

Effect of Individual Strengthening Exercises for Anterior Pelvic Tilt Muscles on Back Pain, Pelvic Angle, and Lumbar ROMs of a LBP Patient with Flat Back

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Abstract. [Purpose] The purpose of this paper is to report the effect of individual strengthening exercises for the anterior pelvic tilt muscles on back pain, pelvic tilt angle, and lumbar ROM of a low back pain (LBP) patient with flat back. [Subject] A 37 year-old male, who complained of LBP pain at L3-5 levels with flat back, participated. [Methods] He performed the individual strengthening exercises for anterior pelvic tilt muscles (erector spinae, iliopsoas, rectus femoris). [Results] Pelvic tilt angles of the right and left sides were recovered to normal ranges. His lumbar ROMs increased, and low back pain decreased. [Conclusion] We suggest that individual resistance exercises are a necessary approach for effective and fast strengthening of pelvic anterior tilt muscles in LBP with flat back.

Key words: Anterior pelvic tilt, Flat back syndrome, LBP

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INTRODUCTION

The traditional approach to low back pain (LBP) has failed as an effective treatment for LBP patients¹⁾. Accordingly, some researchers have recently suggested the necessity of a patient-centered approach to LBP¹⁾. Lower lumbar lordosis plays an important role in sagittal alignment and balance²⁾. Flat back posture decreases the lumbar lordosis of the spine^{2, 3)}. The decreased lumbar spine lordosis induces changes in spinal discs, creating abnormal pressures when absorbing shock between vertebrae, and creating stresses in spinal muscles, tendons and ligaments^{2, 3)}. Flat-back syndrome is characterized by forward inclination of the trunk, inability to stand upright, and LBP pain⁴⁾. Therefore, the exercises for flat back syndrome include trunk backward extension and pelvic anterior tilt exercises^{3, 5)}. Clinicians recommend various anterior pelvic tilt exercises for LBP with flat back in the lying, sitting, quadruped or standing positions^{3, 5)}. However, the anterior pelvic tilt motion in these positions doesn't apply powerful resistance for anterior pelvic tilt muscle strengthening. The purpose of this paper was to report showed the effect of individual strengthening exercises for anterior pelvic tilt muscles on back pain, pelvic tilt angle, and lumbar ROM of a LBP patient with flat back.

SUBJECTS AND METHODS

A 37 year-old male, who complained of LBP pain in L3-5

levels with flat back, was participated. Ethical approval was obtained from Yonsei University Faculty of Health Science Human Ethics Committee, and the subject provided written informed consent to participation prior to the commencement of the study. He complained of continuous LBP for 10 months, and an examination revealed that his pelvis was tilted posteriorly. He had not undergone any specific treatment for his condition, which included mechanical LBP without radiating pain, and in forward flexion in the standing position with his knees fully extended, he experienced pain and stiffness in his lower back. The visual analogue scale (VAS) score of this back pain was 6. Pelvic inclination was measured with a palpation meter (PALM; Performance Attainment Associates, St. Paul, MN, USA) by one examiner. PALM consists of an inclinometer and two caliper arms. The intra-test and inter-test reliabilities of the PALM are greater than 0.8⁶⁾. The subject removed his shoes and spread his feet during the measurement, stood upright with the anterior aspect of the thighs against a stabilizing table. The sagittal plane rotation was measured with the caliper tips of the PALM in contact with the ipsilateral anterior superior iliac spine (ASIS) and posterior superior iliac spine (PSIS). At the initial assessment, the anterior pelvic tilt angles were 2° and 2° on the right and left sides (normal range, 11 ± 4°), respectively. The Dual Inclinometer (ACUMAR, Lafayette Instrument Co., Lafayette, USA) was used to measure the trunk flexion and extension angles. The intra-test and inter-test reliabilities of the Dual Inclinometer are greater than 0.8. Initially, the lumbar flexion angle was 55° and the extension angle was 34°. The subject performed individual strengthening exercises for the anterior pelvic tilt muscles

(erector spinae, iliopsoas, rectus femoris)⁵). The strengthening exercise for erector spinae was as follows: stand with the feet shoulder width apart with both hands holding 5 kg weights; then flex the trunk slowly (5 seconds) until parallel with the floor while keeping the natural arch of the back with the shoulder blades back; then slowly return (5 seconds) to the starting position. The strengthening exercise for the iliopsoas was an above 90° hip flexion (so-called psoas isolation) exercise for both legs with 10 kg weights. The initial position was sitting with the hips and knees flexed at 90° on a table. Reciprocal flexion to above 120° hip flexion on both sides was performed with knee flexion of 90°. The strengthening exercise for the rectus femoris was an 80° knee extension exercise for both legs with 10 kg weights on a NK table. The subject performed the three individual strengthening exercises for two weeks in three sets of 30 repetitions per day.

RESULTS

After the exercise intervention, the anterior pelvic tilt angle increased, the angles were 7° and 8° on the right and left sides, compared to the initial angles of 2° and 2° on the right and left sides. The lumbar ROMs were increased: the flexion angle was 62° and extension angle was 45°, compared to the initial flexion angle of 55° and extension angle of 34°. When in backward trunk extension, the VAS score of back pain decreased to a score of 3, compared to the initial score of 6.

DISCUSSION

Pelvic anterior tilt motion is produced by couple-force of the erector spinae, iliopsoas and rectus femoris muscles⁵. During anterior pelvic tilt motion, clinicians can't directly

apply a powerful resistance to patients for strengthening of pelvic anterior tilt muscles. So, in this study, we tried prescribing individual resistance exercises for pelvic anterior tilt for a LBP patient with flat back. After the intervention, pelvic tilt angles of the right and left sides had recovered to normal ranges. The patient's lumbar ROMs had increased, and the VAS score of low back pain had decreased. We think that these individual strengthening exercises for the strengthening of pelvic anterior tilt muscles are an effective approach for the treatment of LBP with flat back. Therefore, we suggest that individual resistance exercises are necessary for effective and fast strengthening of pelvic anterior tilt muscles in LBP with flat back.

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