

Comparison of hamstrings flexibility in subjects with chronic low back pain versus normal individuals

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ABSTRACT

Objectives: As the hamstrings and lumbar extensors have their muscular origin in the pelvis, there may be possible relationship among these structures. So weakness or inflexibility of one structure may correspondingly change the strength and position of the other to maintain pelvis control, which may lead to development of low back pain. So the aim of the study is to compare the prevalence of hamstrings tightness in subjects with chronic low back pain versus normal individuals. **Methods:** A comparative study was conducted at S.B.B. College of Physiotherapy. A convenience sample of 60 participants with age group between 20 to 60 years was taken, 30 in each group. Group A were patients with chronic low back pain who were not taking any physiotherapy treatment and Group B were age and gender matched normal individuals. For both the groups, persons with previous history of knee injury, knee deformity and fractures around knee joint with limited range of movement and radiating pain were excluded. Patients with low back pain of more than 3 months and normal individuals who were not involved in any flexibility programme were approached and flexibility of hamstrings was measured by active knee extension test. **Results:** Means of hamstrings flexibility in groups A & B were compared using Mann Whitney U test. Mean degree of hamstrings tightness for A=31.63°±8.34°, B=14.30°±9.70°, U=81.00, p<0.01. **Conclusion:** There was significant difference of hamstrings flexibility between patients having chronic low back pain and age and gender matched normal individuals.

Key words: Active knee extension test, chronic low back pain, hamstrings flexibility

INTRODUCTION

Chronic low back pain (CLBP) is defined as back pain lasting more than 12 weeks.^[1] It affects more than 50% of the general population.^[1] It is estimated that over 70% of adults have at least one episode of low back pain during their lifetime.^[2] Despite its detrimental association with social and work related activities the exact cause of LBP has not yet been determined.

There are several factors which are responsible for development of LBP. Various factors include increased lumbar lordosis, reduced abdominal muscle length and strength, decreased back extensor muscle endurance, back extensor

muscle flexibility, length of iliopsoas, hamstring muscle flexibility, body composition^[3,4,5,6] etc. Controversies exist regarding association between various physical characteristics and the occurrence of LBP.

Anatomically hamstrings muscles are originated from the inferomedial impression on the upper part on the ischial tuberosity and inserted on the upper part of the posterior surface of tibia.^[7] Due to that the hamstrings tightness generate a posterior pelvic tilt and decreases lumbar lordosis, which can result in low back pain.^[8] Lack of hamstring muscles extensibility also decreases pelvic mobility.^[9] This invariably leads to biomechanical changes in the pressure distribution of the spine and consequent

spinal disorders.^[10] Therefore, poor hamstring extensibility has been associated with thoracic kyphosis, spondylolysis, disc herniation, changes in lumbopelvic rhythm and low back pain.^[11] Additionally, individuals with shortened hamstring muscles present gait limitations, increased risk of falls, and susceptibility to musculoskeletal injuries.^[12]

One previous study stated that there is no relationship of hamstrings flexibility and development of low back pain.^[13] Due to lack of adequate physical activity, muscle weakness and some degenerative factors like osteoarthritis, senile osteoporosis and degenerative disk disease low back pain occurs in elderly people. It is also predicted that prolong tight hamstring muscle cause back pain.^[14] So the present study investigated the relationship between hamstring flexibility and chronic low back pain.

MATERIALS AND METHODS

A non-experimental study was conducted at the physiotherapy department of S.B.B. College of physiotherapy, VS hospital, Ahmadabad from September 2013 to December 2013. Convenience sampling technique was used to recruit total of 60 subjects between the age group of 20 to 70 years. All the subjects were divided into 2 groups, group A and Group B, 30 in each group. Group A were patients having Chronic (more than 3 months) low back pain who were not taking any physiotherapy treatment and Group B included age and gender matched normal individuals. Persons with previous history of knee injury, knee deformity with limited range of movement at knee and patients having radiating pain were excluded.

Subjects were assessed for hamstring tightness using the active knee extension test (popliteal angle).^[15] The subjects were in supine position with the hip flexed to 90 degrees and knee flexed. The testing was done on the right lower extremity and subsequently on the left lower extremity and the pelvis was strapped down to the table for stabilization. The fulcrum of the goniometer was centered over the lateral condyle of the femur. The proximal arm was aligned with the long axis of femur using greater trochanter as a reference. The distal arm was aligned with the lower leg using the lateral malleolus as a reference. The subject was then asked to extend the lower extremity as far as possible until a mild stretch was felt. Three repetitions were

performed and an average of the three was taken as final reading of popliteal angle.

