Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/fn0xw184

CRICKET INJURIES IN CLUB-BASED PLAYERS: AN EPIDEMIOLOGICAL STUDY

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Abstract

Introduction- Cricket is a highly popular sport in India, particularly among young children and adolescents. The sport not only demands physical skills but is also physically strenuous, which can result in injuries that impact both physical health and mental well-being. The study sought to examine the incidence of sports injuries among adolescent cricketers in clubs in Delhi, as there is a notable deficiency in literature concerning the injuries sustained by club-based players.

Material &Methods- The descriptive cross-sectional study design was applied 4 different cricket clubs in Delhi. 136 adolescent cricketers of different categories of injuries including bowling, batting, wicket-keeping and fielding were included in this study. A self-structured questionnaire was developed, in which data was collected by face-to-face interview with the assistance of physiotherapist, coaches and trainers. Sports injury severity was graded and ranging by the Abbreviated Injury Scale (AIS).

Results- Of 136 players, 98 players were found to encounter injuries within a one-year duration. Factors like warm-up training and age were the key causes of these injuries. The average age of the participants was 19.95 ± 3.58 years, with ages ranging from 15 to 30 years. The highest injury incidence was observed among bowlers, with 60 players (61.2%) affected, followed by all-rounders at 29 players (29.6%). Various anatomical sites including the ankle, hamstring, hand, knee, quadriceps, shoulder, and wrist were found to be involved. Shoulder was the most commonly involved site among the injured players (15.3%). Specifically, 22.4% of players experienced lower back pain, 41.8% had lower limb injuries, and 35.7% suffered upper limb injuries.

Conclusion- Cricket injuries are remarkably high in club-based adolescent cricket players. Age and warm up and training are the key factors for the injury. Implementing exercise-based interventions, such as standardized specific cricket injury prevention programmes (CIPP), can enhance strength and flexibility.

Keywords : Cricket, AIS, Injury, club-based, CIPP

Introduction

Although cricket is classified as a non-contact sport, it is still associated with a high incidence of injuries due to overuse and impact.[1] Activities such as running, throwing, batting, and bowling place significant strain on the body, while the risk of projectile injuries from a hard cricket ball traveling at speeds of up to 160 km/h remains, even with the use of protective equipment.[2,3] Recent studies indicate that sudden fluctuations in workload, rather than the overall volume of activity, are more likely to elevate the risk of injury.[4,5,6,7] Furthermore, variations in workload may influence the types of injuries sustained.[8,9,10] The relationship between workload and injuries is a critical focus of research in the field of sports science. Cricket serves as a prime example of the intricate connection between workload and injury risk.[7] This is particularly evident because many elite cricket players compete across three distinct formats of the game: Test matches, One Day Internationals, and Twenty20.

Cricket's repetitive actions (bowling, batting, fielding) increase overuse injury risk. Player position and playing time influence musculoskeletal (MSK) problems.[11] Injuries are classified by onset: sudden noncontact (e.g., ACL tears), impact (e.g., mallet finger), gradual (e.g., bowler's back pain), and insidious (e.g., anterior knee pain from patella-femoral degeneration or posterosuperior shoulder pain linked to SLAP lesions). Medical issues (e.g., flu) also affect performance. Understanding these injury categories is vital for effective prevention and management in sports. Due to their potential to impact cricket training or play, these ailments have been included in the definition of cricket injuries since 2016. [12]

Younger cricket players are more prone to injury and recurrence than older players.[13] Injury incidence averages 26/10,000 hours for club players[14,15] and 333/10,000 hours for Australian first-class players.[16] Head, neck, and facial injuries comprise 20-25% of all cricket injuries.[17] Surprisingly, youth cricket injury research is limited despite the sport's popularity and injury risk.[18] A few studies focus on junior fast bowlers[19, 20, 21, 22], South African schoolboys[23], and Australian junior club players via insurance claims[24]. Asian cricket injury research is scarce. Studies by Rashaduzzaman M et al. [25] and Bodanki C et al. [1] examined musculoskeletal pain among teenage club cricket players in Dhaka and Indian junior club players respectively, highlighting the need for cricket injury prevention programs (CIPP) including warm-ups/cool-downs. Match injuries in Sri Lankan junior cricket were also documented by Gamage PJ et al. [26].

