



## Epidemiology of Injuries in Field Hockey in India

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### ABSTRACT

Field hockey is one of the utmost popular team sports and a well-documented one too. There are less number of studies in Indian context to specifically evaluate prevalence and risk factors issues which is acting as a barrier for the injury prevention programme as well as the efficacy of the players. Hence, the purpose of this research was to find the epidemiology of injuries among the field hockey players which can help to understand the injury patterns in terms of anatomical site of the body, gender variance, injury in relation to playing positions and playing situations, severity and time loss due to injury. Identification of injury patterns and its prevalence, thereby providing a better help in prevention of these injuries. Sample consisted of 179 field hockey players recruited using convenient sampling and snowball technique. The data was collected through scheduled interview. The prevalence of injury in the game of field hockey was 17.9% whereas the two years' prevalence was 34.6%. The incidence of injuries was 8.38%. The most commonly injured anatomical site was lower limb (65.6%) followed by back & upper limb. Most commonly injured body part was anterior leg (28.13%) followed by knee. Practice injuries (62.5%) were more prevalent than injuries in game situation. Non-contact injuries (65.63%) were more prevalent than the contact injuries. History of previous injury found to be highly associated with the prevalence of injuries ( $P < 0.05$ ). Immediate reporting of any injury or discomfort, to the physiotherapist and giving priority to complete recovery from injury rather than early return to game is the need of the hour. Providing regular physiotherapy treatment and injury prevention programme may reduce the rate of prevalence and improve efficacy.

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### INTRODUCTION

Every Sport has risk of injury with it and its own particular injury profile. The more is the participation within a game, the more will be the number of Injuries (1). As injuries act as barriers to the upliftment of physical activity and result in costs for society, prevention measures should be undertaken to avoid them. Hence epidemiological research is the fundamental first step in the sequence of prevention (2). The origin of modern hockey has not been recorded but the game is believed to start from the days of civilizations, making it possibly one of the oldest sports. Despite the large number of literature on the epidemiology of injuries in field hockey worldwide (3,4,5,6), there are less number of studies in Indian context to specifically evaluate prevalence and risk factors issues which is acting as a barrier for the injury prevention programme as well as the efficacy of the players. If India has to emerge as an elite nation, organized research into injury epidemiology and prevention is necessary. Keeping this in mind the purpose of this survey is to find the epidemiology of injuries among the players of field hockey which can help to understand the injury patterns in terms of anatomical site of the body, gender variance, injury in relation to playing positions and playing situations, severity and time loss due to injury. Identification of injury patterns and its prevalence, there by providing a better help in prevention of these injuries.

### MATERIAL AND METHODS

Sample consisted of 179 field hockey players (95 males and 84 females) recruited by means of convenient sampling. The snowball technique with the intent of taking as much field hockey players as possible. The players from age group 15 to 30 with minimum 2 years of playing experience were included. Recreational players were excluded using this criterion. Subjects were recruited from Kalinga Stadium- Bhubaneswar, National Under-17 hockey Championship-Ambala, Surjit hockey stadium- Jalandhar, Punjab Agricultural University-Ludhiana, Punjabi University Patiala, NSNIS Patiala. The data was collected through scheduled interview.

### Survey Instrument

An extensive literature search was done to locate appropriate questionnaire. The initial draft consisted of 64 questions. This draft was shown to a 5 field hockey coaches from Odisha, Punjabi university and National institute of sports, Patiala and 6 senior physiotherapy expert to validate the content and as per their suggestions 5 questions were deleted, 30 questions were added and 3 questions were modified. The final questionnaire was validated with content validity ratio 0.73 (8 out of 11). The final interview schedule consisted of 89 questions which were further divide into 13 domains focusing on demographic, socioeconomic status, playing position and surface, training profile, recovery, safety measures, present injuries and past injures.

### Survey Protocol

After getting the clearance from technical committee as well as ethical committee of Punjabi University, Patiala, the investigator personally went to field hockey stadiums and training institutes in various parts of India and met respective coaches. A letter from Department of Physiotherapy, Punjabi University, and Patiala requesting coaches to cooperate with the investigator was handed over to them. Coaches were explained in detail about the study. The field hockey players were interviewed during the competition after the days' play is over. During the practice schedule either in appropriate break times or after cool down period not to disturb competitors and practice session.

