

# Seasonal incidence and nature of cricket injuries among elite South African schoolboy cricketers

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## Abstract

**Objective.** To identify the incidence and nature of injuries sustained by elite South African schoolboy cricketers.

**Design.** Data were collected retrospectively using a questionnaire. Cricketers recalled all injuries from June 2003 to May 2004.

**Setting.** The population consisted of 196 cricketers representing all provincial teams in the 2004 under-19 Coca-Cola Khaya Majola cricket week.

**Results.** Sixty-seven injuries were sustained by 196 cricketers, with an incidence of 34.2% during the period under review. Injuries occurred during matches (71.6%), throughout the season due to repetitive stresses sustained during matches and practices (14.9%), during practice (11.9%) and during other forms of training (1.5%). Bowling accounted for 50.7% of the injuries, fielding 32.8%, batting 14.9% and the remaining 1.5% occurred while warming up or training. The primary mechanism of injury occurred during the delivery stride and follow through of the fast bowler (34.3%). Eighty seven per cent of the injuries were first-time injuries while 13% were recurrent. Most injuries (40.6%) reported were severe and took the cricketers more than 21 days to recover. Cricketers were more prone

to injury during December and January.

**Conclusion.** The incidence and nature of injuries have been recorded and potential risk factors for injury have been identified. It is suggested that coaches and cricketers partake in continuous educational processes that focus on all the physical, mental and technical components necessary for success in cricket, with a national database

## Introduction

The game of cricket can be dangerous, considering that the ball (156 g) can travel up to 160 kilometres per hour ( $\text{km h}^{-1}$ ). Serious injuries as a result of being struck on the head by a cricket ball, while not a daily occurrence, can result if the correct protective gear is not worn. The nature of the game is evolving: while traditionally associated with a low to moderate injury risk, cricket is showing a dramatic increase in injury incidence.<sup>7</sup>

Australia, England and South Africa rank among the top researching nations with regards to the epidemiology of cricket injuries at first class level,<sup>5</sup> with New Zealand and the West Indies undertaking similar studies. It was only in 2005 that a standardised method of data collection and formulation was established and published.<sup>7</sup> However, to date Australia and the West Indies have been the only nations to utilise the internationally standardised method of data collection, making a comparison of injury profiling among the nations impossible. A study was conducted on elite male cricketers in Australia over a 10-year period and it was found that the injury match incidence varied from 31.4/10 000 man-hours in test matches to 59.4 injuries/10 000 man-hours in 1-day internationals. The average seasonal incidence was reported to be 16.3 injuries.<sup>8</sup> Following a 6-season study, using a similar method as the one in the schoolboy study, it was found that South African first-class cricketers are at risk of sustaining an average of 2.1 injuries per season.<sup>14</sup> As can be seen by the expression of the results, comparison between the various injury profiling systems are nearly impossible but with appropriate implementation of the standardised method, comparison between the injury profiles of various countries should be possible in the near future.

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The volume of literature on the epidemiology, mechanisms and prevention of cricket injuries is limited at the non-elite levels of play,<sup>2</sup> as shown by the report of a study relating to the nature of injuries among schoolboy cricketers carried out over 10 years ago.<sup>6</sup> The seasonal incidence of injuries among these schoolboy cricketers was reported as 49.0%.<sup>7</sup>

Younger cricketers were found to be more at risk of sustaining an injury and a recurrence of that injury during the season or the subsequent season than their older counterparts.<sup>14</sup> In a study conducted on senior provincial cricketers,<sup>11</sup> it was found that 19 - 24-year-old cricketers were more prone to injury than their older counterparts, sustaining 46% of the injuries acquired during a 4-season study. A more thorough investigation of injury profiling of this particular age group needs to be undertaken to ascertain the reasons for the increased injury incidence.

The primary aim of this study was to identify the incidence and nature of injuries sustained by elite South African schoolboy cricketers. The results will then be used to develop protocols in order to decrease the incidence of first-time and recurrent injuries.

## Methods

The population consisted of 196 cricketers representing all 16 provincial teams in the 2004 under-19 Coca-Cola Khaya Majola Cricket Week held in Pretoria in December. Data were collected retrospectively, using a questionnaire, for the period of June 2003 - May 2004 based on methods used in previous South African studies.<sup>8-11</sup> Each cricketer was interviewed and various terms were defined if any uncertainties arose.

