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Prevalence Of Iliopsoas Muscle Tightness In Prolonged Desk Job Workers Within The BMI Subgroups.

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ABSTRACT

Background : Iliopsoas tightness is prevalent among desk job workers with adaptive hip flexors shortening due to prolonged sitting.

Objective:To determine the prevalence of iliopsoas tightness among desk job workers and analyze its correlation with BMI subgroups.

Materials and Methods:A cross-sectional study of 209 banking employees assessed bilateral iliopsoas tightness using the Modified Thomas Test and universal goniometer. BMI was calculated and participants were categorized into underweight, normal, overweight, and obese groups. Statistical analysis determined prevalence and compared tightness severity across BMI categories.

Results:The prevalence of iliopsoas tightness was 64.59%. Significant variations ($p<0.05$) were observed across BMI subgroups. Obese individuals showed 2.4-fold greater tightness than underweight individuals.

Conclusion:Iliopsoas tightness is highly prevalent among desk job workers, with severity correlating with BMI, needing for BMI-stratified interventions.

Keywords BMI subgroups, Desk job workers, Iliopsoas muscle tightness, Modified Thomas Test, Occupational health, Sedentary behavior..

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INTRODUCTION

Desk workers accumulate roughly 75% of their workday in a seated position, much of this time in extended, continuous sessions.[1] The frequency of musculoskeletal complications among desk job workers is a result of this sedentary work environment. The neck, shoulders, upper and lower back, wrists, hands, knees, and ankles are among the most often damaged locations; the neck and lower back are the most severely affected. [2] Extended periods of occupational immobility show associations with numerous musculoskeletal adaptations, including decreased range of motion, muscular restrictions, and diminished flexibility, which potentially disrupt regular functional performance. The sedentary lifestyle associated with desk jobs makes workers more susceptible to adaptive shortening and tightness, particularly in the muscles surrounding the hip joint.[3]

Flexibility has been defined as the ability to move a joint through the range of motion required for a given activity.[4] It is essential for maintaining health and avoiding orthopedic disorders, especially those involving the spine and posture.[5] A lack of flexibility can lead to difficulties in performing and sustaining various activities in daily life, limiting overall mobility and function. Poor flexibility interferes with completing and maintaining regular physical movements in day-to-day life.[6] The iliopsoas muscle is the primary flexor of the hip joint and also helps maintain an erect posture.[7] Prolonged desk job can induce tightness within iliopsoas musculature. As the muscle serves to link lumbar spine to hip joint, tightness may lead to anterior pelvic tilt. This postural alteration, combined with lumbar hyper-lordosis represents a underlying mechanism contributing to development of low back pain.[8,9]

Sedentary behavior and obesity tend to coincide. Individuals who engage in minimal physical activity often faces weight management issues and obesity.[10] Obesity is frequently linked to compromised muscle quality, marked by deficits in specific strength rather than power capabilities. This often manifests as reduced maximum strength, increased muscle soreness, and elevated creatine kinase levels in individuals with higher BMIs. [11,12] Increased muscle stiffness and tone, predominantly in the lower body, were detected among individuals with high BMI.[12] Excess weight increase physiological and mechanical strain on the body's tissues. While sitting, the load on intervertebral discs increases, implying greater muscular effort is necessary to sustain proper posture, which further stresses the spinal cord. Excess weight also correlates with amplified low back pain, likely due to

diminished flexibility and restricted hip mobility.[13] As a result, this present study was executed to study occurrence of iliopsoas tightness among prolonged desk job workers within BMI subgroups.

ETHICAL COMMITTEE APPROVAL

The approval for this study is gained from the institutional ethics committee of Krishna Vishwa Vidyapeeth (deemed to be university), Karad. Respondents were given a complete overview of data collection protocols sheet as well the study which is to be conducted and informed consent was acquired from each and every participant participating in this study after explaining the study procedure, whose confidentiality was thoroughly maintained**.**

METHODS

Study Design: This observational cross-sectional study was conducted in Karad over a period of six months. Simple random sampling method was used to recruit participants from the banking sector.

Sample Size Calculation: Sample size was calculated using the formula

$n = z^2 \times p \times q / L^2$,

where z = 1.96 at 95% confidence level,

p = prevalence of 83.8% based on previous literature, q = 100-p = 16.2%,

L = allowable error of 5%.

The calculated sample size was 209 participants.

Selection and Description of Participants: The study included banking sector employees aged 25-40 years with minimum 8 hours of daily desk work and more than 5 years of desk job experience. Both male and female participants willing to participate were included. Participants were excluded if they had history of musculoskeletal injury or surgery in the lower limb or spine within the past 6 months, pre-existing musculoskeletal disorders, neurological conditions affecting lower limb function, pregnancy, regular physical exercise participation more than twice per week, diagnosed medical conditions affecting muscle and joint flexibility such as rheumatoid arthritis, or current use of medications affecting muscle tone or flexibility.