### Statistical Analysis

Statistical analysis was done using mean, Standard Deviation and percentage. Chi-square test was used to determine relationship of continuous and categorical variables respectively. Statistical significance is accepted at  $p < 0.05$  level.

## RESULT AND DISCUSSION

The prevalence of injury in the game of field hockey was 17.9% whereas the two years' prevalence was 34.6%. The incidence of injuries was 8.38%. This finding is largely in disagreement with the study of Sethy and Sinha (7). They reported 73.2% injury rate in the pre-Olympic preparation camp 2012. The major difference was found may be due to the level of players involved, intensity of training and method of collection of data. Previous study also reported higher prevalence (38%) than the present study (8). It might be due to the difference in duration of survey and relatively smaller sample size of 111. Various other studies (3,9,10) opted different methods to report the prevalence making it difficult to compare. The incidence of injury in the period of survey was 8.38%. Cumstock reported incidence of injury in 122 high school girls to be 1.48 per 1000 A-E which opted different method of reporting making it difficult to compare with the present study (5). No other studies reported the incidence of injury to the best of our knowledge.

Table 1: Prevalence of injury in the injured and injury free group in past 24 months

		Injured group	Injury free group	Total
Prevalence of injury in past 24 months	YES	18(56.25%)	44(29.93%)	62(34.64%)
	NO	14(43.75%)	103(70.06%)	117(65.36%)
Total		32 (100%)	147 (100%)	179 (100%)

Analyzing the mechanism of injury in the current session it was observed that the noncontact injures were more common (65.63%) than the contact injuries (34.37%). This is in agreement with a study which reported 57.4% noncontact injuries followed by 42.6% contact injuries whereas extrinsic injuries (22%) were reported on a lower side (7,11). However, the sample size in those studies was quite smaller. A study focused on rehabilitation reported 17 repetitive injuries in comparison to the 8 traumatic injury in shoulder (12). On the other hand, most of the studies disagree with the current finding and reported contact injuries to be more common(9,13,14). Mukherjee had done a prospective study at the junior world cup which may influence the mechanism as lack of skill and technical difference from the elite players.

Players play at different positions according to the need of the team and rule of the game. It engages the players to different jobs such as defending, attacking, tackling predisposing them to different patterns of injury. In the present study forward players were most prone to injury (43.75%) followed by defenders (31.25%), midfielders (18.75%) and goalkeepers (6.25%). Studies of Kumar *et al.* (2015), Sharma *et al.*(2009) Some studies were supported by the present study with similar results whereas one study reported goalkeeper to be the most vulnerable position and few reported midfielders to be the most injury prone position (8,14,3,5). It may be due to at the time of study, goalkeepers were not equipped with enough safety equipment resulting in higher rate of injury. Contact injuries were more in midfielders whereas forward, defenders and goalkeepers sustained more number of noncontact injuries. No studies reported relationship between player position and mechanism of injury. High contact injury among

midfielders may be due to their frequent tackling job however further research could provide a better picture. Increased number of noncontact injuries among forward and defenders may be due to rapid rotational movements as it increases the risk of MCL and ACL sprain. Goalkeepers sustained least number of injury. It may suggest the success of using more safety equipment in recent times(3,8).

