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PREVALENCE OF ILIOPSOAS MUSCLE TIGHTNESS IN FEMALE STUDENTS WITH MECHANICAL LOW BACK PAIN

A Cross-Sectional Observational Study

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Abstract: Background: Low back pain is a frequent complaint among young adults, and women report it more often than men. Long hours of sitting keep the hips flexed and may gradually shorten the iliopsoas, a muscle that attaches directly to the lumbar spine. Evidence on this problem in female students is limited. Methods: A cross-sectional observational study was carried out after ethics committee clearance. Written consent was taken from 211 female students with mechanical low back pain who sat for at least four hours daily. Iliopsoas tightness was examined with the Modified Thomas Test, pain intensity with the 0–10 Visual Analogue Scale (VAS), and sitting hours were self-reported. Results: The mean age was 23.77 ± 1.00 years. The test was positive in 164 students (77.7%) and negative in 47 (22.3%). The proportion of positive tests was similar across 4, 5, 6 and 7 hours of daily sitting. The mean VAS score was 4.44 ± 1.55. Students with tightness reported higher pain (4.74 ± 1.39) than those without (3.40 ± 1.65); $t(209) = 5.56$, $p < 0.001$. Conclusion: Iliopsoas tightness was common in this group and was associated with greater pain. Because of the design, causation cannot be inferred. The Modified Thomas Test is a quick screening option for this population.

Index Terms *- Iliopsoas tightness, mechanical low back pain, female students, Modified Thomas Test, Visual Analogue Scale, prolonged sitting.*

INTRODUCTION

Low back pain (LBP) is one of the leading musculoskeletal reasons for lost function across the world. Once thought of as a problem of middle age, it is now regularly reported by college-going young adults whose days are built around lectures, screens and long study sessions. Several studies indicate that women are affected more often than men, which has been linked to hormonal, postural and ergonomic influences [1], [2].

Most clinical presentations are labelled mechanical LBP. The pain arises from muscles, ligaments, discs or facet joints, with no sign of a serious disease such as a tumour, infection, fracture or cauda equina compression. It is usually provoked by movement or posture and eases with rest, which makes it well suited to physiotherapy once the contributing impairments are found.

The iliopsoas, formed by psoas major and iliacus, is the main hip flexor. Psoas major arises from the lumbar vertebrae and the last thoracic vertebra, and the combined tendon ends on the lesser trochanter of the femur [4]. This direct bony link to the lumbar spine means a change in muscle length can alter lumbar posture. Sitting keeps the hip in flexion for hours, and it has been proposed that the psoas settles into a shortened position, producing an imbalance that contributes to back pain in young women [3]. A shortened iliopsoas can increase the anterior pelvic tilt and lumbar lordosis, loading the facet joints and discs. Cross-sectional work in desk workers has reported a link between shorter iliopsoas length and greater lumbar lordosis [5], and flexibility of the hip muscles has been related to LBP in first-year undergraduates [6].

Despite this, studies that look specifically at iliopsoas tightness in female students with mechanical LBP are scarce, since most research has recruited office staff, athletes or mixed-sex groups. The present study was therefore planned to estimate how common iliopsoas tightness is in this group and to compare pain intensity between students with and without it.

II. NEED OF THE STUDY

The low back pain is one of the common problem that affecting the population. In female anatomical certain lifestyles patterns like limited physical activity, specific postural habits, prolonged sitting work for jobs can contribute to iliopsoas muscle tightness. So, tightness of these muscle may alter the pelvic alignment and increases the stress on the lumbar joint which is eventually leads to low back pain

III. AIM AND OBJECTIVES

Aim: To estimate the prevalence of iliopsoas muscle tightness in female students with mechanical low back pain.

Objectives:

- To estimate the prevalence of iliopsoas tightness using the Modified Thomas Test.
- To measure pain intensity using the Visual Analogue Scale (VAS).
- To compare pain intensity between students with and without iliopsoas tightness.

REVIEW OF LITERACTURE

1. Stamenkovic,A.,et al.,2021- "Distinguishing chronic low pain in young adults with focus on gender differences." they found that in young adults, especially females, had higher prevalence of chronic low back pain due to hormonal, postural, and ergonomic factors.1

2. Singhvi et al. (2024) conducted "A Cross-sectional Study on Association of Iliopsoas Muscle Length with Lumbar Lordosis Among Desk Job Workers", involving desk job workers. They found a moderate positive correlation between shorter iliopsoas muscle length and increased lumbar lordosis; participants with more lordosis showed higher iliopsoas tightness.

3. Abbas et al. (2024) in "Is Hip Muscle Flexibility Associated with Low Back Pain Among First-Year Undergraduate Students" reported that students with low flexibility in hip muscles including iliopsoas had higher occurrence of LBP.

