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TYPES AND REGIONS OF MUSCULOSKELETAL INJURIES AMONG PAKISTANI FIELD HOCKEY PLAYERS: AN ASSOCIATION WITH PLAYING POSITION

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HIGHLIGHTS

- Field hockey is a national game of Pakistan and is an integral sport in several international events.
- A total of 136 male hockey players in Pakistan, ages between 16 and 45 years were served a standard questionnaire. Additional information on player's age, experience, playing position, type of injury, frequently injured body area and dominant hand usage during play was documented and used for statistical inference.
- Mean and standard deviation of age of the players was 22.9±6.55 with 50% having 1-3 years of playing experience. The occurrence of lower limb injuries was 30.1%. Low back pain was reported by 25.7% of the players.
- There is a significant association of playing positions with regions and types of injuries.

ABSTRACT

Background: Hockey players in comparison to other field sports have a higher risk of physical injuries due to great demand of physical activity together with twisting and bending, long duration standing, perpetual movement of upper limb and forceful strategic movements of body segments leading to an increased probability of joint and muscular damage. **Objective:** To determine the association of playing positions with the regions and type of injuries among field hockey players in Pakistan. **Material and Methods:** A total of 136 male hockey players in Pakistan, ages between 16 and 45 years were served a standard questionnaire in this observational study. Additional information on player's age, experience, playing position, type of injury, frequently injured body area and dominant hand usage during play was documented. Mean and standard deviation had been determined for numerical data. For data of qualitative nature, frequency and percentage was calculated. Analysis for type of injury and playing position was done using chi-square test and level of significance was set at <0.001. **Results:** Mean and standard deviation of age of the players was 22.9 ±6.55 with 50% having 1-3 years of playing experience. The occurrence of lower limb injuries was 30.1%. Low back pain was reported by 25.7% of the players. Comparing overall occurrence of injuries, anterior cruciate ligament, posterior cruciate ligament, meniscal injuries were at the peak level (38.23%) followed by ankle sprain (19.11%), rotator cuff injuries (18.38%), dislocations (13.97%) and fractures (10.29%), respectively. **Conclusion:** There is a significant association of playing positions with regions and types of injuries. Ankle and knee as well as lower back are

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the most recurrent injury sites. Strikers as well as midfielders have equal likelihood of injuries. Strain and sprain found to be the commonest type of injuries among the hockey players.
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INTRODUCTION

Field hockey is a national game of Pakistan and is an integral sport in several international events. Being an integral sport in Olympics, World Cup, Champions Trophy, World League and Junior World Cup, it is played by men and women worldwide from recreational to elite level. All players use hockey sticks skillfully during a play with continuous forceful strategic movement of body at different field positions and different roles typically arranged into forwards, mid fielders, defensive, and a goalkeeper who stays at goal posts. Hockey players in comparison to other field sports have more risk of physical injuries due to high demand of muscular activity together with twisting and bending, standing for long duration, perpetual movement of upper limb and forceful strategic movements of body segments leading to increased probability of joint and muscular damage and fatigue.

Several factors play a role in aggravation of musculoskeletal injuries while performing during hockey sport. During play, among field hockey players, shoulders and girdles are loaded constantly.[1, 2] Head, shoulder and knee are the most stressed parts with high incidence of injury in field hockey.[3] Also, the occurrence of orofacial injuries in the field hockey players is relatively common.[4] Additionally, injuries in the shoulder may be the sequel of direct or indirect forces contributing to increased probability of musculoskeletal impairment via stress of muscles, tendons, peripheral nerves, joints, bones, ligaments, and blood vessels as a result of repetitive blows over time or a sudden trauma.

Shoulder pain is considered to be caused by malfunction of rotator cuff especially among athletes who undergo repetitive overhead activity commonly caused by rotator cuff tear as a res a result of repeated micro-trauma acutely or chronically. Since, above shoulder height gestures are permissible in hockey that may result in shoulder abduction in a range wider than normal.[5] In comparison to non-athletes, altered ratios in intra-muscular and inter-muscular balance in shoulder girdle have been recorded while in maximal contractions of shoulder girdle. Thus, use of protective equipment, training and physical loudening against injury is desirable for better and successful career of players.[2] Recurrently occurring injuries in the sports are the strains to tendons, greatly to the hip, thigh and leg due to sprinting in the limited areas of play, an immediate change in direction and quick stop-start actions and impulsive physical strikes. All these actions result significant strain on the joints of the lower limbs in restricted area related movements. In strain prevention of muscles and tendons, physical loudening and muscle strength plays a major role, in particular in hamstrings strains.[6]

