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Original Article

Prevalence of Lateral Epicondylitis and Associated Risk Factors Among Racket Sports Players in Lahore, Pakistan: A Cross-Sectional Study

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ABSTRACT

Background: Lateral elbow pain related to repetitive wrist extensor loading is common in racket sports, but local evidence among Pakistani athletes remains limited. Racket sport players may be exposed to sport-specific mechanical demands, gripping loads, equipment-related factors, and inconsistent warm-up routines that contribute to symptom and functional burden. Objective: To estimate the frequency and severity of lateral elbow symptoms and PRTEE-measured functional impairment among active racket sport players in Lahore, Pakistan, and examine associations with demographic and sport-related factors. Methods: This cross-sectional observational study included 265 badminton, tennis, and squash players aged 18–35 years recruited from sports clubs, universities, and academies in Lahore. Data were collected using a structured questionnaire, the Patient-Rated Tennis Elbow Evaluation, and the Numeric Rating Scale. Descriptive statistics, Pearson correlation, and chi-square tests were used for analysis. Results: Participants had a mean age of 23.65 ± 5.38 years, and 161 (60.8%) were male. Badminton players constituted 236 (89.1%) of the sample. Only 11 participants (4.2%) had a PRTEE score of zero, while 254 (95.8%) reported some degree of PRTEE-measured pain or functional limitation. NRS pain was mild in 118 (44.5%), moderate in 50 (18.9%), and severe in 35 (13.2%) participants. Age was positively correlated with PRTEE total score ($r = 0.31$, $p < 0.001$). PRTEE severity categories were significantly associated with gender ($\chi^2 = 21.50$, $p < 0.001$), racket grip size ($\chi^2 = 44.48$, $p < 0.001$), sport type ($\chi^2 = 39.22$, $p < 0.001$), and warm-up routine ($\chi^2 = 27.00$, $p < 0.001$). Conclusion: Lateral elbow symptoms and PRTEE-measured pain and functional limitation were frequent among sampled racket sport players in Lahore. Age, gender, self-reported racket grip size, sport type, and warm-up behavior showed significant unadjusted associations with symptom severity. Findings support routine symptom screening, structured warm-up education, and ergonomic equipment guidance, while future studies should include clinical diagnostic confirmation and adjusted longitudinal analysis. Keywords: Lateral Epicondylitis; Racket Sports; PRTEE; Numeric Rating Scale; Grip Size; Warm-Up; Pakistan

INTRODUCTION

Lateral epicondylitis, commonly referred to as tennis elbow, is a frequent overuse-related musculoskeletal condition characterized by pain and tenderness around the lateral humeral epicondyle, usually involving the common extensor tendon origin and particularly the extensor carpi radialis brevis. Although the term “epicondylitis” implies inflammation, contemporary understanding recognizes the

condition primarily as a degenerative tendinopathy marked by failed tendon healing, collagen disorganization, neovascularization, and angiofibroblastic change rather than a purely inflammatory process. Clinically, the disorder presents with lateral elbow pain aggravated by gripping, resisted wrist extension, lifting, and repetitive forearm activity, making it highly relevant for individuals exposed to repetitive wrist and hand loading in occupational, domestic, and sporting contexts (1,2).

Racket sports such as badminton, tennis, and squash impose repeated mechanical loading on the wrist extensors through rapid gripping, acceleration–deceleration movements, forearm rotation, overhead strokes, smashes, and backhand actions. During these sport-specific movements, eccentric and repetitive loading of the extensor mechanism can increase mechanical stress at the lateral elbow, particularly when training load, technique, recovery, and equipment ergonomics are suboptimal. Equipment-related factors, including racket grip size, handle dimensions, vibration transmission, and player–racket fit, may further influence forearm muscle activation and tendon loading. A grip that does not match the player's hand mechanics may require excessive stabilizing force or restrict natural wrist motion, thereby increasing strain across the common extensor origin during repeated play (3,4).

