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*Original Article*

# Prevalence of Musculoskeletal Problems among Tennis Players in Twin Cities of Pakistan

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## ABSTRACT

Background: Tennis, a popular sport played worldwide, requires a unique combination of agility, strength, and endurance, which predisposes players to a range of musculoskeletal injuries. Despite its widespread popularity, there is a paucity of research on the prevalence of such injuries among tennis players in the twin cities of Islamabad and Rawalpindi, Pakistan.

Objective: This study aimed to investigate the prevalence and distribution of musculoskeletal problems among tennis players in Islamabad and Rawalpindi, with a focus on identifying the most commonly affected areas and the impact of these injuries on the players' activities.

Methods: A cross-sectional study was conducted among 218 tennis players from various clubs in Rawalpindi and Islamabad between February 27, 2023, and January 30, 2024. Participants were selected using convenient sampling. Data on demographics and musculoskeletal discomfort were collected through a self-structured questionnaire and the Nordic Musculoskeletal Questionnaire (NMQ). The Rao-soft calculator determined the sample size with a 95% confidence interval and a 5% margin of error. Inclusion criteria targeted players aged 18-35 with a playing experience of less than 3 years, playing at least twice a week. Exclusion criteria included a history of fracture, recent surgical procedures, or neurological deficits. Data analysis was conducted using SPSS version 25.

Results: The mean age of participants was 23.92 (±4.76) years. The prevalence of musculoskeletal problems in the past week and year was highest in the shoulders (16.1%, 48.6%), followed by knees (13.3%, 25.2%), elbows (7.8%, 23.4%), and upper back (10.1%, 17.9%). Over the past year, 10.6% of participants reported that shoulder issues prevented daily activities, and 7.8% sought physician consultations for shoulder pain.

Conclusion: Shoulder pain was the most prevalent musculoskeletal issue among tennis players, indicating the need for targeted preventive measures and interventions. Emphasizing proper technique and incorporating specific strength and flexibility training could mitigate the risk of injuries.

Keywords: Tennis injuries, Musculoskeletal problems, Prevalence, Shoulder pain, Knee injuries, Tennis players, Islamabad, Rawalpindi, Nordic Musculoskeletal Questionnaire, Sports medicine.

## INTRODUCTION

Tennis, a globally recognized racket sport, necessitates a harmonious combination of physical prowess and mental acuity, incorporating agility, speed, strength, balance, and strategic insight. This sport, appealing to a wide spectrum of individuals across different ages and skill levels, can be played on diverse surfaces such as clay, grass, and hard courts, ranging from recreational to competitive professional engagement. The dynamic nature of tennis, characterized by rapid movements and frequent directional changes, not only enhances joint flexibility but also contributes to reducing the risk of joint stiffness, thereby promoting overall physical fitness. Despite the plethora of benefits associated with tennis, it is crucial to acknowledge the potential drawbacks, particularly the risk of musculoskeletal injuries which stands as a significant concern for players (4). The prevalence of tennis-related injuries, such as tennis elbow, shoulder overuse injuries, wrist sprains, and ankle sprains, underscores the physical demands and risks inherent in the sport (5). Tennis elbow, or tendinitis, manifests from the repetitive gripping and swinging motions, leading to

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inflammation in the elbow tendons (6). Similarly, shoulder overuse injuries, including rotator cuff tendinitis and impingement syndrome, result from repetitive overhead actions, while wrist and ankle sprains are common outcomes of awkward landings or rapid directional shifts on the court (7). The repetitive nature of these actions, without adequate healing and recovery time, predominantly contributes to these injuries (8).

Research in this domain has been extensive, with studies such as those by Kaiser et al. (9), Humphrey et al. (10), Talha et al. (11), Toma et al. (12), and Moussa et al. (13) providing valuable insights into the prevalence and nature of musculoskeletal injuries among tennis and other sports players. Kaiser et al. highlighted the distribution of acute injuries in recreational tennis players, noting a significant portion of lower extremity injuries (9). Humphrey et al. reported on the injuries sustained by amateur and professional real tennis players, indicating a mix of gradual and sudden onset injuries across different limbs (10). Talha et al. focused on table tennis players, finding a high incidence of musculoskeletal pain, particularly in the spine and limbs (11). Toma et al. and Moussa et al. extended this inquiry to elite female basketball players and amateur and professional athletes, respectively, identifying common areas of musculoskeletal discomfort and pain (12, 13).

