

Injury patterns of South African international cricket players over a two-season period

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Abstract

Objective. The aim of the study was to determine the incidence and nature of injury patterns of South African international cricket players.

Methods. A questionnaire was completed for each cricketer who presented with an injury during the 2004 - 2005 (S₁) and 2005 - 2006 (S₂) cricket seasons to determine the anatomical site, month, diagnosis and mechanism of injury.

Results. The results showed that 113 injuries were sustained, with a match exposure time of 1 906 hours for one-day internationals (ODIs) and 5 070 hours for test matches. The injury prevalence was 4% per match, while the incidence of injury was 90 injuries per 10 000 hours of matches. Injuries occurred mostly to the lower limbs, back and trunk, upper limbs and head and neck. The injuries occurred primarily during test matches (43%), practices (20%) and practices and matches (19%). Acute injuries comprised 87% of the injuries. The major injuries during S₁ were haematomas (20%), muscle strains (14%) and other trauma (20%), while during S₂ the injuries were primarily muscle strains (16%), other trauma (32%), tendinopathy (10%) and acute sprains (12%). The primary mechanisms of injury occurred when bowling (67%), on impact by the ball (batting – 65%, fielding – 26%) and when sliding for the ball (19%).

Conclusion. The study provided prospective injury incidence and prevalence data for South African cricketers playing at international level over a two-season period, high-lighting the increased injury prevalence for away matches and an increased match injury incidence for test and ODI matches possibly as a result of increased match exposure time.

Introduction

Long-term injury surveillance has been carried out in Australia, South Africa and England with the view to identifying injury patterns.¹⁻³ Data of injuries to Australian state and national cricketers were collected retrospectively for the first three seasons (1995 - 1996 season – 1997 - 1998 season) and then prospectively for the next six seasons (1999 - 2000 season – 2004 - 2005 season).³ Of the 886 injuries recorded, 92% were new injuries, 8% were recurrent injuries and 52% occurred during major matches. The injuries were mainly sustained while bowling (45%), with lower limb injuries accounting for 49% of the injuries. The mean incidence of injuries during matches for the season (injuries/10 000 player hours) was reported for domestic one-day (38.5), first-class (27.3), one-day international (ODI) (59.8) and test (31.4) matches. Fast bowlers missed about 16% of potential playing time because of injury, while other players missed less than 5%.

The study in South Africa² prospectively recorded 1 606 injuries in 783 national and provincial cricketers over a six-season period from 1998/1999 to 2003/2004. More injuries occurred during first-class matches (32%), with limited-over matches (26%) and practices and training (27%) resulting in a similar number of injuries. Fifteen per cent of the injuries accumulated gradually during the season. The majority of injuries were classified as acute injuries (65%), with chronic (23%) and acute-on-chronic (12%) injuries making up the balance. First-time injuries accounted for 65%, with the balance of injuries from the previous season (22%) and recurring again during the same season (13%). Bowling (40%) accounted for the majority of the injuries, with 55% of these being lower limb injuries and 33% back and trunk injuries. Of the 39 stress fractures, 79% occurred in bowlers. The primary activity associated with injury was the delivery and follow-through of the fast bowler (25%), running, diving, catching and throwing the ball when fielding (23%) and overuse (17%). Other activities included various batting situations, such as being struck while batting (7%), running between the wickets (4%), batting for long periods at a time (4%), training specifically for cricket (4%) and participating in various other sports (3%).

A retrospective study by Leary and White¹ on 54 cricketers who had played for the same county first team in England between 1985 and 1995 reported 990 injuries, indicating an injury exposure of 17 247 days played and an injury incidence rate of 57.4 injuries per 1 000 days played.¹ Most injuries were sustained early in the season, with bowlers most susceptible to injury (70.1 injuries per 1 000 days), followed by the all-rounders, batsmen and wicket-keepers with 55.0, 49.4 and 47.3 injuries per 1 000 days, respectively. Most injuries occurred to the lower limbs (45%), with muscle/tendon strains, contusions/haematomas, and ligament/joint sprains the most common injuries. The most vulnerable sites for injury were the thigh and calf (25%), fingers (14%) and lumbar spine (11%).

