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Original Article

Prevalence of Sacroiliac Joint Dysfunction and Its Association with Achillodynia Among Female Teachers

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ABSTRACT

Background: Sacroiliac joint dysfunction and Achilles tendon-region pain are clinically relevant musculoskeletal problems that may affect teachers exposed to prolonged standing, repetitive classroom activity, and sustained postural loading. Although both conditions have been studied separately, limited evidence has examined their coexistence within female teaching populations, particularly in semi-urban Pakistani settings. Objective: To determine the prevalence of sacroiliac joint dysfunction and achillodynia and examine their association among female school teachers in Daska, Sialkot. Methods: A cross-sectional analytical study was conducted among 130 female school teachers aged 25–40 years from public and private schools in Daska. Sacroiliac joint dysfunction was assessed using a cluster of five pain provocation tests, with at least three positive tests classified as dysfunction. Achillodynia was assessed using Achilles tendon-region symptoms and VISA-A scoring. Data were analyzed using SPSS version 21.0. Frequencies and percentages were calculated, and associations were examined using chi-square and Fisher's exact tests, with Cramer's V used to estimate association strength. Results: Sacroiliac joint dysfunction was present in 108 participants (83.1%), while achillodynia was present in 102 participants (78.5%). Sacroiliac joint dysfunction was significantly associated with achillodynia, $\chi^2 = 7.269$, $p = 0.007$, with Fisher's exact test also supporting the association, $p = 0.004$. Cramer's V was 0.236, indicating a small-to-moderate association. Prolonged standing for more than six hours daily was reported by 68.5% of teachers with sacroiliac joint dysfunction and 63.7% of those with achillodynia. Conclusion: Sacroiliac joint dysfunction and achillodynia were highly prevalent among female teachers and showed a statistically significant association. The findings support comprehensive kinetic-chain assessment and workplace ergonomic strategies for teachers with pelvic or Achilles tendon-region symptoms. Keywords: Sacroiliac joint dysfunction; achillodynia; Achilles tendinopathy; female teachers; occupational standing; musculoskeletal disorders; Pakistan; VISA-A.

INTRODUCTION

Sacroiliac joint dysfunction is an important but frequently under-recognized contributor to musculoskeletal pain involving the lumbopelvic-hip complex. The sacroiliac joint forms a critical biomechanical link between the axial skeleton and the lower extremities, allowing limited movement while transferring load from the trunk to the pelvis and lower limbs during standing, walking, bending, and other weight-bearing activities (1). Dysfunction of this joint may arise from altered mobility, impaired force transmission, ligamentous strain, or abnormal neuromuscular control, and it has been reported to contribute to a considerable proportion of chronic low back pain presentations in clinical and rehabilitation settings (2,3). Because symptoms of sacroiliac joint dysfunction may overlap with lumbar spine, hip, gluteal, and lower-limb disorders, clinical diagnosis remains challenging. Current evidence therefore supports the use of clustered pain provocation tests rather than relying on a single

clinical maneuver, as combined testing improves diagnostic confidence and reduces the likelihood of nonspecific interpretation (4–7).

The burden of sacroiliac joint dysfunction is particularly relevant among women because anatomical, biomechanical, and hormonal factors may influence pelvic stability and joint loading. Female pelvic morphology, ligamentous laxity, and reproductive hormonal influences may contribute to altered sacroiliac joint mechanics, especially when combined with sustained occupational loading and repetitive postural stress (8,9). Evidence from Pakistani populations has also indicated that sacroiliac joint dysfunction is clinically relevant among females presenting with low back pain, while studies among female teachers have shown that pelvic and lower-back symptoms occur within educational work settings (10–12). These findings suggest that female teachers represent an occupational group in whom pelvic girdle dysfunction requires focused investigation, particularly in contexts where prolonged standing, repetitive bending, limited ergonomic support, and reduced opportunities for postural variation are common.