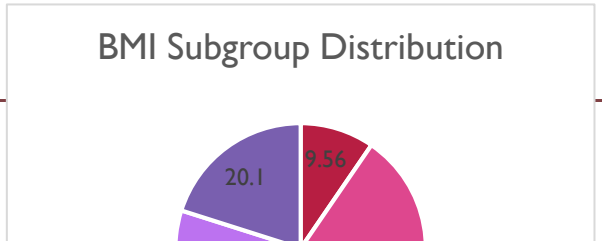
Procedures: Bilateral iliopsoas muscle tightness was assessed using the Modified Thomas Test with a universal goniometer. During the test, participants sat at the edge of an examination table and laid back while pulling both knees to their chest to flatten the lower back and rotate the pelvis backward. The participant then held one leg close to their chest while simultaneously lowering the contralateral leg towards the floor. Hip flexion angles were measured on each side using a universal goniometer with the stable arm positioned parallel to the lateral midline of pelvis and the moving arm placed parallel to the midline of femur, using the lateral epicondyle as a reference point. A 0° hip position was considered neutral, and any angle beyond this indicated iliopsoas muscle tightness. Measurements were recorded bilaterally for each participant.[14]

Anthropometric measurements were taken to calculate Body Mass Index (BMI). Weight was measured using a calibrated digital weighing scale with participants in light clothing, and height was measured using a ruler with participants standing barefoot against a wall. BMI was calculated using the standard formula: BMI = weight (kg)/[height (m)]^2. Participants were categorized into four BMI subgroups according to WHO classification: underweight (BMI <18.5 kg/m^2), normal weight (BMI 18.5-24.9 kg/m^2), overweight (BMI 25-29.9 kg/m^2), and obese (BMI ≥30 kg/m^2). [15,16]

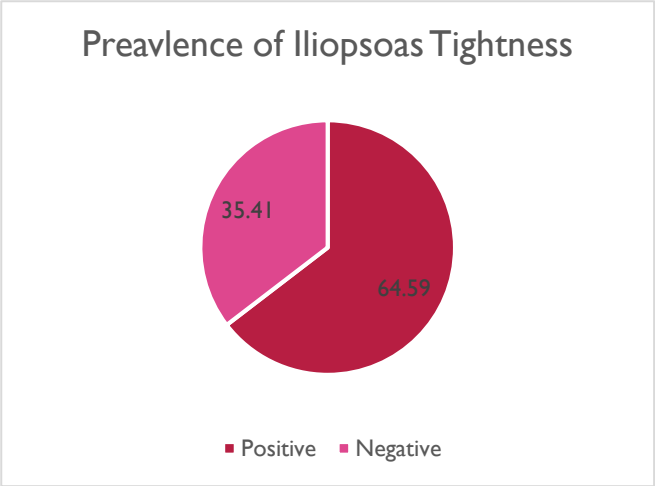
Statistical Analysis : Data were statistically analyzed using MS Excel application. Percentage values for each parameter were calculated and various graphs were drawn with given frequencies. Prevalence of iliopsoas muscle tightness was calculated for the overall sample and within each BMI subgroup. Statistical analysis was performed to identify patterns and relationships between BMI categories and iliopsoas muscle tightness severity. Statistical significance was calculated using the Chi-Square test with p-values less than 0.05 considered significant. The comparison of iliopsoas tightness across different BMI subgroups was analyzed using Instat software.

RESULTS AND INTERPRETATION-

This study examined 209 prolonged desk job workers from the banking sector with over 5 years of experience, working minimum 8 hours daily. The demographic distribution showed male predominance (59.8%, n=125) over females The majority of participants fell in the age group of 36–40 years (48.8%), followed by 31–35 years (34.44%) and 25–30 years (16.75%). The distribution based on duration of job indicated that 34.45% had 5–10 years of experience, 34.92% had 11–15 years, and 30.62% had 16–20 years of work experience.



BMI categorization revealed normal weight as the largest subgroup (42.1%, n=88), followed by overweight (28.23%, n=59), obese (20.1%, n=42), and underweight (9.56%, n=20) participants. Notably, 48.33% of participants exceeded normal BMI range, indicating high prevalence of elevated body mass in this occupational group.



The Modified Thomas Test revealed that 64.59% (n=135) of participants tested positive for iliopsoas tightness while 35.41% (n=74) tested negative, confirming high prevalence in sedentary occupational populations. Bilateral measurements showed no significant difference between sides (left: 13.83° ± 6.76°; right: 14.15° ± 6.79°; p=0.632), indicating symmetric involvement due to prolonged sitting posture.

BMI	Right- Mean	Right- SD	Left- mean	Left SD	p value
Underweight	7.83	4.79	7.5	4.5	0.0016
Normal	11.29	5.86	10.88	5.69	0.0001
Overweight	13.86	5.98	13.58	5.95	0.0003
Obese	18.81	6.52	18.54	6.54	0.0007

There was a progressive relationship between BMI categories and tightness severity. Underweight participants showed least restriction (30%), followed by normal BMI (47.7%), overweight (84.7%), and obese groups showing maximum tightness (88.1%). All p-values were statistically significant ($p<0.05$), demonstrating a clear dose-response relationship between BMI and iliopsoas tightness severity, with obese participants showing 2.4-fold greater restriction compared to underweight individuals.

