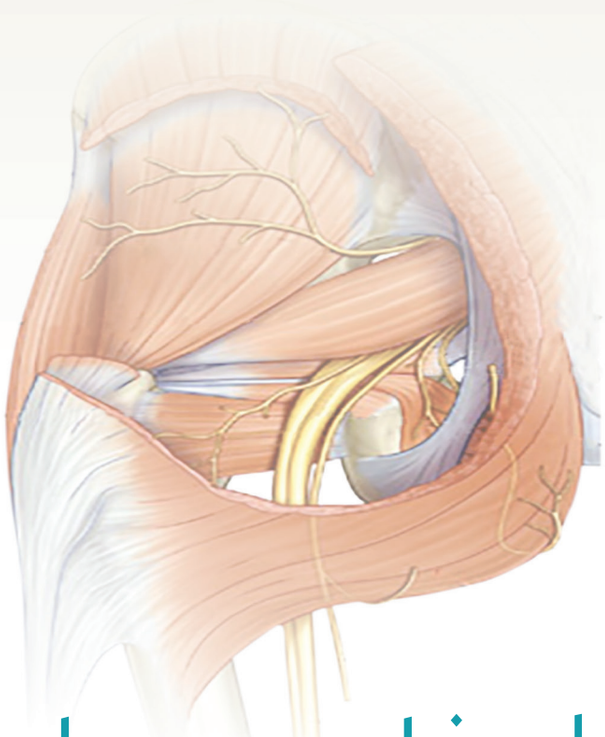
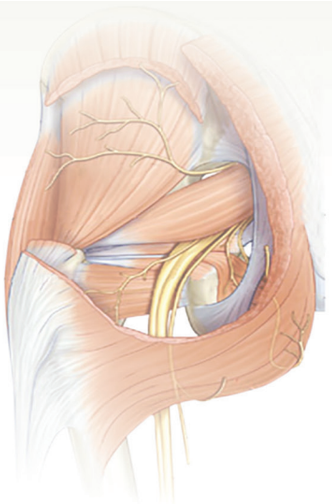


Section 1

Lower Limb



Chapter

1

Introduction

The lower limb or extremities are modified in the human body for weight transmission and bipedal locomotion. The lower limb, in its basic structure, is slightly different from the upper limb. The emancipated upper limb is specialised for prehension and free mobility, whereas the lower limb is specialised for support and locomotion.

In general, the lower limbs attain stability at the cost of some mobility, and the upper limbs attain freedom of mobility at the cost of some stability. Thus, the lower limbs are bulkier and stronger than the upper limbs.

PARTS OF THE LOWER LIMB

The lower limb consists of four parts (Table 1.1 and Plate 1.1):

1. Gluteal region
2. Thigh
3. Leg or crus
4. Foot or pes.

Gluteal Region

The *gluteal region,* overlying the side and back of the pelvis, includes the hip and the buttock, which are not sharply distinguished from each other.

Hip or *coxa* is the superolateral part of the gluteal region presented in a side view, while the ***buttock*** or *natis* is the inferomedial rounded bulge of the region presented in a back view.

The ***hip bone*** is made up of three elements—ilium, pubis and ischium; which are fused at the acetabulum. Two hip bones form the *hip girdle*, which articulates posteriorly with the sacrum at the sacroiliac joints. The bony *pelvis* includes the two hip bones—a sacrum and a coccyx. *Hip joint* is an articulation between the hip bone and femur.

Thigh

The thigh extends from hip to the knee joint. ***Femur*** and patella are bones of thigh. The junction of thigh and anterior abdominal wall is indicated by the groove of groin or inguinal region. The *gluteal fold* is the upper limit of the thigh posteriorly. *Ham* or *poples* is the lower part of the back of thigh and the back of the knee.

Leg

Leg lies between the ***knee joint*** and the ankle joint. It comprises tibia and fibula including their three tibiofibular joints.

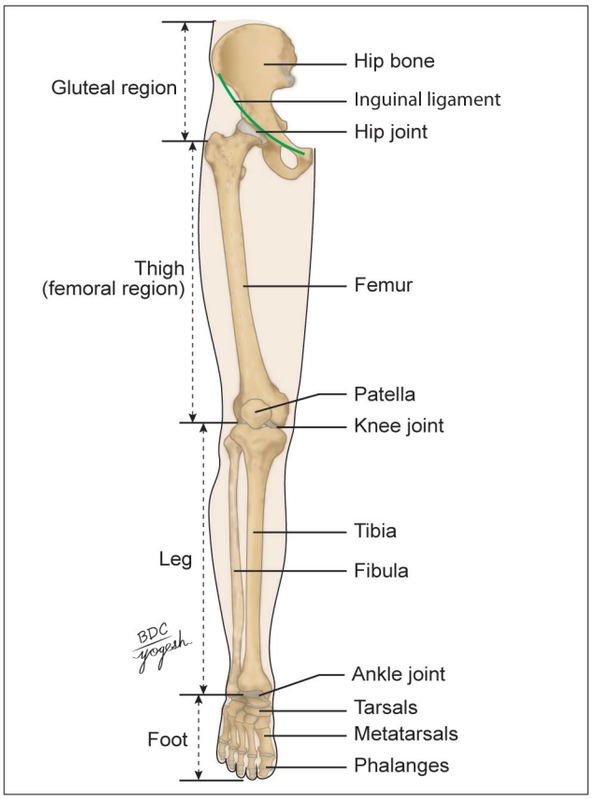
Foot

The foot or *pes* has an upper surface, called the *dorsal surface,* and a lower surface, called the ***sole*** or *plantar surface.* Sole is homologous with the palm of the hand.

