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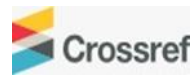


Hip Flexors Shortening among Patients with Low Back Pain

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Abstract

Purpose: Determine the hip flexors shortening in individuals with low back pain.

Methodology: It was descriptive cross-sectional study. A total of 255 participants were included according to the selection criteria. Non-probability sampling technique was used to select participants. Inclusion criteria of the study were the patients of age between 18 to 65 years having low back pain from a period of 3 months or more. Exclusion criteria were the individuals with history of spinal trauma, joint dysfunction in past 3 months, any congenital deformity in hip or lumbar region, any history of fracture in related joints in previous 6 months and history of abdominal, hip or lumbar surgery in previous 3 months. Study settings include OPD of DHQ hospital, Gujranwala and Physical therapy department of Gondal hospital, Gujranwala. Study was completed within 4 month. Thomas test was used to assess hip flexors shortening. A structured questionnaire was used to collect participants' relevant data. Data was analysed by SPSS version 20.

Findings: Mean age of the patients was 40.10±12.31 and mean body mass index was 27.44±6.10. Out of 255 patients, 35.7% were male and 64.3% were females. 64.3% participants were housewife, 20.8% were labour and 14.9% were worker. Thomas test

was found to be positive in 63.5% patients of low back pain and negative in 36.5% patients. Chi square shows that ($p>0.05$) there was no significant association between participants' gender and the results of Thomas test. But a statistically significant association was found between gender and occupation ($p<0.05$).

Conclusion: In conclusion, hip flexor shortening was prevalent in patients of low back pain. The prevalence of hip flexor muscles shortening was found to be 63.5%. There was no statistical significant association of participants' gender with hip flexor shortening. However, statistical significant association was found between gender and occupation of the participant with low back pain.

Recommendations: The relationship of hip flexor shortening with various conditions should be evaluated in future research with a bigger sample size, diverse populations, and different age groups. It is suggested that future research look at the prevalence of hip flexor shortening in those without LBP. To stop people's muscles from shortening in general, several awareness programmes for posture advice and muscle stretching practices should be set up.

Keywords: Hip Flexors, Hip Flexors Tightness, Low Back Pain, Muscle Shortening, Nonspecific Low Back Pain.

1.0 INTRODUCTION

Low back pain (LBP) is the leading cause of disability among adults of all ages.¹ The most incapacitating diseases, according to the World Health Organization (WHO), are musculoskeletal morbidities. LBP contributed the most to overall disability out of the 291 health disorders examined in the Global Burden of illness 2010 study (GBD 2010), which placed it sixth in terms of the global burden of illness calculated by Disability-Adjusted Life Year.²

In many nations, LBP is a significant contributor to morbidity and disability.³ LBP can have an impact on a person's physical, psychological, social, and economic aspects, raising costs for industry, the state, and society.⁴

According to the data, there are significant gender variations in LBP prevalence, the severity of impairment caused by LBP, and the number of comorbidities, which were higher in women.⁵ Studies looking at coping mechanisms for LBP have found that while men may utilize unhelpful coping mechanisms such as catastrophizing, women may be more adaptable and innovative in how they manage their pain. The majority of epidemiological studies on LBP also originate in European nations, particularly in the Scandinavian region and among certain groups. Few population-based research in Brazil compare how men and women with LBP perceive pain.^{6,7}

Major factors in the stability of the lumbar spine are the iliacus, psoas, pectineus, rectus femoris, and Sartorius hip flexor muscles. Hip flexors that are overly tight increase the likelihood of lower back pain, even though a certain level of stiffness is necessary for lumbar spine stability and health.⁸ Therefore, a sufficient range of motion (ROM) in the hip flexors is needed. If the modified Thomas test's final position cannot be attained with full hip extension, the hip flexors are considered to be tight. Tight hip flexors can contribute to isometric trunk weakness and lower back pain, both of which can negatively impact athletic performance. Using star excursion balancing tests to measure dynamic balance, Endo and Sakamoto also discovered associations between tight hip flexors and decreased dynamic balance in the lateral direction. Hip flexor tightness can also lead to muscle fatigue and can negatively affect movement patterns.⁸

