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Original Research Article

Prevalence of Jumper's knee among recreational badminton players: a cross-sectional study

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ABSTRACT

Background: Badminton involves rapid directional changes, jumping, and lunges that increase the risk of overuse injuries, particularly patellar tendinopathy (jumper's knee). Although injury prevalence varies among different player populations, data on recreational badminton players in India remain limited. This study assessed the prevalence among recreational badminton players aged 18-30 years.

Methods: A cross-sectional study was conducted from May 2025 to October 2025 among 75 recreational badminton players selected through convenient sampling method. Participants scoring <80 on the Victorian Institute of Sport Assessment-Patella (VISA-P) questionnaire were assessed using the Royal London Hospital Test (RLHT) for patellar tendinopathy. Pearson correlation analysis determined the relationship between symptom severity and clinical findings.

Results: Of 75 participants (30 males, 45 females; mean age 22.5±2.8 years), 22 (29.33%) tested positive for jumper's knee. Prevalence increased with age: 4.76% (age 18-20), 36.84% (age 21-25), and 43.75% (age 26-30). A moderate negative correlation (r=-0.474, p=0.001) was found between VISA-P scores and RLHT results.

Conclusions: This study demonstrated a significant prevalence of jumper's knee (29.33%) among recreational badminton players, particularly in the older age groups. The findings highlight the need for injury prevention strategies and proper training protocols in this population.

Keywords: Badminton, Jumper's knee, Patellar tendinopathy, Prevalence, Royal London hospital test

INTRODUCTION

Badminton has been traditionally considered a safe individual non-contact sport. However, it has a high potential for causing musculoskeletal injuries because of its inherent movements, such as rapid directional changes, jumping, lunging at the net, and rapid movements of the arms from various postural positions. The most important point to be noted here is that the likelihood of sustaining an injury in badminton is higher during training than competition. Recreational players have a higher likelihood of sustaining an injury than elite players.[1,2]

Jumper's knee, also known as patellar tendinopathy, is an overuse injury of the knee extensor mechanism. The pathophysiology of jumper's knee occurs because of repetitive mechanical stress to the patellar tendon. Repetitive mechanical stress to the patellar tendon occurs during movements requiring jumping, landing, acceleration, and deceleration. The most commonly affected area of jumper's knee is the inferior pole of the patella at the insertion of the patellar tendon.[3]

Jumper's knee presents as a painful knee condition primarily related to activity, characterized by small tears

in the patellar tendon and localized tenderness. The repetitive directional changes, jumping, and lunging required in badminton lead to patellar tendon overuse, causing inflammation and eventual degeneration.[4] Overload on tendon is considered important factor for onset of pain and the intensity of jumps and change of directions aggravate the overload thus, causing patellar tendon pain.[5] While previous studies have documented jumper's knee prevalence in elite athletes across various sports, data specifically addressing recreational badminton players remain limited, particularly in the Indian context.

METHODS

A cross-sectional descriptive study was conducted to determine the prevalence of jumper's knee among recreational badminton players. The study setting included badminton courts located in and around Pune, Maharashtra, India, over a study duration of 6 months from May 2025 to October 2025.

The study population comprised recreational badminton players. A convenient sampling method was calculated using the single proportion formula resulting in final sample size of 75 participants. The participants were included if they met age criteria from 18-30 years and scored less than 80 on VISA-P questionnaire. Those with any recent knee injury or surgery within 6 months as well as if had any other physical or cognitive disabilities that hindered accurate RLHT test were excluded to preserve reliability of assessment process.

Data collection included age, gender, VISA-P score and RLHT test results. The VISA-P questionnaire is a validated instrument assessing the severity of knee pain symptoms in individuals with knee-related problems. Scores range from 0-100, with lower scores indicating greater symptom severity.[6]

The RLHT is a clinical diagnostic test for patellar tendinopathy with reported specificity of 98% and sensitivity of 88%. The test is performed with the patient in supine position and the knee in extension. The examiner palpates the patellar tendon and assesses for local tenderness. The knee is then flexed to 90 degrees, and the tendon is again palpated. The test is considered positive when local tenderness elicited during palpation in knee extension decreases or disappears when the tendon is palpated in 90 degrees of knee flexion.[7] The test's higher specificity indicates fewer false-positive results, making it suitable for confirming the presence of patellar tendinopathy.

Statistical analysis

The collected data was entered in Microsoft Excel for descriptive statistics. Pearson Correlation test was performed using SPSS software to determine the relationship between VISA-P questionnaire scores and RLHT results. Descriptive statistics, including means, frequency distribution and percentage were used to determine prevalence of jumper's knee.

RESULTS

Mean VISA-P scores indicated the presence of knee pain symptoms across both genders. Males (n=30) demonstrated a mean VISA-P score of 68.5±7.33, while females (n=45) showed a mean score of 68.11±6.24. These scores (both <80) satisfied the inclusion criterion indicating symptomatic knee pain (Table 1).

Table 1: VISA-P questionnaire scores by gender (scores <80 indicate knee pain symptoms).

Gender	N	Mean VISA-P Score (SD)
Male	30	68.5 (7.33)
Female	45	68.11 (6.24)

Total 22 out of 75 participants (29.33%) were tested RLHT positive for jumper's knee. The prevalence varied significantly across age groups. The highest prevalence (43.75%) was observed in the oldest age group, while the lowest prevalence (4.76%) was found in the youngest age group, suggesting an age-related increase in jumper's knee prevalence (Table 2).