Achillodynia refers to pain localized around the Achilles tendon region and is commonly associated with posterior heel discomfort, morning stiffness, pain during tendon-loading activities, and reduced tolerance for walking, standing, or functional activity. It is often discussed within the broader clinical context of Achilles tendon-related disorders, particularly Achilles tendinopathy, which may involve tendon pain, localized tenderness, impaired function, and reduced loading capacity (13). The Victorian Institute of Sport Assessment–Achilles questionnaire is a validated condition-specific instrument used to assess pain and functional limitation associated with Achilles tendon disorders, providing a standardized measure of symptom severity and functional impact in clinical and research settings (14). In teachers, Achilles tendon-region pain may be aggravated by prolonged standing on hard classroom surfaces, repeated walking during teaching tasks, inadequate footwear support, and cumulative lower-limb loading across the working day.

Although sacroiliac joint dysfunction and achillodynia are often evaluated as separate clinical entities, a plausible biomechanical relationship exists between proximal pelvic dysfunction and distal Achilles tendon symptoms. The sacroiliac joint contributes to efficient load transfer from the spine to the lower limbs, and dysfunction in this region may alter pelvic alignment, weight-bearing symmetry, stride characteristics, push-off mechanics, and lower-extremity kinetic-chain loading (15–17). Altered rearfoot mechanics, tibial rotation, hip control, pelvic drop, and compensatory gait patterns have been associated with lower-limb overuse disorders, including Achilles tendon-related pain (18,19). Therefore, Achilles tendon symptoms in teachers may not always represent an isolated distal tendon problem; they may also reflect broader regional interdependence involving the lumbopelvic region, hip, lower limb, and foot.

Teaching is a physically demanding occupation, particularly for female school teachers working in resource-limited or semi-urban settings. Teachers often stand for prolonged periods during classroom instruction, bend repeatedly while assisting students, walk on hard surfaces, and may use footwear with limited arch support or cushioning. Previous occupational health research has reported high rates of musculoskeletal disorders among teachers, with pain frequently affecting the low back, neck, shoulders, knees, and feet (20–25). However, most available studies have focused on general musculoskeletal pain, low back pain, or foot pain as separate outcomes, while limited evidence has explored whether sacroiliac joint dysfunction is associated with Achilles tendon-region pain within the same occupational cohort.

This gap is particularly important in Daska, Sialkot District, where female teachers may experience a distinct combination of semi-urban commuting patterns, prolonged classroom standing, hard flooring, limited ergonomic support, and footwear-related loading factors. Evidence from larger urban centers or international settings may not fully reflect the occupational and biomechanical exposures of teachers in this local context. Furthermore, if sacroiliac joint dysfunction is associated with achillodynia, clinical management of heel pain in teachers should extend beyond localized tendon treatment and include assessment of pelvic stability, gait mechanics, lower-limb alignment, and work-related postural demands.

Therefore, this study was conducted to determine the prevalence of sacroiliac joint dysfunction and achillodynia among female school teachers in Daska, Sialkot, and to examine the association between sacroiliac joint dysfunction and achillodynia in this occupational population. The study hypothesized that sacroiliac joint dysfunction would be significantly associated with achillodynia among female school teachers.

MATERIAL AND METHODS

This cross-sectional analytical study was conducted among female school teachers working in public and private schools of Daska, Sialkot District, Pakistan, over a four-month period from November 2025 to February 2026. The study design was selected because the primary objective was to estimate the point prevalence of sacroiliac joint dysfunction and achillodynia and to examine the association between these two musculoskeletal conditions at a single point in time. The target population consisted of female school teachers exposed to routine occupational activities, including prolonged standing, classroom walking, repetitive bending, and sustained postural demands during teaching.

A non-probability convenience sampling technique was used to recruit participants from selected schools. The final analyzable sample included 130 female teachers. The sample size was calculated using G*Power according to the planned association analysis between two categorical variables. Eligible participants were female school teachers aged 25–40 years who were employed full-time and had at least one year of teaching experience. Participants were excluded if they were pregnant, had undergone surgery during the previous six months, had an acute musculoskeletal injury, had a diagnosed neurological disorder, or had a diagnosed inflammatory disease that could independently affect pelvic or lower-limb pain assessment.

