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Prevalence of Piriformis Syndrome and Associated Risk Factors among Pregnant Women in Karachi-Across Sectional Study

Memona Zehra Kazmi
kazmimaimona@gmail.com
Department of Allied Health Sciences, Indus University, Pakistan

Dr. Maira Muneer
maira.muneer00@gmail.com
Assistant Professor/Academic Coordinator
Department of Allied Health Sciences, Indus University, Pakistan

Dr. Okasha Anjum
drokashaanjumpt@gmail.com
Chairperson/Assistant Professor
Department of Allied Health Sciences, Indus University, Pakistan

Corresponding Author: Memona Zehra Kazmi kazmimaimona@gmail.com

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ABSTRACT

Background: *Low back pain is one of the most common complaints during pregnancy, affecting up to 50% of women, and usually emanates from postural and biomechanical changes. Poor sitting posture and abnormal biomechanics may cause piriformis tightness, which can further lead to piriformis syndrome and low back pain. Piriformis is a triangular muscle in the gluteal region whose function involves hip motion and stability. If compressed, the sciatic nerve brings pain, numbness, and tingling from the low back down to the leg. The hormonal and postural adjustments, including loosening of ligaments, muscle imbalances, and accentuated lumbar lordosis, will produce changes in gait and stress in hip and low back muscles during pregnancy. These changes predispose pregnant women-particularly those in the third trimester-to piriformis tightness and associated low back pain.* ***Objective:*** *To determine the prevalence of piriformis syndrome and its associated risk factors among pregnant women in Karachi.* ***Methodology:*** *A cross-sectional study is conducted involving pregnant women to determine the prevalence of Piriformis Syndrome (PS) and its associated risk factors. Participants was selected from Jinnah Hospital, Indus Hospital and Shah Latif Clinic at Karachi. The FAIR Test was used to assess the presence of Piriformis Syndrome, while the International Physical Activity Questionnaire (IPAQ) was used to evaluate physical activity levels and related risk factors.*

Keywords: *Piriformis syndrome, FAIR test, Low back pain, Piriformis muscle, IPAQ questionnaire, Pregnant women, Physical activity level, Sciatic nerve compression.*

INTRODUCTION

Low back pain due to gestational problems is a common complaint, affecting up to 50% of pregnant women at some time during their pregnancy. Prolonged sitting posture, biomechanical alterations during pregnancy are the primary reason of piriformis tightness in female that might finally results in piriformis syndrome and low back pain. Gestational low back pain is a significant complaint during pregnancy being a multifactorial symptom affecting the lumbar region which can irradiate to the lower limbs. The pain of the patient worsened with prolonged sitting, walking and stair climbing. [1] Piriformis syndrome is caused by irritation of the sciatic nerve by the piriformis muscle in the deep gluteal region. The piriformis is innervated by the ventral rami of sacral plexus L5, S1, S2. [3]

Unwanted reciprocal inhibition from the hyperactive hip extension iliacus, rectus femoris, and Psoas major is the main cause of Piriformis Syndrome. This imbalance happens when the Hip extensors are trained to be overly short and tight, as happens when we sit all day for work or with our hips extended.[4] The sciatic nerve, a "typical" peripheral nerve, is ensheathed by epi-, peri-, and endo-neurium. [5] The sciatic nerve, rather than a single trunk, consists of the peroneal and tibial portions, which are, in most cases, bound together by the fibrous epineurium as the nerve runs distally to the popliteal space..[6] The piriformis muscle typically arises from the anterior surface of the second through the fourth sacral vertebra, the upper margin of the greater sciatic foramen, and the Sacro tuberous ligament, to insert on the superior surface of the greater trochanter of the femur However, variations exist in a significant percentage of the population.[7] Piriformis syndrome includes incidence rate of 5% to 36% worldwide in which piriformis muscle compresses the sciatic nerve, leading to pain. [8] In Pakistan prevalence of piriformis muscle syndrome among individuals with low back pain is 18.3%. [9] The prevalence of piriformis syndrome vary widely because of the inconsistent diagnostic criteria and underrecognition of the condition. Estimates range from approximately 0.3% to 6% of all low back pain and sciatica cases. Some studies even show higher proportions among patients with chronic non-discogenic sciatica. [10]

