

## Relationships Between Lower Limb Biomechanics, Gluteal and Thigh Muscle Strength and Non-Specific Low Back Pain

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**Purpose:** This study aimed to investigate relationships between lower limb biomechanics, gluteal and thigh muscle strength, and the presence of non-specific low back pain (NSLBP) in young adults.

**Methods:** A cross-sectional study included 34 participants divided into two groups: NSLBP (n = 17) and control (n = 17), based on self-reported pain using the Visual Analogue Scale. Goniometry was used for hip and knee joint range of motion (ROM) measurement. Biomechanical function, dynamic balance was assessed using the Y-Balance Test and the Drop Jump Test. Gluteal and thigh muscle strength were measured with the DIERS Myoline Professional system. IBM SPSS Statistics software was used for data analysis.

**Results:** NSLBP was not associated with differences in hip or knee ROM, nor dynamic balance.

Participants without NSLBP had significantly stronger hip adductor muscles compared to those with NSLBP ( $169.87 \pm 64.22$  N/kg vs  $131.76 \pm 26.8$  N/kg,  $p = 0.01$ ).

In both groups, hip abductors were weaker than adductors, and hamstrings were weaker than quadricepses. In the control group, hamstring strength was 28.82% of quadriceps strength, while in the NSLBP group it was 36.6% ( $p < 0.05$ ). Hip abductor strength was 77.51% of adductor strength in the control group and 86.26% in the NSLBP group ( $p < 0.05$ ).

Functional knee instability during the Drop Jump Test was more prevalent among individuals with NSLBP. In the control group, 41% maintained knee stability and only 11% failed to do so. In contrast, in the NSLBP group, 38% demonstrated knee valgus mechanism during landing, and only 9% maintained stable knees ( $p < 0.01$ ).

**Conclusion:** Subjects with NSLBP had weaker hip adductors and more frequent knee valgus during landing task. Hip abductors and hamstrings were consistently weaker relative to their antagonists in both groups. These results suggest the importance of addressing muscle imbalances and functional knee stability in the prevention and management of NSLBP. Incorporating strength training of hip abductors and adductors, along with neuromuscular control exercises, into health-enhancing physical activity programmes could reduce NSLBP risk in young adults.

**Support/Funding Source:** No external funding was received.