4. Magee, D.J.,2014-Orthopedic Physical Assessment.

5. Methods to assess joint mobility, flexibility, and iliopsoas muscles tightness, including Modified Thomas test (MTT).

6. Kendall et al. (2005) described in Muscles: Testing and Function that prolonged sitting causes psoas adaptively shortened position. This creates a muscle imbalance, contributing to LBP in young females.

7. Eimiller,K.,2024-Association between iliopsoas tightness and low back pain in young adults.

8. confirmed that iliopsoas tightness as a significant factor associated with LBP in young adults8.

9. Kisner & Colby –Therapeutic Exercise: Foundations and Techniques (7th edition,2017) The Thomas Test is valid measure for assessing hip flexor (iliopsoas) tightness. Proper pelvic stabilization is required to avoid compensatory movements and false positives.

10. Begum MR, Hossain MA. Validity and reliability of visual analogue Scale (vas) for pain measurement VAS is a widely used in nationally and internationally. It is a reliable scale but it showed moderate to strong correlation

RESEARCH METHODOLOGY

Study design and participants

An observational, cross-sectional design was used after clearance from the Institutional Ethics Committee. Female students aged 20–26 years who had mechanical LBP, sat for four or more hours a day and agreed to take part were eligible. Written informed consent was obtained from every participant. The final sample was 211 students.

Exclusion criteria

Males, and students with a history of spinal surgery or major spinal trauma, structural deformity such as scoliosis, a neurological condition affecting gait or posture (for example sciatica), or who were currently receiving physiotherapy or medical treatment for LBP, were excluded.

Outcome measures

The Modified Thomas Test was used to detect iliopsoas tightness. It is a widely used bedside test that needs no special equipment, and its intra-rater and inter-rater reliability have been reported [9], [11]. Pain intensity was recorded on a 0–10 Visual Analogue Scale, a self-report tool with good reported validity and reliability [10].

Procedure

Age and daily sitting hours were noted for each participant. For the Modified Thomas Test, the participant sat at the end of the plinth, drew both knees to the chest while lying back, then held one knee against the chest and let the other leg hang over the edge. If the hanging thigh did not rest on the plinth, the test was recorded as positive for iliopsoas tightness. Both sides were examined and the examiner limited pelvic tilt as far as possible. Participants then gave a number from 0 to 10 for their pain on the VAS.

The methodology section outline the plan and method that how the study is conducted. This includes Universe of the study, sample of the study,Data and Sources of Data, study's variables and analytical framework. The detailsare as follows;

RESULTS AND DISCUSSION

Participant characteristics

All 211 participants were female, with a mean age of 23.77 ± 1.00 years (range 21–26 years).

Prevalence of iliopsoas tightness

The Modified Thomas Test was positive in 164 of 211 students, a prevalence of 77.7% (164/211 × 100). Forty-seven students (22.3%) tested negative (Table 1, Fig. 1).

Table 1. Modified Thomas Test results (N = 211)

Test result	n	%
Positive (tightness present)	164	77.7
Negative (tightness absent)	47	22.3
Total	211	100.0

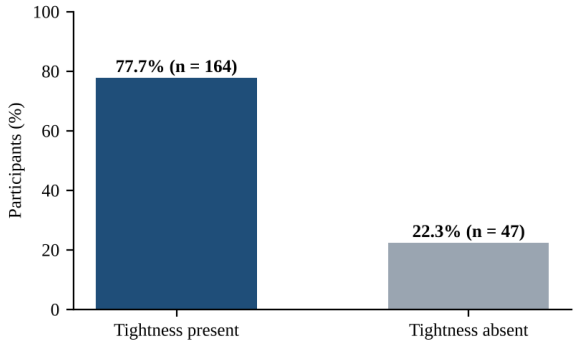

Fig. 1. Prevalence of iliopsoas tightness on the Modified Thomas Test (N = 211)

5.3 Tightness and daily sitting time

Reported daily sitting ranged from 4 to 7 hours: 107 students sat for 4 hours, 78 for 5 hours, 24 for 6 hours and 2 for 7 hours. The proportion with a positive test was 77.6%, 78.2%, 75.0% and 100% respectively (Table 2, Fig. 2). Sitting time was recorded as additional descriptive information and was not tested statistically, and the 7-hour group contained only two students.