Despite the growing participation of young adults in racket sports across urban sports clubs, universities, and academies in Pakistan, local evidence on lateral elbow symptoms among this athletic population remains limited. Existing regional work has largely focused on occupational or household populations exposed to repetitive upper-limb tasks, including housewives and manual workers, but these findings cannot be directly generalized to racket sport athletes because the pattern of exposure differs substantially. In sports players, lateral elbow symptoms may be influenced not only by repetition but also by stroke mechanics, grip force, racket handling, warm-up behavior, sport type, training duration, and competitive intensity. Therefore, local athlete-specific data are needed to guide prevention, screening, ergonomic education, and rehabilitation planning in sports physiotherapy settings (5,6).

A further limitation in the local literature is the lack of symptom-based functional profiling using standardized patient-reported outcome measures. The Patient-Rated Tennis Elbow Evaluation provides a structured method for quantifying pain and functional limitation related to lateral elbow symptoms, while the Numeric Rating Scale offers a simple estimate of pain intensity. These tools are useful for identifying symptom burden and functional impairment in field-based sports settings, although they should not be interpreted as replacements for clinical examination or imaging-confirmed diagnosis. This distinction is important because prevalence estimates based solely on self-reported pain and disability may reflect symptoms suggestive of lateral epicondylitis rather than clinically confirmed disease.

Given these gaps, the present study was designed to estimate the frequency and severity of lateral elbow symptoms and PRTEE-defined pain and functional impairment among active racket sport players in Lahore, Pakistan, and to examine their associations with demographic and sport-related factors, including age, gender, sport type, self-reported racket grip size, and warm-up behavior. The study specifically asked whether lateral elbow symptom burden among racket sport players is associated with intrinsic characteristics and modifiable playing-related factors that may inform targeted screening, ergonomic education, and injury-prevention strategies.

MATERIALS AND METHODS

This cross-sectional observational study was conducted over six months among active racket sport players recruited from sports clubs, universities, and sports academies in Lahore, Punjab, Pakistan, where badminton, tennis, and squash were regularly practiced. The study was designed and reported in accordance with observational research reporting principles, with emphasis on clearly defining the study population, eligibility criteria, outcome measures, exposure variables, sampling procedure, and statistical analysis plan (7).

A total of 265 male and female racket sport players aged 18–35 years were included through non-probability convenience sampling. Participants were eligible if they had been actively playing badminton, tennis, or squash for at least six months and provided voluntary written informed consent. Players were excluded if they had a previous elbow fracture or surgery, a systemic musculoskeletal disorder such as rheumatoid arthritis, a neurological condition affecting upper-limb function, or were receiving ongoing treatment for an elbow injury at the time of data collection. These criteria were applied to reduce misclassification from non-sport-related elbow pathology and to improve the relevance of the sample to active racket sport participation.

Participants were approached at the selected sports settings and informed about the purpose, voluntary nature, and confidentiality of the study before enrollment. After consent, data were collected using a structured questionnaire and standardized patient-reported outcome measures. The questionnaire recorded age, gender, sport type, duration of active participation, habitual racket grip size categorized as small, medium, or large, and warm-up behavior categorized as always, sometimes, or no/direct play. Racket grip size was treated as a self-reported equipment-related exposure and was not interpreted as objectively appropriate or inappropriate unless measured against hand dimensions. Warm-up behavior was recorded as a pre-play preparation variable reflecting the participant's usual practice before racket sport activity.

The primary outcome was lateral elbow symptom burden and functional impairment measured using the Patient-Rated Tennis Elbow Evaluation. The PRTEE is a 15-item patient-reported measure that assesses pain and functional difficulty related to tennis elbow symptoms, with pain and function components contributing to a total score ranging from 0 to 100, where higher scores indicate greater pain and disability. In the present study, PRTEE was used to quantify symptom severity and functional limitation suggestive of lateral elbow tendinopathy rather than to establish clinically confirmed lateral epicondylitis in isolation (8). Pain intensity was additionally assessed using the 11-point Numeric Rating Scale, with scores ranging from 0 to 10, where 0 indicated no pain and 10 indicated the worst possible pain intensity. For descriptive reporting, NRS scores were categorized as no pain, mild pain, moderate pain, and severe pain using standard clinical groupings (9).

