

Original Article

## Mechanism and situation of injuries in fast bowlers: A YouTube-based video analysis study

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### ABSTRACT

**Objectives:** The present study was conducted with the objective of identifying the cause of injuries in fast bowlers.

**Materials and Methods:** The present study is a video analysis study, keywords such as “fast bowler’s injury,” “failure of bowling,” and “cricket injuries” were searched on YouTube. Bowling action was divided into four stages – Stage 1 – jump, Stage 2 – back foot contact, Stage 3 – front foot contact, and Stage 4 – follow-through. The type and timing of injury (stage) were noted after analyzing the videos.

**Results:** Sixteen injuries were identified in five videos. It was observed that 15 athletes had acute injury to lower limb and 1 athlete had an acute injury to lower back. 13/16 injuries happened in Stage 2 and 3/16 injuries happened in Stage 4.

**Conclusion:** Most of the injuries happened at the time of landing and follow-through. Therefore, improvement of ground conditions, especially around the bowling area, and addition of exercise-based injury prevention programs can reduce the risk of injuries. This is more important for young fast bowlers at the club levels and state levels, as proper training at an early stage, can prevent injuries in many young fast bowlers.

**Keywords:** Cricket, Fast bowlers, Sports injuries, Lower limb injuries, Core weakness

### INTRODUCTION

Cricket is one of the oldest sports and has been played since the 16<sup>th</sup> century. This sport has undergone considerable changes, especially in the past two decades. Fast bowlers play an important role in cricket and are more prone to injury as compared to batsmen and fielders.<sup>[1,2]</sup> Due to this, a fast bowler’s career is usually shorter and even in a short career, fast bowlers have to recover from multiple injuries, leading to a significant loss of on-field time.<sup>[3]</sup> Overall, the reported prevalence of match injury was 49.2–51.6 injuries per 10,000 player-hours.<sup>[4,5]</sup> In recent years, the number of matches per season has increased significantly due to which workload on players has increased drastically. The introduction of premier leagues has further added to an increased workload on the fast bowlers.

The most commonly reported injuries in fast bowlers are knee injuries, hamstring injuries, ankle injuries, and back injuries.<sup>[6-14]</sup> It is thus imperative to ascertain the cause of these injuries. The present study is an attempt to identify the cause of some of these injuries. In the present study, videos of various players, who got injured while playing international or Premier League games,

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were studied with the aim of identifying the cause of these injuries.

## MATERIALS AND METHODS

The present study is a video analysis study and review of the literature regarding the fast bowler's injuries in cricket. Videos were searched on YouTube using keywords such as "fast bowler's injury," "failure of bowling," and "cricket injuries." After seeing several videos, five relevant videos were identified. Only the videos of fast bowlers who got injured during bowling were included in this study, whereas videos in which injury occurred during batting or fielding were not included in this study. Fast bowlers who were injured after Stage 4 (collision/hit by a ball on follow-through/injured while fielding or catching in follow-through) were also not included in this study. Even in these videos, clips showing injuries of many players were repeated. Repeated clips were ignored and only new clips were considered. After analyzing these five videos, the site (back or lower limb) and side (dominant or non-dominant) of injury were classified. For a better understanding of causes of injuries, bowling action was categorized into four stages: Stage 1 – Jump, Stage 2 – back foot contact, Stage 3 – front foot contact, and Stage 4 – follow-through [Figure 1]<sup>[15]</sup>. The injury patterns were further studied according to these stages. A total of 16 injuries were studied in 15 players [Table 1].