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The first study to use the internationally recognised surveillance method⁴ reported that 162 domestic and 33 international West Indian cricketers sustained 50 injuries. Most injuries were sustained in test and first-class matches (40%), with a further 28% sustained during one-day matches. The injury incidence for test and ODI matches was 48.7 and 40.6 injuries per 10 000 player-hours, respectively. For domestic first-class and limited overs matches it was 13.9 and 25.4 injuries per 10 000 player-hours, respectively. The injury prevalence for test (11.3%) and ODI (8.1%) matches was lower for home matches than away matches. Bowlers (46%) and batsmen (40%) were at the greatest risk of injury, with muscles (26%) and ligament (12%) injuries, stress fractures (12%) and fractures (10%) the most common injuries. Most of the injuries were new (80%), with 10% recurrent injuries from the previous season and 10% recurring again during the same season.

All these injury surveillance studies, with the exception of the study on West Indian cricketers,⁴ were carried out prior to the international acceptance of the publication of the consensus paper regarding injury definitions, methods of calculating injury rates and reporting of injuries.² Therefore, the aim of this study was to use the internationally agreed methods for injury surveillance to investigate the seasonal incidence and nature of injuries sustained by South African cricketers to further understand and identify injury patterns, risk factors and other possible factors associated with these injuries.

Methods

During the 2004 - 2005 (S₁) and 2005 - 2006 (S₂) cricket seasons, test and ODI matches played by the South African team were monitored prospectively. The data collection and reporting have been done according to the guidelines from the consensus paper developed to allow meaningful comparisons to be made with other international studies.⁵ The physiotherapists working with the teams were required to complete a questionnaire for all cricketers who presented with an injury. The questionnaire was designed to obtain the following information: (i) biographical data; (ii) month of injury during the season; (iii) activity and time of onset of injury; (iv) whether it was a first-time injury or recurrent injury from the previous or current season; (v) chronicity of the injury; (vi) whether the injury had recurred again during the season; (vii) OSICS⁶ injury classification code; (viii) diagnosis; and (ix) mechanism of injury. Further, in order to determine the player exposure it was necessary to collect information of the player's participation in each match, reasons for non-participation in a match and duration of the match.²

For the purpose of this research, an injury was defined as any injury or other medical condition that either: (i) prevents a player from being fully available for selection for a major match; or (ii) 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.⁵ Acute injuries were those of rapid onset, chronic injuries involved prolonged or extended onset, while acute-on-chronic injuries were increased symptoms of a chronic injury, but were brought about by movements causing rapid onset.

The time in the season when the injury occurred was recorded. Off-season was defined as that part of the season when no specific cricket practice or training was performed. Pre-season was that part of the season when specific cricket practice and training was undertaken before the commencement of matches. Season was defined as that part of the season where matches were played and included international tours.⁵

Injury incidence refers to the number of injuries occurring during the season, while injury prevalence is the average percentage of players who are not available for selection for a match.⁵

One of the limitations of this study was that it does not include the few 20/20 over competitions and the Afro-Asian Cup competitions during this period. Further, the effect of any South African players in the domestic competition was not included here as it has been included in a study on provincial players over the similar period.⁷

The BMDP Statistical Software Package (BMDP, 1993, Los Angeles, BMDP Statistical Software Inc.) was used to compute descriptive statistics. The chi-square test of independence was used to determine whether injury prevalence is related to home and away status.

Results

One hundred and thirteen injuries were recorded by 36 South African players over the two-season period. The injuries were evenly spread across both seasons (S₁=56 and S₂=57) and resulted in 39 matches being missed by players. The number of matches played from S₁ (37) to S₂ (33), regardless of format or venue, remained fairly consistent (Table I).

