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Evaluating the Prevalence of Hamstrings and Hip Flexors Tightness in Male Transient Low Back Pain Developers During Prolonged Standing

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ABSTRACT

Aims: Tightness of the hamstrings and hip flexors are two well-known disorders in people with Low Back Pain (LBP). According to the kinesiopathological model, these two disorders may have occurred before the onset of pain and may be predisposing factors for LBP. Therefore, the aim of this study was to investigate the prevalence of the tightness of these two muscles in men who were identified as prone to LBP through the Prolonged Standing Protocol (PSP).

Methods and Materials: This study was a descriptive comparative cross-sectional study in which the statistical population included men prone to LBP aged between 18 to 75 years. The criterion for identifying men prone to LBP was reporting at least 10 mm of pain on a 100 mm Visual Analog Scale (VAS). Thomas test was used to assess hip flexors muscles length. Straight Leg Raise (SLR) test was used to assess hamstring length.

Findings: The results of this study showed that hamstring tightness rate among men prone to LBP was 63% and hip flexor muscle tightness in this group was 35%. According to these results, hamstring tightness can be considered as a common disorder in men prone to LBP, and its identification as well as its correction in men can be one of the ways to LBP improvement.

Conclusion: Based on these results, it can be explained that hamstring tightness is one of the most common disorders in men prone to LBP, and its identifying and correcting in time, can prevent and improve LBP.

Keywords: low Back Pain, Hamstring Tightness, Hip Flexors Tightness.

Introduction

Low Back Pain (LBP) is one of the most common musculoskeletal disorders, that about 80% of people experiencing LBP at least once in their lifetime [1], It has been argued that majority of patients suffering from nonspecific LBP [2]. In particular, studies on the prevalence of LBP in Iran indicate 50% of people experienced LBP during their life [3]. The prevalence of LBP in all age groups from 15 to more than 50 years shows that different age groups of societies, especially adolescents and young people, who constitute a large group of the country's population, are affected by this health problem [4]. Prevention of LBP is one of the biggest challenges in modern medicine.

There are several classification systems for LBP [5]. In the Sahrmann classification model, back pain is classified into five categories [6]. Flexion and extension are two of these 5 categories that can be caused by muscle imbalance. Tight hamstring muscles can impair flexion direction and tight flexor hip muscles can impair extension direction.

The hamstring muscle group includes Biceps femoris, Semimembranosus and Semitendinosus, so that their unique anatomy and function expose this muscle group to tightening and other injuries. Various causes have been reported for hamstring muscle tightening and subsequent injuries, the most important of which are frequent muscle

strains, lower limb immobilization, and the presence of wound tissue on the tissue. Many studies have shown a high prevalence of tightening and injuries of this muscle in athletes and healthy individuals [7].

One of the approaches to preventing musculoskeletal pain is Sahrmann's kinesiopathological model. This model states that a series of recognizable postural and motor changes occur before the sensation of pain in a particular area and the repetition of which causes pain. Moreover, musculoskeletal pain can be prevented by timely diagnosis and correction of these impairments [8]. This principle is the basis of what of corrective exercise specialists do. They seek to help reducing the prevalence of musculoskeletal pain in society by identifying the movement and postural patterns of pain.

One of the most common musculoskeletal disorders is tight muscle. Muscle imbalances occur when the length or strength of an agonist or antagonist muscle interferes with normal function [9]. Studies have shown that tightness of the hamstring, as a postural muscle, plays an important role in the development of musculoskeletal disorders, and can disrupt the natural curves of the spine and put abnormal pressure on it and by disrupting the function of the sacroiliac joints, affecting the lumboplevic rhythm and restricting hip movement; increases the application of tensile loads on the vertebrae and results in LBP [7, 10, 11, 12].