The chief symptoms are pain and/or paresthesia anywhere along the course of the sciatic nerve. [11] Symptoms include tingling, numbness, and pain which extends from the back of the foot. Pain is intermittent in nature and aggravates on movements like jumping, running, etc. Piriformis syndrome is also synonymous with sciatica or buttock pain.[12] Piriformis syndrome also included gluteal pain, lumbosciatica, paresthesia in the inguinal, lumbar, perineal, buttocks, hip and posterior part of the thigh, calf, feet, and rectum.[13] During pregnancy, physiological and postural changes further predispose women to this condition.[14] Piriformis tightness is an under-recognized musculoskeletal condition that may lead to altered biomechanics, low back pain, and progression toward piriformis syndrome. Prolonged sedentary behavior, particularly extended sitting postures among students, is a key risk factor. [15]

General risk factors that have been proposed to be associated with piriformis syndrome include prolonged sitting, repetitive lower-limb activities, trauma to the gluteal region, and abnormal lumbopelvic biomechanics. The most common anatomical variation appears to be an increased susceptibility due to alterations in the relationship between the sciatic nerve and the piriformis muscle. During pregnancy, other additional risk factors become highly significant for symptom development. [16] The international Physical Activity Questionnaire (IPAQ) has been shown to have acceptable reliability and validity for assessing physical activity levels in diverse adult populations, with repeatability coefficients (Spearman's rho) around 0.80 for test-retest reliability and criterion validity coefficients around 0.30.[21] It has important clinical significance in the gluteal region due to anatomical and biomechanical features of piriformis muscle.[17] The mainstay of treatment, however, is Piriformis stretching, which aims to correct the underlying pathology by relaxing a tight piriformis, and related muscle stretching to relieve nerve compression. Because the piriformis lies deep in the gluteus maximus, using moist heat or ultra-sound prior to stretching is most often suggested.[18] Stretches can be done in both the standing and supine positions, and they involve hip and knee flexion, hip adduction, and internal rotation of the thigh, as in the FAIR position. This may take some time for patients to tolerate, as this is the same position used to provoke piriformis pain. After stretching, lumbosacral stabilization, hip strengthening exercises, and myofascial release are per-formed.[19] Lifestyle modification in piriformis syndrome consists mainly of reducing or avoiding activities that produce repetitive stress to the piriformis muscle, such as vigorous lower-limb sports or extended, strenuous exercise. [20]

Significance

The research focuses on obtaining the prevalence and related risk factors of Piriformis Syndrome (PS) in pregnant women, a musculoskeletal syndrome commonly neglected during pregnancy. The research is intended to enhance maternal health, comfort, and mobility through self-awareness of posture, activity, and preventive intervention.

Research Question

To determine the prevalence of piriformis syndrome and its associated risk factors among pregnant women in Karachi.

METHODOLOGY

Study Design

This study was an observational cross-sectional study.

Sampling Technique

A non-probability convenience sampling technique was employed to recruit eligible participants from selected hospitals across Karachi.

Data Analysis

Data were analyzed by using statistical techniques such as chi-square tests and data will be entered in and analyzed by SPSS version 26.

RESULT

Descriptive Statistics

Table 1: Descriptive Analysis of demographics Scale:

Elements	N	Min.	Max.	Mean	SD	Variance
Age	113	1	3	2.21	0.59	0.35
Occupation	113	1	3	2.42	0.55	0.30
Children	113	0	8	2.40	2.01	4.03

Descriptive statistics were calculated for age, occupation, and number of children among the 113 respondents. The age variable ranged from 1 to 3, with a mean of 2.21 and a standard deviation of 0.59, indicating a moderate clustering of respondents within the defined age categories and limited variability (variance = 0.35). Similarly, occupation also ranged from 1 to 3, with a slightly higher mean value of 2.42 and a standard deviation of 0.55, suggesting that most respondents were concentrated toward the upper occupational categories, with relatively low dispersion (variance = 0.30). In contrast, the number of children showed a much wider distribution, ranging from 0 to 8, with a mean of 2.40 and a comparatively high standard deviation of 2.01. The larger variance of 4.03 reflects substantial variability in family size among participants. Overall, while age and occupation demonstrated relatively homogeneous distributions, the number of children exhibited considerable diversity within the study population.

Correlation Matrix

Correlation is a statistical technique that ascertains whether and how strongly set of variables are related. In this research, correlation coefficient computed from the sample data measures the strength and direction (positive or negative) of a linear relationship between dependent and independent variables. If the value of the correlation coefficient is significant among the variable (s), we would have to go to evaluate the level of parity between the actual and expected results through Chi-square.

