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## A study on shoulder injuries and rehabilitation of Pakistani hockey players

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### Abstract

The purpose of the present study was to find the rate of shoulder muscle injury, causing factors and rehabilitation techniques related to it, in field hockey players. Twenty five (29) male field hockey players between the age of twenty (20) to thirty five (35) years were taken as subjects from the National Hockey Stadium, Lahore, Pakistan. Convenience sampling technique was used. SPSS was used to analyse the data. All the quantitative variables were presented in the form of mean  $\pm$  standard error (S.E) along with standard deviation (S.D). There was a strong relationship between the shoulder muscle strength and the cause of injuries. In the current study it was concluded that Supraspinatus injury of the shoulder joint in field hockey players was more common. Players with weak muscles were more injured than others. Players with repetitive injury had the previous history of rehabilitation. Players were satisfied with the rehabilitation techniques.

**Keywords:** shoulder injury, rehabilitation techniques, muscle strength, muscle weakness, hockey players

### 1. Introduction

Hockey is played in 132 countries and is the second largest team sport after football. It is estimated that 15% of hockey players injured in a season, and the player spends 11% of the time in training and competition during the entire hockey season. Players aged 10 to 19 account for 50% of injuries, mostly in the 15-19 age group. In all reports, 5% of patients were hospitalized for further treatment. Hockey is a sport that has taken the world by storm. Most of the literature on this sport focuses on describing injury patterns. This study shows that most injuries are minor and the most common injuries are shoulder muscles. Studies have also shown that men have a higher percentage of injuries, and they are more likely to suffer serious injuries than women.

Compared with developed countries, Pakistan is still in a backward and catching-up stage in sports. Pakistan is a developing country in the world. In recent years, the Pakistani government has increased its emphasis on and investment in sports, and has strengthened the process of scientific sports training. Hockey is Pakistan's national game and has a very broad mass base. In the world, Pakistan's hockey has a relatively high level. Hockey is a fast, aggressive and physically demanding sport. Its characteristic is that it includes both technical and tactical training, physical training, and controlled offensive training<sup>[1]</sup>. It is precisely because of these characteristics that hockey training also leads to higher sports injuries. According to the research of Boro (2002), direct hockey trauma (80%) is related to hockey ball speed, offensive stick use and direct body collision and confrontation. An athlete's shoulder injury may be caused by direct or indirect force. In sports, when an athlete attacks another athlete, such as hitting an opponent with a stick, body, or speed, it will generate direct force. If it is not properly controlled, it will cause damage to the opponent or the player himself. When a player stretches out his arm and falls on the ground, stick or ball, indirect force may be generated, and then the force is transmitted along the arm to the shoulder strap, causing injury to the athlete. Reilly "In his research, direct contact with players was the main source of injury (43.3%); in contrast, the proportion of injuries caused by contact with a stick, goal or ice is relatively small. Norfray found that direct trauma is the main cause of acromion clavicle injury and indirect force leads to clavicle fracture. What is the supraspinatus muscle, the shoulder joint is the most common dislocation joint in the human body, anterior dislocation is the most

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common injury in daily life, especially in young people (Liu *et al.*, 2014; Rumian *et al.*, 2011). It is estimated that the incidence of shoulder dislocation is 23.9 cases per 100,000 people per year (Owens *et al.*, 2009). In this study, there were 16 people (55%) Unmarried, 13 (45%) are married. According to the cause of the injury, 8 (32%) players have traumatic injuries and 17 (68%) players have repetitive injuries. Twenty (80%) athletes have weak muscles and the rest have muscles Strong. Fifteen (60%) athletes have a history of recovery, and all athletes are satisfied with the recovery. There is a strong relationship between shoulder muscle strength and the cause of the injury. The chi-square value of 13.28 has a significant correlation with  $p$  value = 0.000 Sex. There is a connection between the rehabilitation technique and the cause of the injury. Chi-square = 9.06,  $p$ -value = 0.011, showing a significant correlation.

