

SNS COLLEGE OF PHYSIOTHERAPY

**Affiliated To The Tamil Nadu Dr. MGR Medical University, Chennai
Coimbatore– 641035**

COURSE NAME : BIOMECHANICS

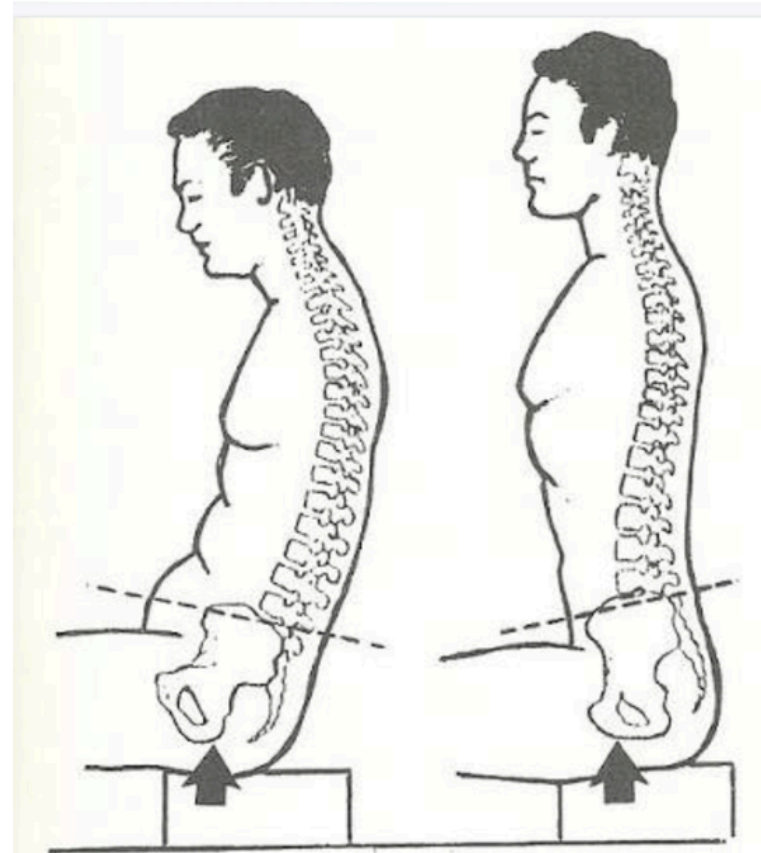
SUBJECT CODE : 6277

TOPIC : HIP JOINT

EMPATHIZE

Essential for:

- Standing balance
- Fall prevention
- Poor stability causes:
 - Hip pain
- Trendelenburg gait



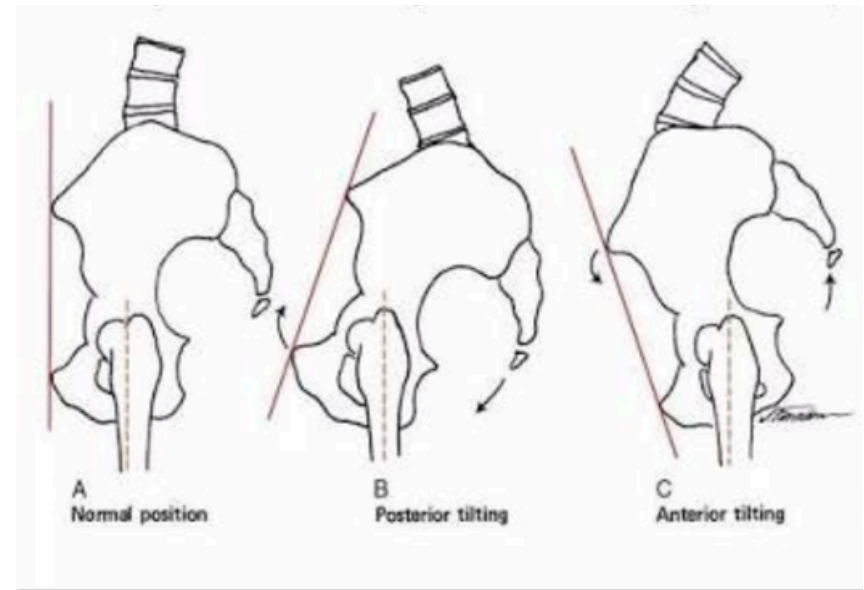
IDEATE

Used in:

Balance training

Gait correction

Cane prescription



Important in elderly rehabilitation

DEFINE AND EXPLAIN

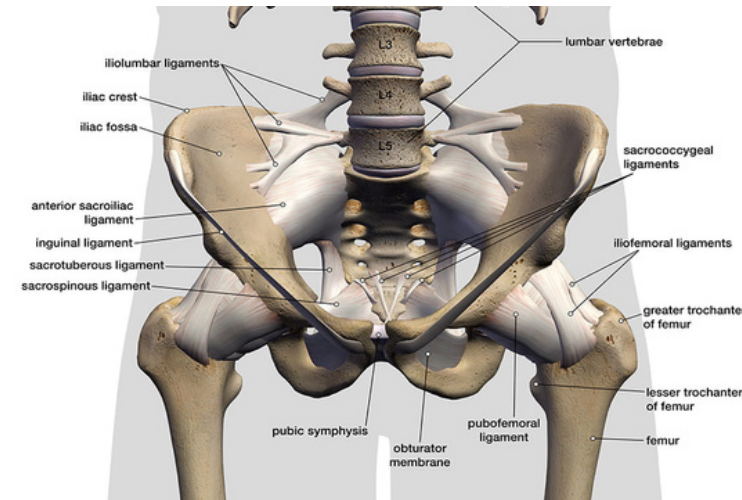
Hip stability is the ability to maintain joint alignment under load

Depends on:

Bone structure

Ligaments

Muscles



Bilateral Erect Stance

Weight evenly distributed

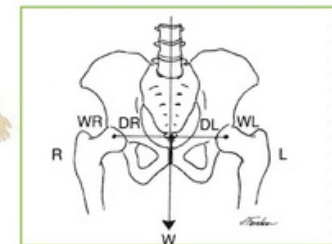
Line of gravity passes medial to hip

Minimal muscle activity
required

Muscle Function in Stance



BILATERAL STANCE

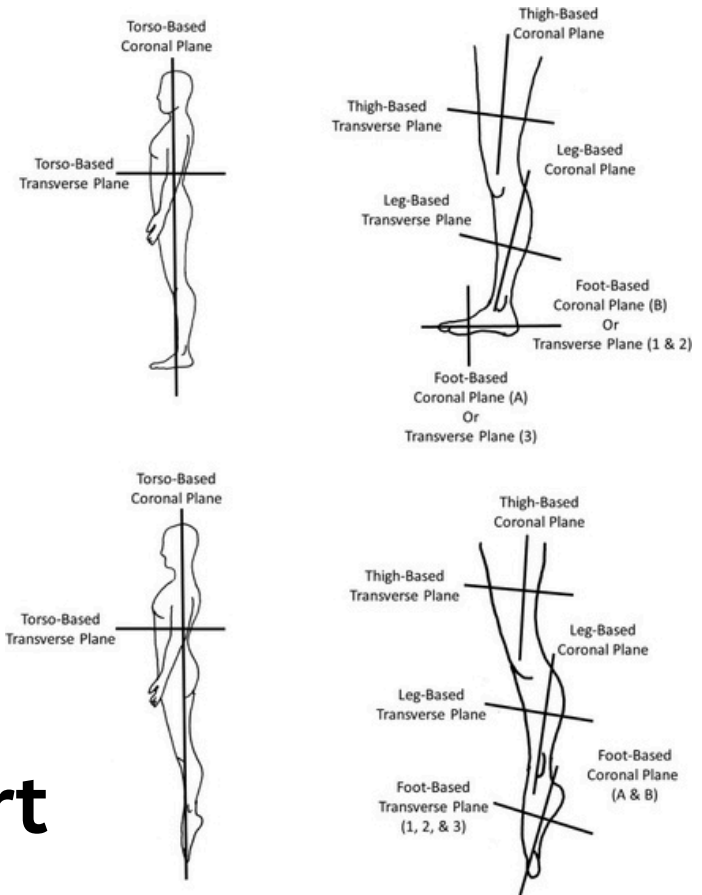


An anterior view of the pelvis in normal erect bilateral stance. The weight acting on the right hip joint (WR) multiplied by the distance from the right hip joint axis to the body's center of gravity (DR) is equal to the weight acting at the left hip joint (WL) multiplied by the distance from the left hip to the body's center of gravity (DL). Therefore, $WR \times DR = WL \times DL$.