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.<sup>7</sup> The questionnaire was designed to obtain the following information: (i) anatomical site of injury; (ii) month of injury; (iii) diagnosis of injury by a medical practitioner; (iv) cause of injury as perceived by the cricketer; (v) whether it was a recurrence of a previous injury; and (vi) whether the injury recurred during the season.

The incidence of injury was expressed as a percentage of the total number of injuries. Injuries were grouped according to the anatomical region injured: (i) head, neck and face; (ii) upper limbs; (iii) back and trunk; and (iv) lower limbs. The injuries were classified according to whether they were sustained during batting, bowling, fielding or other activities

including gym and fitness activities. The number of injuries in each phase was then expressed as a percentage of the total number of injuries to allow for comparison between the phases of play during which the injuries were sustained.

The cricketers involved in bowling were asked to give an approximation of the number of overs bowled during training in order to gauge individual workloads. Match workloads were not reported as schoolboy cricketers only play 1 - day cricket which allows for a maximum of 10 overs. Various questions were also asked regarding training specificity.

The Centre for Statistical Consultation at Stellenbosch University used Statistica 7.1 to compute univariate statistics and frequency distributions. The seasonal incidence was calculated using all reported injuries. The Pearson chi-square test was used to determine significant relationships between occurrences of injuries and the various phases of play. Due to the assumption of independent observations by the Pearson chi-square test, only singular injuries were considered. This means that even though a cricketer presented with two injuries, only one injury was considered for comparative statistics. The level of significance used was  $p < 0.05$ .

## Results

A total of 196 cricketers (94.2% of the projected population of 208 cricketers) present at the Coca-Cola Khaya Majola under-19 Cricket Week, an interprovincial tournament, completed the questionnaire. The age of the cricketers ranged from 16 to 19 years, with an average of  $17.6 \pm 0.6$  years. Of the 196 cricketers 126 were all-rounders, 24 batsmen, 26 bowlers and 20 wicket-keepers, 24 had represented their senior provincial teams and 19 had played nationally at under-17 or under-19 level.

Only 54% of the cricketers reported that they followed a pre-season training or fitness programme, but 27 cricketers reported that they were involved in cricket throughout the year, either playing indoor cricket or following a winter cricket programme. During the season, 21% of the players spent 1 - 5 hours per week, 68% spent 6 - 10 hours per week, while 22% spent more than 10 hours practising and training per week (Table I).

A total of 67 cricket injuries were reported during the period under review (June 2003 - May 2004). Seven players reported that they sustained 2 injuries during the period under review, with the incidence of injury for the group as 34.2%. No injuries were sustained to the head, neck and face

**TABLE I. The role of the cricketers and their weekly training loads\***

	1 - 5 hours		6 - 10 hours		11 - 15 hours		15 - 20 hours		Total	
	N	%	N	%	N	%	N	%	N	%
Bowler	7	3.6	16	8.2	3	1.5	0	0	26	13.3
Batsman	13	6.6	24	12.2	6	3.1	1	0.5	44	22.4
All-rounder	22	11.2	92	46.9	10	5.1	2	1.0	126	64.3
Total	42	21.4	132	67.3	19	9.7	3	1.5	196	100.0

\* Wicket-keepers were regarded as batsmen for this comparison.

**TABLE II. The anatomical site of injuries and phase of play in which it occurred**

	Batting		Bowling		Fielding		Other		Total	
	N	%	N	%	N	%	N	%	N	%
Head, neck and face	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Upper limbs	1	1.5	5	7.5	16	23.9	1	1.5	23	34.3
Back and trunk	2	3.0	18	26.9	1	1.5	0	0.0	21	31.3
Lower limbs	7	10.4	11	16.4	5	7.5	0	0.0	23	34.3
Total	10	14.9	34	50.7	22	32.8	1	1.5	67	100.0

**TABLE III. Severity of injuries (i.e. no. of days it took the player to recover) and the activities in which they occurred**