The most prevalent and expensive musculoskeletal illness or disorder in modern society, lower back pain (LBP) is a global health issue.⁹ Depending on the community, the prevalence rate of LBP is predicted to range from 10 to 80%. An antagonist and synergist muscle's action must be coordinated for a healthy motor system.¹⁰ Normal muscle activity, passive joint movement, and adjustments to the central nervous system all contribute to the trunk's normal functioning. Acute (pain lasting less than 6 weeks), sub-acute (6 to 12 weeks), and chronic (pain lasting more than 12 weeks) kinds of non-specific LBP are categorized according to duration.¹¹ Adults who seek general medical care most frequently do so due to acute LBP because of moderate to severe discomfort and debilitating psychological and motor functions.¹²

The iliacus and psoas major make up the composite muscle known as the iliopsoas. The spinal column is situated lateral to the psoas major. It starts at the thoracic vertebrae 12 and the vertebral body of the lateral surface of the lumbar vertebrae 5, continues to the transverse process of the lumbar vertebrae 1 to 5, and then connects to the medial linea aspera and the lesser trochanter of the femur. The anterior sacroiliac ligament, iliac crest, anterior inferior iliac spine, iliolumbar ligament, and anterior sacroiliac ligament are the iliacus' primary places of origin. It also connects to the lesser trochanter and linea aspera medial of the femur. Currently, the majority of daily tasks, such as working or studying, involve prolonged standing or sitting with little movement. Such conditions in the long-term can have a negative effect on the iliopsoas muscle and often lead to shortening of adaptations. Hence shortening or straining of the iliopsoas can cause excessive pelvic anterior tilt or increased spine extension during hip joint motion, thereby acting as a risk factor for low back pain.¹³

Numerous researches have focused on how the iliopsoas can be stretched and relaxed utilizing relaxation techniques like massages. In a recent interventional investigation, patients with low back discomfort were examined for shortened iliopsoas. According to a study, stretching exercises both passively and actively can dramatically increase the length of the iliopsoas, which relieves low back discomfort. Patients with non-specific low back pain who underwent iliopsoas intervention with stabilization exercises reported decreased low back pain and increased flexibility. They also demonstrated significant changes in the thickness, muscle tone, and pelvic angle of the iliopsoas after deep muscle massage, passive stretching, and muscle energy technique intervention.¹⁴

Muscle shortening is defined as a reduction in the length of the musculotendinous unit, resulting in limitation in joint mobility.¹⁵ The presence of shortening in the flexor muscles of the hip joint (i.e., iliopsoas and rectus femoris as the main ones) can compromise gait biomechanics, in addition to positively correlating with changes in lumbar curvature (i.e., hyperlordosis), back pain and dysfunction in the knee joint. Furthermore, the lack of hip extension associated with the shortening of these muscles can compromise several sports activities, besides predisposing individuals who make frequent use of accelerations (e.g., football players) to hamstring muscles injuries.¹⁶

The Thomas test (TT), a method for inferring the iliopsoas muscle's flexibility indirectly, is frequently used to evaluate the range of motion (ROM) of the hip joint¹⁶ Its modified form, also known as the rectus femoris contraction test or Kendall test, can be used to evaluate the range of motion (ROM) of the knee joint and infer the flexibility of the rectus femoris muscle. Although there is a correlation between the rectus femoris length and the range of motion of the joints it crosses, the modified Thomas test's (MTT) reliability is high when there is lumbo-pelvic stability.¹⁷

The main objective of this study is to considering a possible role of reduced flexibility of the iliopsoas and rectus femoris muscles in the low back pain patients. The aim of the present study was to indirectly assess the flexibility of the muscles using Thomas scale, and calculate the odds ratio for the association between the flexibility deficits of these muscles and low back pain patients. This article will adopt a vigorous systematic approach, including a comprehensive research strategy, eligibility criteria and research extraction methods.

2.0 METHODOLOGY

Selection and description of participants: A descriptive cross-sectional study was conducted in OPD department of DHQ hospital, Gujranwala and Physical therapy department of Gondal hospital, Gujranwala. This study was completed in 4 months after approval of synopsis. Non probability convenient sampling technique was used. And total 255 males and females were evaluated. People with low back pain age 18-65 were included in this study. People with lower limb deformity, neurological disorders are excluded from this study.

A Performa used to get demographic data including name, age, gender, weight and height. Their BMI was calculated. Tool (Thomas Test) was used to the shortening of hip flexors. The reliability of this tool was good.

Technical Information: Body Mass Index (kg/m^2) of the participants was calculated by measuring their weight in kilograms and height in meters. A measuring tape was used to measure their height by asking the patient to stand erect without shoes and a weight machine was used to measure their weight by asking the participants to stand bare footed on it.