The iliopsoas musculotendinous unit is part of the inner muscles of the hip and forms part of the posterior abdominal wall, lying posteriorly at the retroperitoneum level [13]. Shortening of the iliopsoas muscle was found to be the primary cause of lumbar hyperlordosis and excessive anterior pelvic tilt [14]. This abnormal alignment may inhibit the function of the TrA [15] leading to chronic LBP [16].

Hence, another common exercise for treating and reducing pain in people with LBP is hamstring stretching, which has had a positive response in many people. Therefore, it is possible that hamstring tightness can be considered as one of the factors and disorders that make people prone to LBP. However, studies have provided contradictory results regarding the length of the hamstrings in patients with LBP [7, 32, 33]. However, one of the reasons for the contradictory results of studies in this field is probably the heterogeneity of samples, especially in terms of gender [11]. However, no study has been conducted on the prevalence of these disorders in people prone to LBP. Therefore, this study aims to investigate the rate of hamstring and hip flexors tightness in men prone to LBP and to examine the importance of these disorders in causing LBP in men.

Method and Materials

This study is a cross-sectional descriptive comparative study and its statistical population consisted of people prone to LBP without a history of LBP and aged between 18 to 75 years. Accordingly, 250 men who were identified as susceptible to LBP, after agreeing to participate in the study according to the inclusion and exclusion criteria, were studied as a sample in this study and completed the consent form and personal information. Prolonged Standing Protocol (PSP) was used to diagnose people prone to LBP. This protocol is capable of causing LBP in susceptible individuals. For this purpose, subjects were asked to stand for a maximum of 30 minutes in a limited area of 40 by 50 cm in their normal position and without leaning on any part of the body, as usual in line or they asked to wait behind the counter as soon as they feel discomfort in the lower back, check their pain level with the 100mm Visual Analog Scale (VAS)

available to them and report it to the assessor. This criterion has good structural validity and reliability [17]. The validity of the PSP has been reported high and this test has excellent reproducibility (ICCs <80) [18, 19, 20, 21]. Individuals with a score greater than 10 of VAS, were classified as prone to LBP. According to studies, this pain in susceptible individuals is usually felt 15 to 30 minutes after the start of the protocol and the maximum time of onset is reported to be 42 minutes [22, 23]. To ensure the susceptibility of people to LBP, only those who reported a scale above 10 score of VAS in the first 30 minutes were included in the study.

Inclusion criteria include in this study was being in the age range of 18 to 75 years, Body Mass Index (BMI) less than 30 [24], no dizziness, metabolic disorders, balance disorders during the last 12 months [25], no history of LBP leading using of any medical interventions, inability to attend work or study for more than 3 days, changing daily activities for 3 days or more[24], no history of injuries in the past year in the trunk and lower limbs that require medical care and possible effect on test results, no history of spinal surgery, and no severe kyphosis or severe scoliosis [26], ability to walk without assistive device, not seeing any difficulty in walking or abnormal gait (scissor gait, plate walking, duck walking, limping, walking with a drooping ankle, spastic walking, walking on the toe), and no pregnancy [5].

Individuals who experienced pain in any part of the body at the time of referral for the tests, or report any symptoms greater than zero millimeters in the VAS at the beginning of the PSP in the lumbar region [27], and individuals with unwillingness to complete the test session [24] were excluded from the test.

Before performing the movement disorders test, the necessary explanations and details about the present study and its protocols were given to the subjects orally. The items for the assessment of movement disorders included 2 items of the standard evaluation format of the Sahrmann pelvic lumbar region, which was dedicated to the study of the time of onset of pelvic lumbar movement during active lower limb movements. For this purpose, the reliability between the testers of these tests was first evaluated between two evaluators, and tests with acceptable reliability were selected for review and were evaluated according to the following process in the samples:

Straight Leg Raise (SLR) test: Leg rise less than 80 degrees. To do this test, the person was asked to lie on his or her back with the leg extended while the knee was straight (extension), to the point of feeling a stretch or pain in the back of the thigh or the knee is raising. If the leg is raised less than 80 degrees, it can be detected that the hamstring muscles are tight [28].