Professional cricket features three formats: fast-paced T20 (20 overs), strategic ODIs (50 overs), and endurance-testing Test matches (up to 5 days, two innings each), demanding varied skills and approaches. In recent years, elite cricketers suffer more musculoskeletal injuries than other lower limb issues, likely due to demanding T20 cricket. High over counts in these intense matches is a major contributing factor for hamstring injuries. Controllable factors like inadequate warm-ups, fatigue, poor flexibility, back pain, and muscle imbalances further elevate injury risk, emphasizing the need for injury prevention strategies.

The study's main focus was to assess the frequency of injuries among club and provincial cricketers throughout a season. Additionally, it aimed to explore risk factors associated with these injuries, providing insights into their causes in the sport. The findings are intended to inform strategies for improving player safety and preventing injuries.

Material and methods

A descriptive cross-sectional study was conducted at four cricket clubs in Delhi, India, from October 2022 to September 2023, involving 136 male registered cricket players. Coaches, physiotherapists, and trainers evaluated all players for musculoskeletal pain (injuries) over the past year using a questionnaire. The study protocol received approval from the institutional Research Ethics Board (REB) adhering to international ethical guidelines for biomedical research involving human subjects. (13). Written informed consent was given to the researcher while the data was being collected. Prior to data collection, each respondent received a briefing in Hindi. Every responder was made aware that they might withdraw from the study at any moment or choose not to participate. The responders'

personal data was kept entirely confidential. To ensure that no one could identify the individuals who participated, the information they provided was evaluated using code numbers.
In order to minimize the potential for recall bias in our study, we took the necessary step of thoroughly verifying the attendance sheets of all players involved. Alongside this verification, we also took the time to assess and document the various reasons for any absences noted during the season. To facilitate the collection of accurate information, the team manager took the initiative to distribute a comprehensive questionnaire to all players. This questionnaire was designed to gather a wide range of important information related to injuries, specifically including the following key details: (i) the specific anatomical site where each injury occurred; (ii) the month in which the injury took place; (iii) the circumstances or cause that led to the injury; (iv) the diagnosis provided by a qualified medical practitioner following the injury; (v) whether the injury was a recurrence of a previous one that the player had experienced before; and (vi) any additional instances of recurrence that may have occurred during the course of the season being reviewed.

Working definitions

A thorough database of every player's practice profile was maintained. All injury classifications were based on Dr. John Orchard's Cricket Australia model [30], with minor adjustments. Three categories are used to define and classify the player type. Bowlers—both fast and slow, batsmen, and all-around players who give both bowling and batting their equal effort. A fast bowler [31] was defined as a bowler for whom the wicketkeeper would normally stand back from the stumps, due to the increased speed of the ball when bowled.
An injury was defined as any physical damage that occurred during a match, practice or training session and which prevented the player from completing the match, practice or training session.[27]
Musculoskeletal pain (Injury) is defined as ‘A sensation of agony that inhibits the individual from participating in cricket or practice for a minimum of 24 hours’.[28]
Injury incidence was defined as number of injuries occurring per 10,000 hours of play.[29]
Prevalence was calculated as by the following formula: missed player days × number of injured players/numbers of play days × total number of players.[29]
The definition of a significant or match time-loss cricket injury is one that either prevents a player from being fully available for selection in a major match, or during a major match, causes a player to be unable to bat, bowl, or keep wicket when required by either the rules or the team’s captain[30]
The three body parts that were impacted by the musculoskeletal injuries were (i) the upper limbs, (ii) the back and trunk, and (iv) the lower limbs. These injuries were categorized as either fielding, bowling, or batting injuries. The severity of the injuries was assessed using the Abbreviated Injury Scale (AIS), which was classified as follows: AIS1 = minor, AIS2 = moderate, AIS3 = serious, AIS4 = severe, AIS5 = critical, and AIS6 = maximal (untreatable).[31]
To facilitate comparisons of injury phases, the number of injuries in each phase was calculated as a percentage of the total injuries. A comparison was made regarding the timing of injuries throughout the season. The off-season was defined as the period without specific cricket practice or training, while the pre-season included specific practice, training, and friendly matches. The season referred to the time when official matches were played in various competitions. No medical records were obtained from the injured players.

