The Correlation between Hamstring Tightness and Low Back Pain in Seated Workers

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Anatomy of the Hamstrings
Description of the Hamstrings

• Three long muscles that move the hip and knee joints

• Located from medial to lateral:
  • Semimembranosus
  • Semitendinosus
  • Biceps femoris

• Actions:
  • Extend the thigh at the hip
  • Flex the leg at the knee
  • Medially and laterally rotate leg when knee is bent
Attachments of the Hamstrings

• Proximally, attach to the pelvis at the ischial tuberosity

• Distally, attach to the tibia and fibula

• Also attached to the sacrotuberous ligament
  • Resists anterior displacement of the sacrum

• Indirectly attached to the lower back muscles and fascia
  • Extensors of the spine – superficial and deep groups
Transversospinalis muscles

Erector spinae muscles
Tibia

Oblique popliteal ligament

Head of fibula
Sciatic Nerve
THE SCIATIC NERVE
Mechanics of the Hamstrings

We know what the hamstrings do, right?
Do they affect sacro-iliac joint stability?
Lumbar Curvature

• Normal curvature (lumbar lordotic angle) when standing is 20-45 degrees

• When sitting, lordosis is 50% less on average than in standing position

• Pelvis tilts posteriorly and hamstrings tighten
Pelvis Tilt Posteriorly

Flatten Lumbar Lordosis

Hamstrings & Hip Flexors Tighten

Increased Spine Loads & Disc Pressures
Could tightness affect all of these angles?

- Pelvic tilt angle (7-15°)
  A. Lumbar lordotic curve (50°)
  B. Lumbosacral angle (140°)
  C. Sacral angle (30°)
  D. Pelvic angle (30°)

- Neutral pelvic position
  - ASIS & pubic symphysis are on the same plane
Pathomechanics of Hamstring Tightness
Lumbar-pelvic Rhythm
Effect of Pelvic Tilting on Lumbar Spine Curvature
Correlation between Hamstring Tightness and LBP

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Abstract

PURPOSE: To evaluate the extent of intra-subject difference in hamstring flexibility and its possible relationship to the severity of Low Back Pain (LBP). A secondary purpose was to evaluate the extent of intra-rater reliability using both electrogoniometer and conventional goniometer for measuring hamstring tightness.

IMPORTANCE: Potential correlations between muscle impairments and LBP may lead to more effective treatments and prevention strategies.

METHODS: Seventy-two participants with mechanical LBP were recruited for this study. The sample included 41 females, 31 males with a mean age of 33.69 ± (11.04) years, height of 170 ± (9) cm, and weight of 79.5 ± (1.6) kg. Hamstring length was detected indirectly using the Active Knee Extension method in the 90/90 position from supine. The amount of extension was measured using both electro-goniometer (EG) and a standard goniometer (SG).
Correlation between Tightness and Mechanical LBP

• Radwan et al. (2014) evaluated the relationship between hamstring tightness and LBP

• The authors examined hamstring flexibility in 72 seated workers with history of LBP

• All participants in the study had tight hamstrings
Measurement of Hamstring Tightness
Correlation between Tightness and Mechanical LBP

- Additionally, participants presented significant intra-subject differences in hamstring flexibility.

- All dominant lower extremities were significantly more flexible than the non-dominant sides.

- There was a significant mean difference of two degrees.
Correlation between Tightness and Mechanical LBP

• Scores were positively and significantly correlated with the extent of their back discomfort as reported by Oswestry scores

• Similarly, Halbertsma et al. (2001) confirmed the presence of hamstring tightness in patients with non-specific LBP when assessed during passive straight-leg raising tests
Oswestry Score Correlations to Hamstring Tightness Values

\[ Y = 0.234 \times x + 1.823 \]

Values of Right and Left Lower Extremity Tightness
SIJ is a Six-degree of Freedom Joint

• Average active movement of 0.2-2 degrees
SI Dysfunction is a Major Cause of LBP
Stretching Tight Hamstrings
With Ease
Creeping Phenomenon

creeping under constant loading
Anterior Tilting of Pelvis + Hip Flexion + Knee Extension for 30-60 Seconds
References


References