The main independent variables were age, gender, sport type, self-reported racket grip size, and warm-up behavior. Age was analyzed as a continuous variable in relation to PRTEE total score. Gender, sport type, racket grip size, and warm-up behavior were analyzed as categorical variables in relation to PRTEE severity categories. Because the study used a cross-sectional design, all observed relationships were interpreted as unadjusted associations rather than causal risk effects. The term "associated factors" was therefore preferred over causal terminology in reporting and interpretation.

The sample size was calculated using OpenEpi version 3, with a 95% confidence level, 6% margin of error, and an anticipated lateral elbow symptom frequency of 54.3%, yielding a required sample of 265 participants. Data were entered into SPSS version 26.0 for analysis. Continuous variables were summarized as mean ± standard deviation and range where appropriate, while categorical variables were summarized as frequencies and percentages. Pearson bivariate correlation was used to examine the relationship between age and PRTEE total score. Pearson chi-square tests of independence were used to evaluate associations between PRTEE severity categories and categorical variables, including gender, racket grip size, sport type, and warm-up behavior. Where subgroup distributions were sparse, particularly for sport types with small cell counts, interpretation of chi-square findings was made cautiously because expected-frequency assumptions may be affected. A p-value of ≤ 0.05 was considered statistically significant.

To reduce information bias, the same structured questionnaire and scoring procedures were used across participants, and data were collected using predefined response categories. To support data integrity, completed forms were reviewed for completeness and consistency before analysis, and categorical coding was checked before statistical testing. Potential confounding was considered during

interpretation because factors such as age, gender, sport type, playing exposure, grip size, and warm-up behavior may be interrelated; however, the available analysis was primarily descriptive and bivariate, so the findings were not presented as adjusted causal estimates. The study was approved by the Institute Research Ethics Board of the University of Lahore and was conducted in accordance with the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from all participants, anonymity was maintained during data handling and analysis, and participants retained the right to withdraw without penalty.

RESULTS

A total of 265 racket sport players were included in the analysis. The mean age of participants was 23.65 ± 5.38 years, with an age range of 18–35 years. Of the total sample, 161 participants were male and 104 were female. Badminton players represented the largest proportion of the sample, followed by tennis and squash players. Most participants reported using a medium racket grip size, while warm-up practices varied across the sample.

Table 1. Participant Demographic and Sport-Related Characteristics (N = 265)

Variable	Category	n (%) or Mean ± SD
Age, years	—	23.65 ± 5.38
Age range, years	—	18–35
Gender	Male	161 (60.8)
Gender	Female	104 (39.2)
Sport type	Badminton	236 (89.1)
Sport type	Tennis	23 (8.7)
Sport type	Squash	6 (2.3)
Racket grip size	Small	73 (27.5)
Racket grip size	Medium	168 (63.4)
Racket grip size	Large	24 (9.1)
Warm-up routine	Yes	108 (40.8)
Warm-up routine	Sometimes	81 (30.6)
Warm-up routine	No	76 (28.7)

The study population was predominantly composed of young adult athletes, with males representing 60.8% of the sample and females representing 39.2%. Badminton players accounted for 89.1% of participants, while tennis and squash players accounted for 8.7% and 2.3%, respectively. Medium racket grip size was the most frequently reported equipment category, used by 63.4% of participants. Only 40.8% of players reported always performing a warm-up routine, while 30.6% warmed up sometimes and 28.7% reported direct play without warm-up.

PRTEE total scores showed that only 11 participants recorded a score of zero, while the remaining participants reported some degree of lateral elbow-related pain or functional limitation. Among participants with non-zero PRTEE scores, the observed score range extended from 3.50 to 89.00 on the 0–100 PRTEE scale.

Table 2. PRTEE-Reported Lateral Elbow Symptom and Functional Burden (N = 265)

PRTEE Measure	n (%)	Score Range
PRTEE total score = 0	11 (4.2)	0
PRTEE total score > 0	254 (95.8)	3.50–89.00
Total sample	265 (100.0)	0–89.00

PRTEE, Patient-Rated Tennis Elbow Evaluation.