TABLE 1.1: Parts of the lower limb

Regions	***Bones***	***Joints***
Gluteal region (covers the side and back of the pelvis)	Hip bone	Hip joint
Thigh (from hip to knee)	Femur Patella	Knee joint
Leg or crus (from knee to ankle)	Tibia Fibula	Tibiofibular joints
Foot or pes (from heel to toe)	Tarsus: 7 tarsal bones Metatarsus: 5 metatarsals 14 phalanges: Two for great toe, three for each of the four toes	Ankle joint Subtalar and transverse tarsal (TT) joints Tarsometatarsal (TM) joints Intermetatarsal (IM) joints Metatarsophalangeal (MP) joints Interphalangeal (IP) joints

Plate 1.1: Parts and bones of lower limb



Line of Gravity

The line of gravity passes through cervical and lumbar vertebrae. In the lower limbs, it passes behind the hip joint and in front of knee and ankle joints (Fig. 1.1).

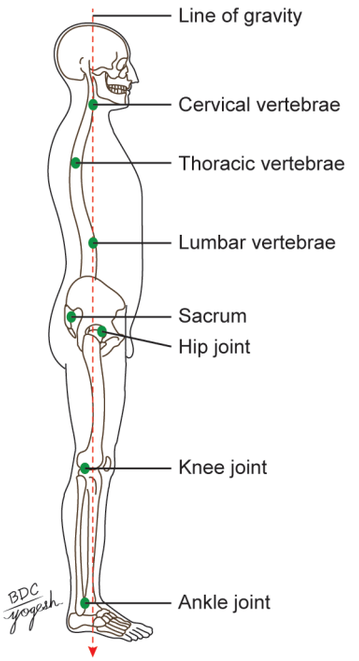


Fig. 1.1: Line of gravity

Weight Transmission in Lower Limb

The weight of a person of 60 kg gets divided into two parts of 30 kg each and descends to respective ankle joint. At ankle joint, 30 kg is divided into two equal parts; 15 kg goes to ground via calcaneal tuberosity, and other 15 kg reaches forepart of the foot. At the metatarsophalangeal joints of foot, 15 kg is divided into six parts of 2.5 kg each; two parts pass to the big toe, and one part each passes to 2nd–5th toes. Since the big toe on its head articulates with two sesamoid bones, each transmits 2.5 kg to the ground (Figs 1.2 and 1.3).

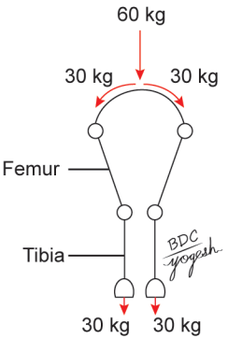


Fig. 1.2: Distribution of weight

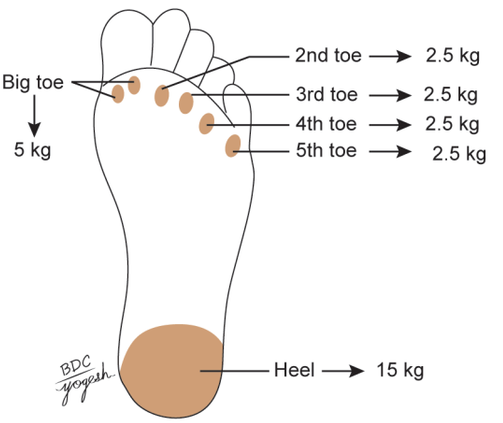


Fig. 1.3: Weight transmission

Peculiarities of Lower Limb

1. Longest and heaviest bone—femur
2. Most complicated joint—knee joint. There are 12 bursae in this joint.
3. Longest muscle—sartorius
4. Largest muscle—gluteus maximus
5. Strongest tendon—tendo calcaneus
6. Thickest nerve—sciatic nerve
7. Longest vein—great saphenous vein
8. Arches—foot with well-developed arches
9. Muscle with maximum heads—quadriceps femoris
10. Biggest sesamoid bone—patella
11. Longest cutaneous nerve—saphenous nerve.

CLINICAL ANATOMY

***Intramuscular injection*:** The commonest sites for intramuscular injections in the lower limb are gluteal region in adults (gluteus medius muscle) and the anterolateral aspect of thigh in children (vastus lateralis muscle).

Arterial pulse palpation**:** The commonly used arterial pulse in the lower limb is as follows:

a. Femoral pulse
b. Popliteal pulse
c. Posterior tibial pulse
d. Dorsalis pedis pulse

***Varicose veins*:** The superficial veins of the lower limb often become enlarged, swollen, and tortuous, called varicose veins. It occurs mostly in individuals with prolonged standing jobs such as bus conductors, traffic police, doctors and teachers.

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1. Development of lower limb
2. Molecular regulation of limb development
3. Viva voce questions