In Pakistan, previous studies have delved into the prevalence of musculoskeletal disorders among tennis players, exploring issues such as neck pain, back pain, and other related problems. This study aims to further evaluate the occurrence of musculoskeletal issues among this specific athletic group, building upon the foundational work of preceding research (4-13). The focus on tennis players in the twin cities of Pakistan seeks to contribute to the understanding of the impact of the sport on the musculoskeletal health of its players, drawing attention to the necessity for preventive measures and tailored fitness programs to mitigate the risk of injury and enhance the wellbeing and performance of tennis enthusiasts.

## MATERIAL AND METHODS

A cross-sectional study was conducted among tennis players frequenting various clubs in Rawalpindi and Islamabad, spanning from 27th February 2023 to 30th January 2024. Employing convenient (nonprobability) sampling, the sample size was determined using the Rao-soft calculator. This decision was based on a confidence interval of 95%, a margin of error of 5%, and an estimated population size of 750 tennis players within the study sites of Rawalpindi and Islamabad, culminating in a recommended sample size of 218 participants for the study. The inclusion criteria targeted players aged 18-35, with a level of performance under 3 years, and engaging in tennis at least twice per week. Exclusion criteria were set for players with a history of fractures, recent surgical procedures, or neurological deficits.

Data collection was facilitated through a self-structured questionnaire focusing on the demographics of the tennis players. The Nordic Musculoskeletal Questionnaire (NMQ) was employed to gather specific outcomes related to the reported musculoskeletal discomfort among the participants. This questionnaire is designed to be part of a specialized study on musculoskeletal problems when utilized during a routine general health checkup. It consists of 28 multiple-choice questions divided into two distinct sections. Section 1 comprises 40 forced-choice questions that help identify body parts afflicted by musculoskeletal issues, aided by a body map highlighting nine symptom sites: the neck, shoulders, upper back, elbows, low back, wrist/hands, hips/thighs, knees, and ankles/feet. This section probes whether respondents have experienced any musculoskeletal pain in the previous year or the preceding seven days that has led to prohibitive discomfort. Section 2 delves deeper into issues concerning the neck, shoulders, and lower back, encompassing 25 multiple-choice questions regarding accidents impacting each area, their functional impact at home and work, duration of the problem, assessments by health professionals, and recent musculoskeletal issues. The NMQ is recognized for its reliability, sensitivity, and practicality as a screening method (14).

Ethical approval for the study was granted by the ethical review committee of the Margalla Institute of Health Sciences Rawalpindi (ERC Ref No: AT/192/23). Participants were assured of their right to inquire about the study details and were informed that their participation was voluntary, with the assurance that refusal to participate would not affect their relationship with the investigator. A written consent form was obtained from each participant. Data entry and analysis were conducted using SPSS version 25, with frequency and percentages calculated for both continuous and categorical variables.

## RESULTS

In the investigation of demographic characteristics among tennis players, Table 1 reveals an average age of 23.92 years with a standard deviation of ±4.76, indicating a young participant group.

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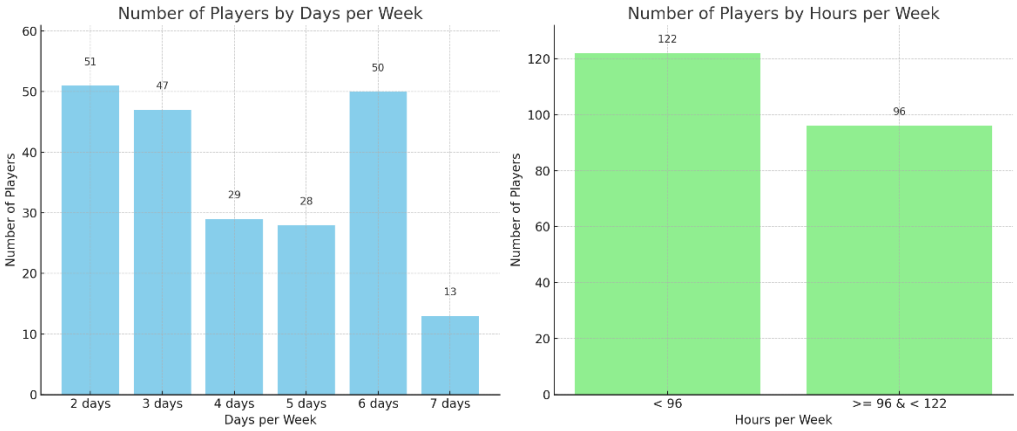