There is dearth of literature regarding the type and pattern of physical injuries and their relationship with playing position among field hockey players of Pakistan. Many studies conducted in other regions indicate that prevalence of musculoskeletal injury is the most common and may lead to disability, occupational injury, and withdrawal from play temporarily or permanently.[7-9] Therefore, given the value and realization, prevention of musculoskeletal

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injuries and their results among the hockey players, the present study was held to find the prevalence and extent of musculoskeletal damage in different segments of the body and its association with playing position in the hockey field among field hockey players of Pakistan. This may provide concerned evidence for making guidelines for prevention of injuries and rehabilitation strategies that may be guided by physiotherapists, coaches and related healthcare providers when dealing with hockey players. The purpose of the study was to determine the association of playing positions with the regions and type of injuries among field hockey players in Pakistan.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted on 136 players of hockey with use of musculoskeletal survey nordic questionnaire[10] and ethical considerations for players were approved. Non-probability convenience sampling was employed and data had been collected from male hockey players at National Hockey Stadium, Lahore, Pakistan by using an additional questionnaire that age, position in the playground, player's role and health parameters like previous injury, congenital anomalies, steroid usage were included into study. The sample size was calculated with level of confidence at 95% and adjusted for drop-rate of 5% and 10% expected margin of error.[11]

Inclusion criteria were only male field players of hockey having playing experience of minimum one year and ages from 16 to 45 years. Criteria for exclusion were traumatic history, inborn anomaly, diabetes, hypertension and use of steroids. After informed consent were taken from the players, information was gathered by using "musculoskeletal survey nordic questionnaire". Data were analyzed by using SPSS (Statistical package for social sciences version 25). Mean and standard deviation had been determined for numerical data. For data of qualitative nature, frequency and percentage was calculated. Analysis for type of injury and playing position was done using chi-square (χ^2) test and level of significance was set at <0.001.

RESULTS

Out of 136 hockey players, 16 were goalkeepers, defenders had a count of 45, midfielders at 48 and strikers at count of 27 (Table I). Among these participating hockey players 50% had 1-3 years of professional playing experience. While 40.6% were having 4-6 years and remaining 13.2% were very seasoned and had 7-10 years of professional hockey playing experience (Figure I).

Data on right or left-handed usage showed that majority (94.1%) of these players used their right hand in routine playing activities and only 5.9% were left handed. Inclusion criteria defined ages of the players between 16 and 45 years. Data on age showed that the mean age of the player was 22.9±6.55 years.

Figure II showed neck pain in the last 7 days, neck discomfort in last 12 months and activity limitations due to neck pain in the past 12 months. Data on neck pain from one week to one-year period of time indicate that out of 136 participants 33.1% had neck pain in the past seven days. Correspondingly, 36.8% among these players had neck discomfort in the past 12 months. In contrast, only 6.6% players had limitation of activity during the last 12 months indicating chronic injury (Figure II).

Shoulder pain in the recent 7 days was reported by 10.3% players. Correspondingly, a similar number (11%) of players reported shoulder discomfort during the past 12 months. However, none of the players had limitation of activity due to shoulder pain in the last 12 months (Figure III).

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Out of 136 hockey players only 2.9% reported pain of lower back in the past 7 days. Conversely, a soaring figure of players (41.2%) was evident who experienced low back discomfort during last 12 months' period. However, there had not been any report of limitation of activity due to low back pain during the last 12 months' period (Figure IV). This showed that out of 136 players included in this study, 43.38 % had musculoskeletal problems in lower limb and 25.7% had low back pain. Whereas, 13.24% had upper limb injuries and 11.03% had upper back hitch. Only 6.67 % among them had pain in neck, as the least implicated region.

Based on playing positions as indicated in Figure IV, 28 midfielders had incidence of anterior anterior cruciate ligament (ACL), posterior cruciate ligament (PCL) and meniscal injuries. Whereas, ankle sprain had minimal incidence associated with that playing position (n=5). Twenty-six hockey players suffered from sprain of ankle while 19 had suffered with fractures. In the goalkeepers, sprain of ankle was most frequent type of injury (n=11). Results of the present study demonstrate that lower limb was the most painful region with a prevalence of 43.36 % (n=59) and the neck region has very less rate of pain at 6.6%. The results have also indicated that the commonest type of injury in the hockey players was of the knee along with ACL as well as PCL and the meniscal injuries as the most implicated injuries during the time of play and comprises 38.24% among the all types of injury and fractures rate was minimum at around 10% (Figure V). Most prevalent types of injuries among field hockey players playing at different field positions. Figures in columns show percentage of prevalence of a certain injury. (Figure VI).

