International Journal of Yoga, Physiotherapy and Physical Education
www.sportsjournal.in
ISSN: 2456-5067
Received: 20-10-2025, Accepted: 19-11-2025, Published: 03-12-2025
Volume 10, Issue 4, 2025, Page No. 66-72

Prevalence of patellar tendinopathy in male cricket players of South Gujarat region- A cross-sectional study

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Abstract
Background: Cricket, a non-contact sport, in which a wide variety of injuries occur, one of them is patellar tendinopathy, that consist of pain localized to the inferior pole of the patella along with pain in prolonged sitting, squatting, and stairs climb and descend, may be present. VISA-P questionnaire is a validated pain and functional outcome measure that can be used to assess severity of symptoms.
Method: The study was conducted with 152 cricket players of age group 18 - 24 years using convenient sampling, the players were included in study according to inclusion criteria, exclusion criteria and VISA -P score <80. The study was conducted over the period of 6 months, the outcome measures were SLDS and RLHT was used.
Result: The Prevalence of Patellar Tendinopathy in cricket according to RLHT and SLDS are 95.39% in RLHT & 76.31% in SLDS Prevalence in SLDS; According to age: In 18 years was 65.38%, 19years was78.94%,20years was81.81%,21yearswas68.42%,22year swas86.66%,23
Years was79.16%,24yea rswas78.99%. According to BMI:<18.5was64.70%,18.5-24.9 was 75.67%,25.0-29.9was85%,30.0-34.9was100%. According to work experience: group:1-5 Years was81.81%,6-10years was80.64%and11-15 was 69.23%. In RLHT, according to age, prevalence of patellar tendinopathy in cricket players in 18 years was 88.46%, 19 years was 100%,20yearswas100%,21yearswas89.47%,22yearswas100%,23yearswas91.66%,
24 years was 97.36%. According to BMI: <18.5 was 100%, 18.5-24.9 was 92.79%, 25.0-29.9 was 100%, 30.0-34.9 was 100%. According to work experience, in the group: 1-5 years was 98.70%, 6-10 years was 98.38% and 11-15 was 100%.
Conclusion: Theresultsconcludesthatcricketplayershavehighprevalenceofpatellar tendinopathy.

Keywords: Cricket players, knee pain, patellar tendinopathy

Introduction

Cricket, a popular sport played in India, is enjoyed by players of all levels of ability [1]. Cricket is a non-contact sport, there is a wide variety of causes of injuries. It is a multidimensional sport in which players engage in a wide range of diverse activities, namely batting, bowling, fielding (catching and throwing) and wicket keeping. Injuries on the cricket field tend to fall into one of two categories: repetitive/overuse and impact [2]. Overuse injuries occur predominantly in bowlers and in fielders who have to throw the ball frequently during matches or training. Impact or collision injuries can occur in a number of ways in the cricket field: as a result of direct contact with a ball, another player, the ground or the boundary [3].

Severalstudieshavedescribedthecharacteristicsofcricket-relatedinjuriesatthelevel of elite competition [3]. Musculoskeletal pain can occur in various ways while playing cricket: a player being struck by a ball or bat, rapid rotational movements, sliding and diving, collisions with other players and overuse injuries [4]. Lower limbs (50%), upper limbs (23%), and back and trunk (23%) are most commonly injured [6].

Other knee problems that occur in cricketers and one of them is patellar tendinopathy, whichhasbeenshowntooccurinupto20%ofathleticallyactivepeoplePatellartendinopathy is seen as an overuse injury and occurs often in cricketers, especially bowlers [9].

Patellar tendinopathy is primarily a condition of relatively young (15-30 years old) athletes, especially men, who participate in sports such as basketball, volleyball, athletic jump events, tennis, cricket and football, which require repetitive loading of the patellar tendon [10]

The main causes of patellar tendinopathy are repetitive overloading and microtrauma [11]. Energy storage and release (similar to a spring) from the long tendons of the lower limb are key features for high performance while reducing the energy cost of human movements [13]. Repetition of this spring-like activity over a single exercise session, or with insufficient rest to enable remodeling between sessions, can induce pathology and a change in the tendon's mechanical properties, which is a risk factor for developing symptoms [15].