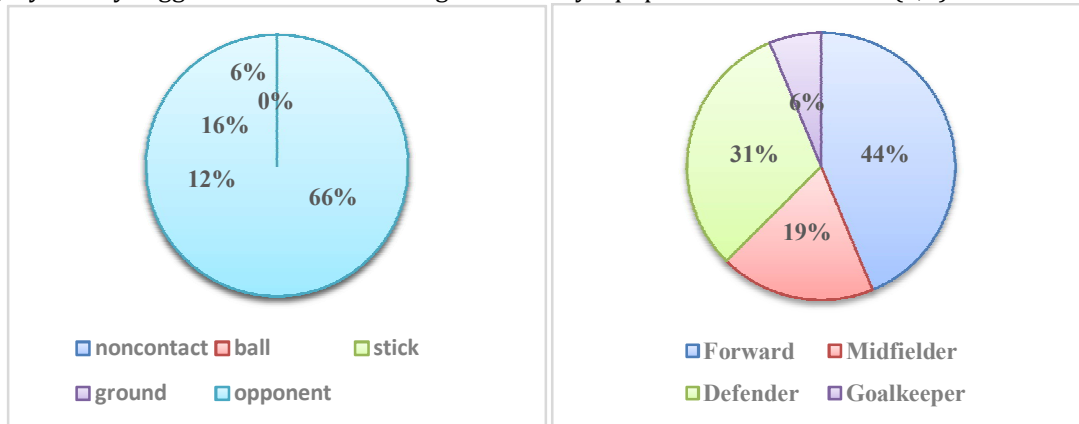


Figure 1: Mechanism of injury

Figure 2: Injury rate according to player position

The pattern of field hockey injuries observed in current study is in agreement with previous studies (4,6,8,15). The most commonly injured anatomical site was lower limb (65.6%). The stooped posture adopted during ball dribbling may be a faulty position for fast motion and could add to lower limb injury (3). In a survey of 82 players of preolympic camp 2012, reported as high as 72.05% injuries to the lower limb (7). Study comparing effect of surface on injury reported Lower limb to be the commonest site of injury (67.33%) on both the surfaces. In the lower limb 47.79% injuries were stated from grass surface as related to 19.54% in artificial turf. In a one-year prevalence study also reported highest rate of lower limb injury (48%) in almost similar mean age of subjects of the study. However one study reported lower back to be the most prevalent pain area but noted lower limb to be the most injured anatomical site of the body (51%) (3,8,15).

Injuries to lower back were also frequently reported and comprised 18.7% of hockey injuries described in this study. Previous study on high school girls stated low back as the most painful site of the body whereas other studies reported lower back injury as low as 8.82% of total injuries sustained by the players. Longitudinal survey study found low back injury prevalence in one year was 17% without any marked difference in terms of gender specificity (3,7,8). However, the present study showed females were more affected than male (66.67%). All the lower back injuries were noncontact injuries and 83.33% of all players suffering from back injury were forward players. 83% of lower back injuries were sustained by the experienced players having experience of more than 5 years. The mechanism and prevalence among the senior players suggest it to be a chronic overuse injury. Continues flexed posture of the spine for a prolong period over time may cause mechanical dysfunction of the back resulting in back injury.

Upper limb was the 3<sup>rd</sup> most frequently injured body part with 9.4% prevalence. Elbow and forearm injury were not found in this study whereas wrist was the most injured part of the upper limb. 28 upper limb injuries in 58 matches in men's junior world cup 2009 were reported whereas 16.17% injuries of upper limb being the second most frequent part to be injured were reported in the elite male players. High school female field hockey players reported 64 upper limb injuries in 158 subjects. Less prevalence of upper limb injuries may be due to use of protective gloves. (9,7,3)

Head and face were found to be the least injured part in the study (6.3%). As high as 54% of facial and dental injuries were reported before 3 decades. 16 head and face injuries per 1000 match hour in men's junior world cup 2009 were documented. Study examining injury risk as per playing position reported face to be the highest injured body part (18%). Gender variation might be the reason behind such conflicting findings as the study was done only on male players. Among high school females head and face region were found to be the second most frequent injured site. The difference in the rate of injuries may be due to gender specificity and level of participation. (3,6,14,16)