Data Processing

Information was gathered through the use of a semi-structured questionnaire designed specifically for this purpose. This questionnaire included a range of inquiries that focused on various important variables, such as anthropometric features, as well as information related to sports participation and health. The data collection process took place in the presence of the players, ensuring a comfortable environment for them to provide accurate responses. Additionally, any injuries that were present were identified with the assistance of coaches, physiotherapists, and trainers. Their expertise was crucial in accurately documenting the players' conditions and understanding the interplay between their physical characteristics and their health status related to their sporting activities.

Data Analysis

Upon completion of data collection, a comprehensive verification of the questionnaires was undertaken to ensure completeness, accuracy, and internal consistency, with any instances of missing or inconsistent data excluded. The validated data were subsequently inputted into a computerized system for analysis utilizing SPSS (Version 21), while Microsoft Excel 2007 was utilized for graphical representation of the findings. Descriptive statistical analysis was performed, with continuous measurements reported as mean, standard deviation, and range, and significance tested at the 5% level.

Results

The study comprised 136 male players who satisfied the inclusion criteria, of which 98 were classified as injured (72.1%) and 38 as uninjured (27.9%). Within the injured cohort, 37 players (37.8%) sustained mild injuries, 42 players (42.9%) had moderate injuries, and 19 players (19.4%) experienced severe injuries. The average age of the participants was 19.95 ± 3.58 years, with ages ranging from 15 to 30 years. The group included 80 bowlers (58.8%), 16 batsmen (11.8%), and 40 all-rounders (29.4%), as presented in Table 1. On average, these cricketers had engaged in professional or semi-professional play for 4.5 years (with a range of 1 to 10 years). The highest injury incidence was observed among bowlers, with 60 players (61.2%) affected, followed by all-rounders at 29 players (29.6%), and batsmen comprising 9 players (9.2%).

FIGURE 1: Frequency distribution of sports injury among the cricketers

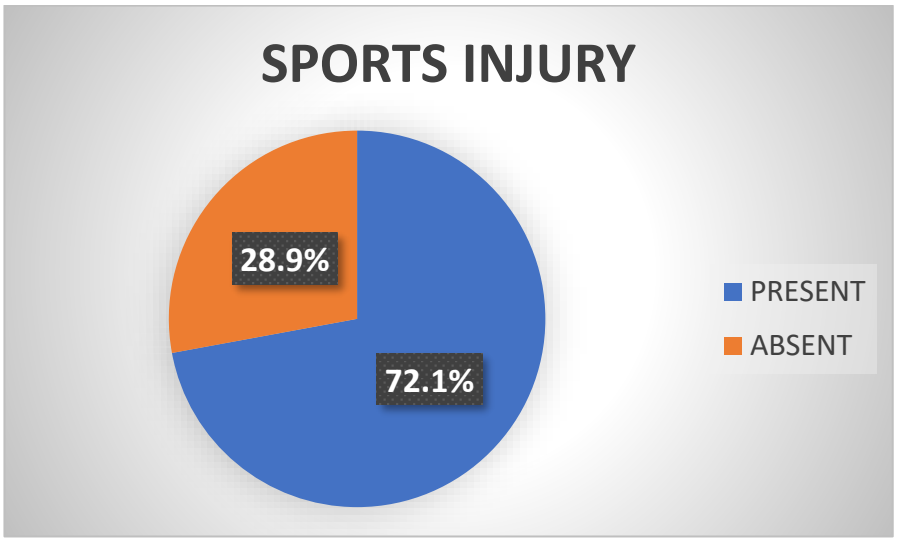

Table 1 : Player profile, demographic and anthropometric characteristics

Demographic and clinical profile of patients	
Number of players (n)	136
Age in years (mean; SD)	19.95±3.58
Body weight in kg (mean; SD)	62.15±5.15
Height in cm (mean; SD)	170.14±5.12
BMI (mean; SD)	21.44±1.25