TABLE I. Number of matches played and missed

		S ₁		S ₂		S _T	
		#	%	#	%	#	%
Matches played (#)							
ODI	Home & away	22	100	22	100	44	100
	Home	12	55	10	46	22	50
	Away	10	46	12	55	22	50
Test	Home & away	15	100	11	100	26	100
	Home	7	47	6	55	13	50
	Away	8	53	5	46	13	50
Total	Home & away	37	100	33	100	70	100
	Home	19	51	16	49	35	50
	Away	18	49	17	52	35	50
Matches missed (#)		17	44	22	56	39	100
Injuries (#)		56	50	57	50	113	100

S₁ 2004 - 2005 season.

S₂ 2005 - 2006 season.

S_T 2004 - 2005 and 2005 - 2006 seasons.

Number.

The majority of the injuries were first-time (77%) and acute (86%) injuries in S₁, with similar results found in S₂ (75% and 88%, respectively). The number of recurring injuries from the previous season increased slightly from S₁ (9%) to S₂ (11%) and was

TABLE II. Injury occurrence

	S ₁		S ₂		S _T	
	#	%	#	%	#	%
First time	43	77	43	75	86	76
Recurring						
Previous season	5	9	6	11	11	10
Present season	8	14	8	14	16	14
Acute	48	86	50	88	98	87
Chronic	2	3	0	0	2	2
Acute-on-chronic	6	11	7	12	13	11
Injury occurrence						
Matches						
50-over	5	8	10	17	15	13
Test	30	54	18	32	48	43
Practice	11	20	12	21	23	20
Gradual onset	8	14	13	23	21	19
Training	2	4	4	7	6	5

S₁ 2004 - 2005 season.
S₂ 2005 - 2006 season.
S_T 2004 - 2005 and 2005 - 2006 seasons.
Number.

TABLE III. Regional distribution and diagnosis of injuries

	S ₁		S ₂		S _T	
	#	%	#	%	#	%
Regional distribution						
Head & neck	4	7	-	0	4	4
Upper limb	12	21	13	23	25	22
Back & trunk	7	13	6	10	13	11
Lower limb	24	43	21	37	45	40
Other	9	16	17	30	26	23
Diagnosis						
Haematomas	11	20	5	9	16	14
Acute sprains	3	5	7	12	10	9
Tendinopathy	2	3	6	10	8	7
Muscle strains	8	14	9	16	17	15
Other trauma	11	20	18	32	29	26
Joint inflammation	5	9	5	9	10	9
Other injuries	16	29	7	12	23	20
Total	56	100	57	100	113	100

S₁ 2004 - 2005 season.
S₂ 2005 - 2006 season.
S_T 2004 - 2005 and 2005 - 2006 seasons.
Number.

accompanied by a slight increase in acute-on-chronic injuries from 11% to 12% (Table II).

The injuries primarily occurred during matches (63%) in S₁, with the balance occurring as a result of practices (20%), during practices and matches (14%) and training (7%). However, there were fewer injuries that occurred during matches (49%) in S₂, with an increased occurrence in practices (21%), gradual onset (23%) and training (7%). The majority of injuries occurred during test matches (43%), practice (20%) or were of gradual onset (19%) (Table II).

The regional distribution of the injuries indicates that these were mainly to the lower limbs (S₁ – 43%; S₂ – 37%; S_T – 40%). However, there was a substantial increase in other injuries or illnesses, such as upper-throat respiratory tract infections, gastrointestinal infection and infection, from S₁ (16%) to S₂ (30%) (Table III).