After permission was obtained from the relevant school authorities, eligible teachers were approached and informed about the study purpose, assessment procedures, voluntary nature of participation, confidentiality of data, and right to withdraw. Written informed consent was obtained before enrollment. Data collection was performed in designated school spaces that allowed privacy and safe physical examination. Each participant completed a structured data collection form that recorded demographic and occupational information, including age, teaching experience, daily standing duration, daily sitting duration, physical activity pattern, and relevant work-related exposure. Height was measured using a height measurement chart, and body weight was measured using a weighing machine. Body mass index was calculated from measured height and weight and categorized according to standard adult BMI categories.

Sacroiliac joint dysfunction was assessed using a cluster of five standardized pain provocation tests: FABER test, distraction test, compression test, thigh thrust test, and Gaenslen's test. These tests were selected because clustered pain provocation testing has stronger clinical utility than isolated single-test interpretation for identifying sacroiliac joint pain or dysfunction (4,6,7). During each test, the examiner applied the standardized maneuver and recorded the response as positive when the participant reported familiar pain localized to the sacroiliac joint region, posterior pelvis, buttock, or clinically relevant lower-back region. A participant was classified as having sacroiliac joint dysfunction when at least three of the five provocation tests were positive. This operational definition was used to improve diagnostic confidence and reduce the likelihood of classifying sacroiliac involvement on the basis of a single nonspecific painful maneuver.

Achillodynia was assessed using symptom location, Achilles-specific functional limitation, and clinical screening of the Achilles tendon region. The Victorian Institute of Sport Assessment–Achilles questionnaire was used to quantify Achilles tendon-related pain and functional status, with lower scores indicating greater symptom burden and functional limitation (14,42). Participants were classified as having achillodynia when Achilles tendon-region pain was present and the VISA-A score was 80 or below. Clinical examination included palpation of the Achilles tendon region, the Royal London Hospital test,

and the single-leg heel raise test to support identification of Achilles tendon-related symptoms and functional loading pain. Pain during palpation or tendon-loading activity was recorded according to side and location, and clinical findings were interpreted in relation to the participant's reported posterior heel or Achilles tendon symptoms (30,41).

The primary study variables were sacroiliac joint dysfunction status and achillodynia status, both coded as binary categorical variables. Sacroiliac joint dysfunction was operationally defined as the presence of at least three positive sacroiliac joint provocation tests out of five. Achillodynia was operationally defined as Achilles tendon-region pain with a VISA-A score of 80 or below. Secondary variables included age category, body mass index category, teaching experience, daily standing duration, daily sitting duration, and physical activity level. Daily standing duration and sitting duration were recorded as categorical occupational exposure variables to explore work-related postural patterns in relation to sacroiliac joint dysfunction and achillodynia.

To reduce measurement bias, the same standardized assessment sequence was followed for all participants. Sacroiliac joint provocation tests and Achilles tendon assessments were performed using uniform participant positioning, examiner hand placement, stabilization procedures, repetition criteria, and interpretation rules. The use of a test cluster for sacroiliac joint dysfunction and a combined symptom-functional definition for achillodynia was intended to improve classification consistency. Data were reviewed after collection for completeness and internal consistency before entry into the statistical software. Participant identifiers were removed from the analysis file to preserve confidentiality, and only participants with complete primary outcome data were included in the final association analysis.

Data were analyzed using Statistical Package for the Social Sciences version 21.0. Frequencies and percentages were calculated for categorical variables, including sacroiliac joint dysfunction, achillodynia, age category, body mass index category, standing duration, sitting duration, and physical activity level. Cross-tabulation was used to compare achillodynia status across sacroiliac joint dysfunction categories. Because both primary variables were categorical, the chi-square test of independence was used to examine the association between sacroiliac joint dysfunction and achillodynia. Fisher's exact test was applied where expected cell counts were small. Cramer's V was calculated to estimate the strength of association between the two categorical variables. Risk ratio with 95% confidence interval was reported only when the verified two-by-two table supported valid estimation. Statistical significance was set at $p \leq 0.05$.