Briefly, tendon pathology includes increases in tenocyte numbers and rounding, and in ground substance expression, causing swelling, matrix degradation, and neovascular in growth [16].

Patellar tendinopathy, as one of many potential diagnoses producing anterior knee pain, has specific and defining hallmark clinical features that consist of [1] pain localized to the inferior pole of the patella [20] and [2] load-related pain that increases with the demand on the knee extensors, notably in activities that store and release energy in the patellar tendon [21]. Other signs and symptoms, such as pain with prolonged sitting, squatting, and stairs, may be present [19].

Tendonpainoccursinstantlywithloadingandusuallyceasesalmostimmediately when the load is removed. Pain is rarely experienced in a resting state [22]. Pain may improve with

repeated loading (the "warm-up" phenomenon), but there is often increased pain the day after energy-storage activities [19].

Early diagnosis and management are important. Even though imaging is the gold standard for diagnosis, including both high-resolution real-time ultrasonography (US) and magnetic resonance imaging (MRI) [24], the first suspicion is clinical, based on history and clinical examination [23].

Assessingpainirritabilityisafundamentalpartofmanagingpatellartendinopathyand consists of determining the duration of symptom aggravation (during loading) following energy-storage activities like a training session [19].

The Victorian Institute of Sport Assessment-patella (VISA-P) questionnaire is a validated pain and function outcome measure that can be used to assess severity of symptoms as well as to monitor outcomes [17].

The Royal London Hospital test for clinical diagnosis of PT. This test is considered positive when the local tenderness elicited palpating the tendon in a relaxed position (knee extended), decreases or disappears when the tendon is palpated under tension (knee flexion) [14].

Need Of Study

Many studies have been found with different musculoskeletal disorders in athletes, especially who participates in sports such as basketball, volleyball, football. There is very less evidence specially for patellar tendinitis so due to lack of evidence of this study, the need has been arised to evaluate the Prevalence of patellar tendinitis in cricket players of South Gujarat.

Aim And Objectives Of Study

Aim of the study

- ThepurposeofthisstudyistofindoutthePrevalenceofPatellartendinopathyincricket players of South Gujarat.

Objectives of study

- To assess pain using VISA-P questionnaire for patellar tendinopathy in cricket players of South Gujarat.
- ToassesstendernessusingROYALLONDONHOSPITALTESTforpatellartendinopathy in cricket players of South Gujarat.
- ToassesspatellartendinopathyusingSINGLELEGDECLINESQUATSincricketplayers of south Gujarat.
- To find out the Prevalence of Patellar tendinopathy in cricket players of South Gujarat.

Methodology

- **Studydesign**

A Cross-Sectional study

- **Sample Design**

Convenient sampling

- **Study Population**

Cricket players of South Gujarat

- **Sample Size**

152(Timebound)

- **Studyduration**

6 months

- **Sourceofdata Collection**

Different cricket academy of south Gujarat

Inclusion Criteria

- **Agegroup:**18-24 years [7]
- Professional male cricket layers [4]
- Playershavingminimum3 years of experience [7]
- A typical history of gradually developed activity-related anterior knee pain [12]
- Most painful spot at the upper or lower pole of the patella, in the patellar tendon, or its tibial insertion [12]
- Scoreunder80onVISA-Pareindicativeofpatellar tendinopathy [26]
- Players willing to participate

Exclusion Criteria

- Female players [4]
- Players having any recent medical or musculoskeletal trauma
- Players having anysurgicalhistorywithin6 months [18]
- Experience less than3 years [7]

Material Sused

- Consent form
- Pen and paper
- Assessment form
- Questionnaire
- VISA-P
- Single leg decline squats board
- Weighing machine

Outcome Measures

1. Royal London Hospital test

This include, once the local tenderness had been elicited palpating the tendon with the knee extended, the tender portion of the tendon to be palpated again with the kneeflexedto90°.The test will be considered positive if the pain is marked reduced or absent in knee flexion. In asymptomatic tendons, the test is performed with knee extended, selecting the area of the tendon 1 cm distal to the patellar insertion. Specificity = P>0.05 [14]

2. Single Leg Decline Squats (SLDS)

The SLDS consists of 1 repetition of a single-leg squat, performed barefoot on a 30° decline ramp, from a position of knee extension to 30 degree of knee flexion. Data were collected on both eccentric and concentric phases for each leg. data collection was conducted following 3 trails to familiarize the participant with the exercises.