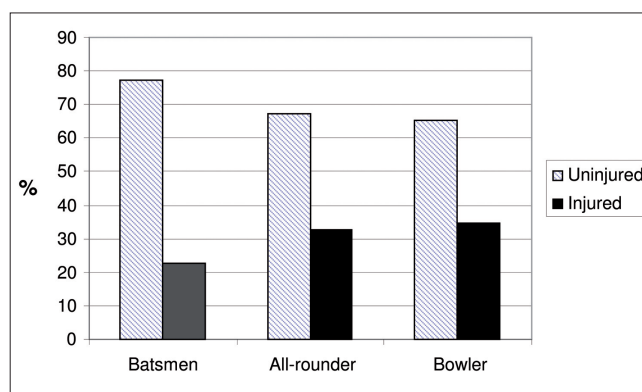
	Not given		1 - 7 days		8 - 21 days		> 21 days		Total	
	N	%	N	%	N	%	N	%	N	%
Batting	1	1.5	6	9.0	1	1.5	2	3.0	10	14.9
Bowling	0	0.0	8	11.9	9	13.4	17	25.4	34	50.7
Fielding	2	3.0	8	11.9	5	7.5	7	10.4	22	32.8
Other	0	0.0	1	1.5	0	0.0	0	0.0	1	1.5
Total	3	4.5	23	34.3	15	22.4	26	38.8	67	100.0

region while 34.3% were sustained to the upper limbs, 34.3% to the lower limbs and 31.3% to the back and trunk (Table II). Bowling accounted for 50.7% of the injuries, fielding 32.8%, batting 14.9% and the remaining 1.5% occurred while warming up or training.

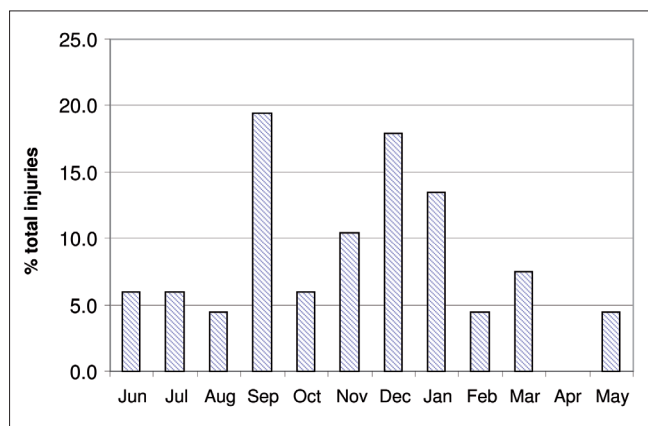
Cricketers sustained 71.6% of injuries during matches, 14.9% throughout the season due to the repetitive stresses sustained during matches and practices, 11.9% during practice and 1.5% of injuries occurred during other forms of training. Most injuries (40.6%) reported were severe and took the cricketers more than 21 days to recover (Table III). Thirty-six per cent of injuries allowed the cricketers to return to play within 7 days of acquiring the injury. Fifty-eight (86.6%) of the injuries were reported as being first-time injuries while only 9 injuries (13.4%) were due to the recurrence of a previous injury from a previous season.

At schoolboy level very few cricketers specialise as either batsmen or bowlers. This can be seen from the fact that there are almost 5 times as many all-rounders (126) compared with batsmen (24) and bowlers (26) in the current study. Versatility is advantageous to schoolboy cricketers although all-rounders are thought to be more susceptible to injury than batsmen and bowlers as the total impact on their bodies is far greater. Fig. 1 shows that there is no significant difference ( $p>0.05$ ) in the injury rate between all-rounders, batsmen and bowlers, although bowlers (33.3%) presented with slightly more injuries than the all-rounders (32.0%) and batsmen (25.0%). For the purpose of this comparison, wicket-keepers were regarded as batsmen.

Fig. 2 shows a breakdown of injuries sustained over the various months of the year. Cricketers were more susceptible to injuries during the pre-season (September) and over the



**Fig. 1. The injury incidence of all-rounders, batsmen and bowlers.**



**Fig. 2. A graph depicting the monthly proportion of injuries.**

December/January period when most of their high-intensity matches were played in competitions such as the Coca-Cola Khaya Majola under-19 Cricket Week. Injuries were also sustained by cricketers in their so-called 'off-season' and can be attributed to the winter cricket programmes hosted by schools and clubs.