TABLE IV. Injuries per activity and mechanism

	S ₁		S ₂		S _T	
	#	%	#	%	#	%
Batting	13	23	13	23	26	23
Impact by ball	11		6		17	
Batting – overuse	-		7		7	
Other	2		-		2	
Bowling	19	34	11	19	30	27
Delivery stride	1		-		1	
Over-bowling	6		3		9	
Bowling	4		7		11	
Other	8		1		9	
Fielding	14	25	13	23	27	24
Sliding for ball	4		1		5	
Running to field ball	1		1		2	
Impact by ball	5		2		7	
Catching a ball	2		1		3	
Throwing	-		1		1	
Other	2		7		9	
Fitness	1	2	2	4	3	3
Touch rugby	1		1		2	
Other	-		1		1	
Other	9	16	18	32	27	24
Illness	8		17		25	
Other	1		1		2	
Total	56	100	57	100	113	100

S₁ 2004 - 2005 season.
S₂ 2005 - 2006 season.
S_T 2004 - 2005 and 2005 - 2006 seasons.
Number.

The major injury categories in S₁ were haematomas (20%), other trauma (20%) and muscle strains (14%). However, the results were more evenly spread for S₂, with the major injury categories being muscle strains (16%), acute sprains (12%) and tendinopathies (10%). A large increase in other trauma was reported from S₁ (20%) to S₂ (32%) (Table III).

In S₁ the majority of injuries occurred while bowling (34%), fielding (25%) and batting (23%). In S₂ the injuries were distributed more evenly among fielding (23%), batting (23%) and bowling (19%). The mechanisms for injury were mainly impact when batting (*N*=17) and fielding (*N*=7), bowling and bowling for long periods (*N*=20) and illness (*N*=25) (Table IV). More injuries occurred during the first half of the season (October - December) than the second half (January - March) (Table V).

TABLE V. Injuries per month

	S ₁		S ₂		S _T	
	#	%	#	%	#	%
Pre-season	-	-	-	-	-	-
August	-	-	-	-	-	-
September	-	-	-	-	-	-
Season	56	100	44	77	100	89
October	1	-	-	-	1	-
November	19	-	16	-	35	-
December	12	-	11	-	23	-
January	7	-	6	-	13	-
February	5	-	1	-	6	-
March	12	-	10	-	22	-
Off-season	0	0	13	23	13	11
April	-	-	1	-	1	-
May	-	-	12	-	12	-
June	-	-	-	-	-	-
July	-	-	-	-	-	-
Total	56	100	57	100	113	100

S₁ 2004 - 2005 season.
 S₂ 2005 - 2006 season.
 S_T 2004 - 2005 and 2005 - 2006 seasons.
 # Number.

The match exposure time of ODI and test matches was 1 906 h and 5 070 h, respectively, with a total match exposure time of 6 976 h (Table VI). The ODI injury prevalence was higher for away matches (5%) than home matches (2%). Similar results were found for the test injury prevalence, with away matches (6%) producing more missed matches than home matches (2%). The total injury prevalence was higher for away matches (6%) than home matches (2%), showing a moderate practical significant difference (chi-square

TABLE VI. Exposure time, injury prevalence and incidence

		S ₁	S ₂	S _T
Exposure time (h)				
ODI	Home	520	433	953
	Away	433	520	953
	Total	953	953	1 906
Test	Home	1 365	1 170	2 535
	Away	1 560	975	2 535
	Total	2 925	2 145	5 070
Total	Home	1 885	1 603	3 488
	Away	1 993	1 495	3 488
	Total	3 878	3 098	6 976
Injury prevalence (% per match)				
ODI	Home & away	2.5	4.5	3.5
	Home	2.2	1.3	1.8
	Away	2.9	7.2	5.2
Test	Home & away	4.2	4.1	4.2
	Home	2.2	2.2	2.2
	Away	6.0	6.4	6.2
Total	Home & away	3.2	4.4	3.8
	Home	2.2	1.6	2.0
	Away	4.3	7.0	5.6
Injury incidence (injuries/10 000 h)				
ODI		53	105	79
Test		101	84	95
Total		90	90	90

S₁ 2004 - 2005 season.
 S₂ 2005 - 2006 season.
 S_T 2004 - 2005 and 2005 - 2006 seasons.

