

Association of Occupational Sitting Time and Piriformis Muscle Tightness in Desk Job Professionals

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ABSTRACT

Prolonged sedentary behavior is linked to musculoskeletal issues such as muscle tightness, reduced joint mobility, and decreased flexibility, all of which can hinder daily functioning. Office-based workers are particularly at risk due to extended sitting durations, often resulting in adaptive shortening of hip muscles. The piriformis muscle, when tight, contributes to low back pain (LBP), accounting for approximately 6.5% of cases. This study aimed to investigate the association between piriformis muscle tightness and occupational sitting duration among desk job workers.

Objectives: 1. To assess piriformis muscle tightness using the Piriformis Test. 2. To examine the association between right and left piriformis tightness and sitting duration.

Methods: A cross-sectional analytical study was conducted on 69 desk job workers selected based on inclusion and exclusion criteria. After informed consent and demographic data collection, piriformis muscle tightness was assessed using the Piriformis Test. Participants were categorized based on daily sitting duration: 4–6 hours, 7–9 hours, and 10–12 hours. Point biserial correlation was used to analyze the relationship between sitting time and piriformis tightness.

Results: Of the 69 participants, 20 sat for 4–6 hours, 46 for 7–9 hours, and 3 for 10–12 hours daily. A weak but statistically significant positive correlation was found between sitting duration and right piriformis tightness ($r = 0.285$, $p = 0.018$) as well as left piriformis tightness ($r = 0.315$, $p = 0.008$).

Conclusion: Longer sitting durations are significantly associated with increased piriformis muscle tightness among desk job workers.

Implications: Workplace health strategies—including posture education, ergonomic setups, and regular stretching—are essential to reduce piriformis-related discomfort and prevent associated LBP in sedentary professionals.

Keywords: Piriformis tightness, occupational sitting, low back pain.

INTRODUCTION

In contemporary occupational settings, prolonged sitting has become an integral part of daily routines, particularly among individuals engaged in desk-based professions. Extended periods of sitting, often accompanied by poor posture and limited physical activity, contribute significantly to musculoskeletal imbalances and discomfort. One such concern is the tightness of the piriformis muscle, a deep

gluteal muscle that plays a key role in hip stabilization and movement. Chronic piriformis tightness has been associated with symptoms such as lower back pain, buttock discomfort, and even sciatic nerve compression, collectively known as piriformis syndrome, which may impair functional mobility and reduce quality of life. With individuals spending a substantial portion of their day in static seated positions at work or at home [1,2], sedentary behavior has become a major public health concern. A sedentary lifestyle is strongly correlated with various health risks and serves as a key contributing factor to the development of musculoskeletal disorders. It can lead to muscle tightness, reduced joint range of motion, and diminished flexibility, all of which adversely affect daily activities and overall physical function [3].

Adequate flexibility is a vital component of physical and health-related fitness, contributing significantly to overall functional performance and injury prevention [4,5]. Insufficient flexibility has been linked to difficulties in performing and maintaining various daily activities, potentially leading to limitations in mobility and functional independence [6]. The importance of flexibility as a key aspect of health-related fitness lies in its preventive role against orthopedic impairments, particularly those affecting the lower back. Well-maintained muscular flexibility allows for efficient pelvic movement, reduces intervertebral disc compression, and prevents overstretching of supportive musculature, thereby minimizing the risk of musculoskeletal strain and chronic pain conditions [7,8].

A recent study titled “*It’s Time to Switch*” conducted by Godrej Interio’s Workplace and Ergonomics Research Cell found that 64% of employees sit for more than nine hours a day at work [9]. Prolonged sitting, particularly in a forward-flexed position within the sagittal plane, contributes to postural deviations and muscle imbalances. Such sustained positioning places stress on specific muscle groups while weakening

others, leading to discomfort and dysfunction over time.

This finding underscores the physical challenges faced by desk-based employees and the various adaptive strategies they may employ to cope with work-related musculoskeletal discomfort. One of the most prevalent conditions associated with physical inactivity is lower back pain (LBP) [10]. Among the musculoskeletal causes of LBP, piriformis muscle tightness accounts for approximately 6.5% of cases globally [11]. This highlights the clinical significance of early identification and management of piriformis tightness in sedentary populations.