Table I: Frequency of Hockey Players

Players	Frequency (%)
Goalkeepers	16(11.8%)
Strikers	27(19.9%)
Mid Fielders	48(35.3%)
Defenders	45(33%)

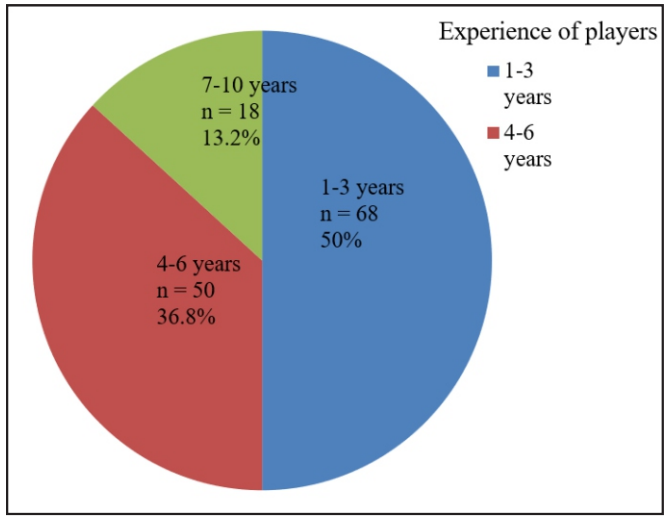

Figure I: Frequency of Players and Their Playing Experience

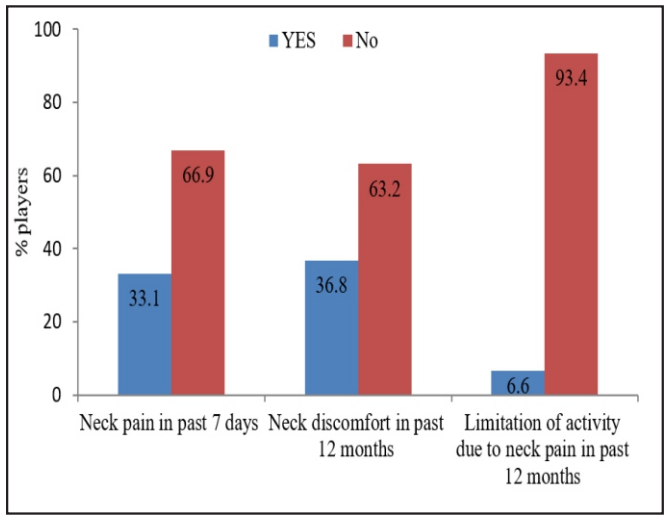

Figure II: Frequency of Neck Pain

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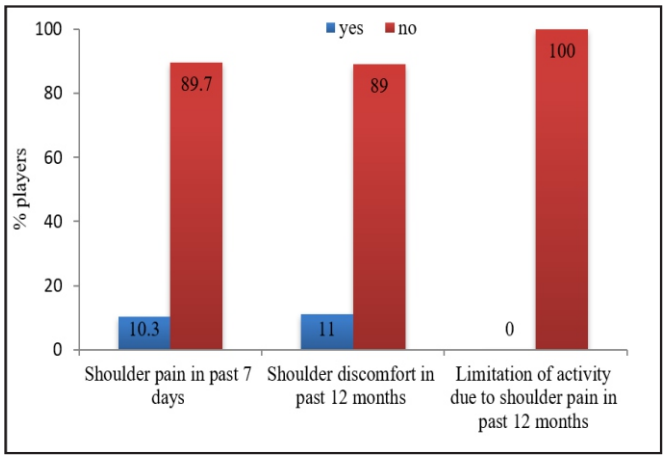