(1)=5.13, *p*=0 .023, *V*=0.07, and increased slightly from S₁ (3%) to S₂ (4%). The injury prevalence was higher in test (4.2%) than ODI (3.5%) in both home (test: 2.2% and ODI: 1.8%) and away (test: 6.2% and ODI: 5.2%) matches. The match injury incidence of ODI and test matches was 79 and 95 injuries/10 000 h, respectively, with a total match injury incidence of 90 (Table VI). No home and away injury incidence could be calculated.

Discussion

The first important finding was that the injury prevalence was greater in test (4.2%) than ODI (3.5%) matches. When compared with the West Indian and Australian study, the South African injury prevalence was less than in the West Indian and Australian test (11.3% and 7.0%, respectively) and ODI (8.1% and 10.0%, respectively)

matches. A possible explanation for this is that the West Indian and Australian studies were conducted over only one season, with the possibility of one serious injury requiring surgery and a long-term lay-off having a greater effect on the injury prevalence.

The second important finding was that the South African match injury incidence for test (95/10 000 h) and ODI (79/10 000 h) matches was significantly higher than that of the West Indian and Australian test (48.7 and 23.1 injuries/10 000 h, respectively) and ODI (40.6 and 38.5 injuries/10 000 h, respectively) injury incidence.⁴ In the current study no practice or fitness exposure time was recorded for the South African cricketers, which would greatly influence injury incidence as seen by the South African provincial cricketers.⁸ Further, the South African cricketers had more match exposure time compared with that of the West Indian and Australian studies.

A large number of injuries were first-time injuries of an acute nature, which included impact injuries, particularly when batting, resulting in haematomas and other trauma injuries. However, there was an increase in recurring injuries from the previous season, which was accompanied by an increase in acute-on-chronic injuries, with the majority of the injuries being muscle strains, tendinopathies and acute sprains. The abovementioned could have been the result of the players returning to play without being fully rehabilitated and the nature of the injury sustained.

When playing international cricket, test matches are generally scheduled to be played first in the series before the ODIs, which could explain the increased number of injuries during the early part of the season regardless of home and away matches. However, the increased number of injuries towards the end of the season could be due to the South African end-of-year tours. During the longer version of the game the players tend to be relatively inactive for long periods of time before rapidly moving after the ball when fielding. Bowlers may be required to bowl multiple spells, sometimes accumulating more than 20 overs in a day compared with four - ten over spells in limited over cricket. This could have resulted in the large number of injuries that occurred during fielding and bowling, particularly during test cricket.⁷ Similar results were found with the South African provincial players.

The primary mechanisms of injury were bowling, sliding for and impact by the ball when fielding. Similar results were found where many of the West Indian injuries were muscle strains caused by running after and picking up the ball and injuries to young fast bowlers.³ These activities all require some kind of stop-start movement and/or change in direction of the whole body requiring strength, agility and flexibility. In sports involving bouncing and jumping activities, with a high intensity of a stretch-shortening cycle,

a stretching programme significantly influenced the viscosity of the tendons, making them more compliant, and stretching may be beneficial for injury prevention.⁷

For both ODI and test matches the injury prevalence showed a practical significant greater difference for away than home matches, which was similar to the West Indian study.⁴ The possible reason could be multifactorial and could include factors such as unfamiliar climate and underfoot conditions, different food and beverage intake, amount of time before receiving medical treatment, particularly in the case of illnesses such as upper-throat respiratory tract infections, gastrointestinal infection and infection. A second report on West Indian cricket has shown a decrease in the number of away injuries over the past five years as a result of a physiotherapist and a structured medical panel overseeing the management of injuries when on tour,⁹ which appears now to be standard practice with all the touring teams of the major cricket- playing nations.

Conclusion

Injury surveillance is the fundamental process behind successful injury prevention and should be carried out on an on-going long-term basis using the internationally accepted injury surveillance method for the reporting of injuries at all levels of South African cricket. The study provided prospective injury incidence and prevalence data for South African cricketers playing at international level over a two-season period, highlighting the increased injury prevalence for away matches and an increased match injury incidence for test and ODI matches, possibly as a result of increased match exposure time.

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