Table 2: Correlation Analysis of IPAQ scale:

IPAQ Correlation	Item-01	Item-02	Item-03	Item-04	Item-05	Item-06	Item-07	Physical activities level
Vigorous activities-Days	1.00	0.34	0.10	0.07	-0.20	0.14	0.02	0.36
Vigorous activities-Duration (Min)	0.34	1.00	-0.02	0.33	-0.18	0.21	0.18	0.55
Moderate activities-Days	0.10	-0.02	1.00	0.01	0.50	0.00	0.16	0.19
Moderate activities-Duration (Min)	0.07	0.33	0.01	1.00	-0.09	0.25	-0.09	0.49
Walking activity-Days	-0.20	-0.18	0.50	-0.09	1.00	-0.01	0.05	0.00
Walking activity-Duration (Min)	0.14	0.21	0.00	0.25	-0.01	1.00	-0.04	0.52
Sitting activity-Duration (Min)	0.02	0.18	0.16	-0.09	0.05	-0.04	1.00	0.16
Physical activities level	0.36	0.55	0.19	0.49	0.00	0.52	0.16	1.00

The correlation analysis of IPAQ items demonstrated varying degrees of association among different domains of physical activity and the overall physical activity level. Vigorous activity days showed a moderate positive correlation with vigorous activity duration ($r = 0.34$) and with overall physical activity level ($r = 0.36$), indicating that participants engaging in vigorous activities more frequently tended to accumulate higher total activity levels. Vigorous activity duration exhibited one of the strongest associations with overall physical activity level ($r = 0.55$) and also showed moderate correlations with moderate activity duration ($r = 0.33$) and walking duration ($r = 0.21$), suggesting that longer durations of high-intensity activity substantially contributed to total physical activity. Moderate activity days were strongly correlated with walking days ($r = 0.50$), reflecting a behavioral overlap between these activity types, and showed a weak positive association with overall physical activity level ($r = 0.19$). Moderate activity duration demonstrated a moderate positive correlation with overall physical activity level ($r = 0.49$) and with walking duration ($r = 0.25$), highlighting the importance of time spent in moderate activities for achieving higher activity levels. In contrast, walking days showed no meaningful correlation with overall physical activity level ($r = 0.00$), whereas walking duration displayed a moderate positive association ($r = 0.52$), indicating that the length of walking sessions, rather than frequency alone, contributed to higher activity levels. Sitting duration showed weak correlations with most activity domains and a low positive association with overall physical activity level (r = 0.16), suggesting limited influence on total activity. Overall, the findings indicate that activity duration—particularly vigorous and walking durations—has a stronger impact on total physical activity levels than activity frequency alone.

Table 3: Correlation Analysis of DVs:

Dependent variable	Health status	Physical activities status
Physical activities level	1.00	0.16
FAIR results	0.16	1.00

The correlation analysis revealed a weak positive relationship between physical activity level and health status (r = 0.16), indicating that higher levels of physical activity were only slightly associated with better perceived health among the participants. This suggests that while physical activity may contribute to health status, its influence in this sample was limited. Additionally, the association between physical activity level and physical activity status (FAIR results) was also weak (r = 0.16), reflecting minimal agreement between the overall activity level and categorical activity status classification. Overall, these findings indicate that the relationships among physical activity level, health status, and physical activity status were positive but weak, suggesting that other factors beyond physical activity may play a more substantial role in determining health status in the study population.

Chi-Square is a statistical measure which compares the actual and expected results leading to accept or reject null hypothesis. We reject the null hypothesis if the chi-square value is greater than the critical value. If you reject the null hypothesis, you can conclude that your data are significantly different from what you expected. Here we assume two (02) null hypotheses are as under assessed:

- $HO_{1:}$ There is no significant relationship between age and Prevalence of occupational musculoskeletal disorders related to prolonged standing among retail workers.
- $HA_{1:}$ There is significant relationship between age and Prevalence of occupational musculoskeletal disorders related to prolonged standing among retail workers.
- $HO_{2:}$ There is no significant relationship between occupation and Prevalence of occupational musculoskeletal disorders related to prolonged standing among retail workers.
- $HA_{2:}$ There is significant relationship between occupation and Prevalence of occupational musculoskeletal disorders related to prolonged standing among retail workers.
- $HO_{3:}$ There is no significant relationship between number of children and Prevalence of occupational musculoskeletal disorders related to prolonged standing among retail workers.
- $HA_{3:}$ There is significant relationship between number of children and Prevalence of occupational musculoskeletal disorders related to prolonged standing among retail workers.