Figure III: Frequency of Shoulder Pain

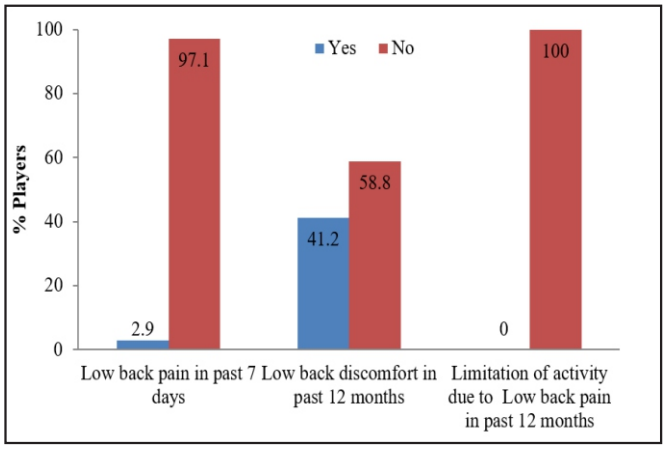

Figure IV: Frequency of Back Pain

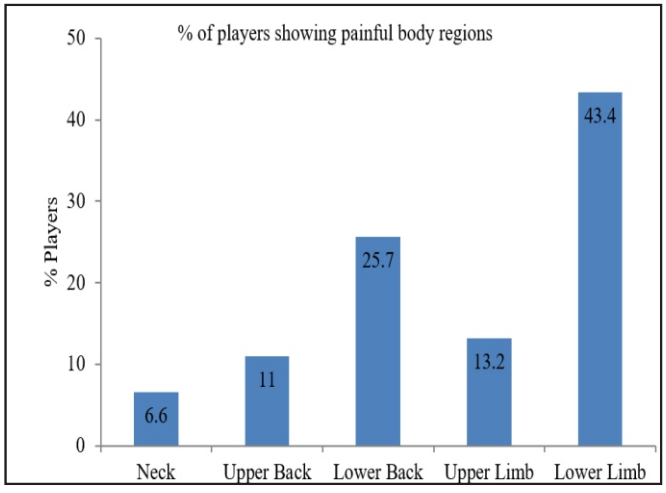

Figure V: Body Regions Among Hockey Players Showing Recurrence of Pain

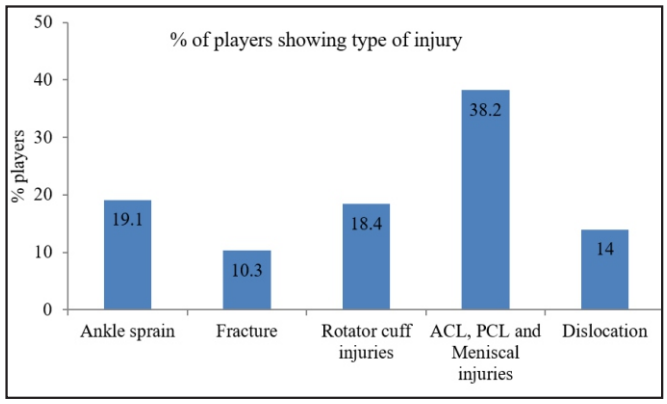

Table II: Association of Most Prevalent Types of Injuries Among Field Hockey Players Playing at Various Field Positions

Types of Injury	Playing Position				Total	%
	Goal keeper	Defender	Mid Fielder	Striker		
Number of players	16	45	48	27	136	-
Ankle sprain	11	9	5	1	26	19.11
Fracture	2	7	3	2	14	10.29
Rotator cuff injuries	0	5	11	9	25	18.38
ACL, PCL, meniscal injuries	4	8	28	12	52	38.23
Dislocation	0	11	6	2	19	13.97

Chi square (χ^2) analysis was done by employing SPSS for playing position and type of injury. Calculated critical value = 52.02; Degree of freedom = 12; p-value = <0.001 showing a significant correlation.

There was significant association of playing positions with the type of injury (Table 1). Mid-fielders were most injury prone segment of a team having highest incidence of ACL, PCL and meniscal injuries. Defenders were the second most affected segment with highest frequency of dislocations, ankle sprains, fractures and rotator cuff injuries. Whereas, among strikers ACL, PCL and meniscal injuries followed by rotator cuff injuries were most frequent. Goalkeepers frequently suffer from ankle sprains. Comparing overall occurrence of injuries, ACL, PCL, meniscal injuries were at the peak level (38.23) followed by ankle sprain (19.11%), rotator cuff injuries

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(18.38%), dislocations (13.97%) and fractures (10.29%), respectively.

DISCUSSION

Average age of players was 23 years; the maximum age was 45 years and 16.50% of the players had 1-3 years of experience. Whereas, 36.8% of the players had experience of 4-6 years and players with experience to 7 to 10 years had a ratio of 13.2% in the study. Among these 136 players, 16 were goalkeepers, 45 were defenders, midfielders at 48 and strikers had a count of 27.

