

Influence of Back Pain on Hip Joint Motion and Movement Patterns in Individuals With and Without Non-specific Low Back Pain

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Summary

This study investigates the impact of non-specific low back pain (LBP) on hip joint mobility and movement asymmetry. A cross-sectional comparison was conducted with 20 LBP participants and 20 healthy controls. Participants performed active and passive hip internal (IR) and external rotation (ER) while strapped to control lumbopelvic movement. Results showed no significant differences in maximum hip IR and ER angles between groups, but LBP participants exhibited greater asymmetry in active IR movement ($p = 0.002$) and movement asymmetry ratio ($p = 0.009$). Additionally, LBP participants had a greater difference in dominant leg IR between active and passive movements ($p = 0.007$). These findings highlight the need for clinical assessments to consider lumbopelvic and hip mobility in managing LBP-related impairments.

Introduction

Low back pain is one of the most prevalent musculoskeletal conditions worldwide [1]. It often leads to kinematic compensations in the lumbopelvic and hip joints, significantly altering movement patterns. However, there is limited evidence on how LBP affects hip joint mobility and movement asymmetry. Therefore, this study examines hip joint motion and movement asymmetry between the dominant and non-dominant limbs during active and passive internal and external rotation, comparing individuals with non-specific LBP to healthy controls.

Methods

Twenty participants with non-specific low back pain (NLBP) (24.15 ± 2.74 years old with 23.55 ± 20.73 months of symptoms) and twenty healthy controls (25.40 ± 2.72 years old) were recruited. Six reflective markers were attached to each participant's lower limbs. Participants lay in a prone position with their knees flexed at 90° . To minimize lumbopelvic movement, a belt strap secured their pelvis to a treatment bed (Figure 1). They performed active hip IR and ER three times per leg, reaching the maximum angle. The researcher performed passive IR and ER movements under the same conditions. The maximum hip movement angle was recorded as long as the pelvic motion was detected. Kinematic data were processed using MATLAB, and statistical analysis was conducted using independent and paired t-tests in SPSS, with a significance level set at 0.05. The Outcome Measures were (1) maximum hip IR and ER angle of the dominant and non-dominant leg, (2) differences in the maximum angle

between dominant and non-dominant leg (movement asymmetry ratio), and (3) differences in the maximum hip angle between active and passive movements.

Results and Discussion

In the active movement, the NLBP group displayed higher maximum hip IR angle differences ($p=0.002$) and higher movement asymmetry ratio ($p=0.009$) than the control groups. These outcomes showed only a higher trend in the NLBP group with no statistical significance in the passive movement. In addition, this study revealed a higher difference in maximum hip IR angle between the active and passive movement of the dominant leg of the NLBP than the control groups ($p=0.007$) with no difference in ER movement ($p=0.605$). The findings suggest that the NLBP group exhibits greater asymmetry in hip IR during active movement, indicating potential compensatory mechanisms affecting mobility [2,3]. While no significant differences were observed in passive movements, the higher discrepancy between active and passive IR in the dominant leg of the NLBP group suggests neuromuscular control deficits.



Figure 1: Hip rotation measurement in the prone position.

Conclusions

This study offers a new clinical perspective on evaluating lumbopelvic and hip movements. The findings indicate that individuals with LBP exhibit impaired hip mobility compared to healthy controls. Clinical assessments should incorporate physical examinations of lumbopelvic and hip movements in symptomatic LBP patients. This approach may help prevent or address secondary complications associated with back pain.

References

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