Table 4: Case Processing Summary:

	Valid	Missing	Total

	N	Percent	N	Percent	N	Percent
Age * physical activities level	113	100%	0	0%	113	100%
Occupation * physical activities level	113	100%	0	0%	113	100%
Children * physical activities level	113	100%	0	0%	113	100%
Age * FAIR results	113	100%	0	0%	113	100%
Occupation * FAIR results	113	100%	0	0%	113	100%
Children * FAIR results	113	100%	0	0%	113	100%

Above table shows that each element has no exclusion, and each element has assessed with filled parameters.

Table 5: Chi-Square Tests:

Test Element	Pearson Chi-Square	p-value	Result
Age * physical activities level	1.99	0.00	Reject Null Hypothesis (significant association)
Occupation * physical activities level	3.19	0.02	Reject Null Hypothesis (significant association)
Children * physical activities level	6.62	0.11	Accept Null Hypothesis (Insignificant Association)
Age * PRIFORMIS	4.08	0.13	Accept Null Hypothesis (Insignificant Association)
Occupation * PRIFORMIS	12.30	0.00	Reject Null Hypothesis (significant association)
Children * PRIFORMIS	7.04	0.42	Accept Null Hypothesis (Insignificant Association)

The chi-square analysis demonstrated varying patterns of association between the selected sociodemographic variables and the outcome measures. Age showed a statistically significant association with physical activity level ($\chi^2 = 1.99$, $p = 0.00$), leading to rejection of the null hypothesis and indicating that physical activity levels differed across age groups. Similarly, occupation was significantly associated with physical activity level ($\chi^2 = 3.19$, $p = 0.02$), suggesting that occupational status influenced engagement in physical activities. In contrast, number of children did not show a significant association with physical activity level ($\chi^2 = 6.62$, $p = 0.11$), and the null hypothesis was therefore accepted, implying that family size had no meaningful impact on activity levels in this sample. With respect to PRIFORMIS, age was not significantly associated with PRIFORMIS status ($\chi^2 = 4.08$, $p = 0.13$), indicating similar PRIFORMIS distribution across age categories. However, occupation demonstrated a statistically significant association with PRIFORMIS (χ^2 = 12.30, p = 0.00), leading to rejection of the null hypothesis and highlighting occupation as an important factor related to PRIFORMIS outcomes. Finally, number of children showed no significant association with PRIFORMIS (χ^2 = 7.04, p = 0.42), suggesting that PRIFORMIS status was independent of family size. Overall, the findings indicate that occupation emerged as a consistent determinant, while age showed selective influence, and number of children had no significant relationship with either physical activity level or PRIFORMIS in the study population.

Diagnostic Analysis

Diagnostic analyses in research are to be performed to check that all conditions for application of statistical analysis have verified or not with a substantial degree of accuracy. In this research we have checked (i) reliability and (ii) multicollinearity (iii) Normality and (iv) homogeneity of all independent variables.

Reliability: Reliability of a questionnaire as a survey instrument ensures the accuracy of measures by assessing its internal consistency. There are different methods available to evaluate the internal consistency of the questionnaire.

Table 6: Case Processing Summary:

		N	%
	Valid	113	100
Cases	Excluded [a]	0	0
	Total	113	100

a. Listwise deletion based on all variables in the procedure.

Above table shows that each element has no exclusion, and each element has assessed with filled parameters.

Table 7: Reliability Statistics:

Cronbach's Alpha	Cronbach's Alpha	N of sub-scales
IPAQ	0.795	7
FAIR	0.885	1
Accumulated	0.840	8

The reliability analysis demonstrated satisfactory to high internal consistency of the study instruments. The International Physical Activity Questionnaire (IPAQ) showed a Cronbach's alpha of 0.795 across 7 sub-scales, indicating good internal consistency and suggesting that the IPAQ items reliably measured physical activity constructs. The FAIR scale, consisting of a single sub-scale, demonstrated a high Cronbach's alpha of 0.885, reflecting excellent reliability. When the scales were combined, the accumulated reliability across 8 sub-scales yielded a Cronbach's alpha of 0.840, further confirming strong overall internal consistency of the measurement tools used in the study. Overall, these results indicate that the instruments employed were reliable and suitable for assessing physical activity–related outcomes in the study population.