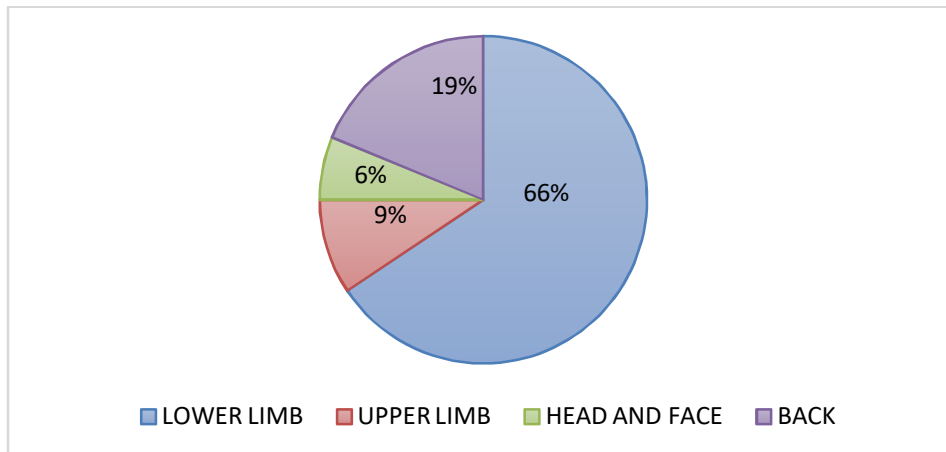


Figure 3: Distribution of injury according to anatomical site of body

Most injured body part in the present study was anterior leg (28.13%). This finding is in accordance with the study of elite players, who reported knee/leg were the most common part to be injured (27.94%) followed by hip/thigh (23.52%) and ankle/foot (20.58%). However, that study didn't separate anterior and posterior leg (7). Studies evaluating injury rate in different positions found tibia bone contusion to be one of the most common sites of injury in midfielders. Knee was second most frequently injured in lower limb (18.75%) (4). Theilen reported thigh and knee were affected in 28% of injuries in males which is not supported by the present study as it reported equal prevalence of knee injury irrespective of gender. Previous study reported 10% of all injuries affect knee joint which is in line with this study. Knee injury was more common in experienced players as it was found in players with at least 5 years of experience. Though there was equal distribution of knee injury according to the mechanism, sudden rotatory activities during running is believed to be the reason for knee injury. (13,14)

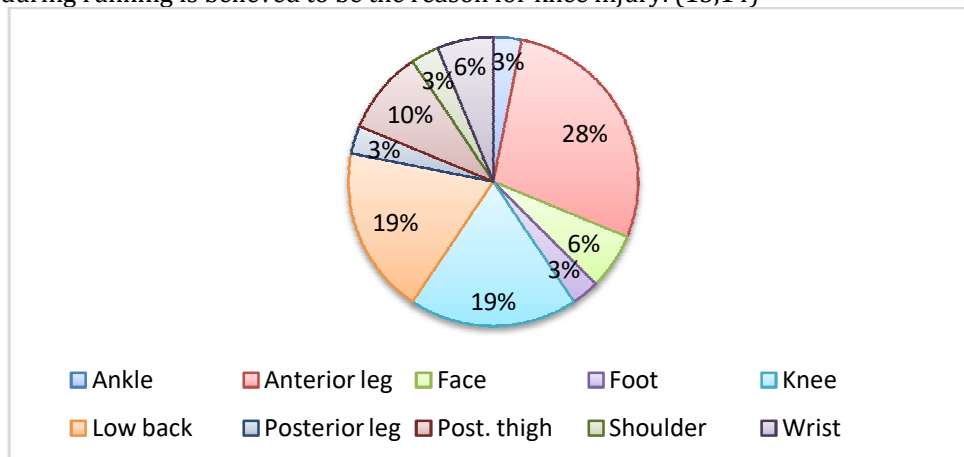


Figure 4: Injury distribution according to body part

Present study reported majority of injuries were practice injuries (62.5%) than competition injuries (37.5%). This finding backs the study performed on high school athletes which reported more number of practice injuries (64) than games (57). 60-70% of all women hockey injuries occurred during practice (3,5). NCAA reported game injury prevalence was 1.7 times more than practice injuries, which stands absolutely conflicting with the findings of present study. The variation may be present due to lack of proper reporting of practice injuries as the injuries were reported to NCAA via email or fax. The duration of practice was more than game duration which may influence the injury rate. So injury rates in relation to the hours of exposure can clear the picture in future. (17)

In present study, Grass injury were more (65.63%) in comparison to the artificial turf injury. The lower limb injuries were more in grass (71.43%) than the turf (29.57%), similar result for lower back (66.67%) also testified. On contrary to the same, upper limb and facial injuries were reported on the turf only. Increased lower limb injuries may be due to uneven surface, improper maintenance of grass leading to plantar flexion in addition to inversion, resulting in ankle sprains. Improperly worn protective devices and poorly fitted foot wear may also cause this injury. Also the grass surface is more slippery than the turf generating less frictional force prompting the instability of lower limb during running. Sudden twisting and jerky movements due to running on uneven grass surface may lead to increased rate of back injury in

grass surface. The running speed increases on turf than grass surface. The ball bounce and roll were more in turf compared to grass (15,18). It may result in poor control over ball and stick while running resulting in higher rate of upper limb injuries on turf surface.

