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A Cross-Sectional Study to Explore the Prevalence of Shoulder Impingement and Its Association with Training Volume Among Cricketers in Sport Academies of Faisalabad

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Abstract

Purpose: Cricketers are vulnerable to high-risk injuries. Throwing and striking are the two activities that put the most strain and effort at the shoulder joint and leads to shoulder impingement and other problems. To explore the prevalence of shoulder impingement and its association with training volume among cricketers in sport academies of Faisalabad.

Methodology: It was cross-sectional study. Study was conducted from November 2018 to January 2019. Sample size of the study was 116. Convenient sampling technique was used to enrolled participants in study. Inclusion criteria of the study were the cricket players of age between 13 to 22 years, practice regularly in sport academies of Faisalabad. Players of Faisalabad cricket academies including, Saeed Ajmal International Cricket Academy, Eden cricket & Fitness center, Combined cricket club, National Cricket Club, Lyallpur Gymkhana cricket club and Prince Gymkhana Cricket Club, Faisalabad were interviewed and evaluated for the presence of shoulder impingement. Data was analyzed by using SPSS version 22. Data was presented in forms of tables and graphs.

Findings: Out of 116 cricket players, 28.44% were spinners, 41.37% were fast bowlers and 30.17% were batsmen. Shoulder impingement was found to be present in 49(42%) of the cricketers in sport academies of Faisalabad. Chi- square test showed a statistically significant association between shoulder impingement and training volume ($p<0.05$).

Recommendations: Shoulder impingement had a prevalence of 42% in cricketers of Faisalabad. A statistically significant association was found between shoulder impingement and training volume among cricketers of sport academies in Faisalabad. This study was informed by the BiomechanicalTheory, emphasizing the importance of considering mechanical stressors on the shoulder region in cricketers. To reduce the occurrence of shoulder pain among cricket players, practitioners should emphasize proper biomechanical techniques in training programs, with a focus on shoulder joint stability and injury prevention strategies. Policymakers should advocate for sports injury prevention programs that incorporate fundamental biomechanical concepts into training curricula, ensuring cricket players' long-term shoulder health and ensuring the sport's long-term viability.

Keywords: *Cricketers, Faisalabad, Prevalence, Shoulder Impingement*

1.0 INTRODUCTION

Cricket is among the most favorite global group activities in terms of general leisure time. Bowling is a highly skilled recreational activity that requires years of careful practice adaptations. The shoulder complex is the most movable joint in the human body. The delicate movements of the arm and hand are related to the stability of this joint. Throwing and striking are the two activities that put the most strain and effort on the shoulder. Shoulder injuries result from overuse and incorrect throwing and hitting techniques (1). Fielding the ball effectively and quickly appropriately from the outfield is an essential skill for every player to learn. Throwing strategy is essential for a player to be able to accurately project the ball with precision and velocity from any area of the field in order to prevent runs and attempt a run-out. Cricketers are more prone to vulnerable injuries since they must work out for an extended period of time, harder, and sooner in their professional careers (2).

The internal rotators of the shoulder participate in the arm's acceleration phase through concentric compressions while the external-rotators are in the deceleration phase. The external rotator muscles function abnormally in the acceleration-phase of the bowling action to control the arm and shoulder. Any defect that occurs during the acceleration stage may aggravate the impingement condition (3). The main causes of shoulder injuries like separation and impingement are weak external rotators and because of an imbalance between the agonist and opposite muscle groups. Shoulder injuries are caused by improper throwing technique and overuse. The use of proper throwing techniques enhances performance and lowers the chance of injury (4).

Shoulder impingement is a frequent problem in orthopedic centres. A mechanical disturbance within the sub-acromial space causes sub-acromial impingement syndrome (SAIS) (5). The sub-acromial cavity is constituted inferiorly by the head of humerus and superiorly by the undersurface of the front third of acromion, the acromio-claviular tendon, and the claviculo-acromion joint. SAIS is a sub-acromial tissue infringement caused by a narrowing of the sub-acromial space. It is distinguished by pain and functional limitations, particularly during overhead activities (6).

Sports-related injuries are predisposed to by both internal and external risk factors. Workload, player positioning, the environment, and training time are examples of external influences. Examples of intrinsic risk factors include postural issues techniques of batting or bowling, body mechanics and fitness levels. Community-level athletes lack the necessary training, cardiovascular adaptability, and equipment. As a result, they become more prone to muscle injury and strain from repeated balling as well as upper extremity overuse problems, especially if enough rest isn't provided. Community-level injuries also commonly go unreported and untreated, and they may only manifest during a game if they are serious enough to need medical treatment (7).

JK Yadav et al. carried out a study in 2023 to determine the frequency of musculo-skeletal pain among university-level cricketers. According to the study's findings, the proportion of pain was found to be 44.1% in the shoulder, 20.50% in the forearm, 27.5% in the region of wrist, 21.3% in the upper back area, 28.3% in the low back, region 23.6% in the gluteal area, 30.7% in the knees, and 29.9% in the ankles and foot. The study found a comparatively high frequency of shoulder pain as compare to other regions (1). Another study conducted in 2019 by M Mohammad Rashaduzzaman et al. on cricketers of city Dhaka, revealed that 97 cricketers experienced musculoskeletal pain, with the most reported pain being in the upper limb (33.3%

in shoulders) (8). G. Pritchard et al. discovered that one of the most prevalent shoulder injuries in female cricketers were rotator cuff injuries (3.9 per 100 players per-season) (9).