*Figure 1 Days and Hours per Week*

The graphs (Figure 1) above depict the distribution of tennis players by the number of days they play per week and the number of hours they play per week. The first graph shows the number of players participating in tennis on different days ranging from 2 to 7 days per week, with the majority playing either 2 days or 6 days per week. The second graph categorizes players based on the total hours they play per week, with specific groupings for those playing less than 96 hours and those playing between 96 and 122 hours. These visualizations offer insights into the playing habits of tennis players in the study.

The average height and weight of the players were recorded at 168.85 cm (±8.89) and 63.83 kg (±9.96), respectively, which suggests a physically fit demographic.

Table 1 Demographic Characteristics

| Variables | Mean | Std. Deviation |
|---|---|---|
| Age (years) | 23.92 | ±4.76 |
| Height (cm) | 168.85 | ±8.89 |
| Weight (kg) | 63.83 | ±9.96 |
| BMI | 21.88 | ±2.88 |

Furthermore, the Body Mass Index (BMI) averaged at 21.88 (±2.88), aligning with a healthy weight range for the age and height of the participants.

Table 2 Musculoskeletal Problems Among Tennis Players

| Area | Past Week (Freq., %) | Last 12 Months (Freq., %) | Activities Prevented (Freq., %) | Physician Visit (Freq., %) |
|---|---|---|---|---|
| Neck | 19 (8.7%) | 32 (14.7%) | 10 (4.6%) | 6 (2.8%) |
| Shoulders | 35 (16.1%) | 106 (48.6%) | 23 (10.6%) | 17 (7.8%) |
| Upper Back | 22 (10.1%) | 39 (17.9%) | 17 (7.8%) | 10 (4.6%) |
| Elbows | 17 (7.8%) | 51 (23.4%) | 15 (6.9%) | 10 (4.6%) |
| Wrists/Hands | 16 (7.3%) | 48 (22.0%) | 17 (7.8%) | 13 (6.0%) |
| Lower Back | 17 (7.8%) | 28 (12.8%) | 12 (5.5%) | 5 (2.3%) |
| Hips/Thighs | 10 (4.6%) | 14 (6.4%) | 8 (3.7%) | 3 (1.4%) |
| Knees | 29 (13.3%) | 55 (25.2%) | 15 (6.9%) | 14 (6.4%) |
| Ankle/Feet | 11 (5.0%) | 34 (15.6%) | 10 (4.6%) | 9 (4.1%) |

The musculoskeletal problems among tennis players, as detailed in Table 2, exhibit a varied prevalence of issues across different body areas. In the past week, the highest frequency of complaints was noted in the shoulders with 35 reports, constituting 16.1% of the study group, followed by knees with a 13.3% incidence rate. This immediate past observation is contrasted by the data over the last 12 months, where shoulder issues surged dramatically to 106 cases, marking 48.6% of the participants, significantly higher than any other area. This indicates a predominant vulnerability in the shoulder region among tennis players over time. Furthermore, elbows and wrists/hands also showed substantial reports over the year with 23.4% and 22.0% respectively, highlighting the stress on upper limb joints and muscles in tennis.