Bowling was the major cause of injury among cricketers, comprising 50.7% of the total number of injuries reported. The 34 bowling injuries reported in this study occurred primarily as a result of overload in the run-up (2.9%), delivery stride (73.5%) and follow through (11.8%). Incorrect foot placement resulted in 11.8% of the injuries sustained by bowlers.

A brief description of bowling injuries follows. Lower back strain and lumbar vertebrae stress fractures (47.1%) were the most common injuries. Five cricketers (14.7%) sustained groin strains, 11.8% sustained ankle injuries and 8.8% sustained infraspinatus and deltoid strains. Intercostal strains (5.9%), biceps strains (2.9%), triceps strains (2.9%), meniscal lesions (2.9%) and tibialis anterior strains (2.9%) were also reported.

Fielding was the second leading cause of injury. Most of the 22 fielding injuries occurred from direct impact from the cricket ball (31.8%), when cricketers attempted to take a catch, chasing after the ball (22.7%), from diving to catch the ball and landing incorrectly (18.2%) and trying to stop the ball along the ground (18.2%). Other injuries occurred as a result of overloading the shoulder on ball release when throwing (4.5%) and overuse from throwing (4.5%).

Fielding injuries were found to include predominantly phalangeal fractures and/or dislocations (50.0%). Rotator cuff and deltoid strains (13.6%) were reported along with groin strains (9.1%) and ankle sprains (9.1%). One case each (4.5%) was reported for a glenohumeral ligament sprain, ulna fracture, slipped disc and hamstring strain.

Ten batting injuries were reported and occurred as a result of direct impact from the ball (30.0%), running between the wickets (30.0%), playing a shot (20.0%) and overuse following long spells out in the middle (20.0%). Batting injuries included: hamstring and quadriceps strains (30.0%), lower back strains (20.0%), anterior knee pain (10.0%), ankle sprain (10.0%), phalangeal fracture (10.0%), groin strain (10.0%) and tarsal fracture (10.0%).

The 67 injuries sustained comprised mainly of soft-tissue injuries which include muscle tears or strains (61.2%) and ligament tears or sprains (11.9%). There were 13 fractures reported (19.4%), 2 stress fractures (3.0%) and 1 dislocation (1.5%). Only 1 (1.5%) meniscal injury was reported and 1 (1.5%) of the cricketers presented with anterior knee pain.

## Discussion

The principal finding of the study is that the seasonal incidence of injury for the current study is 34.2%, which is significantly ( $p < 0.05$ ) lower than the seasonal incidence (49.0%) found in a previous schoolboy study.<sup>9</sup> There could be various explanations for the significant difference. These include:

- A difference in the population used. The previous schoolboy study<sup>7</sup> involved cricketers from the Border, Eastern and Western Cape regions, playing for their schools' first teams while the current study looked at all the provincial, under-19 cricketers.
- Loss of position within the team. Due to the nature of the game, players often compete to keep their places in the squad and might continue to play even though they are injured.
- Better management of players. Programmes were set in place to increase coaches' awareness of injuries, particularly bowling injuries, and the various factors that lead to these injuries. The use of helmets has also become more common, even compulsory in some cases, which could result in a decrease in the number of head and face injuries.

Fast bowling, in particular, is reported as being the phase of play with the highest injury incidence amongst cricketers.<sup>3</sup> Various factors pertaining to fast bowling, such as incorrect technique, volume and intensity<sup>1,14</sup> as well as conditioning<sup>4</sup> can lead to an increased risk of injury. In the current study bowling injuries comprised 50.7% of the total number of injuries reported, which is similar to the previous schoolboy study (47.4%).<sup>9</sup>

Significantly more fast bowlers (26.4%) than spin bowlers (8.7%) ( $p < 0.05$ ) were injured in the current study. In a study conducted on senior bowlers,<sup>4</sup> fast bowlers were found to be more prone to ankle (8.6%) and knee (11.4%) injuries while spin bowlers, particularly wrist spinners, were said to be more susceptible to shoulder injuries (11.9%). In the same study, the authors did not find a significant difference in the injury prevalence of the lower back between spin bowlers (2.4%) and fast bowlers (5.7%). This was supported by a study that found the lower limb to be the anatomical region most likely to be injured by elite adult fast bowlers.<sup>9</sup> Schoolboy fast bowlers, however, were found to present with more back and trunk injuries (26.9%), which was similar to that found in the previous schoolboy study, namely 26.3%.<sup>9</sup>