Table 2: Prevalence of jumper's knee by age group (RLHT positive cases).

Age group (years)	Number positive/total	Prevalence (%)
18-20	1/21	4.76
21-25	14/38	36.84
26-30	7/16	43.75
Overall	22/75	29.33

Table 3: Correlation between VISA-P scores and RLHT findings.

Variables	Mean (SD)	r value	P value	Interpretation
VISA-P (Male)	68.5 (7.33)	-0.474	0.001	Moderate negative correlation
VISA-P (Female)	68.11 (6.24)			
RLHT (Male)	0.33 (0.47)			
RLHT (Female)	0.26 (0.44)			

Pearson correlation analysis revealed a statistically significant moderate negative correlation (r = -0.474, p=0.001) between VISA-P scores and RLHT results. This moderate negative correlation indicated an inverse

relationship between symptom severity (VISA-P scores) and clinical confirmation of patellar tendinopathy (RLHT results). Higher VISA-P scores were associated with negative RLHT results, suggesting that while participants reported knee pain symptoms, not all had clinical evidence of patellar tendinopathy (Table 3).

DISCUSSION

Jumper's knee is caused by overuse of the knee extensor mechanism due to repetitive mechanical stress from movements requiring jumping, landing, acceleration, and deceleration. The knee extensor tendons gradually degenerate and fail due to overuse and repetitive mechanical stress. High mechanical stress causes microscopic failure in the tendon, leading to cellular changes that affect the mechanical properties of the tendon. Degeneration of the individual fibril is a result of micro-trauma in the tendon and the strain this causes throughout the tendon. Despite badminton being classified as a non-contact sport, chronic overuse injuries are commonly seen in badminton players.

This study was designed with the aim of establishing the prevalence of jumper's knee in badminton players using the VISA-P questionnaire as the inclusion criterion and the RLHT as the diagnostic outcome measure. Out of the 75 badminton players sampled in the study, 22 (29.33%) were found to be positive for jumper's knee using the diagnostic criterion of the RLHT. The VISA-P questionnaire was effective in identifying badminton players with knee pain symptoms, and a statistically significant moderate negative correlation was established between the results of the clinical test and the severity of the symptoms ($r = -0.474$, $p = 0.001$).

From the results obtained from the stratified study, the trend that was evident was that the higher the age group, the higher the prevalence of jumper's knee. The lowest prevalence was recorded in the 18-20 year's group at 4.76%, followed by the 21-25 year's group at 36.84%, and the highest recorded was in the 26-30 year's group at 43.75%. The results obtained from the study are in line with the general epidemiology that has been established so far. A study done by Lian et al, concerning the epidemiology of jumper's knee in elite athletes from nine different sports, showed that the general prevalence was 14.2%. The highest was recorded in volleyball at 44.6%, followed by basketball at 31.9%, and no cases recorded in cycling and orienteering.[2] Another study showed that the total non-elite athletes from various sports recorded a total of 8.5%.[9]

The results of the present study validate the fact that the prevalence of jumper's knee is higher among recreational-level athletes rather than elite-level athletes, possibly because of the lack of training programs, insufficient warm-up and cool-down procedures, and muscle fatigue.[10]

It is believed that various factors could have led to the high prevalence of jumper's knee among recreational badminton players. The influence of muscle fatigue on the movement of badminton players has been identified as an important factor that impacts the quality of movement in badminton play, including the performance of the lunge movement and the jumping movement, thereby reducing the potency and structural stability of the tendon.[10] The absence of sufficient warm-up and cool-down procedures among recreational badminton players could have led to muscle fatigue, thereby resulting in the degenerative changes in the patellar tendon.

The study identified that the observed pathophysiology was due to micro-tearing and degenerative changes in the patellar tendon because of chronic overloading. Literature identified other intrinsic risk factors that predispose patients to patellar tendinopathy and they are ligamentous laxity, quadriceps and hamstring muscle tightness, excessive Q angle, abnormal patella height, and excessive force generation in the knee.[11] However, the extrinsic factors play more important role than the intrinsic factors in cause of patellar tendinopathy.[12] The increasing prevalence with advancing age could have been attributed to various risk factors not assessed in this study and they are body mass index, waist-to-hip ratio, quadriceps muscle strength, and years of badminton playing.

The moderate negative correlation between the results of the VISA-P scores and the RLHT results showed an inverse relationship between the results, in those higher scores on the VISA-P, indicating fewer symptoms, were associated with negative results in the RLHT, while lower scores on the VISA-P, indicating more symptoms, were associated with positive results in the RLHT. This correlation between the results of both tests further validates both tests as useful in the assessment of patellar tendinopathy. However, the moderate negative correlation between the results of the tests also showed that there is heterogeneity in the manifestation of patellar tendinopathy.

This study has few limitations. Parameters like height, weight, BMI were not taken into consideration. The study was conducted at badminton courts around Pune only thus, limiting accessibility to a broader population.

CONCLUSION

The present study revealed that there was a significant prevalence of 29.33% of jumper's knee among badminton players. The prevalence was found to increase with increasing age. The negative correlation between symptom severity and clinical findings validates the reliability and utility of both VISA-P and RLHT. The negative correlation also indicated that patellar tendinopathy had variable manifestations among badminton players. The present study highlights the significance of patellar tendinopathy among badminton

players and emphasizes the need to develop specific strategies to prevent injuries among badminton players.

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