Effect of wearing tight pants on the trunk flexion and pelvic tilting angles in the stand-to-sit movement and a seated posture

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Abstract. [Purpose] The purpose of this study was to evaluate the effect of wearing the tight pants on the trunk flexion and pelvic posterior tilting angles in the stand-to-sit movement and a seated posture. [Subjects] Nine male subjects were recruited. [Methods] The trunk flexion angle and pelvic posterior tilting angle were measured using a motion-capture system during the stand-to-sit movement and in a seated posture. [Results] The trunk flexion and the posterior pelvic tilting angles during the stand-to-sit movement and in the seated posture when wearing tight pants significantly increased compared with those when wearing of general pants. [Conclusion] Therefore, wearing tight pants could produce musculoskeletal disorders via abnormal movement and posture in the lumbar spine and pelvis. So the effects of wearing tight pants need to be investigated in further studies to reveal their direct relationship to musculoskeletal problems.

Key words: Pelvic tilting, Seated posture, Tight clothes

INTRODUCTION

In modern society, the fashion of wearing tight clothes for stylish dressed states or comeliness is getting very popular1). However, specialists reported that excessively pressing certain areas of the human body could cause many problems in the cardiovascular systems and visceral organs1). In addition to this pressure inflicted on the human body may deform muscles, the skeletal system, and even the overall body type2, 3). Jeans that are too tight compress a nerve that cuts off sensation to the thighs, and this is consistent with human anatomy and physiology4). Trousers that are too tight can squeeze a sensory nerve under the hip bone, causing a tingling, burning sensation called paresthesia1, 4-5). With this as the background, the present study aimed to understand the hazards of the habit of wearing tightly fitting clothes in relation to deformations of the musculoskeletal system and the movement of the lumbar spine and pelvis for the purpose of providing basic data regarding proper habits in wearing clothes for the prevention of pain in the musculoskeletal systems2, 3). So the present study evaluated the effect of wearing tight pants on the trunk flexion and pelvic tilting angles in stand-to-sit movement and in a seated posture.

SUBJECTS AND METHODS

This study was performed on nine males aged 20–27 years (23.2±2.0 years, mean±SD) whose height and weight were 175.1±3.2 cm and 62.1±3.4 kg, respectively. Subjects with conditions that might affect trunk mobility, such as injury or neurologic deficits of the hip and lower extremities during the past year, were excluded from study. The study purpose and methods were explained to all the subjects, who provided informed consent according to the principles of the Declaration of Helsinki before participating. Kinematic data were recorded during gait. Data were collected at a sampling rate of 100 Hz.

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with a motion capture system (Vicon MX, Oxford Metrics, Oxford, UK) that consisted of eight infrared cameras. The kinematic data were smoothed using a Woltring filter. Sixteen reflective markers were attached to the lower body according to the Plug-in-Gait Marker Set (Oxford Metrics) using double-sided tape. The software used for kinematic data collection was Nexus 1.4.1 (Oxford Metrics), and the data were analyzed with the Polygon 3.1 software (Oxford Metrics). The experimental protocol required the completion of two stand-to-sit trials for each of the two pants conditions. The worn pants were made from the same material, cotton, woven into a rugged cotton textile. We used general and tight pants from the same company (G Company). The pants were worn under two conditions in this study: (1) general pants, worn with sizes equivalent to 105–110% of the subjects’ hip, thigh, and calf circumferences, and (2) tight pants, worn with sizes equivalent to 90–95% of the subjects’ hip, thigh, and calf circumferences. The test order was randomized. Each subject was asked to stand up at a self-selected speed from a seated posture and to stand in an erect spine posture. For time normalization, the time required for a complete stand-to-sit movement cycle, that is, from movement onset to completion, was considered to be 100%; values were determined for each 2% of the movement, beginning at 0%. The changes in trunk flexion and pelvic posterior tilting angles were calculated based on the difference between the maximal and initial angles. As the analysis was performed with a within-subject design, the paired t-test was conducted to test for differences in pelvic and trunk kinematics values during the maneuver. All significance levels were set at p<0.05, and SPSS version 12.0 (SPSS, Chicago, IL, USA) was used for statistical analyses.

**RESULTS**

The change in the posterior pelvic tilting angle (9.3± 4.1°) during the stand-to-sit movement when wearing the tight pants increased significantly compared with that when wearing the general pants (7.0± 3.3°) (p<0.05). The change of the trunk flexion angle (19.3± 5.4°) during the stand-to-sit movement when wearing the tight pants increased significantly compared with that when wearing the general pants (12.0± 3.8°) (p<0.05). The change in the posterior pelvic tilting angle (13.3± 3.2°) in the seated posture when wearing the tight pants increased significantly compared with that when wearing of the general pants (10.3± 2.9°) (p<0.05). The change in the trunk flexion angle (25.3± 6.1°) in the seated posture when wearing the tight pants increased significantly compared with that when wearing of the general pants (20.1± 5.4°) (p<0.05).

**DISCUSSION**

Park and Yoo reported that the tightness of a waist belt might restricts forward movement of the center of mass and that pelvic inclination might be increased as a compensatory mechanism. They showed that the wearing a tight belt could interrupt normal lumbo-pelvic coordination, which might contribute to muscle imbalance. Elevated abdominal pressure has been shown to cause multidirectional stiffness of the spine. A previous study that used a wide belt reported that the intra-abdominal pressure on the erector spinae could influence spinal stiffness separately from muscle. The results of the present study showed that the trunk flexion and posterior pelvic tilting angles during the stand-to-sit movement when wearing tight pants significantly increased when compared with wearing general pants. Also, the trunk flexion and posterior pelvic tilting angles in the seated posture when wearing tight pants significantly increased when compared with those when wearing of general pants. The lumbar and hip rhythm and interaction between the lumbar spine and hip are important kinematic factors that are used not only in experimental research but also in clinical examination. Wearing tight jeans induced excessive lumbar flexion during stand to sit movement and in the seated posture. 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 joints. Posterior pelvic tilt decreases lordosis via flexion of the lumbar spine, causes posterior movement of the nucleus pulposus, and increases the diameter of the intervertebral foramina. Slump sitting reduces the activation of the spinal stabilizing muscles and is associated with increases in loading on the intervertebral disc and connective tissue. Therefore, wearing tight pants could produce musculoskeletal disorders via abnormal movement and posture in the lumbar spine and pelvis. So the effects of wearing tight pants need to be investigated in further studies to reveal their direct relationship to musculoskeletal problems. The effects of tight clothes and accessory items on the human body should also be investigated in order to provide basic data for proper use. Further studies will become the starting point for studies regarding the effects of wearing tight clothes and tight fashion accessories on the musculoskeletal system.

**REFERENCES**