The impact of musculoskeletal problems on daily activities and the subsequent need for medical consultation were also significant. In the last 12 months, shoulder-related issues led to activity restrictions for 23 participants (10.6%), suggesting a notable impact on functionality and quality of life. Similarly, physician visits for conditions related to shoulders were the highest at 17 (7.8%), underscoring the severity of shoulder ailments among the players. The ankles/feet and knees were also notable areas of concern,

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with physician visits recorded for 9 (4.1%) and 14 (6.4%) participants, respectively, reflecting the physical demands and risks associated with tennis on the lower extremities.

These findings highlight the physical challenges faced by tennis players, with a pronounced risk of musculoskeletal issues particularly in the shoulders, knees, and upper limbs, affecting their daily activities and necessitating medical attention. The demographic data provides a context for understanding the physical stature and general health of the participants, offering insights into the potential risk factors for injury within this athletic population.

## DISCUSSION

The investigation into the prevalence of musculoskeletal injuries among tennis players in Islamabad and Rawalpindi elucidated that shoulder pain emerged as the most frequently reported complaint, succeeded by issues in the knees, elbows, and upper back both over the preceding week and year. This pattern aligns with previous research indicating a higher prevalence of upper extremity pain among tennis players (9, 10, 13, 15). The intermittent nature of tennis, characterized by repeated overhead motions, predominantly loads the dominant shoulder, leading to significant discomfort (16). Notably, knee pain, reported by 25.5% of participants over the last year, corroborates findings by Ahmet et al. (13) and is further supported by Lozana et al. (17), underscoring its commonality among tennis players. Similarly, the incidence of ankle pain, documented at 15.6%, resonates with prior studies, indicating a consistent pattern of injury prevalence (13).

The discrepancy observed in the prevalence of knee problems, reported at 19% by Kaiser et al. (9), compared to this study, may be attributed to the demographic differences, particularly the mean age of participants. The advanced mean age of 43.6 years in Kaiser et al.'s study suggests a higher likelihood of degenerative joint changes, a commonality less pronounced in our younger cohort with a mean age of 23 years. Furthermore, the incidence of elbow pain, which was lower in this study (7.8%) compared to the 15.6% reported by Humphrey et al. (10), may be explained by the differing levels of experience among participants. The latter study's subjects had, on average, 18 years of playing tennis, significantly more than the novice level (<3 years) of players in the current investigation, highlighting the role of cumulative overuse in the development of elbow injuries (18).

The one-year prevalence of upper back pain reported by Fett et al. (19) at 21% slightly exceeds the 17.9% noted in the current study. This variance could be attributed to the intensity of training, with Fett et al.'s cohort training for over 17 hours per week, in contrast to less than 5 hours in the present study. The higher prevalence of elbow pain (36.4%) reported by Lozano et al. (17) compared to the 23.4% in this investigation further underscores the impact of prolonged exposure and technique on injury rates, with the former's participants averaging 6 years of play (16, 20).

The study's strengths lie in its focused examination of tennis players within a specific geographical region, providing detailed insights into the prevalence of musculoskeletal issues within this cohort. However, limitations arise from the use of convenient sampling and the inclusion of players with a relatively short duration of tennis experience, which may not fully represent the injury spectrum of more seasoned players. Future research should aim to encompass a broader participant base, including those with longer playing careers, to better understand the progression of musculoskeletal injuries over time. Additionally, investigating the impact of training intensity, duration, and technique on injury prevalence could offer valuable information for preventive strategies. Recommendations for tennis players include emphasizing proper technique, incorporating strength and flexibility training specific to tennis, and ensuring adequate recovery periods to mitigate the risk of overuse injuries.

## CONCLUSION

The study conclusively identified shoulder pain as the most prevalent musculoskeletal issue among tennis players in Islamabad and Rawalpindi, followed by knee, elbow, and upper back discomfort. These findings underscore the critical need for targeted preventive strategies and interventions in the healthcare and sports training domains. Healthcare professionals should prioritize the development and dissemination of education programs focused on proper warm-up techniques, strength training, and injury prevention practices tailored to tennis players. Additionally, coaches and trainers are encouraged to incorporate biomechanical analysis and technique refinement in their training regimes to reduce the incidence of common injuries. This approach not only has the potential to enhance the overall well-being and performance of tennis players but also to minimize the long-term healthcare burdens associated with sports-related musculoskeletal problems.

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