Prolonged sitting, as commonly seen in desk-based occupations, can lead to adaptive shortening of the hip musculature. Among the various muscles associated with the hip joint, the hamstrings, iliopsoas, and piriformis are particularly susceptible to tightness following extended periods of sedentary posture [12]. The piriformis muscle, located beneath the gluteal muscles, is a key tri-articular muscle involved in hip function. It originates from the pelvic surface of the sacrum—specifically between and lateral to the first through fourth pelvic sacral foramina—as well as from the margin of the greater sciatic foramen and the pelvic surface of the sacrotuberous ligament. The muscle inserts onto the superior border of the greater trochanter of the femur via a rounded tendon, which often merges with the tendons of the obturator internus and gemelli muscles. It is innervated by branches of the sacral plexus, typically the nerve to piriformis, though in some anatomical variations, it may receive contributions from the sciatic nerve [13].

The piriformis muscle functions primarily as an external rotator of the hip, and to a lesser extent, as a weak abductor and weak flexor, contributing to postural stability during both ambulation and standing [14]. Notably, its function is angle-dependent: when the hip is flexed at 60° or less, the piriformis acts as an external rotator. However, when hip flexion exceeds 60°, its

action shifts, and it functions as an internal rotator of the hip [15]. From this it could be stated that piriformis remains active during any type of sitting position whether high sitting or cross sitting although its function changes in different styles of sitting. Piriformis muscle has a predominance of type-I fibers which has a tendency to develop shortness or tightness when the muscle is abnormally stressed. When the piriformis becomes tight it can put pressure on the sciatic nerve causing irritation and sending pain down the back of the leg (sciatica).^[16] Given its anatomical position and close relationship to the sciatic nerve, dysfunction of the piriformis muscle can have significant clinical implications. Therefore, a comprehensive understanding of its structure and function is critical for clinicians, particularly in the diagnosis, prevention, and treatment of lumbopelvic and hip-related disorders. Future research should continue to explore the role of targeted interventions, such as stretching, strengthening, and ergonomic modifications, in managing and preventing dysfunctions associated with the piriformis muscle.

MATERIALS & METHODS

This study employed a cross-sectional observational design to investigate piriformis muscle tightness among desk-bound workers. Participants (N = 69) were recruited using purposive sampling, based on clearly defined criteria. Ethical approval was obtained from the Institutional Ethics Committee, and informed written consent was secured from all participants after they were provided with an information sheet outlining the study objectives and procedures. The inclusion criteria required participants to be male or female, aged 25–55 years, currently employed in desk-based occupations for at least 5 hours per day, 5 days per week, and with a minimum of 5–7 consecutive years of such work experience. Exclusion criteria included a history of

recent surgeries (lower back or lower limbs), musculoskeletal injuries, congenital deformities of the lower limbs, and regular participation in exercise or yoga.

Each participant completed a demographic data form, followed by a clinical assessment using the FAIR test (Flexion-Adduction-Internal Rotation test) to evaluate piriformis muscle tightness. For this test, the participant was positioned in side-lying, with the test leg on top, flexed at the hip to 60°, and the knee also flexed. The examiner stabilized the pelvis and applied downward pressure on the knee. Localized pain indicated piriformis muscle tightness, while radiating pain suggested possible sciatic nerve involvement.

STATISTICAL ANALYSIS

All data were compiled and analyzed using IBM SPSS Statistics Version 29. To assess the correlation between sitting duration and piriformis muscle tightness, the Point-Biserial Correlation Coefficient (r_{pb}) was employed. This statistical method is a special case of the Pearson product-moment correlation, appropriate when one variable is continuous (sitting duration in hours) and the other is dichotomous nominal (FAIR test result: positive or negative). In addition, Eta correlation was utilized to evaluate the strength of non-linear associations between nominal and scale-level variables. A p-value of less than 0.05 ($p < 0.05$) was considered statistically significant for all analyses.

