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ORIGINAL ARTICLE

Lumbopelvic motion during seated hip flexion in subjects with low-back pain accompanying limited hip flexion

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Abstract
Purpose Limited hip flexion may lead to a poor lumbopelvic motion during seated active hip flexion in people with low-back pain (LBP). The purpose of this study was to compare lumbopelvic motion during seated hip flexion between subjects with and without LBP accompanying limited hip flexion.
Methods Fifteen patients with LBP accompanying limited hip flexion and 16 healthy subjects were recruited. The subjects performed seated hip flexion with the dominant leg three times. A three-dimensional motion-analysis system was used to measure lumbopelvic motion during seated hip flexion.
Results During seated active hip flexion, the angle of hip flexion was significantly lower in patients with LBP accompanying limited hip flexion (17.4 ± 4.4 in the LBP group, 20.8 ± 2.6 in the healthy group; $t = 2.63$, $p = 0.014$). The angle of the lumbar flexion (4.8 ± 2.2 in the LBP group, 2.6 ± 2.0 in the healthy group; $t = -2.96$, $p = 0.006$) and posterior pelvic tilting (5.0 ± 2.6 in the LBP group, 2.9 ± 2.0 in the healthy group; $t = 2.48$ $p = 0.019$), however, were significantly greater in patients with this condition.
Conclusions The results of this study suggest that limited hip flexion in LBP can contribute to excessive lumbar flexion and posterior pelvic tilting during hip flexion in the sitting position. Further studies are required to confirm whether improving the hip flexion range of motion can reduce excessive lumbar flexion in patients with LBP accompanying limited hip flexion.

Keywords Kinematics · Limited hip flexion · Low-back pain · Lumbar spine · Lumbopelvic motion

Introduction

The majority of the population experience non-specific low-back pain (LBP) at least once in a lifetime [1, 2]. Non-specific LBP comprises a large proportion of LBP cases, and the cost of treating LBP is high [3–5]. Several studies have demonstrated factors contributing to the development of LBP, and LBP patients present with various symptoms or behaviors [6–8]. For this reason, clinicians and investigators have sought to determine sources and/or causes of LBP based on posture and movement tests, and to provide guidelines for the management of LBP [9–12].

Sahrmann [11] and Harris-Hayes et al. [12] suggested that LBP occurred as a result of repetitive movement in specific sites in the lumbar region, and movement impairment can be explained by a direction-based mechanism of provocation or relief of symptoms and/or pain.

Study information The protocol for this study was approved by the Yonsei University Wonju Campus Human Studies Committee.

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