

## Profile of injuries in Indian elite male field hockey players in relation to playing positions

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**Abstract.** *Aim.* To examine the incidence of injuries in Indian elite male field hockey players and to broaden the current base of knowledge by identifying the injury rates of different playing positions. *Methods.* A total of 252 Indian elite male field hockey players from Punjab state, India aged 10 to 30 years, played at district, university, state and national levels were selected. A pre-tested semi-structured questionnaire was applied to gather necessary information. Subsequently the data was analyzed with SPSS (version 17.0). *Results.* As far as playing positions are concerned, players of forward position considered more vulnerable to injury (37.69%) followed by defenders (30.55%), midfielders (24.20%) and goalkeepers (7.54%). The commonest type of injury among all field hockey players was contusion (29.76%) followed by sprains (13.49%), tendinopathy (11.90%) and hematoma (10.71%). Lower limb was reported to be most affected part (42.86%) so far area of injury was concerned. The district level (31.35%) players were more prone to injury compared to state (26.20%), national (23.01%) and university level players (19.44%). *Conclusions.* Indian elite male field hockey players with forward position were more vulnerable than the players with other positions due to increased athlete contact and quick movement requirements.

**Key words:** *hockey players, injuries, playing positions.*

### Introduction

Hockey is an ancient game thought to be the forerunners of all 'stick and ball' games. The modern game of the hockey is played in 132 countries around the world and is second in popularity to soccer as a team sport. Injuries are a part of sport. There has been gradual change in the pattern of sporting injuries. Some years ago most injuries were acute, traumatic such as fracture, dislocation, ligament sprains and muscle tears. While these injuries are still common, injuries such as tendonitis, stress fracture and compartment syndrome appears to be increasing in frequency. This is undoubtedly due to the increased load placed upon musculoskeletal structure by the increased training demands of modern day sports.

Despite the sport's apparent popularity, the data on injury rates among field hockey players are limited. The majority of the injuries reported are minor ankle sprains and contusions. More serious injuries such as torn knee ligaments, concussions and eye trauma leading to blindness, have also been noted. (1-3).

Because these studies tend to focus on elite level athletes, it has been difficult to generalize their results to the field hockey community as a whole. Reports suggested that increased skill, conditioning and a smooth playing surface decreased the risk of injuries (2 -5), whereas other studies indicated that elite players not only had an increased 'exposure time' but they might be prepared to take more risks (1,6).

Hockey players are exposed to various injuries during running, turning, twisting and stretching activities. It was reported that the majority of injuries in elite players were to the lower limb and to the back.

The occurrence of extrinsic injuries are due to external forces and can result from being struck by ball or stick, by colliding with another player, a goal post or the ground. Several studies reported a high incidence of extrinsic injuries in hockey ranging from 60 to 80 % of all reported injuries (7,8). Contusions are the most commonly reported types of extrinsic injury in hockey (3, 8-12).

Body contact or collisions between players are relatively uncommon and account for 2-11% of all reported injuries (7,8). Jamison and Lee (8) reported that fall injuries on synthetic turf may be more frequent and severe than those on grass.

Intrinsic injuries were reported to account for 11% to 18.5% of all hockey injuries (7, 8). Rate (13) reported that the most common non-contact injuries in hockey were ankle sprains, back and thigh strain.

Repetitive episode of trauma can overwhelm the body's ability to repair itself and result in overuse injuries (14). Typical examples of this type of injury in hockey include dysfunction, tendonitis, patellofemoral pain, plantar fasciitis reported to account for 18% to 32% of hockey injuries (7, 10, 12). Females are more prone to overuse injuries than their male counterparts (12). Playing on harder surface is widely believed to increase the incidence of lower limb overuse injuries.

Reports related to incidence of injuries in hockey players, especially in Indian context are scanty to fulfill the lacunae of knowledge, the present study was planned with objective of investigating frequency of injuries in Indian elite male hockey players as per their playing positions.

### Material and methods

**Subjects.** The present cross-sectional study was based on purposely selected 252 Indian elite male hockey players who belong to district (n=79, 31.35%), state (n=66, 26.20%), national (n=58, 23.01%) and university (n=49, 19.44%) levels aged 15-24 years (mean age 17.3,  $\pm$  3.7) collected from Punjab state, India during July – December, 2011. The hockey players were further divided into four groups, viz. forwards (n= 95), defenders (n= 77), mid fielders (n=61) and goalkeepers (n=19). The age of the subjects were recorded from the date of birth registered in their institutes. A written consent was obtained from the subjects. The study was approved by the local ethics committee.