The goal of this test was to evaluate tendon reactivity during the squat, using the presence of patellar tendon pain during the squat to indicate a positive test.

Correlation coefficient a kappaof1(P<0.0001) for the SLDS [26]

Procedure

- A written and informed consent about enrollment in the study and maintaining adequate privacy and confidentiality was taken from all Cricket Players included in the study.
- All the subjects were selected into the study based on Inclusion and Exclusion criteria.
- Proper explanation and demonstration were given to the subjects.
- Inthisclinicalhistoryandacompletephysicalandfunctional physiotherapyexamination was done in each subject.
- Demographic data was taken.

- Subjects were asked to fill-up VISA-P questionnaire.
- Proper assessments regarding tenderness were checked using Royal London Hospital Test.
- After that the subject was demonstrated about the Single leg decline squats test.
- The subject was then asked to stand on single leg decline squats board with single stance.
- After that subject was asked to perform decline squat on board.

Fig 4: Researcher Performing Royal London Hospital Test

Fig 5: Performing Single Leg Decline Squat

Statistical Analysis

Statistical Analysis was done using Microsoft Excel version 2021.

Result

TABLE 1 Shows the total number of participants were152.All of them were male cricket players.

According to the age, participants were divided into 8 sub-category18 years,19 years, 20 years, 21years, 22years, 23 years, 24years.There were 26 players in18years,19 Players in19years, 11players in 20 years, 19players in 21years, 15players in 22 years,

24 players in 23years, 38 players in 24 years.

According to Body Mass Index (BMI) players were divided into 4 groups. <18.5 there were17players,18.5-24.9group, there were111players,25.0-29.9group, there were 20playersand30.0-34.9group, therewere4 players.

According to years' work experience, players weredividedinto3groups:1-5,6-10,11-15.1-5years has77 players,6-10yearshas62 players,11-15years has13players.

Table 1: Demographic Characteristics Of The Cricketr Players

Characteristics	Subcategory	No.of participants
Totalsamplesize	Rlhtandslds	152
Population	Malecricket Players	152
AGE	18 Years	26
	19 Years	19
	20 Years	11
	21 Years	19
	22 Years	15
	23 Years	24
	24 Years	38
BMI	<18.5	17
	18.5-24.9	95
	25.0-29.9	16
	30.0-34.9	4
Workexperience	1-5years	77
	6-10years	62
	11-15years	13

TABLE 2 is showing the age wise prevalence of cricket players as in 18 years has 26 players, 19 years has19 players, 20 years has11 players, 21 years has 19 players, 22 years has 15 players, 23 years has 24 players, 24years has 38 players.

Table 2: Prevalence Of Rlht In Cricket Players According To Age

AGE	Total Players	Rlhtpositive	Prevalence
18years	26	23	88.46%
19years	19	19	100%
20years	11	11	100%
21years	19	17	89.47%
22years	15	15	100%
23years	24	22	91.66%
24years	38	37	97.36%

TABLE 3 is showing the age wise prevalence of cricket players asin18 years has 26players, 19 years has 19 players,20 years has11 players, 21years has19 players, 22years has15players, 23 years has 24 players, 24 years has38 players.

Table 3: Prevalence Of Slds In Cricket Players According To Age

AGE	Total Players	Sldspositive	Sldsprevalence
18years	26	17	65.38%
19years	19	15	78.94%
20years	11	9	81.81%
21years	19	13	68.42%
22years	15	13	86.66%
23years	24	19	79.16%
24years	38	30	78.99%

TABLE 4 is showing the prevalence of RLHT POSITIVE cricket players according to BMI. As shown in table<18.5has 17players,18.5-24.9has 111players,25.0-29.9has20players,30.0-34.9 has4 players.