RESULT

The demographic and baseline characteristics of the study participants were summarized using descriptive statistics, as shown in Tables 1 to 4.

The age of the 69 participants ranged from 25 to 56 years, with a mean age of **37.7 ± 8.9 years**. This indicates a predominantly young to middle-aged adult population, which is representative of the typical working-age group engaged in desk jobs.

Table 1 – Age of the Participants

Age (years)	N	Minimum	Maximum	Mean	Std. Deviation
	69	25	56	37.70	8.87

Participants' heights ranged from 125 cm to 188 cm, with a mean height of **163.3 ± 11.2 cm**. The wide range suggests a diverse

sample in terms of stature, which helps generalize the findings across different body types.

Table 2 – Height of the Participants

Height (cm)	N	Minimum	Maximum	Mean	Std. Deviation
	69	125	188	163.32	11.19

The weight of participants varied between 34 kg and 102 kg, with an average weight of **67.4 ± 13.4 kg**. This distribution suggests

variability in body mass index (BMI) among participants, which may influence musculoskeletal health.

Table 3 – Weight of the Participants

Weight (kg)	N	Minimum	Maximum	Mean	Std. Deviation
	69	34	102	67.41	13.38

Participants had been working in desk-based roles for between 1 and 31 years, with an average tenure of **12.2 ± 8.4 years**. This indicates a range from relatively new to

experienced workers, allowing assessment of cumulative effects of prolonged sitting on piriformis tightness.

Table 4 – Working Years of the Participants

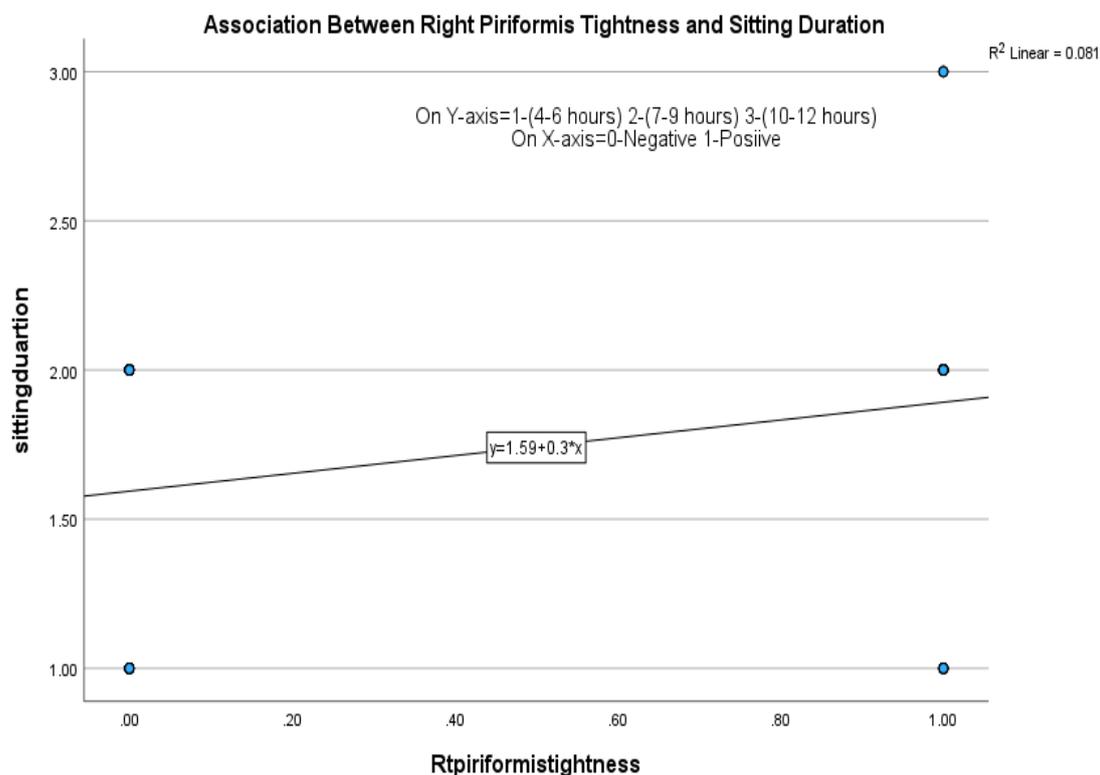
Working Years	N	Minimum	Maximum	Mean	Std. Deviation
	69	1	31	12.19	8.43