**Procedure.** A pre-tested semi-structured questionnaire was used to survey injury patterns in Indian elite male hockey players. The players reported personal characteristics (age, height and weight), field hockey information (levels, years of experience,

playing surface, protective equipments) and injury history (type, site, cause, severity) through a survey questionnaire (table I). The major limitations of this strategy were that it relied heavily on the athletes' abilities to accurately recall their injuries and it was not possible to calculate the number of injuries per athlete exposure. For example, clinical details might not be reliable and there was a tendency for adverse events to be recalled as more recent than they actually occurred.

### Results

Among the players surveyed, 42.86% reported that they regularly used natural grass for training and playing purpose and 36.90% indicated that they used artificial turf for the same. The number of player using both the options alternately was 20.24%. All the players reported that they had encountered with at least one injury during field hockey game or practice.

Distribution of lower limb injuries in table II showed that knee joint was commonly affected in defenders (3.97%) followed by ankle injuries (3.17%). The players with forward position reported ankle as prime site of injury (6.75%) than knee (3.97%). Midfielders showed same result as forwards with ankle injuries (3.57%). Goalkeepers were least affected of which 0.79% reported tendoachilles injuries. Head face and trunk was second most common site of injury where all except goalkeepers showed large amount of facial injuries, in goal keepers lumbar spine (2.38) was most affected area. Though upper limb was less commonly involved shoulder (8.73%) and wrist (5.95%) injuries were reported significantly by players. Forwards (1.98%) and defenders (1.19%) also reported finger injuries frequently.

Players also asked to specify the type of injury occurred to them, contusion was the commonest type (29.76%) followed by sprains (13.49%), tendinopathy (11.90%) and hematoma (10.71%) (fig.1).

Attempt was made to find out causes of injuries in Indian male field hockey players as shown in fig.2 contact with hard hockey ball seems to be commonest cause of injury (22.22%) in field hockey players followed by non contact traumas (20.63%) and overuse injuries (20.24%). In regards with playing

positions, ball contact was prime cause of injury among defender (9.13%) and forward playing positions (7.54%) whereas midfielder (7.14%) and goalkeepers (3.17%) mentioned overuse as main cause of injuries (table III). Tackling was found as most vulnerable technique by forwards (18.25%), defenders

(14.68) and midfielders (9.92%). Other techniques (like diving) are causative factors for injury in goalkeepers (6.35%) (table IV). When the data of technique causes injuries were pulled tackling was found to be major cause (44%) followed by other causes (33%), dribbling (20%) and end furring (3%) (fig.3).

**Table I.** Descriptive statistics of selected variables of Indian elite male hockey players according to the playing positions

Variables	Defenders	Forwards	Midfielders	Goalkeepers	Total
Age(yrs)	16.8 (3.2)	16.6 (3.6)	18.1 (3.7)	19.7 (4.7)	17.3 (3.7)
Experience(yrs)	4.5 (1.8)	4.2 (1.8)	5.1 (2.8)	7 (3.7)	4.7 (2.4)
Height (cm)	161.8 (8.78)	156.84 (7.49)	161.34 (7.98)	169.42 (7.17)	160.39 (8.66)
Mass (kg)	53.8 (7.6)	51 (6.4)	55.4 (7.3)	59.9 (5.7)	53.6 (7.4)

**Table II.** The number of specific traumatic injuries sustained by Indian male field hockey players (values are in percentage)

Body part	Defenders	Forwards	Goalkeepers	Midfielders	Total
Ankle	3.17	6.75		3.57	13.49
Foot	1.19	0.4			1.59
Groin	0.4	1.59	0.4	0.79	3.17
Knee	3.97	3.97		1.98	9.92
Lower leg	2.78	2.78		1.98	7.54
TA	0.79	0.4	0.79	1.98	3.97
Thigh	0.79	0.79		0.4	1.98
Toe	0.4			0.79	1.19
Total	13.49	16.68	1.19	11.49	42.85
Cervical spine		0.4	0.4	0.4	1.19
Face	6.75	7.54		3.57	17.86
Head	1.59	1.98		0.79	4.37
lumbar spine	1.59	1.19	2.38	1.59	6.75
Neck		1.19			1.19
Sacrum	0.4				0.4
Total	10.33	12.3	2.78	6.35	31.76
Elbow	0.4	1.19	0.4	1.98	3.97
Finger	1.19	1.98		0.4	3.57
Forearm	0.79	0.79			1.59
Shoulder	2.78	2.78	1.19	1.98	8.73
Upper arm	1.19	0.4			1.59
Wrist	0.4	1.59	1.98	1.98	5.95
Total	6.75	8.73	3.57	6.34	25.4