Thomas test was used to assess the shortening of hip flexors. For Thomas test patient lies supine while the examiner checks for excessive lordosis. The examiner flexes one of the patient's hips, bringing the knee to the chest to flatten out the lumbar spine and to stabilize the pelvis. The patient holds the flexed hip against the chest. If a contracture is present, the patient's straight leg rises off the table and a muscle stretch end feel will be felt. The test is done on both sides.¹⁸

Statistics: SPSS (Statistical Package for Social Sciences) software version 25 was used to entered and analyzed data. In this descriptive analysis, for quantitative variables mean and standard deviation were calculated while for qualitative variables frequency and percentages were calculated. And an appropriate statistical test was applied for inferential statistics. All the results of this study were calculated at 95 percent confidence interval and P-value <0.05 was considered to be significant value.

3.0 FINDINGS

The results of total 255 diagnosed low back pain patients were recruited for this study. Participants were both (male and female) found during data collection procedure. Frequencies of variables were mentioned in Table 1. Mean age of all patients was 40.10(SD=12.31460). Mean height and weight of the patients were 5.08(SD=0.58) and 67.85(SD=15.85) respectively. Mean body mass index of the patients was 27.44(SD=6.10606) were mentioned in Table 2. Association of participant’s gender and the results of Thomas test was mentioned in Table 3.

Table 1: Frequencies of Variables

Variables		N (%)
Age of participants	18-65	255(100.0%)
	Total	255(100.0%)
Gender of participants	Male	91(35.7%)
	Female	164(64.3%)
Thomas test	Total	255 (100.0%)
	Positive	162(63.95%)
	Negative	93(36.5%)
	Total	255(100.0%)

Table 2: Mean and Standard Deviation of Variables

Variables	Mean ± Standard Deviation
Age of patients	40.1098 ±12.31460
Height of patients	5.08±0.58
Weight of Patients	27.44±6.10606
Body Mass Index (kg/m ²)	27.44±6.10606

Table 3: Association of Participants’ Gender and the Result of Thomas Test

Association	Continuity correction	Pearson’s	P-value
Association of participants gender and result of Thomas test	.007	0.49	>0.05

Discussion

LBP can have an impact on a person's physical, psychological, social, and economic aspects, raising costs for industry, the state, and society.⁴ Hip flexors that are overly tight increase the likelihood of lower back pain, even though a certain level of stiffness is necessary for lumbar spine stability and health.⁸ The goal of the study was to determine the hip flexors shortening in individuals with low back pain.

In the recent study 255 patients with low back pain were recruited, out of the total participants 35.7% were males and 64.3% were females. Results of demographic statistics showed the higher prevalence of low back pain in females. In 2020, Aimin Wu et al., carried out a research to see the global prevalence of LBP from 1970 to 2017. Study resulted that, in comparison to men, women had a higher

age-standardized prevalence of LBP.¹⁹ MAleku et al. revealed that females had a higher prevalence of low back pain (69.8%) and that one of the factors related with LBP was female gender ($P = 0.028$).²⁰

Results of recent study showed that mean BMI of 255 patients was 27.44 ± 6.10 , which indicates that the majority of participants were overweight on average. In line with these findings, Rahman Shiri et al., concluded that obesity in the abdominal region increased the risk of LBP, and obesity in general increased the risk of lumbar radicular pain.²¹ According to Julia FM Gilmartin-Thomas et al., there was a statistically significant ($p 0.001$) link between moderate to extreme LBP and being overweight.²²

In current study, out of 255 patients of low back pain, thomas test was found to be positive in 63.5% patients. It showed the presence of hip flexors shortening in 63.5% patients of low back pain. In support to these findings, a study by Sean M. Roach et al. found that, there was a statistically significant difference ($p = 0.001$) in hip passive extension between the control group and the active NSCLBP group on both sides. Hip extension was reduced in individuals having chronic low back pain.²³ Numerous investigations have discovered a link between low back pain and anterior hip tightness. M. Pattelma et al., discovered that subjects with both subacute and chronic back pain had significantly shorter hip flexors than those who did not have low back pain.²⁴ In accordance with recent findings, K. Evan et al. discovered the association between low back pain and short hip flexors in subjects ranging from young elite golfers to people working in fields who were involved in moderate physical effort and experiencing chronic or recurring low back pain.²⁵