The PRTEE distribution indicated that 4.2% of participants reported no PRTEE-measured pain or functional disability, while 95.8% reported non-zero PRTEE scores. These findings indicate a high frequency of self-reported lateral elbow symptom burden within the sampled racket sport players; however, because the study did not include confirmatory clinical examination, these values should be interpreted as PRTEE-reported symptom and functional impairment rather than clinically confirmed lateral epicondylitis prevalence.

Pain intensity on the Numeric Rating Scale showed that 62 participants reported no pain, while the remaining participants reported mild, moderate, or severe pain. Mild pain was the most frequent NRS category.

Table 3. Numeric Rating Scale Pain Categories Among Racket Sport Players (N = 265)

NRS Category	Score Range	n (%)
No pain	0	62 (23.4)
Mild pain	1–3	118 (44.5)
Moderate pain	4–6	50 (18.9)
Severe pain	7–10	35 (13.2)
Total	0–10	265 (100.0)

NRS, Numeric Rating Scale.

On the NRS, 23.4% of participants reported no pain, while 44.5% reported mild pain, 18.9% reported moderate pain, and 13.2% reported severe pain. The difference between PRTEE non-zero scoring and NRS pain categories suggests that some participants may have reported functional difficulty or low-level symptoms on PRTEE even when current pain intensity was absent or minimal on the NRS.

Age demonstrated a statistically significant positive correlation with PRTEE total score.

Table 4. Correlation Between Age and PRTEE Total Score

Variables	N	r	p-value
Age and PRTEE total score	265	0.31	<0.001

Pearson bivariate correlation was used. PRTEE, Patient-Rated Tennis Elbow Evaluation.

There was a weak-to-moderate positive correlation between age and PRTEE total score ($r = 0.31$, $p < 0.001$), indicating that higher age within the 18–35-year study range was associated with greater PRTEE-measured lateral elbow pain and functional impairment. Because the analysis was cross-sectional, this association does not establish a causal or temporal relationship between age and symptom progression.

Chi-square tests showed statistically significant associations between PRTEE severity categories and gender, racket grip size, sport type, and warm-up routine.

Table 5. Association Between Participant and Sport-Related Factors and PRTEE Severity Categories

Factor	χ^2	df	p-value
Gender	21.50	2	<0.001
Racket grip size	44.48	4	<0.001
Sport type	39.22	4	<0.001
Warm-up routine	27.00	4	<0.001

Pearson chi-square test was used. PRTEE, Patient-Rated Tennis Elbow Evaluation.

PRTEE severity categories were significantly associated with gender, racket grip size, sport type, and warm-up routine. The largest chi-square statistic was observed for racket grip size ($\chi^2 = 44.48$, $df = 4$, $p < 0.001$), followed by sport type ($\chi^2 = 39.22$, $df = 4$, $p < 0.001$), warm-up routine ($\chi^2 = 27.00$, $df = 4$, $p < 0.001$), and gender ($\chi^2 = 21.50$, $df = 2$, $p < 0.001$). These findings indicate statistically significant unadjusted associations between PRTEE severity and selected demographic, equipment-related, and sport-practice variables. However, the direction and magnitude of these associations cannot be fully interpreted without the underlying PRTEE severity category counts for each subgroup.

Analytical reporting note: The manuscript reports chi-square statistics for associations with PRTEE severity categories but does not provide the cross-tabulated frequency distributions used to generate these tests. Therefore, subgroup-specific severity patterns, effect estimates, confidence intervals, and adjusted associations cannot be reported from the available information. In addition, the small squash subgroup should be interpreted cautiously because sparse cell counts may affect chi-square assumptions.

A publication-ready revision should include the PRTEE severity category cut-offs and a complete contingency table for gender, racket grip size, sport type, and warm-up routine.