Table 4: Bmi Wise Prevalence Of Rlht In Cricket Players

BMI(kg/m2)	Players	Rlhtpositive	Prevalence
<18.5(UNDER WEIGHT)	17	17	100%
18.5– 24.9(NORMALWEIGHT)	111	103	92.79%
25.0-29.9(OVER WEIGHT)	20	20	100%
30.0–34.9(OBESITYCLASS1)	4	4	100%

TABLE 5 is showing the prevalence of SLDS POSITIVE cricket players according to BMI.A sshown in table <18.5 has 17 players, 18.5-24.9 has 111 players, 25.0-29.9 has 20 players, 30.0-34.9 has 4 players.

Table 5: Bmi Wise Prevalence Of Slds In Cricket Players

BMI(kg/m2)	Players	Sldspositive	Prevalence
<18.5(Under Weight)	17	11	64.70%
18.5– 24.9(normalweight)	111	84	75.67%
25.0-29.9(Over Weight)	20	20	85%
30.0–34.9(Obesityclass1)	4	4	100%

TABLE 6 represents the prevalence of RLHT Positive players according to the work experience. Asshowing1-5 years has 77cricket players,6-10 years has 62 cricket players,11-15years has13cricket players.

Table 6: experience wise prevalence of rlht in cricket players

Workexpriance	Players	Rlhtpositive	Prevalence
1-5years	77	76	98.70%
6-10years	62	61	98.38%
11-15years	13	13	100%

TABLE 7 represents the prevalence of SLDS positive players according to the work experience. As showing1-5years has 77 cricket players, 6-10years has 62 cricket players,11-15 years has13 cricket players.

Table 7: Experience Wis Eprevalence Of Sldsin Cricket Players

Workexperience	Players	Sldspositive	Prevalence
1-5years	77	63	81.81%
6-10years	62	50	80.64%
11-15years	13	9	69.23%

TABLE 8 gives information about Royal London Hospital Test Positive in Right, Left and Age. Inthese18yearshas21positive,19yearshas18positive,20yearsh as10positive,21yearshas14 positive, 22 years has 12 positive, 23 years has 19 positive, 24 years has 32 positive Royal London Hospital Test.

Table 8: Prevalence Of Rlht In Cricket Players.

AGE	RLHT			
	Right(+)	Left(+)	Right PR.	Leftpr.
18years	21	11	16%	10%
19years	18	15	14%	14%
20years	10	8	7%	7%
21years	14	12	11%	11%
22years	12	11	9%	10%
23years	19	14	15%	13%
24years	32	24	25%	29%

TABLE 9 gives information about Single Leg Decline Squat Test Positive in Right, Left and Age. In this18years has14 positive,19 years has12 positive, 20years has8 positive,21yearshas11 positive, 22 years has 12 positive, 23 years has 13 positive, 24 years has 22 positive Single Leg Decline Squat Test

Table 9: prevalence of slds in cricket players.

AGE	SLDS			
	Right(+)	Left(+)	Rightprevalence	Leftprevalence
18years	14	10	15%	13%
19years	12	8	13%	10%
20years	8	5	8%	6%
21years	11	8	11%	10%
22years	12	9	13%	12%
23years	13	11	14%	14%
24years	22	23	23%	31%

Discussion

A cross sectional study was done to evaluate prevalence of Patellar Tendinopathy in male Cricket players of South Gujarat.

The study has included various cricket academics of South Gujarat such as Shree Sai Cricket Academy (Surat), Lal Bhai Cricket Academy (Surat), Bulsar District Cricket Association (Valsad) R.D Cricket Academy (Navsari) The demographic characteristics of the samples such as Name, Age, Gender, BMI, Work Experience, Previous medical or surgical history etc. The Royal London Hospital Test and Single Leg Decline Squats were used to find out the prevalence of Patellar Tendinopathy respectively.