Impact of injuries among the field hockey players is one of the least considered aspect in epidemiological studies. An attempt was made to categorize the impact in terms of severity of injury by calculating the time loss. Present study showed 20 out of 32 (62.5%) injured players had to stop the game or practice session due to their concerned injury. Out of the 20, 60% players stopped the game for less than one week suggesting minimum impact whereas 35% players had a time loss of at least 3 weeks. The NCAA reported 2.2 injuries per 1000 A-E had a time loss of more than 7 days during competitions and 1.7 injuries per 1000 A-E during practice season. According to this study player with reported time loss was 41.66% and 75% in competition and practice respectively. Due to adaptation of different method of calculation it's difficult to compare the studies. No other studies might have reported time loss in percentage method. Future studies focusing on this factor may help. The difficulty in comparison of the findings were encountered due to the limited availability of information with regards to extrinsic and intrinsic risk factors in field hockey. An effort was made to examine the impact of age, gender, player position, playing surface, level of play, environmental location, previous injuries and training habits on the occurrence of injuries. In the present study none of the factors except for past injury was found significantly associated with occurrence of injuries. The significance of past injury may be due to early return to sports and incomplete rehabilitation post injury.

Table 2: Relationship of risk factors with the rate of recent injuries

Risk Factors		Injured (N=32)		Non-injured (N=147)		X <sup>2</sup> /t
		n	%	n	%	
Gender	Male	18	18.95	77	81.05	0.691
	Female	14	16.66	70	83.33	0.691
Age	15-17	20	62.5	108	73.47	0.492
	18-20	06	18.75	27	18.37	0.492
	21-24	06	18.75	11	7.48	0.492
Position Of Play	Forward	14	20.89	53	79.11	#
	Midfielder	6	13.64	38	86.36	#
	Defender	10	19.61	41	80.39	#
	Goalkeeper	2	11.76	15	88.24	#
Level Of Participation	School National	19	15.45	104	84.55	#
	State	0	0	2	100	#
	Senior National	8	18.6	35	81.4	#
	University	4	57.14	3	42.86	#
	International	1	25	3	75	#
Warm Up	Regular	31	17.61	145	82.39	#
	Irregular	1	33.33	2	66.67	#
Cool Down	Regular	17	16.04	89	83.96	0.439
	Irregular	15	20.55	58	79.45	0.439
Strength Training	Regular	30	18.29	134	81.71	#
	Irregular	2	13.33	13	86.67	#
Balance Training	Regular	20	18.35	89	81.65	0.837
	Irregular	12	17.14	58	82.86	0.837
Playing Surface	Grass	23	19.33	96	80.67	0.476
	Artificial Turf	9	15	51	85	0.476
Rest before game	Yes	18	15.93	95	84.07	0.373
	No	14	21.21	52	78.79	0.373
Rest after game	Yes	32	17.98	146	82.04	#
	No	0	0	1	100	#
Safety equipment	Used	32	17.9	147	82.1	#
	Not used	0	0	0	0	#
Past injury	Yes	18	29.03	44	70.97	0.005
	No	14	11.97	103	88.03	0.005

# chi square test could not be applied due to nature of data

Relatively smaller sample size and one-time interview of the player are notable limitations of the study. Retrospective investigation has its own limitation. The psychosomatic factor that might have influenced the answer could not be measured. Cross validation of the results on a greater sample may be considered.

Prospective studies in field hockey are the need of the hour to identify the risk factors. For maintaining accurate record, physiotherapist and medical support staffs of every team should maintain written medical report for every injury. Immediate reporting of any injury or discomfort, to the physiotherapist, is recommended to the players as well as the coaches. Coaches should cooperate the researchers during the course of research work. They should encourage players to give priority to complete recovery from injury rather than early return to game.

## CONCLUSION

Prevalence of field hockey injury is 17.9%, forward players are most commonly injured, anterior leg is the most commonly injured body part, non-contact injuries are more prevalent. Providing regular physiotherapy treatment and injury prevention programme may reduce the rate of prevalence and improve efficacy.

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