## RESULTS

In the present study, 15 international male players who got injured while bowling were studied. All these bowlers were injured by a non-contact mode of injury. All the players were right-arm medium-fast bowlers. About 87% (14/16) of bowlers had an injury to the dominant limb. About 94% of players had an acute injury to lower limb and only one player had an acute injury to lower back. 7/16 players got injured in a test match, 5 players got injured while playing a T20 match, and 4 players were injured while playing a 50 overs a side

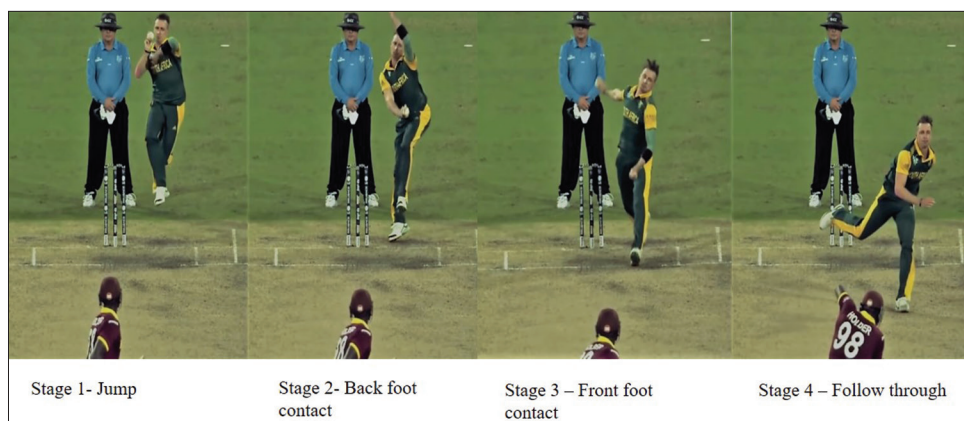
match. 13/16 injuries happened in Stage 2 and 3/16 injuries happened in Stage 4.

After analysis of various videos, it was observed that most injuries occurred due to improper landing after jump [Figures 2 and 3]<sup>[16,17]</sup> as momentum generated during run-up acts as a force causing increased strain on the knee, ankle, and groin region.

The second most common cause of injury is loss of balance during the follow-through due to the bowler's attempt to change direction to avoid running on to the dangerous area of the pitch and to decrease the momentum generated during the run-up.

## DISCUSSION

The fast bowler plays a key role in cricket. These players are at higher risk of injury as compared to batsman.<sup>[18,19]</sup> Due to injuries, many fast bowlers lose significant on-field time and some may even have to retire prematurely. Both intrinsic and extrinsic factors are responsible for injuries in fast bowlers.<sup>[20-22]</sup> In the present study, it was observed that most of the injuries occurred in Stage 2; possible reasons for Stage 2 injuries are slippery ground conditions, poor neuromuscular control, and core muscle weakness. Due to poor neuromuscular control, bowlers were unable to plant the foot properly on landing. Another possible cause could be poor ground conditions, causing slippage of the foot while landing. Stage 2 is a single leg stance phase, where all body weight are transferred to the foot and the momentum generated during the run-up, make this step a little more complicated. Therefore, great neuromuscular control is required for proper positioning of the foot at the time of landing. Improper positioning of the foot and slippery ground conditions is mainly responsible for Stage 2 injuries. A recent meta-analysis study also suggested that neuromuscular deficiencies and weak core strength are the major reasons for non-contact injuries in fast bowlers.<sup>[23]</sup> Neuromuscular training during warm-up can reduce chances of injury, as most of the injuries happen due to improper



**Figure 1:** Four stages of bowling action. Courtesy: YouTube videos.

landing on dominant stride. Daneshjoo *et al.* in their study reported that FIFA 11+ and Harmoknee warm-up protocols improve the knee proprioception of both the dominant and non-dominant limbs. Lauersen *et al.* in their review study observed that incidence of both acute and chronic injuries can be reduced with proprioception and strength training.<sup>[24]</sup> FIFA11+ protocol and various injury prevention programs were observed to be associated with a decreased incidence of lower limb injury.<sup>[25-27]</sup> These injuries prevention programs focus on better dynamic neuromuscular control, trunk endurance exercises, and strengthening core muscles.<sup>[28-31]</sup>

Fast bowlers sprint before jump to generate pace in the delivery. It was reported that jump following the sprint leads to greater knee valgus and increased chances of injury.<sup>[32]</sup> In the present study, it was observed that an injury occurring in Stage 2 leads to dynamic knee varus and injury in Stage 4 leads to dynamic knee valgus.