The study included 69 participants, with a gender distribution of 56.5% male and 43.5% female. Figure 3 illustrates the types of chairs used by participants during their desk jobs. The largest group (39.1%) used ergonomic chairs, followed by 30.4% using wooden chairs, 15.9% plastic chairs, 10.1% metal chairs, and 4.3% visiting chairs. This variety reflects differing seating conditions, which may influence musculoskeletal health.

Figure 4 focuses on male participants (N=40) and their habit of sitting with a wallet in the back pocket. A majority (77.5%) reported not sitting with a wallet in

their back pocket, while 22.5% did. Since sitting with a wallet in the back pocket can cause pelvic asymmetry and contribute to musculoskeletal discomfort, this behavior is an important consideration when assessing occupational posture-related risks.

The linear regression line fitted to the data shows a slight positive trend, with the regression equation given by $y=1.59+0.3xy = 1.59 + 0.3xy=1.59+0.3x$. However, the coefficient of determination ($R^2=0.081R^2 = 0.081$) indicates that only about 8.1% of the variability in sitting duration is explained by right piriformis tightness.



Scatter graph 1-association between right piriformis tightness and sitting duration

TABLE 5 – Crosstabulation- Right piriformis tightness and sitting duration.

Piriformis tightness Rt * sitting duration Crosstabulation					
Count		Sitting duration			Total
		4-6	7-9	10-12	
Piriformis tightness Right	Negative	13	19	0	32
	Positive	7	27	3	37
Total		20	46	3	69

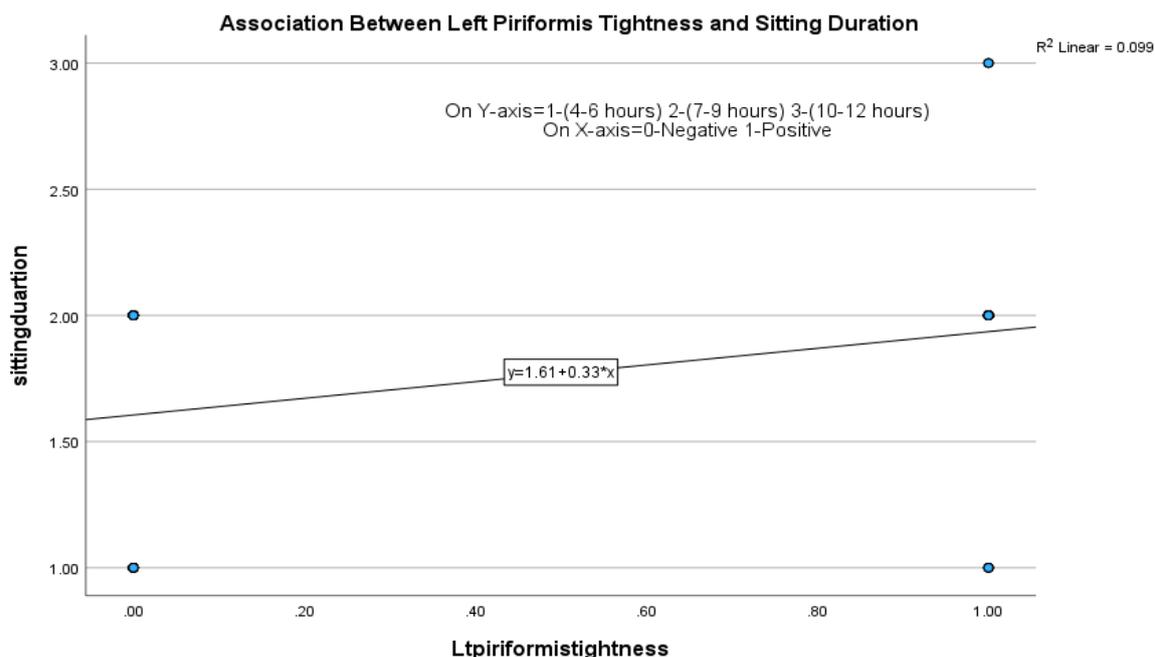
TABLE 6 – Eta measures

Directional Measures			
			Value
Nominal by Interval	Eta	Piriformis tightness Rt Dependent	.291
		Sitting duration Dependent	.285