Table 2. Modified Thomas Test result by sitting hours per day

Sitting/day	Positive (n)	Negative (n)	Total (n)	Positive (%)
4 hours	83	24	107	77.6
5 hours	61	17	78	78.2
6 hours	18	6	24	75.0
7 hours	2	0	2	100.0
Total	164	47	211	77.7

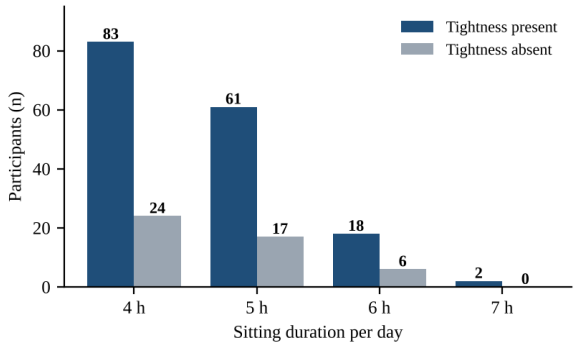

Fig. 2. Iliopsoas tightness by daily sitting duration

Pain intensity

The mean VAS score was 4.44 ± 1.55 (range 1–9). The most frequent score was 5, given by 59 students (28.0%), followed by 6 (42 students, 19.9%) and 4 (38 students, 18.0%). Scores of 8 and 9 were rare, reported by 3 students in all. Most participants therefore had mild to moderate pain.

Pain intensity according to tightness

Students with a positive test (n = 164) had a mean VAS of 4.74 ± 1.39, against 3.40 ± 1.65 in those with a negative test (n = 47), a difference of about 1.3 points. This was statistically significant, $t(209) = 5.56$, $p < 0.001$ (Table 3, Fig. 3).

Table 3. Comparison of VAS scores by Modified Thomas Test status

Group	N	Mean VAS ± SD	t	p
Tightness present	164	4.74 ± 1.39	5.56	< 0.001
Tightness absent	47	3.40 ± 1.65		

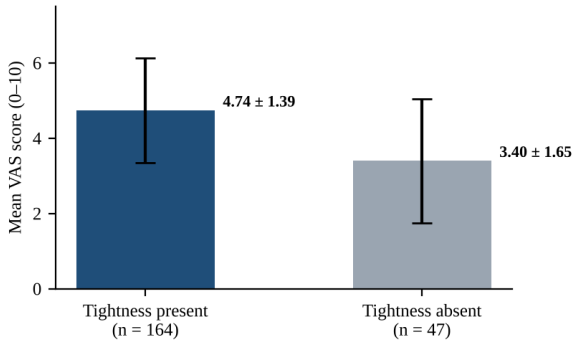

Fig. 3. Mean VAS score by iliopsoas tightness (error bars: ±1 SD)

Discussion

About four in five students with mechanical LBP had a positive Modified Thomas Test. This agrees in direction with earlier reports linking hip muscle length or flexibility with back complaints in similar groups: shorter iliopsoas length was related to greater lumbar lordosis in desk workers [5], and limited hip muscle flexibility was related to LBP in first-year undergraduates [6]. A dissertation on young adults likewise reported an

association between iliopsoas tightness and LBP [7]. Our figure applies to students who already had back pain and should not be taken as the rate in the general student population, since no pain-free comparison group was examined.

The share of positive tests did not rise with longer sitting; it was close to 75–78% in the 4, 5 and 6 hour groups. A possible explanation is that most participants already sat long enough for the muscle to adapt, so the range of sitting time was too narrow to show a gradient. This remains a suggestion, and objective measurement of sitting time across a wider range is needed.

Students with tightness reported higher pain than those without. A plausible mechanism is that a shortened iliopsoas pulls the pelvis forward and increases lumbar lordosis, raising load on the posterior spinal structures, often together with weak gluteal and abdominal muscles [3]. Treatment studies of iliopsoas stretching in people with lumbar hyperlordosis and LBP also exist [8]. However, this study measured both variables at one time point, so the association cannot show that tightness causes pain, and pain itself may also alter muscle behaviour.

LIMITATIONS

- The cross-sectional design cannot establish cause and effect.
- Sitting time was self-reported and open to recall bias; very few students sat for 6–7 hours.
- Only female students from one institution took part, which limits generalisability.
- Body mass index, physical activity, sports participation and injury history were not controlled.
- The Modified Thomas Test involves examiner judgement and may carry measurement error.
- No students without back pain were examined, so the prevalence applies only to those with LBP.

CONCLUSION

Iliopsoas tightness was found in 77.7% of female students with mechanical low back pain, and those with tightness reported significantly higher pain than those without. These findings show an association, not causation. The Modified Thomas Test is quick and inexpensive and can be used to screen this population.

CLINICAL IMPLICATIONS

- The Modified Thomas Test can be included in routine musculoskeletal screening of female students.
- Management may combine iliopsoas stretching with gluteal and core strengthening and correction of pelvic posture, rather than stretching alone.
- Regular breaks from sitting during lectures and study may be encouraged at institutional level.

FUTURE SCOPE

- Studies with a pain-free comparison group and male participants.
- Objective measurement of sitting time, hip extension range, muscle strength and disability.
- Control of body mass index, physical activity and posture.
- Randomised trials of stretching and lumbo-pelvic control exercises to test whether treating tightness reduces pain.

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