Handwritten notes:
2/3
180 lbs
2/3 x 180
120 lbs

Sagittal Plane Equilibrium

- **Hip tends to extend**
- **Iliofemoral ligament**
resists extension
- **Reduces muscular effort**



Unilateral Stance

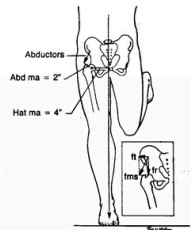
- **Body weight creates adduction moment**

- **Hip abductors counteract**

- **Prevents pelvic drop**

Unilateral Stance

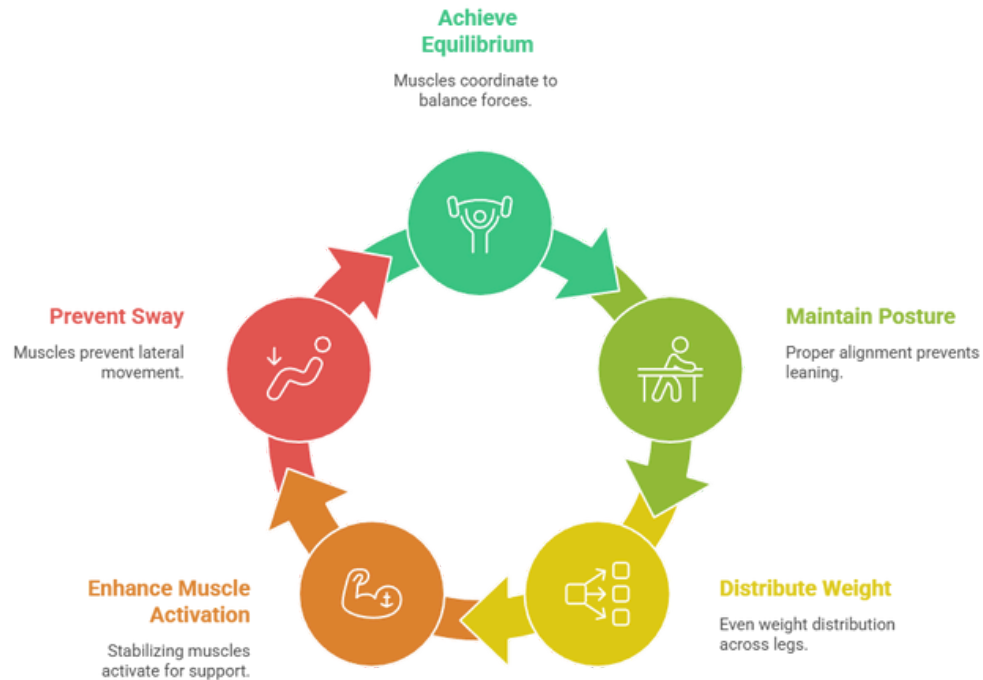
- Rt. hip joint compression = $\frac{2}{3} X W + \frac{1}{6} X W$ or $\frac{5}{6} X W$
- Magnitude of gravitational adduction torque at Rt. hip i.e. HATLL torque $add = Rt. hip jt. compression X 4"$
- Magnitude of muscle contraction or Torque abd or $Fms =$ Magnitude of gravitational adduction torque at Rt. hip $\div 2"$
- Total joint compression or joint reaction force = Magnitude of muscle contraction + Rt. hip joint compression



Sreeraj S R

FLOW CHART

Hip Stability Cycle



Made with Napkin

In class assessment

- 1. Define hip joint stability and list the factors contributing to it in standing posture.**
- 2. Describe hip stability in erect bilateral stance.**
- 3. Explain the line of gravity in erect bilateral stance and its relation to the hip joint axis.**
- 4. Describe sagittal plane equilibrium at the hip joint during quiet standing.**
- 5. Explain the role of ligaments in maintaining sagittal plane stability of the hip.**

In class assessment

- 6. Describe the muscular control required for sagittal plane equilibrium at the hip.**
- 7. Define unilateral stance and explain the mechanical demands placed on the hip joint.**
- 8. Explain the role of hip abductors in maintaining pelvic stability during unilateral stance.**
- 9. Describe the moment arms and forces acting on the hip joint in single-leg stance.**
- 10. Explain the clinical significance of impaired hip stability during unilateral stance.**

Thank you