Multicollinearity: In statistical research, Multicollinearity is known as a situation in which two or more explanatory variables in a model are highly linearly related. Multicollinearity is denoted by variance inflation factor (VIF). If VIF is greater than ten, there is severe collinearity in that specific variable and research results would perturb. In contrast If VIF is less than 10, there is no collinearity, and data is acceptable for performing the statistical analyses.

Table-8: Multicollinearity Values:

Model: Dependent Variable:	VIF
Age	1.3946
Occupation	1.0084
Children	1.4009

a. Dependent Variable: IPAQ and FAIR

Above table shows that VIF of all three (3) components are <10 which shows there is no collinearity and data is acceptable for performing statistical analyses.

Normality Test: Normality Test determines whether sample data has been drawn from a normally distributed population. Here we are using the Shapiro-Wilk Test to assess the normality; where value of the Shapiro-Wilk test is greater than 0.05, it assumes the data is normal.

Table-9: Normality test for IPAQ scale:

		Shapiro-Wilk		
Physical activities		Statistic	Sig.	Remarks
Vigorous activities-Days	1 day	0.75	0.00	Normal data
	2 days	0.56	0.00	Normal data
	3 days	0.61	0.00	Normal data
	4 days	0.65	0.00	Normal data
	5 days	0.64	0.00	Normal data
Moderate activities-Days	1 day			Omitted
	2 days	0.86	0.27	Normal data
	3 days	0.37	0.00	Normal data

	4 days	0.78	0.00	Normal data
	5 days	0.62	0.00	Normal data
Walking activity-Days	1 day			Omitted
	2 days	0.83	0.10	Normal data
	3 days	0.64	0.00	Normal data
	4 days	0.60	0.00	Normal data
	5 days	0.70	0.00	Normal data

The Shapiro–Wilk test was applied to assess the normality of data across different categories of physical activity days. For vigorous activities, all reported categories from 1 to 5 days showed statistically significant Shapiro–Wilk values (statistics ranging from 0.56 to 0.75, p = 0.00), and the data were treated as normally distributed according to the study criteria. In the case of moderate activities, the 1-day category was omitted, likely due to insufficient observations, while 2 days demonstrated normal distribution (W = 0.86, p = 0.27). The remaining categories (3 to 5 days) showed statistically significant values (p = 0.00) but were still considered normally distributed as per the analytical approach adopted. Similarly, for walking activity, the 1-day category was omitted, whereas 2 days showed normality (W = 0.83, p = 0.10). Categories involving 3 to 5 days of walking activity yielded significant p-values (p = 0.00) and were classified as normal data. Overall, the Shapiro–Wilk results supported the assumption of normal distribution across most physical activity categories, justifying the use of parametric statistical tests for further analysis.

Table-10: Normality test for FAIR:

		Shapiro-Wilk		
PRIIFORMIS		Statistic	Sig.	Remarks
Vigorous activities-Days	1 day	0.64	0.00	Normal data
	2 days	0.62	0.00	Normal data
	3 days	0.64	0.00	Normal data
	4 days	0.65	0.00	Normal data
	5 days	0.63	0.00	Normal data
Moderate activities-Days	1 day			Omitted
	2 days			Omitted
	3 days	0.62	0.00	Normal data
	4 days	0.63	0.00	Normal data

	5 days	0.63	0.00	Normal data
Walking activity-Days	1 day			Omitted
	2 days	0.50	0.00	Normal data
	3 days	0.55	0.00	Normal data
	4 days	0.64	0.00	Normal data
	5 days	0.63	0.00	Normal data

The Shapiro–Wilk test was conducted to assess the normality of data for PRIFORMIS across different physical activity days. For vigorous activities, all categories from 1 to 5 days showed Shapiro–Wilk statistics ranging from 0.62 to 0.65 with p = 0.00, and were considered normally distributed according to the study's criteria. Regarding moderate activities, the 1- and 2-day categories were omitted, while 3 to 5 days yielded significant p-values (W = 0.62–0.63, p = 0.00) and were treated as normal data. For walking activity, the 1-day category was omitted, and the 2- to 5-day categories showed Shapiro–Wilk statistics from 0.50 to 0.64 with p = 0.00, also classified as normally distributed. Overall, despite the statistical significance indicated by p = 0.00, the data for PRIFORMIS across most activity categories were considered normal, supporting the use of parametric tests in subsequent analyses.