TABLE 7- Point Biserial Correlation Analysis by Pearson Correlation of right piriformis tightness and sitting duration.

Correlations			
		Piriformis tightness Right	Sitting duration
Piriformis tightness Right	Pearson Correlation	1	.285*
	Sig. (2-tailed)		.018
	N	69	69
Sitting duration	Pearson Correlation	.285*	1
	Sig. (2-tailed)	.018	
	N	69	69

*. Correlation is significant at the 0.05 level (2-tailed).



Scatter graph 2- association between left piriformis tightness and sitting duration

The linear regression equation is $y = 1.61 + 0.33x$, indicating a slight positive slope. The coefficient of determination ($R^2 = 0.099$) suggests that approximately 9.9% of the variation in sitting duration can be explained by the presence of left piriformis tightness.

TABLE 8 – Crosstabulation- Left piriformis tightness and sitting duration.

Piriformis tightness Left * sitting duration Crosstabulation					
Count					
		Sitting duration			Total
		4-6	7-9	10-12	
Piriformis tightness Left	Negative	15	23	0	38
	Positive	5	23	3	31
Total		20	46	3	69

TABLE 9 – Eta measures – Left piriformis tightness and sitting duration.

Directional Measures			
			Value
Nominal by Interval	Eta	Piriformis tightness Left Dependent	.327
		Sitting duration Dependent	.315

TABLE 10 - Point Biserial Correlation Analysis by Pearson Correlation of left piriformis tightness and sitting duration.

Correlations			
		Piriformis tightness Lt	Sitting duration
Piriformis tightness Left	Pearson Correlation	1	.315**
	Sig. (2-tailed)		.008
	N	69	69
Sitting duration	Pearson Correlation	.315**	1
	Sig. (2-tailed)	.008	
	N	69	69

** . Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

This study is to explore the relationship between sitting duration and piriformis muscle flexibility within a workplace environment. Given the increasing prevalence of sedentary occupations, understanding how prolonged sitting impacts musculoskeletal health is critical. Despite the importance of this issue, there is a lack of research specifically addressing the effects of sitting duration on piriformis tightness in occupational settings. This study aims to fill that gap by providing foundational data that can inform ergonomic interventions and workplace health strategies to reduce the risk of musculoskeletal discomfort and related complications.

Our findings reveal a significant, weak, positive correlation between piriformis tightness and sitting duration, as indicated by the point biserial correlation coefficients for the right piriformis ($p = 0.018$, $r = 0.285$) and left piriformis ($p = 0.008$, $r = 0.315$).

Additionally, the study collected and analyzed various demographic and occupational variables, including body mass index (BMI), years of desk work experience, type of sitting chair, use of cushion support, and, for male participants, the habit of carrying a wallet in the back pocket while seated.

The BMI of the participants was classified according to Asian standards. Among the underweight group ($n=4$), 25% (1 individual) exhibited piriformis tightness. In the normal BMI category ($n=17$), 47% (8 individuals) showed piriformis tightness. The overweight group ($n=14$) had the highest proportion, with 85% (12 individuals) experiencing tightness. Among those classified as Obese Grade 1 ($n=22$), 50% (11 individuals) had piriformis tightness, while in the Obese Grade 2 group ($n=9$), 77% (7 individuals) demonstrated tightness. These findings suggest a direct relationship between BMI and piriformis tightness: as BMI increases, so does the risk of developing piriformis tightness.^[17] This is particularly evident in the overweight

category (BMI 23–24.9), where the majority of subjects with piriformis tightness were observed.