Table 2 : Practice Profile

Warm up time (mean; SD)	23.14±8.26
Number of hours of daily practice (mean; SD)	5.51±1.01
Number of days of practice in a week (mean; SD)	5.04±0.88

The player practice profile is as follows- apart from competitive matches, all players had daily practice for specific hours at the Academy ranging from 4-7 hours (mean= 5.51±1.01). the maximum number of injured players were within age group of 15-20years. (Table 3) The mean BMI of players was 21.44±1.25, the mean height of players was 170.14±5.12 and the mean body weight was 62.15±5.15. (Table 4) Standard practice is 6 working days, with official day off on Sunday. However, we noticed that most of players played Local Street or club cricket on Sundays and so there was no actual 'day off' from the game. The number of hours of daily practice and number of hours of cricket practice per week detailed in Table 2.

Table 3: AGE IN YEARS- FREQUENCY DISTRIBUTION OF CRICKETERS STUDIED

AGE IN YEARS	WHETHER INJURED OR NOT		Total
	NOT INJURED	INJURED	
15-20	25(65.8%)	62(63.3%)	87(64%)
21-35	7(18.4%)	26(26.5%)	33(24.3%)
>25	6(15.8%)	10(10.2%)	16(11.8%)
Total	38(100%)	98(100%)	136(100%)

Table 4:Comparison of baseline characteristics in relation to Cricketers injured or not of respondents studied

Variables	WHETHER INJURED OR NOT		Total
	NOT INJURED	INJURED	
AGE IN YEARS	20.21±3.95	19.86±3.46	19.96±3.59
BODY WEIGHT KG	61.76±5.23	62.31±5.14	62.15±5.15
HEIGHT CM	169.66±4.89	170.33±5.22	170.14±5.12
BODY MASS INDEX(KG/M^2)	21.47±1.43	22.43±1.18	21.44±1.25

Table 5: Comparison of Daily practice related in relation to Cricketers injured or not of respondents studied

Variables	WHETHER INJURED OR NOT		Total
	NOT INJURED	INJURED	
WARM UP TIME	23.74±7.93	22.91±8.42	23.14±8.26
NUMBER OF HOURS OF DAILY PRACTICE	5.5±1.06	5.52±1	5.51±1.01
NUMBER OF DAYS OF PRACTICE IN A WEEK	4.89±0.98	5.09±0.84	5.04±0.88

The average warm-up duration before practice is 23.14±8.26 minutes, encompassing weight training, skills coordination, and aerobic flexibility. However, adherence to strict pre-warm-up and post-cool-down routines is lacking. We compared injured players against variables such as age, body weight, height, and BMI, as well as daily practice metrics like warm-up time, daily practice hours, and weekly practice frequency. (Table 4 and Table 5)

Table 6: PLAYER CATEGORIZATION- IN RELATION TO INCIDENCE OF INJURY OF CRICKTERS STUDIED

PLAYER CATEGORIZATION	WHETHER INJURED OR NOT		Total
	NOT INJURED	INJURED	
All rounder	12(31.6%)	28(28.6%)	40(29.4%)
Batsman	6(15.8%)	10(10.2%)	16(11.8%)
Bowler	20(52.6%)	60(61.2%)	80(58.8%)
Total	38(100%)	98(100%)	136(100%)

Table 7: SPECIFIC ANATOMICAL SITE IN UPPER/LOWER LIMB- IN RELATION TO INCIDENCE OF INJURY OF CRICKTERS STUDIED

SPECIFIC ANATOMICAL SITE IN UPPER/LOWER LIMB	WHETHER INJURED OR NOT		Total
	NOT INJURED	INJURED	
Normal	38(100%)	22(22.4%)	60(44.1%)
Abnormal	0(0%)	76(77.6%)	76(55.9%)
• Ankle	0(0%)	10(10.2%)	10(7.4%)
• Hamstring	0(0%)	11(11.2%)	11(8.1%)
• Hand	0(0%)	10(10.2%)	10(7.4%)
• Knee	0(0%)	10(10.2%)	10(7.4%)
• Quadriceps	0(0%)	10(10.2%)	10(7.4%)
• Shoulder	0(0%)	15(15.3%)	15(11%)
• Wrist	0(0%)	10(10.2%)	10(7.4%)
Total	38(100%)	98(100%)	136(100%)