Young fast bowlers are more prone to overuse injury than their older counterparts.<sup>1</sup> Overuse injuries occur as a result of repetitive microtrauma where a number of forces combine to produce a fatigue effect.<sup>1</sup> Developing muscles, bones and musculotendinous attachments are areas of potential injury.<sup>1</sup> Fast bowlers who repeatedly hyperextend their lumbar spines in the delivery stride often experience lower back pain as rapid growth of the vertebral bodies is not matched by that of the dorsal soft tissues.<sup>1</sup> The increased elasticity of the intervertebral disc, incomplete ossification of the posterior vertebral elements and the incomplete formation of the iliolumbar ligament (until the third decade of life) can increase the propensity of young cricketers to injury.<sup>1</sup>

It is the elastic intervertebral discs that transmit forces more readily to the facet joints, placing undue stress on the pars interarticularis,<sup>1,5</sup> which can lead to serious overuse injuries as they can limit participation for long periods of time.<sup>1</sup> Excessive bowling throughout the growth period when the spine is relatively immature will increase the cricketer's

vulnerability to injury, as the forces associated with bowling are unable to be absorbed.<sup>5</sup>

The total number of batting injuries reported in the previous schoolboy study (29.8%)<sup>9</sup> was significantly higher than that found in the current study (14.9%).<sup>9</sup> In the current study, it was found that more (10.4%) respondents reported injuries to the lower limbs. No significant difference ( $p>0.05$ ) was found between injuries to the upper and lower limbs, back and trunk in the two studies. In the previous schoolboy study<sup>9</sup> it was found that the head, neck and face (17.5%) were significantly more susceptible to injury ( $p<0.01$ ). Even though no head, neck and face injuries were reported in the current study, batsmen are urged to continue following precautionary measures to prevent or minimise these injuries.

Injuries sustained while fielding comprised 37.8% of the total number of injuries reported. Although the schoolboys of the previous study<sup>9</sup> sustained proportionately fewer injuries while fielding (22.8%), it was not statistically significant. The upper limbs are more prone to injury than any other anatomical region and are responsible for 23.9% of injuries sustained by fielders. This is similar (12.5%) to the previous study.<sup>9</sup> The incidence of lower limb injuries in the current study (7.5%), was similar to that of the schoolboy cricketers (5.3%) in the previous study.<sup>9</sup>

Cricketers experienced a sudden increase in injury incidence during September – this could be attributed to a lack of pre-season training or due to the school holidays. A sudden rise in cricket injuries is also seen during December, when high-intensity cricket is resumed after a relatively inactive period due to year-end examinations.

It is advised that parents and coaches become aware that training programmes for senior cricketers are inappropriate for young cricketers.<sup>1</sup> Rest days should be incorporated into the guidelines for bowling workload, as it was reported that bowling more frequently than every 3.5 days led to a significant increase in the risk of injury.<sup>1</sup>

There appears to be a change in the injury profile of schoolboy cricketers. Where schoolboy cricketers are still prone to back injury due to the forces acting on the body while bowling with pace, there are fewer head, neck and face injuries, particularly during batting and there was an increase in the incidence of fielding injuries. It is advised that coaches try to incorporate some form of pre-season training in order to decrease the incidence of injury early in the season. Training

should not be discontinued during the season to ensure that cricketers remain optimally conditioned for all competitions.

A more thorough, prospective investigation, using the standardised methods for data collection, needs to be undertaken, as a possible limitation to the study was the cricketer's ability to accurately remember diagnoses given by medical professionals. Despite the belief that injury profiling at an amateur level is ineffective, the fact is that more 19 - 24-year-olds are sustaining injuries than their older counterparts.<sup>13</sup> The reasons for increased susceptibility to injury in this age group needs to be established. A serious injury at this age could halt the cricketers' career completely or shorten their playing careers dramatically.

## Acknowledgements

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