Ethical clearance was obtained from the relevant institutional review board before data collection. All participants provided informed consent and were informed that participation was voluntary, that they could withdraw at any stage without penalty, and that refusal to participate would not affect their employment or institutional relationship. The study involved non-invasive questionnaire-based and physical examination procedures only. All assessments were conducted respectfully, participant privacy was maintained, and collected data were used solely for research purposes.

RESULTS

A total of 130 female school teachers from public and private schools in Daska, Sialkot District, were included in the final analysis. The primary outcomes were sacroiliac joint dysfunction and achillodynia, both coded as binary categorical variables. Sacroiliac joint dysfunction was identified using the predefined cluster-based clinical criterion, while achillodynia was classified using Achilles tendon-region symptoms with functional assessment.

Sacroiliac joint dysfunction was present in 108 of 130 participants, giving a prevalence of 83.1%. Only 22 participants, representing 16.9% of the final analyzed sample, were classified as not having sacroiliac joint dysfunction. This indicates a high burden of pelvic girdle dysfunction among female school teachers in the study population.

Table 1. Prevalence of Sacroiliac Joint Dysfunction Among Female School Teachers

Sacroiliac Joint Dysfunction	n	%
Present	108	83.1
Absent	22	16.9
Total	130	100.0

Table 2. Prevalence of Achillodynia Among Female School Teachers

Achillodynia	n	%
Present	102	78.5
Absent	28	21.5
Total	130	100.0

Achillodynia was reported in 102 of 130 participants, corresponding to a prevalence of 78.5%. In comparison, 28 participants, representing 21.5% of the analyzed sample, did not meet the study criterion for achillodynia. These findings show that Achilles tendon-region pain and related functional symptoms were also highly prevalent in this occupational group.

Table 3. Association Between Sacroiliac Joint Dysfunction and Achillodynia

Test	Value	df	p-value
Pearson chi-square	7.269	1	0.007
Continuity correction	5.816	1	0.016
Likelihood ratio	11.848	1	0.001
Fisher's exact test	—	—	0.004
Linear-by-linear association	7.214	1	0.007

The association analysis showed a statistically significant relationship between sacroiliac joint dysfunction and achillodynia. The Pearson chi-square test produced a value of 7.269 with a p-value of 0.007, and Fisher's exact test also supported the association with a p-value of 0.004. These findings indicate that achillodynia was not distributed independently of sacroiliac joint dysfunction status in the analyzed sample.

Table 4. Strength of Association Between Sacroiliac Joint Dysfunction and Achillodynia

Measure	Value	p-value
Phi	-0.236	0.007
Cramer's V	0.236	0.007
Valid cases	130	—

The strength of association between sacroiliac joint dysfunction and achillodynia was small to moderate, as indicated by Cramer's V of 0.236. Although the magnitude does not indicate a strong association, it suggests a clinically relevant relationship between pelvic girdle dysfunction and Achilles tendon-region symptoms in this occupational population.

Table 5. Reported Standing Duration Patterns According to Sacroiliac Joint Dysfunction and Achillodynia Status

Clinical condition	Standing duration category	%
Sacroiliac joint dysfunction present	>6 hours/day	68.5
Sacroiliac joint dysfunction absent	>6 hours/day	59.1
Achillodynia present	>6 hours/day	63.7

A higher proportion of participants with sacroiliac joint dysfunction reported standing for more than six hours per day compared with participants without sacroiliac joint dysfunction. Similarly, 63.7% of participants with achillodynia reported standing for more than six hours daily. These patterns suggest that prolonged occupational standing may be an important exposure associated with both pelvic girdle and Achilles tendon-region symptoms, although causal interpretation cannot be made because of the cross-sectional design.