Core strengthening exercises are advised by several studies to prevent lower limb injuries. Injuries that happened in Stage 4 occurred due to the inability to maintain balance in follow-through, to avoid running over the dangerous area of the pitch,



**Figure 2:** (a) Improper landing leading to slip during bowling, (b) proper landing during bowling. Courtesy: YouTube videos.



**Figure 3:** Ankle injury (3a) and knee injury (3b) happened due to improper landing (stage 2).

there is a need of sudden change in direction, which causes a strain on the knee and can even lead to dynamic knee valgus and hamstring strain. A stable core helps in maintaining balance after sudden perturbation and decreases the chances of knee and back injuries. The previous studies suggested that stable core can also improve the bowling speed of a fast bowler.<sup>[33]</sup>

Chronic backache is another major concern among fast bowlers.<sup>[6,7,34]</sup> The reported incidence of backache among fast bowlers is as high as 14%.<sup>[35]</sup> Most of these injuries are overuse injuries, causing stress fractures and degenerative disc diseases.<sup>[36-43]</sup> It was also reported that lateral flexion [Figure 4]<sup>[44]</sup> happening during the bowling action is one of the major causes of the back pain.<sup>[6,45-47]</sup> Lateral flexion and trunk rotation occur at the time of Stages 2 and 3, causing strain on the opposite side of the back. Lateral trunk rotation and counter-rotation of shoulders are other factors, responsible for strain on the back.<sup>[39]</sup> Core stability is reported to have an association with back injuries in cricketers.<sup>[48-50]</sup> Bayne *et al.* in their study of 12 fast bowlers observed that bowlers who had weak core and back muscles were at a higher risk of injury.<sup>[51]</sup> Olivier *et al.* in their prospective study observed that fast bowlers who have weaker core strength are more prone to injuries.<sup>[52]</sup> Stuber *et al.* in their meta-analysis reported that there is a significant decrease in back pain intensity with the addition of core stability exercises in athletes.<sup>[53]</sup>

Neuromuscular training and core stability exercises should be considered as an important part of training of fast bowlers. Implementation of injury prevention programs at junior levels can help in decreasing the incidence of injuries among the fast bowlers.

This study had some limitations, as this is a video-based study and not complete data of all injuries. Therefore, section bias of available source is present. Further, prospective studies are required to see the impact of the addition of neuromuscular



**Figure 4:** Demonstrating lateral flexion during bowling. Courtesy: Yahoo.com

**Table 1:** Details of bowlers injured during the matches.

	Side	Stage	Match
Video 1	Dominant (right)	Stage 4	Test match
	Dominant (right)	Stage 2	Test match
	Dominant (right)	Stage 2	Test match
	Dominant (right)	Stage 2	T-20
	Non-dominant (left)	Stage 4	Test match
	Dominant (right)	Stage 2	One day
	Dominant (right)	Stage 2	Test match
	Dominant (right)	Stage 2	T-20
	Dominant (right)	Stage 2	T-20
Video 2	Non-dominant (left)	Stage 4	T-20
Video 3	Back injury	Stage 4	One day
Video 4	Dominant	Stage 2	One day
	Dominant	Stage 2	Test match
	Dominant	Stage 2	One day
Video 5	Dominant	Stage 2	Test match

training and core strengthening exercises in prevention of injuries in fast bowlers.

## CONCLUSION

Improvement of ground conditions, especially around the bowling area and the addition of exercise-based injury prevention programs, can reduce the risk of injuries. This is more important for young, fast bowlers at the club level and state level, as proper training from an early stage, can prevent injuries in many young fast bowlers.

## Ethical considerations

All the videos we accessed are publicly available, data were treated confidentially, no personal information was accessed and therefore ethical permission is not required.

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## Declaration of patient consent

Patient's consent not required as there are no patients in this study.

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Nil.

## Conflicts of interest

Dr. Ravi Gupta is on the Editorial Board of the Journal.

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