The purpose of this study is to determine the severity of shoulder injuries in hockey players and to determine the variables associated with these injuries. This research will help therapists, trainers and hockey players understand the muscles of the shoulder injuries and their treatment techniques. Due to the time and availability of injured players, this research is limited. Most injuries occur in actual games, not in training. After aggressive examinations usually injure the upper limbs <sup>[2]</sup>. These include shoulder dislocations, separations, and fractures. Shoulder tendinitis occurs due to overuse in shooting training. Another less common injury is shoulder burns, which are caused by cross lacerations. The supraspinatus muscle extends along the top of the scapula and inserts into the top of the arm or humerus. It is one of the four rotator cuff muscles. A tear in the supraspinatus muscle may be due to landing on an extended arm, or due to a throwing activity. The main function of the supraspinatus muscle is to abduct the shoulder joint (lift the arms up to both sides). It is an important muscle in throwing events, especially to slow down your arm after releasing the equipment. Hockey has always been a physically demanding contact sport. There are too many opportunities for players to be injured or injured, whether it is being hit by another player or knocked down by another player, or falling to the floor. The two most common shoulder injuries in hockey are shoulder separation (AC joint separation) and shoulder dislocation <sup>[3]</sup>.

## 2. Material and Methods

### 2.1 Population

Population is aggregation of the subjects involved in any study. Players entered into the Lahore National Hockey Stadium, where the main population of interest for the research which was based on the topic of Rehabilitation technique of shoulder injuries related to it. The research focuses on the rehabilitation of field hockey players' shoulder injuries. The focus of the research was to find out the incidence of shoulder injuries and the related rehabilitation techniques. The subjects were not discriminated against by gender, age and region. Researchers use convenient sampling techniques to collect data.

#### 2.1.1 Sample size

The sample for this study included 29 male hockey players ranging in age from 20 to 35 years old.

Sr.	Participants	Age rang	Playing Experience	Education
1	9	20-25	03 years	Master's degree
2	11	26-30	05 years	Bachelor's degree
3	10	31-35	04 years	Diploma

## 2.2 Research methods

### 2.2.1 Research tools

Use convenient sampling technology. A convenient sampling method is to choose those who are easily accessible, or choose those who are easily accessible. Convenience sampling does not represent the entire population, so it is considered biased. Players (from clubs in Lahore) entering the Lahore National Hockey Stadium are a sample of interest for research based on the topic of rehabilitation of hockey players' shoulder injuries. In Lahore, hockey players involved in shoulder injuries are the target group.

### 2.2.2 Data collection technology

This research used direct personal interview method. In this method, the researcher directly contacts the players and interviews them. The information collected in this way is considered accurate and reliable.

### 2.2.3 Data analysis technology

Researchers use SPSS software to analyse the data. All quantitative variables are expressed as mean  $\pm$ S. Qualitative variables are expressed in the form of frequency tables, percentages and graphs. Chi-square test was used to analyse the correlation between the data.

### 2.2.4 Statistical analysis

All data were input into SPSS 18 software, and the same software was used for analysis. For example, age is presented in the form of mean, S.D and mode (most frequent value), minimum and maximum. Qualitative information such as (marital status, cause of injury, muscle involvement, shoulder muscle strength, rehabilitation techniques, etc.) was presented in the form of frequency tables, percentages, numbers, and pie charts. The chi-square test was used to find out the relationship between different factors and the cause of injury. The  $p$  value is less than 0.05 as significant.

## 3. Results and analysis

Table 1, shows the age statistics of players. In this study, the youngest athlete is 23 years old, and the oldest athlete is 35 years old.

**Table 1:** Player age statistics

Mean	28.4000 (years)
Std. Deviation	3.53553 (years)
Mode	32 (years)
Minimum	23.00 (years)
Maximum	35.00 (years)

**Table 2:** Hockey club player's shoulder injury

Types of injury	Number	Percentage
Acromioclavicular joint injuries	13	44.8%
Sternoclavicular joint injuries	2	6.9%
Fractures	1	3.5%
Muscles strains	3	10.3%
Dislocations	4	13.8%
Glenohumeral subluxations	3	10.3%
Lacerations	1	3.5%
Pinched nerve	1	3.5%
Other	1	3.5%
Total	29	100%
Injury Rate	11.6/100	