The mean age of desk job workers in the present study was 37.6 ± 8.87 years. Vaishnavi et al. reported a significant increase in the risk of piriformis tightness with advancing age, possibly due to prolonged sitting durations associated with older age groups.^[10,21] Piriformis tightness was observed in 12 (40%) females out of 30 and 22 (56%) males out of 39, indicating a higher prevalence among males. Existing literature suggests that females generally exhibit greater flexibility than males across the lifespan, attributed to anatomical differences in joint structure and the tendency for men to engage in more physically demanding work, leading to increased microtrauma.^[18] Additionally, males often adopt a more open-leg sitting posture, which engages the piriformis as an external hip rotator, potentially contributing to muscle tightness. In contrast, females are more likely to sit with legs crossed, a posture that may influence piriformis muscle dynamics differently.^[19]

Among 69 respondents, 39.1% reported using an ergonomic chair, 30.4% a wooden chair, 15.9% a plastic chair, 10.1% a metal chair, and 4.5% a visiting chair. Cushion support was used by 24.6% of the participants. Of 40 male respondents, 22.5% (9 individuals) reported carrying a wallet in their back pocket while sitting. Notably, 77% (7 out of 9) of these men exhibited piriformis muscle tightness. The findings suggest an increased risk of piriformis tightness associated with the habit of sitting with a wallet in the back pocket.

In this study, 69 desk job workers (39 males and 30 females) were evaluated, and piriformis tightness was identified in 39 participants. Among those, 8 subjects exhibited tightness on the right side only, 3 had tightness on the left side only, and 28 showed bilateral piriformis tightness. The overall prevalence of piriformis tightness in this cohort was 56.56%.

Vaishnavi et al. reported a similar prevalence of 51.92% piriformis tightness among bankers. [10,20,22] The piriformis muscle is classified as a postural muscle, which tends to become overactive, hypertonic, weak, and shortened with prolonged use or improper posture. During extended periods of sitting, the piriformis muscle may become overactive and hypertonic. Modern lifestyles, characterized by increased sitting time due to advances in technology and automation, contribute to this phenomenon. Nicholson S et al. highlighted that the gluteal muscles are often neglected because individuals spend most of their time sitting and engage in minimal walking. [20,23,24] This inactivity can lead to gluteal muscle weakness and a compensatory increase in piriformis muscle activation. Such overactivation may result in hypertonicity and tightness of the piriformis muscle. These factors help explain the high prevalence of piriformis tightness observed in sedentary populations. [25, 26,27]

CONCLUSION

In conclusion, the findings of this study demonstrate a significant association between increased sitting duration and the prevalence of piriformis tightness among desk job workers. Prolonged sitting appears to be a contributory factor to the development of tightness in the piriformis muscle, likely due to sustained postural stress and muscular overactivation. These results emphasize the need for targeted ergonomic strategies and regular movement breaks to mitigate the adverse musculoskeletal effects of sedentary work environments. Addressing these factors can play a vital role in improving the overall musculoskeletal health and quality of life for individuals engaged in prolonged sitting occupations.

Clinical Implications- It is clear that proactive screening of individuals engaged in sedentary or desk-based occupations is crucial to prevent the onset of musculoskeletal discomfort—an

increasingly common issue in such job settings. Early identification of risks like piriformis tightness can help mitigate long-term complications.

Preventive and corrective measures should be prioritized, including the adoption of ergonomically sound workstations, scheduled movement breaks, and incorporation of regular stretching and strengthening exercises. These strategies can significantly reduce both the physical strain and psychological burden associated with prolonged sitting, ultimately promoting better musculoskeletal health and overall workplace well-being.

Further research is warranted to:1)

Explore the long-term effects of ergonomic and exercise-based interventions on piriformis tightness and overall musculoskeletal health. 2) Investigate the role of other contributing factors such as stress, hydration, and physical activity levels. 3) Conduct larger, multi-centered studies to validate the findings across different occupational populations and settings. Implementing the above strategies can significantly reduce the physical and psychological stress associated with sedentary work, promoting a healthier and more productive workforce.

Declaration by Authors

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