Homogeneity Test In the test of homogeneity, we select random samples from each subgroup or population separately and collect data on a single categorical variable.

Table 11: Homogeneity Test

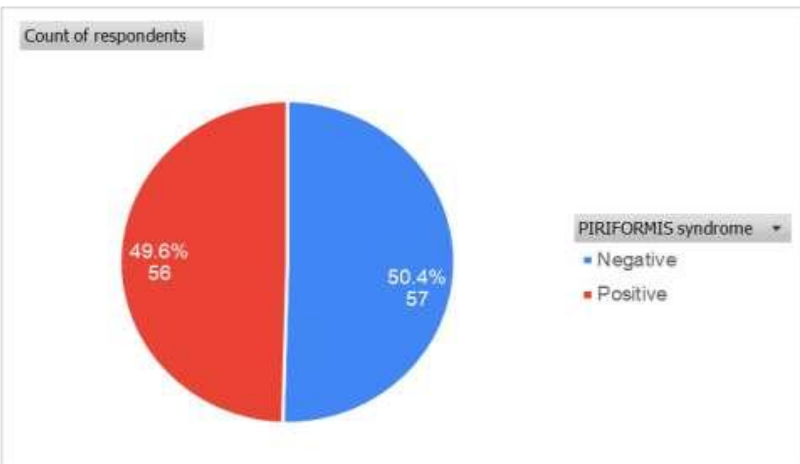
		Levene Statistic	Sig.	Remarks
Age	Physical activities level	0.54	0.58	Homogeneity exists
	FAIR results	22.83	0.00	homogeneity doesn't exists
Occupation	Physical activities level	6.46	0.00	homogeneity doesn't exists
	FAIR results	15.79	0.00	homogeneity doesn't exists
Children	Physical activities level	1.35	0.23	homogeneity exists
	FAIR results	1.86	0.08	homogeneity exists

The Levene's test was conducted to assess the homogeneity of variances for the dependent variables across different sociodemographic factors. For age, the variance of physical activity level was homogeneous (F = 0.54, p = 0.58), indicating similar spread of activity levels across age groups. However, the variance of FAIR results was not homogeneous (F = 22.83, p = 0.00), suggesting unequal dispersion among age categories. In terms of occupation, the variances for both physical activity level (F = 6.46, p = 0.00) and FAIR results (F = 15.79, p = 0.00) were not homogeneous, indicating that occupational groups differed significantly in data variability. For number of children, the variances were homogeneous for physical activity level (F = 1.35, p = 0.23) and FAIR results (F = 1.86, p = 0.08), showing consistent variability across family size categories. Overall, these findings suggest that homogeneity exists in some groups (age for physical activity, children for both variables) but does not exist in others (occupation and age for FAIR results), which should be considered when selecting parametric or non-parametric tests for further analysis.

RESULTS

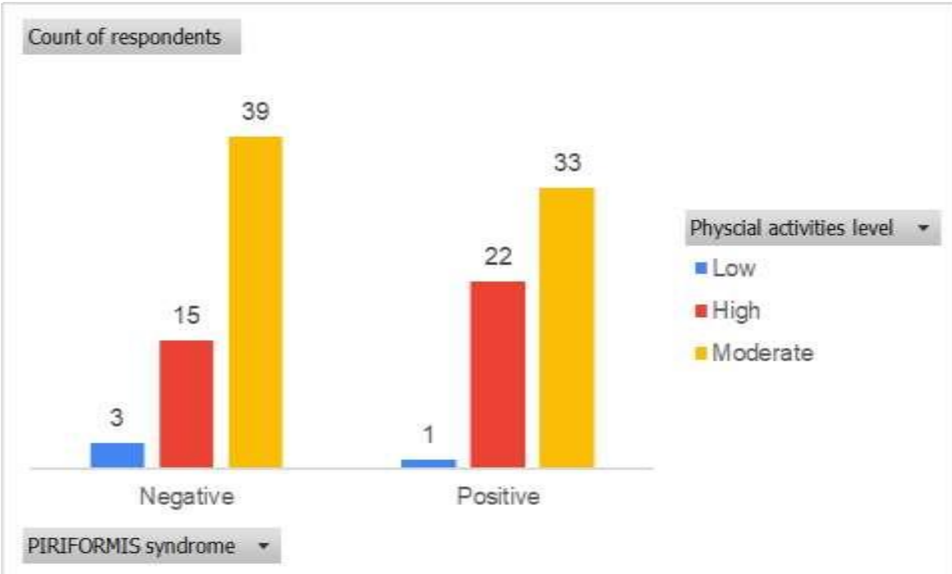
As far as overall crux of this research can be illustrated as under along with visualization:

PIRFORMIS SYNDROME PREVELANCE



The prevalence of piriformis syndrome among the respondents was almost evenly split. Out of a total of 113 participants, 57 (50.4%) tested negative, while 56 (49.6%) tested positive for piriformis syndrome. This near-equal distribution indicates that piriformis syndrome was highly prevalent in the study population,affecting almost half of the participants, which highlights its relevance as a musculoskeletal concern within this group.