Findings of recent study showed that out of 255 participants of low back pain, majority of the subjects (64.3%) were housewife, 20.8% were labour and 14.9% were worker. Results showed that low back pain was more prevalent in house wives with sedentary life style as compare to the individuals involved in intense working like labour. A previously published research by F Serranheira et al., indicated that 39% of workers having low back pain were sedentary, which is the major proportion and supported the findings of recent research, 34% experienced low to moderate physical demands, and 27% reported high physical demands at work. But interestingly, the findings of that research also revealed that as compared to sedentary work, high-intensity work, had more likelihood of work absences due to LBP in the preceding year.²⁶

Results of recent study showed 63.5% prevalence of hip flexors shortening in individuals of low back pain. Previous literature suggests that, hip flexor muscle tightness has been identified as a risk factor for a variety of musculoskeletal injuries in the lower extremities and back pain.^{27,28} Evidence suggests that a limited hip extension may change the timing mechanism and motor activation of the lumbar spine. It is well known that excessive anterior pelvic rotation happens to make up for a lack of hip extension.²⁹ Furthermore, tight hip flexors may cause patients to perform spinal movements that favour increased spinal extension because they lack movement options due to hip extension limitations.¹⁶

The results of this study favours that, hip flexor shortening was present in majority of individuals due to tightness of flexor muscles. This could be related to musculoskeletal adaptations including muscular stiffness, reduced range of motion, and muscle imbalance, which predispose to LBP.³⁰ In line with the aforementioned results, in 2019, a study by G. Kitamura et al. discovered that greater Lumbar Extension During Dolphin Kick and Psoas Major Tightness are connected with swimmers suffering from low back pain.³¹

Current study resulted that, 64% of female patients and 62.6% of male patients had positive Thomas test. Furthermore, 36% of female and 37.4% of male patients had negative Thomas test. Overall, thomas test was found to be positive in 63.5% patients and negative in 36.5% of the patients. The findings chi square test indicated that there wasn't a notable link between the participants' gender and the outcomes of the Thomas test ($p > 0.05$). Contrary to this, a study by Rahil Mahdian and colleagues explored the frequency of tightness in these muscles among men identified as susceptible to LBP using

the Prolonged Standing Protocol (PSP). Based on these findings, it appears that hamstring and hip flexor tightness is a prevalent issue in men at risk for LBP.³²

In a previous study by A. Mahishale et al., it was discerned that Pelvic Cross Syndrome significantly impacts physical activity, with a notable prevalence in 28.5% of females. A defining characteristic of this syndrome is the tightness of the hip flexors, which can play a pivotal role in the onset and progression of the condition.³³ However, in current study, when assessing the hip flexor muscle tightness using the Thomas test, recent research observed no significant correlation between the participants' gender and the test outcomes ($p>0.05$).

Findings of current study revealed that, from the sample of 255 patients, 164 were females and 91 were males. All females (100%) were house wives constituting 64.3% of overall population. 58.2% of all males were labours, constituting 20.8% of total study population. 41.8% of all males were workers, constituting the 14.9% of all patients. Chi-square test showed that there was a statistically significant association between gender and occupation ($p<0.05$). This is consistent with the research by TP. Frascareli Bento et al., which resulted that the prevalence of LBP (Low Back Pain) was found to be 28.8% overall. Interestingly, in their study, the prevalence of LBP was notably higher in females at 60.9% as compared to the males 39.0%. In women, low back pain was significantly associated with several occupational activities like heavy lifting, adopting a standing posture while leaning forward, sitting in forward-leaning posture, and spending more time working on laptops or computer.²

4.0 CONCLUSION AND RECOMMENDATIONS

Conclusion

Hip flexor shortening was prevalent in patients of low back pain. The prevalence of hip flexor muscles shortening was found to be 63.5%. There was no statistical significant association of participants' gender with hip flexor shortening. However, statistical significant association was found between gender and occupation of the participant with low back pain.

Recommendations

Following recommendation should be considered:

1. Further studies are recommended with larger sample size, different population with other problems and different age groups, so the association of hip flexor shortening can be seen with several other factors.
2. Future studies are recommended with inclusion of subjects without LBP to see prevalence of hip flexor shortening in healthy population.
3. Several awareness programs should be arranged for posture guidance and muscle stretching techniques, to reduce muscle shortening in general population.

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