The reported sitting-duration pattern showed that sacroiliac joint dysfunction cases were concentrated mainly in the lower sitting-duration categories, particularly less than one hour and one to three hours per day. Achillodynia cases were most frequently reported among participants sitting for one to three

hours per day, while no cases were reported beyond five hours of sitting. These findings should be interpreted descriptively because exact category-wise counts and inferential statistics were not available.

Table 6. Reported Sitting Duration Patterns According to Sacroiliac Joint Dysfunction and Achillodynia Status

Clinical condition	Highest reported sitting-duration category	Reported distribution feature
Sacroiliac joint dysfunction present	<1 hour/day and 1–3 hours/day	Highest frequency
Sacroiliac joint dysfunction present	>5 hours/day	No cases
Achillodynia present	1–3 hours/day	Highest frequency
Achillodynia present	>5 hours/day	No cases

Overall, the findings indicate a high prevalence of both sacroiliac joint dysfunction and achillodynia among female school teachers in Daska. The association between sacroiliac joint dysfunction and achillodynia was statistically significant, with a small-to-moderate strength of association. Prolonged standing appeared more common among participants with both conditions, supporting the occupational relevance of sustained weight-bearing exposure in this teaching population. However, the available results should be interpreted cautiously because the supplied manuscript contains an internal inconsistency between the reported achillodynia prevalence and the narrative description of the sacroiliac joint dysfunction by achillodynia crosstab. The risk ratio should therefore be recalculated from the verified two-by-two frequency table before inclusion in the final manuscript.

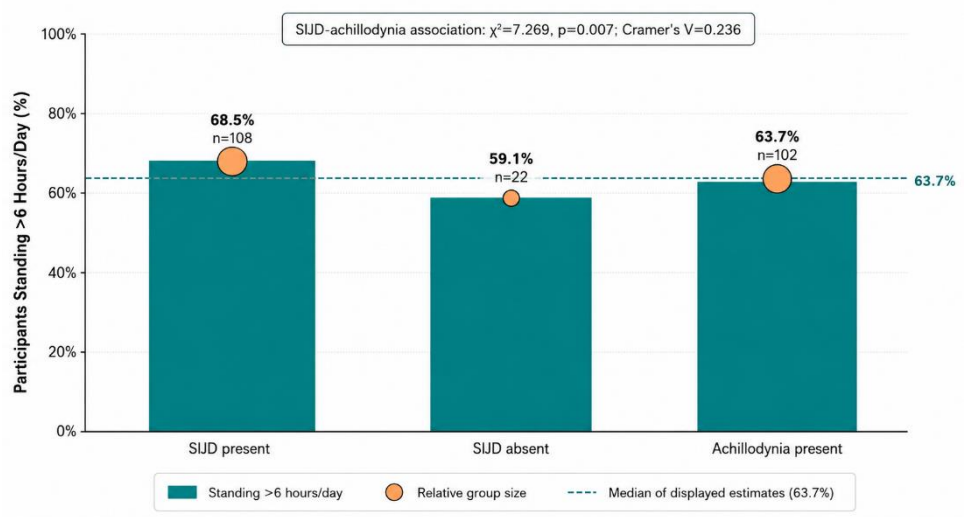

Figure 1 Prolonged Standing Burden Across Musculoskeletal Symptom Groups

The figure demonstrates that prolonged standing was common across the musculoskeletal symptom groups, with the highest proportion observed among teachers with sacroiliac joint dysfunction, of whom 68.5% reported standing for more than six hours per day. Among teachers without sacroiliac joint dysfunction, 59.1% reported standing for more than six hours daily, while 63.7% of participants with achillodynia were also exposed to this level of occupational standing. The visual pattern suggests a higher prolonged-standing burden among symptomatic groups, particularly those with sacroiliac joint dysfunction, and supports the occupational relevance of sustained weight-bearing exposure in this female teaching population. The significant SIJD–achillodynia association reported in the study, χ^2 = 7.269, p = 0.007, with Cramer's V = 0.236, indicates a small-to-moderate relationship; however, the cross-sectional design limits causal interpretation.