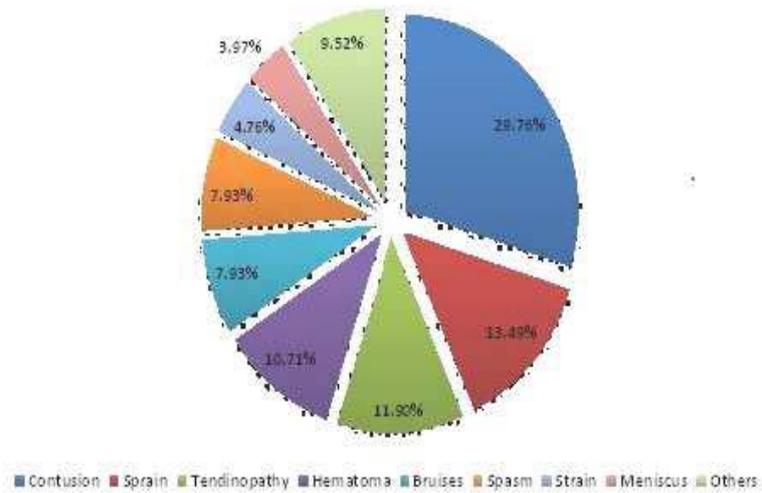


Figure 1. Type of injuries in Indian elite male field hockey players

Table III. Causes of injuries in hockey players as per playing positions

Cause of injury	Defender	Forward	Midfielder	Goalkeeper
Ball contact	9.13	7.54	3.97	1.59
Non contact trauma	7.14	5.56	5.95	1.98
Overuse	4.76	5.16	7.14	3.17
Stick contact	5.56	5.56	4.36	-
Athlete contact	3.57	3.17	1.19	0.4
Field conditions	3.17	1.98	0.79	-
Foul play	1.98	0.4	0.4	-
Pole contact	0.79	1.19	0.4	-
Previous injury	1.59	-	-	0.4

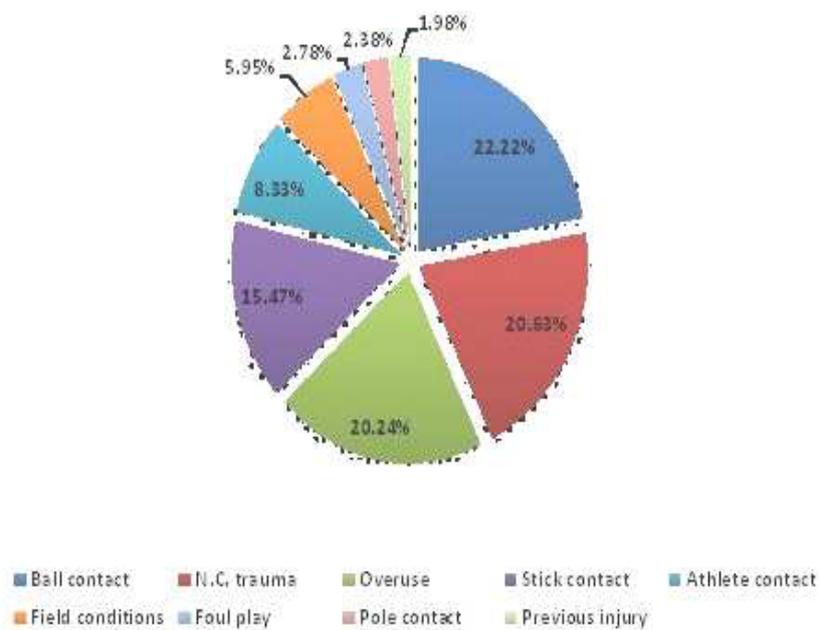
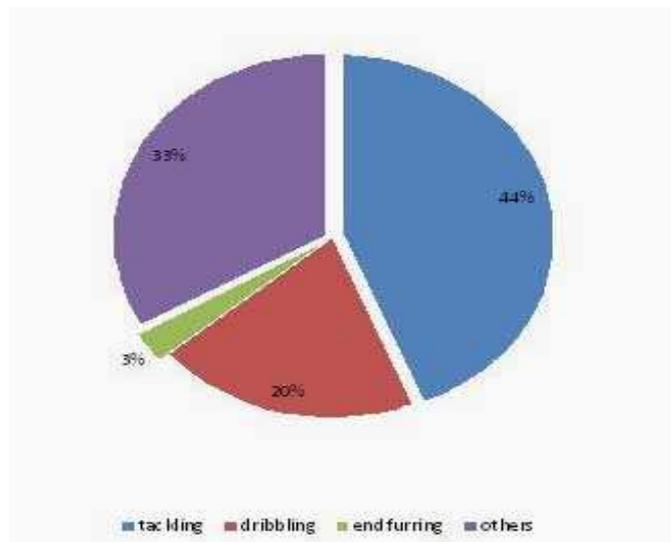