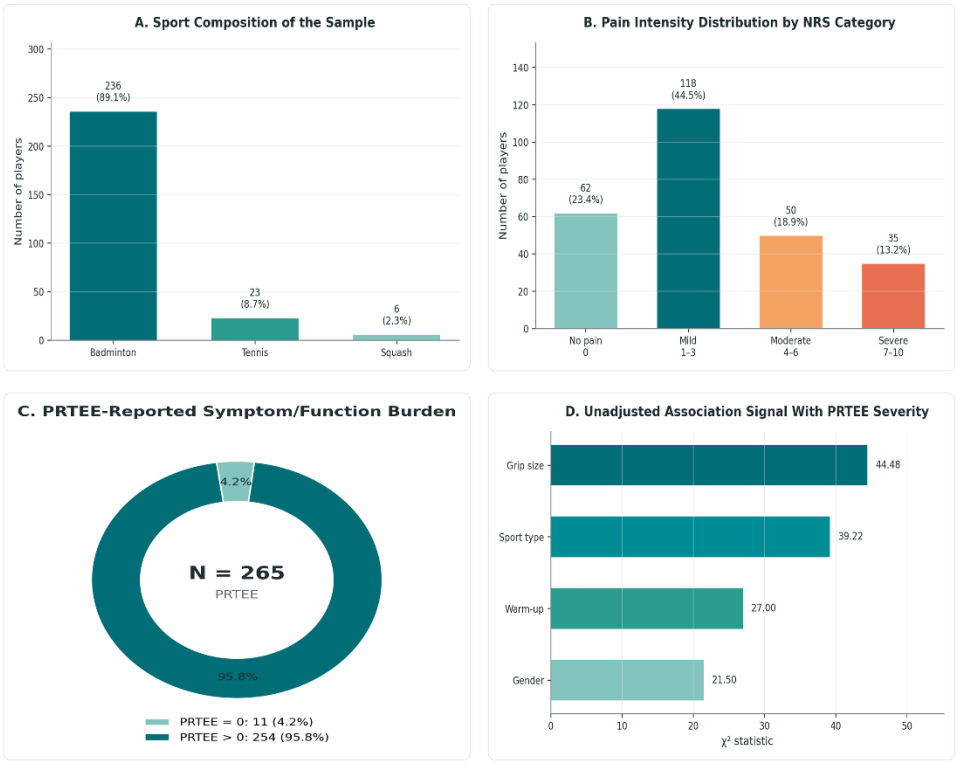

Figure 1. Clinical and Sport-Related Patterns of Lateral Elbow Symptom Burden Among Racket Sport Players

The panelled figure summarizes the clinical and sport-related patterning of lateral elbow symptom burden among 265 racket sport players. Badminton players constituted the dominant subgroup, representing 236 participants (89.1%), followed by tennis players (n = 23, 8.7%) and squash players (n = 6, 2.3%). Pain intensity was most commonly mild on the Numeric Rating Scale, reported by 118 participants (44.5%), while 50 participants (18.9%) reported moderate pain and 35 participants (13.2%) reported severe pain. PRTEE scoring showed that only 11 participants (4.2%) recorded a score of zero, whereas 254 participants (95.8%) reported some degree of PRTEE-measured pain or functional limitation, indicating a high frequency of self-reported lateral elbow symptom and functional burden rather than clinically confirmed lateral epicondylitis. Among the unadjusted association tests, racket grip size showed the largest chi-square statistic in relation to PRTEE severity categories ($\chi^2 = 44.48$), followed by sport type ($\chi^2 = 39.22$), warm-up routine ($\chi^2 = 27.00$), and gender ($\chi^2 = 21.50$), suggesting that equipment-related and sport-practice variables may be important targets for further subgroup analysis and preventive screening.