Table 8: MECHANISM OF INJURY- IN RELATION TO INCIDENCE OF INJURY OF CRICKTERS STUDIED

MECHANISM OF INJURY	WHETHER INJURED OR NOT		Total
	NOT INJURED	INJURED	
Normal	38(100%)	6(6.1%)	44(32.4%)
Abnormal	0(0%)	92(93.9%)	92(67.6%)
• Direct hit	0(0%)	23(23.5%)	23(16.9%)
• Overuse	0(0%)	51(52%)	51(37.5%)
• Twisting	0(0%)	18(18.4%)	18(13.2%)
Total	38(100%)	98(100%)	136(100%)

Table 9: NUMBER OF DAYS OF REST/LOST DUE TO INJURY

NUMBER OF DAYS OF REST/LOST DUE TO INJURY	INJURED	%
1-10	64	65.3
11-20	26	26.5
>20	8	8.2
Total	98	100.0

Mean ± SD: 10.79±6.86

During the study, musculoskeletal pain was recorded in 98 cricketers, affecting various anatomical sites including the ankle, hamstring, hand, knee, quadriceps, shoulder, and wrist. The lower limb was the most frequently injured, followed by the upper limb, back, and trunk. Specifically, 22.4% of players experienced lower back pain, 41.8% had lower limb injuries, and 35.7% suffered upper limb injuries, with no injuries reported for the head and face. The mechanisms of injury and specific anatomical sites are detailed in Tables 7 and 8. The number of days lost due to injury have been documented in table 9 with a mean of 10.79±6.86 days.

Discussion

Our study centres on club cricketers aged 16 to 30. This age group is crucial, as the volume of play frequently takes precedence over the quality of training, leading to an amateur mindset, inadequate training, and an increased risk of injuries. Such injuries can diminish performance and obstruct potential. Junior club cricketers play a significant role in the future of cricket; therefore, our research seeks to enhance their performance and longevity by examining their training practices and the challenges they face.

We compared our results with previous studies. In our study, the mean age was 19.95±3.58 years (16-30 years), while in the studies by Jayasinghe HW et al.[32], Noorbhai et al.[28], Das NS, Usman J et al.[33], and Milsom NM et al.[34], the mean ages were 16.71±1.03 years, 15.6±1.1 years, 17.16±1.6

years, and 17.6±0.6 years, respectively. There was a significant correlation between injury and age observed in our study(p-value=0.002) which suggests younger players were more prone for injury may be because of improper technique.
We identified a significant correlation between injury and warm-up time. The average warm-up time in our study was 23.14±8.26 minutes, comparable to Bodanki C et al.[1] study, which reported 20±5.5 minutes. Islam MR et al [35] research found that 82.6% of players warmed up for 0-30 minutes, while 17.4% warmed up for 31-60 minutes.
The mean BMI for all players was 21.44±1.25, while the injured players had a mean BMI of 22.43±1.18. This aligns with Das NS, Usman J et al.[33] study, which reported a BMI of 22.36±3.9. No significant relationship was found between BMI and sports injuries, supporting findings by Islam MR et al [35] and Bodanki C [1], who suggested that a player's build may not contribute to observed injuries. Overall, the relationship between BMI and sports injury was insignificant.
Our research indicated that the shoulder was the anatomical site most frequently affected, with a rate of 15.3%. This is in agreement with the findings of Bipasha F et al.[36], who noted a significant prevalence of shoulder injuries. In a broader context, lower limb injuries were more prevalent, totalling 41 cases, which constitutes 41.8% of the overall injuries. This observation is supported by the studies of Noorbhai et al.[28], Dhillon, Soni et al.[37], Das NS, Usman J et al.[33] and Jayasinghe HW et al.[32].
According to our study, Lower back problems were fairly prevalent among cricketers. The elastic intervertebral discs transmit pressures more easily to the facet joints, putting unnecessary stress on the pars interarticularis, which can lead to major overuse injuries by limiting participation for extended periods of time. Excessive bowling during the growth stage, when the spine is still juvenile, increases the cricketer's vulnerability to injury, as the stresses connected with bowling cannot be absorbed.[38,39,40]