RESULTS

SPSS version 16 was used for statistical analysis. Means of hamstrings flexibility in group A and group B were compared using Mann Whitney U test. Comparison of means of degree of hamstrings tightness in groups A and group B are given in the Table 1.

Table 1: Comparison of the means of degree of hamstrings tightness between the two groups

| | Group A | Group B | U-value | P-value |
|--------------|--------------|------------------|---------|---------|
| DOHT* | 31.63°±8.34° | 14.30° ±9.70° | 81.00 | <0.01 |

*Degree of hamstrings tightness

DISCUSSION

The findings of the present study show that hamstrings tightness is present in subjects with chronic low back pain. Tightness may be one of the causes for development of the low back pain and LBP can become chronic if hamstrings tightness is left untreated.^[10] Hamstrings are group of three muscles, namely the semi-membranous, semi-tendinous and biceps femoris.^[7] The hamstrings are located in the back of the thigh and connect the lower pelvis to the lower leg. They help in hip extension and bending of the knee.^[7] The upper part of the pelvis is then connected to the spine and many different muscles.^[7] These muscles run alongside the spine and help with posture, core stabilization, and spinal movement. If the hamstrings become tight then they can begin to limit motion in the pelvis. Consequently, if the pelvis has limited movement this can cause the muscles of the low back to become tight, which can lead to development of low back pain.

The hamstrings may become tight for many reasons, some of which include injury and a lack of stretching post exercise. The hamstrings can be tight due to previous injuries such as a strain or pull, there can be a buildup of scar tissue and/or adhesions.^[13]

One of the studies done by Koley S et al in 2011 proved that due to lack of adequate physical activity, muscle weakness, some degenerative factors, viz. osteoarthritis, senile osteoporosis,

and degenerative disc diseases etc., low back pain occurs in elderly people^[14]. And it also predicted that prolonged tight hamstring muscles can cause back pain.^[15] This finding is similar to the present study.

Similarly, it was reported that hamstring flexibility was strongly correlated with pelvic rotation and forward bending range (Bellew et al, 2010), it may affect the lumbar region and in this study there is a strong correlation between hamstring flexibility and low back pain.^[16] Decreased flexibility was observed in limited rotation. So related to this study we can say that assessment of subjects at risk of developing low back pain should include analysis of hamstring flexibility and forward bending motion.^[17]

It has also previously been suggested that restricted pelvic rotation can lead to development of hamstrings tightness. So it will lead to increased lumbar motion and repetitive microtrauma, so these factors together may be a factor in the development of LBP (Esola et al 2006).^[18]

In contrast to findings of the present study Stutchfield and Coleman (2006) found no association between low back pain and hamstring flexibility while studying university male rowers.^[19]

Low back pain affects people from all the strata of the society. In upper income group, lack of physical activity leads to obesity and association of obesity with low back pain is apparently reported by Leino et al (1994) and Hurwitz and Morgenstern (1997). Accumulation of more weight around abdomen results in hyperlordosis of lumbar spine in order to maintain the erect posture and weight line shifts posteriorly and passes through the facet joints. Again, there is stretching of anterior longitudinal ligament, approaching of pedicles, facet joints near to each other, compression of nerve roots and ultimately occurrence of pain at low back.^[20, 21] The findings of that study showed no association of hamstring flexibility and low back pain.

So along with other treatments for low back pain, flexibility management should be carried out to prevent development of hamstrings tightness in all age groups which may be the cause for development of low back pain or vice versa. Studies can be carried out to find out the various risk factors for development of

hamstrings tightness with large sample size and samples should be collected from various professions which were the limitations of the present study. In future, various therapeutic management techniques can be carried out to treat the hamstrings tightness in chronic low back pain subjects. These simple exercises may help to relieve pain. If some patients are present with this condition, it is important to work on proper flexibility of the hamstrings. Increasing hamstring flexibility may help to increase the motion of the pelvis, which can in turn take tension off the low back helping to decrease the low back pain.

CONCLUSION

This study has shown that there is a significant difference of hamstrings tightness between the patients having low back pain and healthy individuals.

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