity, muscular atrophy
2. palpation:
 - a. palpate medial & lateral aspect of each interphalangeal joint between examiners thumb and index finger
 - b. by thumbs palpate the MCP joints
 - c. palpate each wrist joint by thumbs on dorsum of the wrist & fingers beneath.
3. Movement:
 - a. extend & spread fingers of both hands
 - b. make a fist with thumbs across the nucleus
 - c. flex & extend his wrists, adduct & abduct them.

Elbow:

1. inspect the elbow while flexed & extended for malalignment and deformities
2. palpation
support elbow flexed at 90 & palpate the elbow start:
 1. extensor surface of the ulna and the olecranon process
 2. palpate the groove on each side of the olecranon
 3. check for tenderness of the epicondyles

Shoulder:

1. inspect shoulders
 - a. anteriorly looking for swelling, deformity, muscular atrophy.
 - b. Posteriorly look for the scapulae and related muscles
2. palpation
for tenderness at the joints related to the shoulder, i.e. sternoclavicular, Acromioclavicular
and shoulder itself including greater tubercle and biceps groove.
3. Move:
Move the shoulder
Internal rotation
External rotation

Flexion
Extension
Adduction
Abduction

References:

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6. JAWETZ, Melnick & Adelberg: Medical Microbiology. 5th edition, LANGE