Figure 2. Causes of injury in Indian field hockey players

**Table IV.** Distribution of techniques which caused injury according to playing positions

Playing position	Dribbling	Tackling	End furring	Others
Defenders	6.35	14.68	-	9.52
Forwards	7.93	18.25	2.38	9.13
Goalkeepers	0.4	0.79	-	6.35
Midfielders	5.56	9.92	0.4	8.33



**Figure 3.** Techniques causing injuries in Indian field hockey players

### Discussion

Hockey is a contact sport played worldwide, vast number of events it has gained popularity not only as a means of entertainment, but has also shaped up sports personnel's professional career. With gradual change in pattern of sports there also has been a different pattern of injuries. The findings of the present study that lower limb is most frequent site of injury (42.85%), is consistent with the injury pattern reported from other studies (3,15-17). Ankle sprain was the most common single injury reported in the lower limb (i.e.13.49%). Ankle sprain in hockey is likely to occur due to improper footwear which causes inversion and plantar flexion. Lateral ankle is the most frequent area in the body and overall ankle sprain is the most common injury in the sport (18, 19) Rose (3) revealed that ankle injuries accounted for 27% of all reported injuries in

hockey. Fox suggests that the stooped position used when dribbling the ball may be an unsound position for fast locomotion and could contribute to lower limb injury.

The second most frequent site of injury in field hockey was head and trunk (31.74%). the vigorous use of hockey stick for handling the ball increases the potential risk of injury. The percentage of players who had sustained at least one injury in this area was 42% (20) and these findings were supported by other studies conducted on other international players (1). Jones (6) did a review on eye injury in sports. It was found that eye injury sustained during sport was increasingly in incidence worldwide and account for up to 25% of severe eye injuries

The percentage of lumbar spine (low back) injury reported in the present study was relatively less (6.75%) but it could lead to end

of career due to its progressive nature. Reports found that 59% of the players had experienced back pain and most common site of pain was the lower back (20-22).

The third frequent site of injury in field hockey was upper limb (25.40%). Recent surveys of collegiate and high school field hockey indicate that 14% to 15.8% of the injuries are to the upper limb and most of these are wrist and finger fractures (16, 17). Injury to upper limb in hockey occurs due to the contact of stick and due to ball which comes with higher velocity and different techniques for stopping the ball on artificial turf may have led to an increased risk of upper limb injury (20). It also found that the studies conducted before 1980 have reported lower incidences of upper limb injuries than more recent reports.

The present study revealed that forwards are the players who are more likely to get injured (37.69%). The next comes the defender (30.55%). The players in both positions tend to spend most of their time in same area of field attempting to score or defend. Elimination of the offside rule and the strategy of filling the striking circle with many defenders also increase the risk of injury as forwards and defenders crowd around the goal area (20). Goalkeepers (7.54%) are the least injured players according to present study but these findings are differ from previous findings that goalkeepers had the highest injury rate per athlete-year in field hockey (2, 4, 5, 20).

The most common playing technique during which injury occurs was tackling (43.65%), followed by other (33.33%) techniques (like diving or defending etc.), dribbling (20.24%) and end furring (2.78%). The vigorous use of hockey stick for tackling with the semi flexed position of the players might have led to the serious injuries to the different part of the body, up to 20% of field hockey injury attributed to tackling (15). Running and dribbling the ball in semi-crouched position is ergonomically an unsound posture for fast locomotion (2). This posture in dribbling is likely to cause backache among hockey players (23). Further studies are required considering female data to validate the findings.