Our findings show that the most prevalent mechanism of injury was overuse, which accounted for 52% of all injuries, with direct hits following at 23.5%. This observation is supported by studies from Soomro N et al.[41], RA Stretch[42], and Bodanki C et al[1], all of which identified overuse as the most frequent cause of injury. In contrast, research by Bipasha F et al.[36] reported that traumatic injuries made up 51%, compared to 49% for overuse-related injuries.

Our research revealed an injury incidence rate of 1.35 per 10,000 hours of play, which is lower than the 3.27 reported by Dhillon, Soni et al[37]. Additionally, Bodanki C et al [1] found an injury incidence of 0.94.
Many injuries stem from ignoring pain, unsafe environments, inadequate warm-ups, and playing injured. Standardized Cricket Injury prevention programs (CIPP) can improve strength and flexibility. Training fatigued muscles post-exercise may build resilience and reduce injury risk. . For instance, repeated throwing motions by fielders can result in overuse injuries, such as rotator cuff tears in the shoulder, which can be mitigated through targeted strengthening of the rotator cuff muscles.

The issue of time lost to injuries is a significant concern for cricket coaches, administrators, and those involved in the training and rehabilitation of injured athletes. The majority of severe injuries were found to be fractures in the upper limbs, primarily caused by impacts during batting and fielding, as well as lower limb muscle strains and overuse injuries that are generally associated with repetitive actions. According to our study, the average duration of time lost due to injury was 10.79±6.86 days. Players in cricket, including batsmen, bowlers, all-rounders, and wicketkeepers, are subjected to distinct types of physical stress. For instance, wicketkeepers often perform at least 300 squats throughout an innings, while fielding requires various movements such as walking, shuffling, running, jumping, and diving. Fast bowlers face forces that can be 5-8 times their body weight on their knees during the front-foot contact phase, which heightens their risk of sustaining back and

lower limb injuries. CIPP structures its training sessions to specifically address the muscle groups that experience the most stress, ensuring that the training is tailored to each player's needs.
Clubs with limited financial resources may struggle to establish training programs that necessitate extra equipment. CIPP eliminates the need for additional gear, thereby addressing this socioeconomic challenge faced by cricket clubs. Our research underscores the existing training conditions and fitness levels within academies, while also focusing on often neglected injuries that can impede a cricketer's overall performance.

Contemporary cricket necessitates optimal physical conditioning. Proactive injury mitigation and surveillance are paramount for athlete welfare and performance enhancement. Fortunately, advancements in medical knowledge and therapeutic interventions have contributed to reduced injury severity and accelerated recuperation, notwithstanding a higher occurrence rate.
A more extensive, prospective analysis using standardized data collection techniques should be pursued, as one of the study's limitations may have been the cricketer's ability to accurately recall the diagnoses given by medical practitioners.

Conclusion

Advancements in the understanding of the scientific and medical dimensions of cricket, coupled with improvements in both surgical and nonsurgical treatment methodologies, have significantly reduced the time required for players to return to the game. Although the incidence of injuries in cricket has risen, their severity has notably diminished over recent decades. It is essential for junior club cricketers to undergo adequate physical training prior to engaging in practice or competitive matches. Incorporating CIPP as a warm-up before training and a cool-down afterward can enhance strength and fitness while also lowering injury rates. CIPP is advantageous as it necessitates no additional equipment beyond standard cricket gear, facilitating its implementation in academies of all sizes. Regular assessments of physical strength and injuries by a physiotherapist and sports medicine specialist are crucial to timely address any concerns, enabling players to perform at their optimal level and achieve success.

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