The main intention of the study was to check prevalence of Patellar Tendinopathy in elite cricket players of south Gujarat population. Cricket is a non-contact sport; there is a

wide variety of causes of injuries. It is a multidimensional sport in which players engage in a wide range of diverse activities, namely batting, bowling, fielding (catching and throwing) and wicket keeping. Injuries on the cricket field tend to fall into one of two categories: repetitive/overuse and impact.

Patellar Tendinopathy is the clinical presentation of pain and dysfunction associated with activities that load the patellar tendon

Royal London Hospital Test, Single Leg Decline Test is one of the gold standard methods to diagnose Patellar Tendinopathy clinically. For the confirm diagnosis ultrasonography of the tendon can be performed. Visa - P Scale is also used for the evaluation of the pain level.

According to Krishna kadam *et al* (2023) Which included VISA P Questionnaire as a prime outcome measure concluded that the prevalence of patellar tendinopathy was 52%

Countering the above study, this study used SLDS and RLHT to get a more accurate prevalence of Patellar Tendinopathy. This study also includes the prevalence of patellar tendinopathy on the basis of age, BMI, work experience. In SLDS According to age, prevalence of patellar tendinopathy in cricket players in 18 years was 65.38%, 19years was78.94%, 20 years was 81.81%, 21 years was 68.42%, 22 years was 86.66%, 23years was 79.16%, 24 years was 78.99%. According to BMI, prevalence of patellar tendinopathy in cricket players is <18.5 was 64.70%, 18.5-24.9 was 75.67%, 25.0-29.9 was 85%, 30.0-34.9 was 100%. According to work experience, prevalence of patellar tendinopathy in the group:1to 5 years was81.81%,6 to 10 years was 80.64% and11 to 15was 69.23%

In RLHT, according to age, prevalence of patellar tendinopathy in cricket playersin18 years was88.46%,19years was100%, 20years was 100%, 21years was 89.47%,22

years was 100%, 23 years was 91.66%, 24 years was 97.36%. According to BMI, prevalence of patellar tendinopathy in cricket players is <18.5was100%,18.5-24.9was 92.79%, 25.0-29.9 was 100%, 30.0-34.9 was 100%. According to work experience, prevalence of patellar tendinopathy in the group:1 to5years was 98.70%,6 to10years was98.38%and11to15 was 100%.

In the study by Brooke K Coombes *et al* (2020) 15 out of 57 (26.3%), 22.8% in right leg,17.5% in left leg, 14.0% in bilateral sports players experienced pain during SLDS.

Contradicting, this study shows SLDS 116 out of 152 (74.34%) 59.86% in Right leg,49.34% in Left leg, 32.23 % in bilateral leg.

One more study done by Hannington *et al* (2020), which concluded that the Bilateral Tendon abnormality was 45% & unilateral abnormality was 15%

Opposing the number of above mentioned study that is15% unilateral, this study concluded 44.0% unilateral SLDS Positive for Patellar Tendinopathy.

Conclusion

The present study established that Patellar Tendinopathy is prevalent amongst cricket players. The gross prevalence of Patellar Tendinopathy has been noted 95.39% according to RLHT and 79.31% according to SLDS which shows the high prevalence. And the factors like age of player, BMI of players, experience of players have significant influence as an extrinsic factor of Patellar Tendinopathy.

Limitations

- The limitation of this study is we have not used MRI or US scan for the further confirmation of the diagnosis of Patellar Tendinopathy. Though US and MRI increases the likelihood of clinical diagnosis, but they are not gold standard.
- In this study only male cricket players were included.
- The study was confined only to limited areas.
- The study was limited to the given age group of18-24 years.
- The study has included only subjective outcome measure.
- The sample size was limited.

Further Recommendation

- Bigger studies on crickets of another region such as whole Gujarat can be carried out.
- Larger sample size can be used to get more precise result
- Factors such as less experiencethan3 years can be included.
- In further studies both male and female can be included.

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