DISCUSSION

This cross-sectional study evaluated lateral elbow symptom burden and PRTEE-defined pain and functional impairment among active racket sport players in Lahore, Pakistan. The findings indicate that self-reported lateral elbow symptoms and functional limitation were frequent in the sampled athletes, with only 11 participants (4.2%) recording a PRTEE total score of zero and 254 participants (95.8%) reporting some degree of PRTEE-measured pain or functional difficulty. On the Numeric Rating Scale, 62 participants (23.4%) reported no pain, while 118 (44.5%) reported mild pain, 50 (18.9%) reported moderate pain, and 35 (13.2%) reported severe pain. This distinction is important because the PRTEE and NRS reflect symptom burden and patient-reported functional impact but do not independently confirm clinically diagnosed lateral epicondylitis in the absence of physical examination or imaging.

Therefore, the present findings should be interpreted as evidence of a high frequency of lateral elbow symptom and functional burden among racket sport players rather than as a definitive clinical prevalence estimate of lateral epicondylitis.

The observed positive correlation between age and PRTEE total score ($r = 0.31$, $p < 0.001$) suggests that older participants within the relatively young 18–35-year age range reported greater elbow-related pain and disability. Although the magnitude of this relationship was weak-to-moderate rather than strong, it is clinically plausible because cumulative tendon loading, repeated gripping, and recurrent eccentric wrist extensor activity may contribute to progressive symptom expression over time. Lateral elbow tendinopathy is increasingly understood as a degenerative overload-related condition involving tendon matrix disruption, failed healing, and altered collagen organization rather than a purely inflammatory disorder, and repeated sport-specific loading may aggravate symptoms when recovery, conditioning, and technique are insufficient (1,2). However, because this study used a cross-sectional design, the age–PRTEE relationship cannot establish temporal progression or causality; it only indicates that higher age was associated with greater patient-reported symptom severity in this sample.

Gender showed a statistically significant unadjusted association with PRTEE severity categories ($\chi^2 = 21.50$, $df = 2$, $p < 0.001$). This finding may reflect differences in forearm muscle capacity, grip strength, training exposure, conditioning, technique, or biological tendon characteristics, but the present analysis cannot determine which mechanism explains the association. Previous literature has suggested that sex-related differences may influence tendon loading tolerance and susceptibility to lateral elbow symptoms, although these relationships are likely multifactorial and may be modified by training history, equipment fit, and sport-specific biomechanics (12). The present findings therefore support the need for gender-sensitive screening and conditioning strategies, but they should not be interpreted as evidence that female sex independently causes greater lateral elbow disability without adjusted analysis.

Racket grip size demonstrated the largest unadjusted association with PRTEE severity categories ($\chi^2 = 44.48$, $df = 4$, $p < 0.001$), making it one of the most clinically relevant modifiable variables in the study. This association is consistent with biomechanical reasoning because a very small grip may require excessive squeezing force to stabilize the racket, while a very large grip may restrict comfortable wrist movement and increase abnormal torque transfer to the common extensor origin. Prior work on racket handle dimensions and equipment ergonomics has shown that grip characteristics can influence forearm muscle activation and loading patterns during racket sport activity (4,10). Nevertheless, the present study recorded grip size as self-reported small, medium, or large and did not objectively measure hand size, racket handle circumference, string tension, or vibration exposure. Therefore, the finding should be reported as an association between self-reported grip-size category and PRTEE severity rather than as proof of objectively mismatched or improper grip size.

Sport type was also significantly associated with PRTEE severity categories ($\chi^2 = 39.22$, $df = 4$, $p < 0.001$). This finding may reflect differences in movement patterns, stroke frequency, wrist-extensor loading, grip demand, and overhead or backhand mechanics across badminton, tennis, and squash. However, interpretation must remain cautious because the sample was highly imbalanced, with badminton players representing 236 participants (89.1%), tennis players 23 participants (8.7%), and squash players only 6 participants (2.3%). Such unequal distribution may affect the stability of chi-square estimates and may violate expected-cell assumptions, particularly for the squash subgroup. The sport-type association therefore indicates a statistical signal that warrants further investigation, but it cannot support strong sport-specific conclusions without larger and more balanced subgroup recruitment.

