

Effects of the Wearing of Tight Jeans on Lumbar and Hip Movement during Trunk Flexion

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Abstract. [Purpose] The purpose of this study was to show the effects of the wearing of tight jeans on lumbar and hip movements during trunk flexion. [Subjects] Twelve male subjects were recruited. [Methods] The lumbar flexion angle and hip flexion angle were measured using a dual inclinometer during trunk flexion, with and without tight jeans. [Results] The lumbar flexion angle significantly increased when wearing tight jeans compared to not wearing and wearing of general jeans. The hip flexion angle significantly decreased when wearing tight jeans compared to not wearing and wearing of general jeans. [Conclusion] We suggest that tight jeans might limit normal lumbar and hip movements. So, abnormal lumbar and hip movements induced by tight jeans may be a cause of low back musculoskeletal disorders.

Key words: Dual inclinometer, Lumbar and hip movement, Tight jeans

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INTRODUCTION

Some researchers have studied the effect on intraocular pressure of wearing a tight necktie and showed that a tight necktie raises intraocular pressure in both normal patients and those with glaucoma^{1, 2)}. They also speculated that wearing a tight necktie may compress the external jugular vein, leading to raised episcleral venous pressure, which may in turn elevate the intraocular pressure^{1, 2)}. La Vecchia et al.³⁾ reported that the use of tight garments might be contributing to the increasing incidence of esophageal or cardiac adenocarcinoma. Yoo et al.⁴⁾ showed that limitation of cervical joint motion, restricted by a tight necktie, may result from inactivity and structural changes in the tissues of the cervical spine, and resulting in an increase in shortening of collagen tissue and muscles of the neck and shoulder. Recently, wearing tight jeans has become fashionable. Weismann and Larsen⁵⁾ reported that the tightness of jeans may add to injury, by decreasing blood flow and lowering skin temperature in the hip area. Therefore, tight jeans have a direct influence on human the body. However, no studies have investigated the effects of wearing tight jeans on kinematic data, such as the lumbar, pelvic and hip movements. Therefore, the purpose of this study was to clarify the effects of the wearing of tight jeans on lumbar and hip movements during trunk flexion.

SUBJECTS AND METHODS

This subjects of this study were performed on 12 healthy male students aged 22–26 years (24.2 ± 3.0 years, mean \pm SD) and whose average height and weight were $176.9 \pm$

3.7 cm and 69.0 ± 3.6 kg, respectively. Subjects with conditions that might affect trunk mobility, such as injury or neurologic deficits of the hip and lower extremities during the previous year, were excluded. Ethical approval was obtained from Inje University Faculty of Health Science Human Ethics Committee, and all subjects provided their written informed consent to participation prior to the commencement of the study.

Sagittal pelvic kinematic data were recorded using a dual inclinometer during the trunk flexion trials. In this study, a single inclinometer or a dual inclinometer (ACUMAR, Lafayette Instrument Co., Lafayette, USA) were used for clinical measures. An inclinometer with 1 degree resolution was used to evaluate subjects' range of motion. A dual inclinometer, comprised of main and companion units, was used to measure the angle between the main and companion parts (Lumbar flexion: L1 and sacrum; Hip flexion: sacrum and femur). The digital inclinometer was attached to a ruler for accurate fixation to segment. The experimental protocol required the completion of two trunk flexion trials for the each of the three wearing conditions, which were randomized. The worn jeans were made from the same material, denim, is a rugged cotton twill textile. We used the general jeans and tight jeans models of H Company. There were three wearing conditions in this study: (1) not wearing: only short inner wear, (2) general jeans: tightened to 105–110% of the subjects' waist and hip circumference, and (3) tight jeans: tightened to 90–95% of the subjects' waist and hip circumference. ANOVA was conducted to test for differences in lumbar and hip movement. The Bonferroni correction was applied to the significant differences identified by pairwise

Table 1. Comparison among of the three apparel conditions lumbar and hip movements during trunk flexion

Muscles	mean \pm SD (%MVC)		
	Not wearing	General jeans	Tight jeans
Lumbar flexion	62.0 \pm 6.5	60.2 \pm 8.4	69.6 \pm 10.6*
Hip flexion	78.8 \pm 6.9	77.0 \pm 7.5	70.2 \pm 15.7*

*: $p < 0.05$

multiple comparisons. Significance was accepted for value of $p < 0.05$, and SPSS version 12.0 was used for the statistical analyses.

RESULTS

The lumbar flexion angle and hip flexion angle differed significantly among the 3 wearing conditions ($p < 0.05$). The lumbar flexion angle significantly increased when wearing tight jeans compared to not wearing and wearing of general jeans ($p < 0.05$). The hip flexion angle significantly decreased when wearing tight jeans compared to not wearing and wearing of general jeans ($p < 0.05$) (Table 1).

DISCUSSION

Some studies have examined the risks associated with tight clothes. They reported that tight clothes such as tight belts, ties, and jeans, which are becoming increasingly popular, have a constraining influence on the abdomen, which in turn might promote reflux^{4, 6}. This study investigated the effects of wearing tight jeans on kinematic data of the lumbar, pelvic and hip movements. The results show that the lumbar flexion angle and hip flexion angle differed significantly among the 3 wearing conditions. The trunk forward flexion and return task of various clinical examinations is used to classify LBP and is designed to examine the directions and patterns of both the lumbar spine and the hip relative to the pelvic region⁷. The lumbar and hip rhythm, and interaction between the lumbar spine and hip is an important kinematic factor which is used not only in experimental research but also in clinical examination^{8, 9}.

In this study, the lumbar flexion angle significantly increased when wearing tight jeans compared to not wearing and wearing of general jeans. The hip flexion angle significantly decreased when wearing tight jeans compared to not wearing and wearing of general jeans. We think that the wearing of tight jeans induced excessive lumbar flexion by limiting hip flexion. The exaggerated lumbar flexion may overstretch posterior connective tissues, such as the interspinous ligament, apophyseal joint capsule, and thoracolumbar fascia, or increase stress on discs and apophyseal joints¹⁰. Recently, tight jeans have become very fashionable. However, we suggest that tight jeans might limit normal lumbar and hip movements. The mechanical properties of tissues around the lumbopelvic region, i.e. muscle length or nerve tension, affect lumbopelvic motion and contribute to low back pain¹¹. The daily repetition of lumbar and hip

movements may result in hyper-stress on tissues of the spine, pelvis, and hip. A previous study that used a tight back belt compared with a general back belt reported that the intramuscular pressure on the erector spinae influenced spinal stiffness separately from muscle activation¹². If trunk flexion is performed with improper technique or restraint, it may influence the human musculoskeletal system, contributing to musculoskeletal dysfunction, such as low back pain¹³. It is important to consider differences between subjects with and without low back pain, not only in kinematic movement patterns, but also in neuromuscular patterns defined by motor recruitment or activation¹⁴. Abnormal lumbar and hip movements caused by the wearing of tight jeans may be a cause of low back musculoskeletal disorders. It is especially important for people who have to wear jeans for a long time to select jeans in order to prevent musculoskeletal injuries induced by long-term limitation of pelvic or hip movements, or repetitive cumulative tension increase in the lumbar region. There were several limitations to this study. We didn't control pressure on the buttocks and legs between subjects by using a pressure sensor or other devices. This study also recruited subjects who had different body shape. Finally, the measured angles are different among the various lumbopelvic movement. So, the effect on the low back region may also be different among the various lumbopelvic movements.

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