DISCUSSION-

This study demonstrates a clear and progressive correlation between Body Mass Index and Iliopsoas muscle tightness in prolonged desk job workers, with significant clinical and occupational health implications. The dose-response relationship observed, where tightness severity increases from underweight (average 7.67°) to obese (average 18.68°) groups, represents a 2.4-fold increase in muscle restriction severity across BMI categories. This finding suggests that body composition plays a crucial role in determining the extent of adaptive shortening that occurs in response to prolonged sedentary positioning, with higher BMI individuals experiencing disproportionately greater muscle restrictions.

The overall prevalence of 64.59% iliopsoas tightness in our study population aligns with existing literature while providing important extensions to current knowledge. Previous research by Pradip et al. reported 83.8% prevalence in middle-aged male desk workers, whereas our study found a somewhat lower prevalence that may be explained by the inclusion of younger participants (25-30 years) and both genders, potentially moderating the effect seen in exclusively middle-aged male populations. Our findings support and significantly extend the preliminary work by Goyal and Chaudhary, who identified increased iliopsoas tightness in higher BMI students during COVID-19 online learning. [17]

The progressive increase in iliopsoas tightness with higher BMI can be explained through several interconnected mechanisms. First, increased body mass creates greater mechanical loading on the hip flexor muscles during sitting, requiring sustained isometric contraction to maintain posture against gravitational forces. This increased muscular effort accelerates the adaptive shortening process and contributes to earlier onset of structural changes within muscle fibers.[18,19] Second, obesity is associated with chronic low-grade inflammation that affects muscle tissue quality and recovery capacity, potentially impeding the normal restoration of muscle length during non-working hours.[20,21] Third, individuals with higher BMI often demonstrate reduced spontaneous physical activity levels and decreased likelihood of engaging in stretching or mobility exercises, creating a cycle where reduced movement perpetuates muscle shortening. [22,23]

The clinical significance of these findings extends beyond the immediate measurement of muscle tightness to encompass broader musculoskeletal health implications. Iliopsoas tightness, particularly when severe as observed in the obese group, creates a mechanical pull on the lumbar spine that promotes anterior pelvic tilt and compensatory lumbar hyperlordosis. This postural cascade is a well-established risk factor for low back pain development and can contribute to accelerated spinal degeneration over time.[9,14] The combination of prolonged sitting, elevated BMI, and resulting iliopsoas tightness creates a perfect storm for musculoskeletal dysfunction that may manifest as chronic pain, functional limitations, and reduced quality of life.

Healthcare providers treating desk job workers should routinely assess BMI alongside musculoskeletal complaints, as our results indicate that higher BMI individuals are at significantly greater risk for iliopsoas tightness and associated complications. Treatment protocols should be adjusted based on BMI category, with specialized interventions designated for overweight and obese individuals who demonstrate the greatest muscle restrictions. Preventive strategies should emphasize both weight management and targeted flexibility exercises, addressing the dual contributors to muscle tightness identified in this study.

The bilateral symmetry observed in our measurements ($p=0.632$) provides important insights into the nature of occupational muscle adaptations. Unlike unilateral activities that might create asymmetric patterns, prolonged desk work appears to affect both sides equally, reflecting the symmetric postural demands of typical office workstations. This finding supports the implementation of bilateral intervention strategies rather than focusing on dominant or non-dominant sides, simplifying treatment protocols while ensuring comprehensive muscle addressing.

From a workplace wellness standpoint, organizations should consider implementing BMI-stratified health initiatives that offer extended assistance for employees with elevated body mass. This could comprise enhanced ergonomic assessments, targeted exercise programs, nutritional counseling, and modified work schedules that incorporate regular movement breaks. The economic implications of preventing work-related musculoskeletal disorders justify investment in such differentiated approaches, particularly given the high prevalence rates observed in our study population.

Limitations should be acknowledged when interpreting these results. The cross-sectional design prevents establishment of causal relationships and does not account for individual variations in baseline flexibility or genetic predisposition to muscle tightness. Future longitudinal studies could provide stronger evidence for causation and help identify critical intervention windows for preventing progressive muscle shortening.

CONCLUSION-

This study demonstrates a significant prevalence of iliopsoas muscle tightness (64.59%) among prolonged desk job workers, with a clear dose-response relationship between BMI and tightness severity, where obese individuals showed 2.4-fold greater restriction compared to underweight participants. The progressive increase in muscle tightness across BMI categories (underweight to obese) indicates that body composition profoundly impacts the extent of adaptive shortening in response to prolonged sedentary positioning. These findings necessitate BMI-stratified intervention strategies in occupational health programs, highlighting the need for targeted approaches that address both weight management and muscle flexibility to prevent work-related musculoskeletal disorders in desk-based occupations.

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Ethical Committee

The study was approved by institutional Research ethical committee of Krishna Vishwa Vidyapeeth Deemed To Be University, Karad, Maharashtra. With opinion number**.**

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