## Conclusion

From the findings of the present study it might be concluded that Indian elite male field hockey players with forward position were more vulnerable than the players with other positions due to increased athlete contact and quick movement requirements. The commonest type of injury among all field hockey players was contusion, followed by sprains, tendinopathy and bruises. So far area of injury was concerned, lower limb was reported to be most affected part.

*Practical Application.* The data presented in the present study carry immense practical applications and should be useful in management of sports-specific injuries educating the player and coaches about it. Enhancement of performance of the players is possible taking preventive measures and future training program may be developed considering the findings of the study.

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## References

1. Bolhuis JH, Leurs JM, Fogel GE (1987). Dental and facial injuries in international field hockey. *British Journal of Sports Medicine*; 21(4): 174-7.
2. Fox N (1981). Risks in field hockey. In: *Sports fitness and sports injuries*. T. Reilly (Ed.) Boston: Faber and Faber; pp. 112-7.
3. Rose CP (1981). Injuries in women's field hockey: a four year study. *The Physician and Sports Medicine*; 9(3): 97-100.
4. Moore S (1987). Field hockey, In: *Catastrophic injuries in sports. Avoidance strategies*. 2nd Ed., Adams, SH., Adrian, MJ. Bayless, MA (Eds.), Indianapolis, In: Benchmark. Pres Inc; pp. 67-77.
5. Spedding I (1986). Is there a risk of injury in modern hockey? *Sports Coach*; 10(1): 3-4.
6. Jones NP (1988). One year of severe eye injuries in sport. *Eye* 1988; 2(5): 484-7.
7. Fuller MI (1990). A study of injuries in women's field hockey as played on synthetic turf pitches. *Physiotherapy in Sport* 1990; 12(5): 3-6.
8. Jamison S, Lee C (1989). The incidence of female injuries on grass and synthetic

- playing surfaces. *Australian Journal of Science and Medicine in Sport*; 21(2):15-17.
9. Roberts PDT, Geljon AC, Kolters A (1995). Comparison of retrospective and prospective injury data in Australian rules football and field hockey participants. Australian Conference of Science and Medicine in Sport, Canberra, Australia: Sports Medicine Australia.
  10. Frake M, Dalgleish M (1994). Injuries in women's field hockey. Part one. *Sport Health*; 12(1): 41-2.
  11. Frake M, Dalgleish M (1994). Injuries in women's field hockey. Part two on tour. *Sport Health*; 12(3): 44-6.
  12. Lindgren S, Maguire K (1985). Survey of field hockey injuries. *Sports Medicine and Medicine Quarterly*; 1(8): 7-12.
  13. Rate R (1988). Common hockey injuries – prevention and first aid. In: Giltrow LTV. Ed. *From coach to coach*. Toowoomba Old; pp. 219-21.
  14. Herring S, Nilson K (1987). Introduction to overuse injuries. *Clinical Sports Medicine*; 6: 225-39.
  15. Graham GP, Bruce PJ (1977). Survey of intercollegiate athletic injuries to women. *Research Quarterly*; 48: 217-20.
  16. National Collegiate Athletic Association (N.C.A.A). Injury surveillance system reports: Field Hockey, Overland Park, KS, 1998-99; pp. 199.
  17. Powell JW, Barber-Fors KD (1999). Injury patterns in selected high school sports: a review of the 1995- 1997 seasons. *Journal of Athletic Training*; 34: 277-84.
  18. Garrick JG (1977). The frequency of injury, mechanism of injury and epidemiology of ankle sprain. *American Journal of Sports Medicine* 1977; 5: 241-2.
  19. Torg J (1982). Ankle and foot problems in the athlete. *Clinical Sports Medicine*; 1: 77-84.
  20. Karen M (2001). Injury patterns among female field hockey players. *Med Sci Sports Exercise*; 33(2): 201- 7.
  21. Kaur K, Yadav VS, Sandhu JS (2009). A Survey of Injuries in Field Hockey Players in Relation to Playing Surface. *IJPOT* ; 2(3).
  22. Kumar B, Paul M, Sandhu JS (2009). Effect of Turf surfaces on the incidence of low back pain in field hockey *Indian Journal of Physiotherapy and Occupational Therapy*; 1(3).
  23. Reilly T, Seaton A (1990). Physiological strain unique to field hockey. *J Sports Med Phys Fitness*; 30:142-6.

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