This data comes from 30 players (73%) participating in the club's hockey team. Twenty-nine players reported shoulder

injuries (Table 2). Acromioclavicular joint separation (AC separation) refers to damage to the ligament that connects the clavicle (clavicle) to the coracoid (the small bone in front of the shoulder). It seems that the most common injury of athletes is the joint injury of the acromioclavicular joints. The percentage of the joint injury of the acromioclavicular joints of 13 athletes is 44.8. The most common cause is a direct strong blow to the front or top of the shoulder or a fall. Trauma [4]. In a hockey game, this usually happens when the player first hits the board. The main reason for acromioclavicular joint dislocation is direct violence. The shoulder joint is in adduction and directly touches the ground. The acromion is pushed down and inwardly by violence. If there is no distal clavicle fracture, the acromioclavicular joint capsule will be damaged and ruptured first. Then the force is transmitted to the coracoclavicular ligament, and the coracoclavicular ligament is damaged or broken. If the violence is strong enough and the clavicle continues to conduct, the deltoid and trapezius muscles will tear off the anchor point of the clavicle, resulting in complete dislocation of the clavicle. As a result, the entire upper limb loses the suspension of the clavicle and scapula, causing the upper limb to droop [5].

Most AC joint injuries can be treated conservatively through the RICE program, wearing a sling and physical therapy, and the discomfort can last from a few days to 12 weeks. Athletes can resume the game when they perform complete and painless exercises, have no tenderness when touching the AC joints, and can perform painless manual traction. A more severe separation may require surgery to rebuild the ligament and recover within 6-9 months.

**Table 3:** Frequency of involving muscles

Muscle	Frequency	Percentage
Supraspinatus muscle	16	55%
Lateral Rotators	8	28%
Medial Rotators	5	17%
Total	29	100%

In Table 3, it seems that the most damaged muscle in a shoulder injury is the supraspinatus. Fifty-five percent of the athlete's supraspinous muscle injury. The frequency of the shoulder lateral rotator is 28%, and the frequency of the inner shoulder family is 17%. The most commonly used muscle in shoulder injuries is the supraspinatus. The supraspinatus muscle extends along the top of the shoulder blade bone and is inserted into the top of the arm or humerus. It is one of the four sets of cuff muscles. Falling on an outstretched arm or throwing activity may cause a tear on the upper spines. The rehabilitation of supraspinatus injury is to add ice cubes when injured. Do not apply it directly to the skin, but wrap it in a wet towel to avoid being scalded by ice. On the first or second day, apply ice cubes for 15 minutes every 2 hours. From then on, the frequency can be gradually reduced within a few days. When the wound is healed and there is no pain, start the rotator cuff rehabilitation exercise. These should include mobility, reinforcement and functional or sport specific exercises [6]. The later rehabilitation of rotator cuff injury includes progressive resistance strengthening, proprioception training and exercise-specific training. For patients who complain of shoulder pain, acupuncture and non-acupuncture techniques (TSTM) of the cervical thoracic spine and/or ribs can significantly improve pain and disability [7, 8]. The application of TSTM to treat patients with shoulder joints can be described as the relationship between adjacent vertebral

bodies to restore mobility. This can be thought of as a reflection mechanism. TSTM can not only improve shoulder flexibility, but also improve overall functional performance [8].

**Table 4:** Frequency of rehabilitation techniques

Rehabilitation technique	Frequency	Percentage
RICE	11	38
Heating modalities	5	17
Heating modalities and light Exercise	13	45
Total	29	100.0

In this table, we used three rehabilitation techniques, RICE, heating method and heating method and light motion. The percentage is forty-five. The heating method and light exercise rehabilitation technology are used. This method is easier to use when the shoulder is injured. RICE plan, wearing sling and physiotherapy for conservative treatment, discomfort can last from a few days to 12 weeks. Athletes can resume the game when they perform complete and painless exercises, have no tenderness when touching the AC joints, and can perform painless manual traction. A more severe separation may require surgery to rebuild the ligament and recover within 6-9 months. The heating method was also used.

**Table 5:** Causes of injuries are related to muscles

	Muscles involved			Total1
	Supraspinatus	Lateral Rotators	Medial rotator	
Trauma	3	2	5	10
Repetitive	15	4	0	19
Total	18	6	5	29

In Table 5, we can see that the proportion of muscle participation is different. The proportion of muscle participation in repetitive injuries is less than 19%, but the proportion of muscle participation in trauma is more. As part of the rotator cuff, the supraspinatus muscle helps to resist the gravity acting on the shoulder joint and pull the weight of the upper limbs downward. It also helps stabilize the shoulder joint by keeping the humeral head pressed against the inside of the scapular fossa of the scapula. The teres major muscle provides internal rotation, extension, and adduction of the shoulder; it is considered a fusiform muscle. The subscapularis rotates the humerus internally; the upper part of the muscle affects abduction, while the lower part affects adduction.