DISCUSSION

The present study investigated the prevalence of sacroiliac joint dysfunction and achillodynia among female school teachers in Daska, Sialkot, and examined whether these two musculoskeletal conditions were statistically associated within this occupational group. The findings showed a high prevalence of sacroiliac joint dysfunction, affecting 83.1% of participants, and a similarly high prevalence of achillodynia, affecting 78.5% of participants. These findings indicate that both pelvic girdle dysfunction

and Achilles tendon-region symptoms are common among female teachers in this setting and may represent an important occupational health concern. Although the cross-sectional design does not allow causal inference, the coexistence of these conditions supports the need for broader kinetic-chain assessment in teachers presenting with lower-back, pelvic, heel, or Achilles tendon-region symptoms.

The prevalence of sacroiliac joint dysfunction observed in this study is higher than that reported in several previous studies. Bashir et al. reported a prevalence of 16.5% among female school teachers, while Umar et al. reported a prevalence of 43.8% among IT students, and Sivakumar et al. reported sacroiliac joint involvement in approximately 30% of college students (12,27,28). This difference may be explained by variation in study population, occupational exposure, diagnostic criteria, examiner approach, and local working conditions. Female teachers in the present study were exposed to prolonged standing, classroom walking, repetitive bending, and sustained postural demands, all of which may increase mechanical stress across the lumbopelvic region. The use of a cluster-based provocation-test criterion may also have increased the identification of clinically relevant sacroiliac joint dysfunction compared with studies relying on less specific criteria or different screening tools.

The high prevalence of achillodynia in this study is also consistent with the broader literature showing that teachers frequently experience lower-limb and foot-related pain. Alqahtani reported that foot pain was common among school teachers and was often aggravated by prolonged standing, while Abdulmonem et al. found that heel pain affected 56% of female Saudi school teachers (35,40). The higher prevalence observed in the present study may reflect the cumulative effect of sustained weight-bearing exposure, hard classroom surfaces, limited ergonomic support, and footwear-related factors. Since achillodynia was assessed using Achilles tendon-region symptoms and functional assessment, the findings suggest that posterior heel and Achilles tendon-related symptoms may be under-recognized in teaching populations, particularly when teachers continue working despite persistent lower-limb discomfort.

A key finding of this study was the statistically significant association between sacroiliac joint dysfunction and achillodynia. The Pearson chi-square test indicated a significant relationship between the two variables, and Fisher's exact test supported this association. The strength of association, measured using Cramer's V, was small to moderate, suggesting that although sacroiliac joint dysfunction and achillodynia are related, the relationship is likely influenced by additional biomechanical, occupational, and individual factors. This finding aligns with the concept of regional interdependence, where dysfunction in one anatomical region may influence symptoms or loading patterns in another. In this context, altered sacroiliac joint mechanics may affect pelvic control, lower-limb alignment, stride mechanics, weight transfer, and push-off loading, thereby contributing to Achilles tendon-region symptoms.

The biomechanical plausibility of this association is supported by previous evidence linking sacroiliac dysfunction with lower-limb injury patterns and altered kinetic-chain loading. Abdollahi et al. reported that sacroiliac joint pain and dysfunction were associated with a history of lower-extremity and pelvic-region injuries among athletes, suggesting that impaired pelvic mechanics may influence distal musculoskeletal loading (29). Similarly, Akter identified biomechanical and lifestyle-related factors associated with sacroiliac joint problems and highlighted the relevance of altered load transfer in adjacent and distal pain patterns (31). Studies examining lower-limb mechanics have also shown that altered rearfoot motion, tibial rotation, hip control, and pelvic movement may contribute to Achilles tendon-related disorders and other lower-extremity overuse conditions (18,19). Therefore, the association observed in the present study is clinically plausible, although longitudinal research is required to determine directionality.