Warm-up behavior showed a statistically significant association with PRTEE severity categories ($\chi^2 = 27.00$, $df = 4$, $p < 0.001$). Only 108 participants (40.8%) reported always warming up before play, while 81 (30.6%) warmed up sometimes and 76 (28.7%) reported direct play without warm-up. This finding is clinically meaningful because warm-up may increase local muscle temperature, improve neuromuscular readiness, enhance tendon compliance, and reduce abrupt load transfer during explosive

racket movements. Previous sports medicine literature has emphasized that sudden or unconditioned increases in gripping and repetitive upper-limb loading may contribute to lateral elbow symptoms in racket sport contexts (13). Still, because warm-up behavior was self-reported and measured cross-sectionally, the present study cannot prove that absence of warm-up caused greater symptoms. It does, however, identify warm-up practice as a practical prevention target for sports clubs and physiotherapy-led athlete education.

The present findings are broadly consistent with regional evidence showing that lateral elbow symptoms and functional limitation occur in populations exposed to repetitive upper-limb loading. Akbar et al. reported lateral epicondylitis-related burden among housewives in Lahore, while Rehman et al. described substantial PRTEE-measured disability among residential painters in Peshawar (5,6). The current study extends this local evidence base by focusing on racket sport players, a population in which repetitive loading is combined with sport-specific stroke mechanics, equipment variables, warm-up behavior, and training exposure. However, direct comparison between occupational and athletic populations should be made cautiously because diagnostic definitions, sampling frames, exposure patterns, and measurement methods differ across studies.

From a clinical perspective, the results support routine screening for lateral elbow symptoms among racket sport players, especially in settings where formal coaching, ergonomic assessment, and preventive conditioning may be inconsistent. The PRTEE can be useful for monitoring symptom burden and functional limitation over time, while the NRS provides a rapid estimate of current pain intensity. Screening should ideally be combined with clinical examination, including palpation, resisted wrist extension, grip-related provocation, and relevant differential assessment, because patient-reported tools alone cannot confirm tissue-level diagnosis. Conservative management and prevention strategies should emphasize education, load modification, progressive forearm and shoulder conditioning, ergonomic racket assessment, stroke-technique review, and structured warm-up routines. Evidence from non-surgical intervention literature also supports the importance of active rehabilitation and cautions against reliance on short-term symptomatic interventions alone (14).

This study has several limitations. The cross-sectional design prevents causal inference and does not establish whether age, gender, sport type, grip size, or warm-up behavior preceded the development of symptoms. Convenience sampling may have introduced selection bias and limits generalizability beyond the recruited clubs, universities, and academies in Lahore. The sample was dominated by badminton players, restricting reliable comparison across tennis and squash subgroups. Lateral elbow symptoms were assessed using PRTEE and NRS rather than confirmed through standardized clinical examination or imaging, so the findings represent symptom and functional burden rather than confirmed lateral epicondylitis prevalence. Racket grip size and warm-up behavior were self-reported, creating potential recall and classification bias. The analysis was bivariate and did not adjust for possible confounders such as playing duration, weekly playing hours, dominance, previous injury, training level, grip strength, racket characteristics, or stroke mechanics. Future studies should use longitudinal designs, balanced sport-specific sampling, objective equipment measurements, standardized clinical diagnostic criteria, and multivariable modeling to clarify independent predictors of lateral elbow symptom development and progression.

CONCLUSION

Lateral elbow symptoms and PRTEE-measured pain and functional impairment were frequent among sampled racket sport players in Lahore, with only 4.2% reporting no PRTEE-measured symptoms or functional limitation and 13.2% reporting severe current pain on the NRS. Higher age showed a weak-to-moderate positive correlation with PRTEE total score, while gender, self-reported racket grip size, sport type, and warm-up behavior were significantly associated with PRTEE severity categories in unadjusted analyses. These findings suggest that symptom screening, equipment guidance, structured warm-up

routines, and preventive conditioning may be valuable in local racket sport settings. However, because the study was cross-sectional and did not include confirmatory clinical examination, the findings should be interpreted as associations with self-reported lateral elbow symptom burden rather than causal risk factors or clinically confirmed lateral epicondylitis prevalence.

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