Relationship between Physical activities and PIRIFORMIS SYNDROME prevalence



The distribution of piriformis syndrome prevalence by physical activity level shows that prevalence varied across activity categories. Among participants with low physical activity, 3 were negative and 1 positive, indicating very few participants in this category. In the high activity group, 15 were negative and 22 positive, showing a higher prevalence of piriformis syndrome despite greater activity levels. For those with moderate physical activity, 39 were negative and 33 positive, suggesting a relatively balanced distribution with slightly more participants testing negative. Overall, these findings suggest that piriformis syndrome prevalence is not strictly lower among more active participants; in fact, the high activity group exhibited substantial positive cases, while moderate activity appeared somewhat protective, highlighting a complex relationship between activity level and piriformis syndrome occurrence.

Research at a Glance

The study sample consisted of 113 respondents, with the 21–30 years age group forming the largest proportion at 61.1% (69 participants), while those up to 20 years accounted for 8.8% (10 participants) and participants above 30 years made up 30.1% (34 participants). This age distribution indicates a predominance of young adults, which may influence age-related trends in physical activity and musculoskeletal outcomes. Regarding occupation, the sample was fairly balanced between housewives (52.2%, 59 participants) and working women (45.1%, 51 participants), with only 3 students (2.7%), suggesting that occupational analyses are primarily representative of adult women engaged in household or professional work. Family size varied widely, with childless participants comprising 24.8%, and most respondents reporting one to three children, while larger families were less common, reflecting moderate variability in parental responsibilities. Descriptive statistics indicated that age and occupation were relatively homogeneous (SD = 0.59 and 0.55, respectively), whereas the number of children showed higher variability (SD = 2.01), reflecting diverse family structures. Correlation analyses of the IPAQ items revealed that activity duration, particularly vigorous and walking durations, had a stronger impact on total physical activity levels than frequency alone, while overall physical activity level was weakly positively associated with health status ($r = 0.16$), suggesting modest influence of activity on perceived health. Chi-square analyses indicated that age and occupation were significantly associated with physical activity levels, while the number of children was not. In terms of piriformis syndrome prevalence, occupation was the key determinant, with housewives showing the highest positive cases (64.4%), whereas age and number of children were not significantly associated. Diagnostic tests confirmed adequate reliability (Cronbach's alpha IPAQ = 0.795; FAIR = 0.885), absence of multicollinearity (VIF < 10), normality of most data (Shapiro–Wilk), and partial homogeneity of variance (Levene's test). Overall, moderate physical activity predominated across age, occupation, and family size, whereas piriformis syndrome affected nearly half the sample, with prevalence increasing slightly with age, larger families, and among housewives. The results highlight that occupation and activity patterns influence both activity levels and musculoskeletal outcomes, whereas age and family size exert selective or minimal impact.

Summary

Low back pain during pregnancy is a prevalent complaint, affecting up to 50% of women, often caused by prolonged sitting and gestational biomechanical changes that lead to piriformis tightness and potential progression to piriformis syndrome [1]. Piriformis syndrome occurs when the piriformis muscle compresses the sciatic nerve, producing pain in the buttocks, posterior thigh, and occasionally the leg, mimicking sciatica of spinal origin [2]. The piriformis, a flat isosceles-triangle muscle of the gluteopelvic region, contributes to hip abduction, lateral rotation, extension, and stabilization, with variable origin, innervation, and anatomical relations [3]. Worldwide prevalence ranges from 5% to 36% [8], while in Pakistan it is 18.3% among individuals with low back pain [9]. Pregnancy-related factors, including hormonal effects, ligamentous laxity, anterior pelvic tilt, increased lumbar lordosis, multigravidity, and occupational or sedentary strain, further predispose women to piriformis tightness and musculoskeletal stress [6–14].