Thomas test: The person is asked to hug a knee in the chest while lying on the edge of the bed. In the final position, any tilt or rotation in the pelvis is checked. In the presence of tilt or rotation, the hip flexor muscles are tight [29].

Data were analyzed using SPSS software and descriptive statistics. For analyzing the demographic information of the samples, the mean and standard deviation of the variables were calculated using SPSS software.

Findings

In this study 250 men prone to LBP with mean age of 28.23 +18.24 were participated and completed the questionnaires and tests. Table 1 shows the rest demographic characteristic. Table 2 shows age groups of the participants. The results of the SLR test also showed that the hamstring muscle length was tight in 160 (63%) men who were prone to LBP.

Table 1) Descriptive information related to age, height, weight and body mass index of the subjects

Variable	Number	Minimum	Maximum	Mean	Standard Deviation
Age (yrs.)	250	18	70	23.28	18.24
Height(m)	250	1.65	1.95	1.75	0.06
Weight(kg)	250	65	110	82.51	5.32
Body Mass Index(kg/m^2)	250	17	30	18.23	2.31

Table 2) Descriptive information related to age range

Age range	N	%
18-29 years	118	47.2%
30-44 years	78	31.2%
45-59 years	42	16.8%
60-75 years	12	4.8%
Total	250	100%

Furthermore, hip flexor length test showed that in 89 (35%), individuals prone to LBP, the length of hip flexor muscles was tight. Table 3 shows this finding.

Table 3) Descriptive information on SLR test scores and length of hip flexors in men prone to low back pain

Impairment	**N**	**%**
SLR: Raising the leg less than 80 degrees	160	63%
Hip flexor length test	89	35%

Discussion

In this study, with the aim of investigating the rate of hamstring and hip flexors tightness in men prone to LBP, 250 male transient LBP developers during PSP were evaluated by SLR and hip flexor length tests. According to the results, SLR test has a high rate of 63% among men prone to nonspecific LBP. The results of the SLR test showed that the hamstring muscle length was tight in more than half of the men prone to LBP. Tightness of the hamstring muscles causes a posterior tilt in the pelvis, reducing the stability of the pelvis and lumbar region, resulting in LBP. This indicates that men are more prone to LBP in the direction of flexion. Previous studies have shown that tighter hip flexor muscles are more common in women than men. Although hamstring muscle tightness is more common in people with LBP, no study has yet examined these muscle tightness in people prone to LBP.

The present study showed that hamstring muscle tightening is also common in people prone to LBP Therefore, it can be claimed that tightness of these muscles occurs before back pain occurs, and by diagnosing and correcting them in time, pain can be prevented. Another muscle that has a high role in LBP in previous studies is the hip flexor muscles, which according to the results of evaluation by thomas test in less than half of men prone to LBP and cannot be a predisposing factor for back pain. Contrary to this research, the results of the study of Tabatabaei et al., Which was performed on women prone to LBP, stated this factor as one of the common disorders in women prone to LBP [30].

Norton et al., In their study, hypothesized that most people who are known to be prone to LBP through prolonged standing tests have extensions syndrome, a common disorder of which is tight hip flexor muscles [31]. A recent study, however, refuted this hypothesis for men and found that men were more likely to have flexion syndrome.

Conclusion

Although hamstring muscle tightness is more common in people with LBP, no study has yet investigated the rate of tightness

of these muscles in people prone to LBP. The present study examined 250 men who were identified as prone to LBP through prolonged- standing test and showed that hamstring muscle tightness is common in men prone to LBP. Therefore, it can be considered that tightness of these muscles occurs before back pain occurs, and with timely diagnosis and correction, pain can be prevented. In addition, the higher rate of hamstring tightness compared to hip flexors tightness in men prone to LBP indicates that in order to prevent LBP in men, eliminating hamstring length disorders is of great importance.

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