In game of hockey the odds of physical injuries cannot be disregarded. The players have to sprint at intervals for an extended period of time in semi-squat body position, leads enormous proportion of lower limb stress. In this study the rate of lower limb injuries is at its maximum (30.1%). Results of the present study are analogous to numerous findings in the literature.[7,12,13]

Kumar and his associates showed that the prevalence of lower limb injuries was at 48% in their study.[14] They described the factors implicated in lower limb injuries being uneven surfaces, foul play by opponent's pushing, sudden turning and rotational movements.[14] Alternatively, most therapists seem to classify it as an overuse injury or cumulative trauma disorders.[15] and it is suggested to be due to thoraco-lumbar muscle control dysfunction.

Pain Of the lower back is also the most frequent complication faced by the field players of hockey.[16] The major cause of pain in the lower back is also the movement in crouch position in flexed, rotated and awkward positions of the lumbar spine for an extended period of time. In this present study the low back pain was reported by 25.7% of the players in the last 12 months' period. Player's forceful movements are associated with flexed, rotated and awkward positions of the lumbar spine leading to low back pain felt between the lower gluteal folds and the costal margin and could be the most plausible explanation. These results are in compliance with the work of Ellapen et al. who reported incidence of injuries in lower limb at 18%. In their work, the low back was the second most implicated area after the knee injuries.[17] During play, most ball handling and defensive maneuvers demand a combination of repeated spine flexion and rotation in semi-crouched position causing greater load on the spine than the normal locomotion and is a predisposing factor for back pain.[18]

Midfielders are found having the highest work load and activities than other positions. They have to maintain defensive as well as offensive strategic reactions and they have a must role in swift rotatory movements stressing thighs and legs due to sprinting within limited areas of play. Sudden changes in direction with a fixed foot and rapid stop-start actions lead to an increased risk of fatigue and high prevalence of knee and ankle injury. In this study the ACL injuries, PCL injuries as well as meniscal injuries are most prevalent among mid-fielders. These findings corroborate the results of Murtaugh et al. who previously reported that mid fielders were the mainly injured field players during play. This study also indicates that the most common injured segment of the body was lower limb being at 51%.[19] However, in this study the results follow a similar pattern but a lower extent, demonstrating most frequent site of injury being lower limb at 30.1% among male hockey players. This discrepancy in the extent of injury is attributed to the variables like playground associated factors, playing techniques, player training, environmental pressures and physical fitness of players. Furthermore, an observation on gender could be related to this high rate of lower limb

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injuries in their study. It is definitely shown that repetitive landing, dynamic abduction in knee, and the shallow flexion of knee angles may lead to medial collateral ligament, medial patellofemoral ligament, and ACL injuries.[20] The mechanism of injury is usually hyperextension, deceleration, or sudden rotation with a fixed foot.

Study of Yard et al. is suggestive of a high incidence of upper body injuries in field hockey players.[21] In the current study the injury of the rotator cuff is the third commonest concern among players. The frequency of upper limb injuries is recorded at 13.2% in the present study. Most plausible explanation for this injury seems to be due to repeatedly performing overhead motions, perpetual movement of upper limb and forceful strategic movements of upper body segment. This may lead to joint and muscular straining or pinching the rotator cuff tendons, resulting in bruising, inflammation and analgesia. The most common cause of a rotator cuff tear is repeated minor trauma, which may occur acutely or chronically.[18] Present study also revealed high prevalence of ankle sprain particularly among the goalkeepers that is analogous to the reports in the literature.[19,22]

The current study presents a few limitations. First, extent and type of injuries reported by young players may be at variance from those of seasoned players due to repeated exposure to stress and trauma during play in their previous long time participation by the later. Second, the information on training hours, training techniques, types of safety equipment used as well as ground related factors that can provoke risk of injuries, was out of scope of this study. Third, present study was gender specific to male participants only. A comparison with female hockey players may yield a different outcome and better understanding of the issues. Results of the present study underline the importance of examining impact of each factor separately in order to be able to predict the impact of specific type of injury in relation to playing position among the field hockey players.

CONCLUSION

There is a significant association of playing positions with regions and types of injuries. Ankle and knee as well as lower back are the most recurrent injury sites. Strikers as well as midfielders have equal likelihood of injuries. Strain and sprain found to be the commonest type of injuries among the hockey players.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

Competing interests: None

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