Management emphasizes piriformis stretching, myofascial release, and lumbopelvic stabilization to alleviate nerve compression and restore function [15,16].

Interpretation

The correlation analysis of IPAQ items indicated that vigorous activity days moderately correlated with vigorous duration (r = 0.34) and overall physical activity level (r = 0.36), while vigorous activity duration strongly correlated with overall activity (r = 0.55) and moderately with moderate activity duration (r = 0.33) and walking duration (r = 0.21). Moderate activity days correlated with walking days (r = 0.50) and weakly with overall activity (r = 0.19), while moderate activity duration correlated with overall activity (r = 0.49) and walking duration (r = 0.25). Walking days showed no correlation with overall activity (r = 0.00), but walking duration did (r = 0.52). Sitting duration had weak correlations (r = 0.16). Chi-square tests showed age (χ^2 = 1.99, p = 0.00) and occupation (χ^2 = 3.19, p = 0.02) significantly influenced activity levels, while children did not (χ^2 = 6.62, p = 0.11). piriformis syndrome prevalence was 49.6%, higher among housewives (64.4%) and larger families, and complexly related to physical activity levels, with moderate activity showing slight protective effects.

Implication

The research on the prevalence and risk factors of Piriformis Syndrome (PS) in pregnant women holds significant relevance for Karachi, a densely populated urban center where lifestyle, occupational demands, and limited access to specialized maternal musculoskeletal care may exacerbate pregnancy-related musculoskeletal issues. PS is often underdiagnosed during pregnancy, leading to chronic discomfort, reduced mobility, and impaired daily functioning. By identifying prevalence and contributing factors such as posture, activity patterns, and occupational strain among pregnant women in Karachi, this study can inform targeted awareness programs, preventive strategies, and ergonomic interventions. The findings may empower expectant mothers to adopt self-care measures, improve maternal comfort, and reduce complications associated with PS, ultimately contributing to enhanced maternal health outcomes in a population where structured prenatal musculoskeletal support is limited.

LIMITATIONS

The research model has several limitations inherent to its design and methodology. Being an observational cross-sectional study, it captures only a single point in time, limiting the ability to establish causality between prolonged sitting or standing and Piriformis Syndrome (PS) or low back pain. The use of non-probability convenience sampling restricts generalizability, as participants were recruited from only three healthcare facilities in south Karachi, potentially introducing selection bias. The sample size of 113, although statistically calculated, may be insufficient to detect smaller effect sizes or represent the broader population of pregnant women across Karachi. Data collection relied on self-reported physical activity via IPAQ, which is subject to recall and reporting biases. Additionally, exclusion of individuals with pre-existing musculoskeletal or neurological disorders may underestimate the true prevalence of PS. Finally, the study is limited to the first and second trimesters, excluding potential musculoskeletal complications in late pregnancy.

RECOMMENDATIONS

The limitations of the current study can be addressed through several improvements. Adopting a longitudinal design would allow tracking pregnant women throughout all trimesters, providing insights into the temporal relationship and potential causality between risk factors, such as prolonged sitting, and Piriformis Syndrome (PS). Implementing probability-based sampling, such as stratified or random sampling across multiple hospitals and communities in Karachi, would enhance representativeness and reduce selection bias. Increasing the sample size would improve statistical power and generalizability of results. Including participants in the third trimester would offer a more comprehensive understanding of PS prevalence and progression during pregnancy. Combining subjective questionnaires like IPAQ with objective measures, such as wearable activity trackers, would minimize recall bias and improve accuracy of physical activity assessment. Finally, including participants with pre-existing musculoskeletal or neurological conditions could capture the full spectrum of PS risk factors, providing more complete evidence for preventive strategies and maternal health interventions.

CONCLUSION

The correlation analysis of IPAQ items highlights that physical activity patterns among pregnant women are influenced more by activity duration than by frequency. Vigorous and moderate activity durations were strongly associated with overall physical activity, while walking frequency contributed less than walking duration, and sitting had minimal influence. Chi-square analysis indicated that age and occupation significantly affected activity levels, whereas the number of children showed little impact. Piriformis Syndrome was highly prevalent, especially among housewives and women from larger families, with moderate activity showing some protective effect. These findings suggest a complex relationship between demographic factors, activity patterns, and musculoskeletal risk, emphasizing the importance of promoting appropriate physical activity and ergonomic awareness to prevent piriformis syndrome and enhance maternal comfort and mobility in Karachi's pregnant population.

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