Prolonged standing appeared to be an important occupational exposure in this study. Among teachers with sacroiliac joint dysfunction, 68.5% reported standing for more than six hours per day, compared with 59.1% of teachers without sacroiliac joint dysfunction. Similarly, 63.7% of participants with

achillodynia reported standing for more than six hours daily. These descriptive patterns suggest that sustained weight-bearing may contribute to mechanical strain across both the pelvis and Achilles tendon region. Previous studies among teachers have consistently identified prolonged standing, repetitive movements, awkward postures, and inadequate ergonomic conditions as contributors to musculoskeletal disorders (11,20–25,38). However, occupational exposure alone may not fully explain the observed burden because musculoskeletal symptoms are multifactorial and may also be influenced by body mass index, physical activity, psychosocial stress, footwear, recovery time, prior injuries, and individual biomechanical variation.

The findings have important clinical implications for physiotherapy assessment and occupational health practice. Teachers presenting with Achilles tendon-region pain should not be assessed only at the site of symptoms. Instead, clinicians should consider a broader kinetic-chain evaluation that includes sacroiliac joint provocation testing, pelvic alignment, hip control, lower-limb mechanics, footwear, standing tolerance, and occupational postural demands. Similarly, teachers presenting with sacroiliac joint dysfunction should be screened for distal symptoms, including heel pain and Achilles tendon loading pain. A combined approach may improve identification of contributing factors and support more comprehensive rehabilitation strategies, including pelvic stabilization, hip and lower-limb strengthening, calf flexibility and loading programs, footwear advice, standing breaks, and ergonomic modifications within the school environment.

The study also has practical implications for school-based occupational health. Female teachers often work in classrooms where prolonged standing is treated as a routine and unavoidable component of teaching. Simple workplace modifications, such as scheduled postural variation, use of supportive footwear, provision of suitable seating, anti-fatigue mats, and awareness sessions on posture and lower-limb loading, may help reduce cumulative musculoskeletal strain. These recommendations should be interpreted as preventive and ergonomic considerations rather than causal conclusions from the present study. Nevertheless, the high prevalence of both conditions supports the need for early screening and practical workplace-level strategies in schools.

This study has several limitations. First, the cross-sectional design prevents determination of temporal sequence or causality between sacroiliac joint dysfunction and achillodynia. Second, non-probability convenience sampling may limit generalizability beyond female teachers in Daska. Third, some exposure variables, such as standing and sitting duration, were self-reported and may be affected by recall bias. Fourth, diagnosis was based on clinical assessment and questionnaire-based screening without imaging confirmation or instrumented gait analysis. Fifth, the analysis was primarily unadjusted, and potential confounders such as age, BMI, physical activity, footwear, teaching experience, and psychosocial stress were not fully controlled in multivariable modelling. Finally, the reported association statistics should be interpreted carefully because the supplied dataset summary requires verification of the two-by-two crosstab before final reporting of risk estimates.

Despite these limitations, the study contributes locally relevant evidence on two clinically important musculoskeletal problems among female teachers in a semi-urban Pakistani setting. The findings support the view that sacroiliac joint dysfunction and achillodynia may coexist in occupational populations exposed to prolonged standing and repetitive postural loading. Future research should use larger multicenter samples, probability-based recruitment, standardized examiner training, objective exposure measurement, validated diagnostic algorithms, and adjusted regression modelling to clarify the independent relationship between sacroiliac joint dysfunction and Achilles tendon-region symptoms.

CONCLUSION

This study found a high prevalence of sacroiliac joint dysfunction and achillodynia among female school teachers in Daska, Sialkot, and demonstrated a statistically significant association between the two conditions. The findings suggest that pelvic girdle dysfunction and Achilles tendon-region symptoms

may coexist within this occupational group, possibly reflecting shared biomechanical and work-related loading factors such as prolonged standing and sustained weight-bearing activity. Because the study was cross-sectional, the results should be interpreted as evidence of association rather than causation. The findings support the need for early screening, comprehensive kinetic-chain assessment, ergonomic awareness, and preventive physiotherapy strategies among female teachers, while future longitudinal and adjusted analytical studies are needed to clarify causal pathways and identify modifiable risk factors.

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