**Table 6:** The relationship between the cause of injury and rehabilitation technology

Causes	Rehabilitation techniques			Total
	RICE	Heating modalities	Heating modalities with light exercise	
Trauma	7	1	1	9
Repetitive injuries	6	2	12	20
Total	13	3	13	29

In Table 6, we can see that the relationship between rehabilitation techniques without injury causes is different. Each cause has its own rehabilitation technique. Some physical therapists are pessimistic about the use of ice cubes and other measures to prevent inflammation. A 2014 study showed that using ice cubes may actually interfere with the body's ability to heal. Including athletes, it may be necessary

to reduce the intensity and time of their exercise or sports practice to heal in their shoulders. Exercise therapists, fitness coaches, and medical professionals can provide tailored advice and recommendations to prevent injuries during specific exercises

**Table 7:** The relationship between the cause of injury and the strength of the shoulder muscles

	shoulder muscle strength		Total
	Strong muscles (G-5)	weak muscles (G-4 or below)	
Trauma	5	3	8
Repetitive	4	17	21
Total	9	20	29

In Table 7, it seems that the cause of injury is different from the strength of the shoulder muscles, and the muscle strength is different in each injury level. There is different ratio between strong muscles and weak muscles.

A prospective survey of 50 Australian amateur hockey players found that each player was injured an average of 2.36 times during the five-month match. Freke and Dalgleish (1994a) <sup>[9]</sup> found that an average Australian female athlete has 2.37 injuries in their career. Roberts *et al.* (1995) <sup>[10]</sup> reported that one person was injured every 37.5 hours of amateur hockey training and games. Current research shows that 8 (32%) players have injuries and 17 (68%) players have repetitive injuries, depending on the cause of the injury. Published research shows that emergency care for soft tissue injuries includes immediate rest, ice, compression, elevation, and referral (RICER). RICER's treatment method is believed to reduce the possibility of further damage to the injured soft tissue by reducing the swelling of the area. The goal of the rehabilitation program is to free athletes from pain and restore muscle strength and joint flexibility to their pre-injury levels. It is important for a player to make a full recovery before returning to the game. An early comeback may aggravate injuries and lead to more time off the court (Sherker S. & Cassell E. 1998) <sup>[10]</sup>. Participate in the full and supervised rehabilitation of all injuries. Returning to a sport too early has a high risk of injury again. This study also supports the above point of view that the RICER method is used for rehabilitation in the acute phase of hockey soft tissue injury. Another study showed that the injury of the supraspinatus muscle is usually not caused by a single event, but a mild or moderate injury that occurs repeatedly in the same anatomical area. The term repetitive strain injury is used to describe this form of micro trauma <sup>[11]</sup>. The repetitive strain of the supraspinatus muscle is not an isolated incident, but a form of minimal trauma that affects the entire shoulder girdle. This functional unit must be evaluated and considered in the treatment plan. The author discusses the diagnosis of this pain syndrome, which is based on the history of the hockey player, the trigger point for exercise and strength testing and palpation. They also provide treatment guidance, including home exercises and work posture modification combined with operation and functional and response technology (Jacobson, 1989) <sup>[12]</sup>. This study supports the Jacobson concept of repetitive injury of the supraspinatus in hockey players, and found that 16 (64%) of the supraspinatus muscles are most commonly affected by this injury. The outer rotator and the inner rotator account for 16% and 20%, respectively <sup>[13]</sup>.

#### 4. Conclusions

Among hockey players, supraspinatus injury of the shoulder

joint is the most common. After repeated shoulder injuries, it is recommended to use heating and mild exercise within the painless range. It is recommended to take meters (rest, ice therapy, compression, elevation) treatment after acute shoulder injury. Athletes with weaker muscles are more likely to be injured than others. Athletes with repetitive injuries have a history of recovery. The players are very satisfied with the rehabilitation technique.

All of the above sports injuries occur during any physical activity or exercise. They may be due to accidents, lack of training or warm-up techniques in practice, insufficient equipment, etc. to overuse a certain part of the body. Anyone related to the sports field is very important to understand various sports injuries; cause symptoms, prevent and treat, and manage injury prevention projects as a team in order, including hydration, nutrition, monitoring team members, monitoring behavior, Skills and technology education.

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