Internationally, several researches were published regarding shoulder injuries and its risk factors in cricketers. But in Pakistan, a very limited research was conducted on this topic. It was essential to fill up this literature gap and to explore the frequency of shoulder problems and its potential correlation with factors affecting the performance of cricketers. Therefore, the objective of the research was to see the frequency of shoulder impingement and its association with training volume among the cricketers in sport academies of Faisalabad. The study findings will help to focus on making the more effective training strategies for cricketers and eventually leads to better performance of players.

In a recent study, the use of Biomechanical theory aids in explaining the potential link between training duration and shoulder impingement in cricketers. Human biomechanics is concerned with how forces act on the musculoskeletal system and how body tissue reacts to these factors (10). By considering the biomechanical aspects of cricket training routines, including exercises and drills involving the shoulder joint, researchers can uncover how the cumulative mechanical stress on the shoulder during training sessions may correlate with the development of shoulder impingement syndrome. The results of the study will offer valuable insights into injury prevention and athlete well-being.

2.0 METHODOLOGY

It was cross-sectional study. Study period was about 3 months, from November 2018 to the January 2019. Sample size of the study was 116, which was calculated by open Epitool software. Convenient sampling technique was used to enrolled participants in the study. Inclusion criteria of the study were the cricket players of age between 13 to 22 years, practice regularly in sport academies of Faisalabad. Players with any systemic disease or congenital shoulder disorder were excluded from the study.

Data was collected from Faisalabad cricket academies including, Saeed Ajmal International Cricket Academy, Eden cricket & Fitness center, Combined cricket club, National Cricket Club, Lyallpur Gymkhana cricket club and Prince Gymkhana Cricket Club, Faisalabad. All participants were guided about the research process and purpose of this research prior to the data collection. An informed consent form was signed by all participants. All players were interviewed and collected data regarding demographic and training details was recorded. And then, they were evaluated for the presence of shoulder Impingement syndrome through special tests.

The diagnosis of the Shoulder impingement was made according to the following criteria: 1. Pain in the gleno-humeral region. 2. At least two positive impingement signs (Hawkins Kennedy test, speed test, Neer impingement test, Yocum test, Jobe tests), and pain reproduction in 2 out of 3 categories (tenderness while palpation of bicep or rotator cuff muscle, painful arc with active shoulder abduction movement and pain in any of the shoulder movement (FLEX, ABD, IR, ER)) (11). The Hawkins test was executed by internally rotating the player's arm while the elbow was bent to 90 degrees and the shoulder was in 90 degree flexion.

The test was considered positive if the patient complained of discomfort or pain during internal rotation (12). According to reports, the test's specificity ranges from 0.25 to 1.00, while its sensitivity ranges from 0.62 to 0.92 (13). The players' arm was placed in the appropriate position for the speed test—shoulder flexion, ER, complete elbow extension, and supination of forearm— the researcher then applied manual resistance in a inferior direction. If pain occurs

in the tendon of bicep or the bicipital groove, the test deemed to be positive (14). According to the literature, the speed test's sensitivity is 0.32 and its specificity is 0.75 (15). For Neers test, the therapist passively flexed the arm while it was medially rotated while stabilizing the players' scapula with one hand.

If the participant complained of pain while in this posture, the test's outcome was considered affirmative. According to reports, the sensitivity range for the Neers test is 0.00 to 0.93 and a specificity range from 0.31 to 1.00 (14). The arm is brought into adduction during the Yocum manoeuvre, and the elbow is flexed until the hand is over the opposing shoulder. After that, the athlete raised his elbow without moving his shoulder. If the player experienced discomfort or pain during the motion, the test was deemed to be positive (14). For SIS, Yocum's Test has a high sensitivity (79%) and specificity (40%) (16).

To execute the Jobe's test, the players' arms were raised to an angle of 90 degrees in the scapular plane with elbow extended, medially rotated, and forearm pronated. The researcher stabilized the shoulder while providing a downward force on the arm, which the player resisted. The test was deemed positive if the patient felt pain or weakness with resistance. In identifying supraspinatus tendon tears, the sensitivity and specificity of Jobe's test are 88.6% and 58.8%, respectively (17). The painful arc abduction test displayed modest sensitivity (Se 0.51) but good pooled specificity (Sp 0.74; CI 0.46-0.90) (18).

All ethical concerns were taken into account. The study received the ethical approval from institutional review board of "Government College University, Faisalabad". The participation in the research was entirely voluntary. The privacy and dignity of all participants was prioritized. All the collected data were kept confidential. The collected data was analyzed and interpreted by using SPSS version 22. Results were presented in form of tables and graphs. Correlation of shoulder impingement with training volume was calculated by using the chi square test.

3.0 FINDINGS

Descriptive statistics illustrates that out of 116 cricket players, 28.44% were spinners, 41.37% were fast bowlers and 30.17% were batsmen. Age was divided into two categories, 40.51% of the players were of 13 to 17 years and 59.48% players were from the age range of 18 to 22 years. 51.72% players reported to do training of 1 to 10 hours per week, 40.51% reported to do training for 11 to 20 hours per week and 7.75% players had reported to do training for more than 20 hours per week (Table 1).

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Table 1: Descriptive Statistics

Descriptive statistics (N=116)		
Player type	Spinner	33(28.44%)
	Fast bowler	48(41.37%)
	Batsman	35(30.17%)
Age	13-17y	47(40.51%)
	18-22y	69(59.48%)
Training hours per week	1-10h	60(51.72%)
	11-20h	47(40.51%)
	>20	9(7.75%)

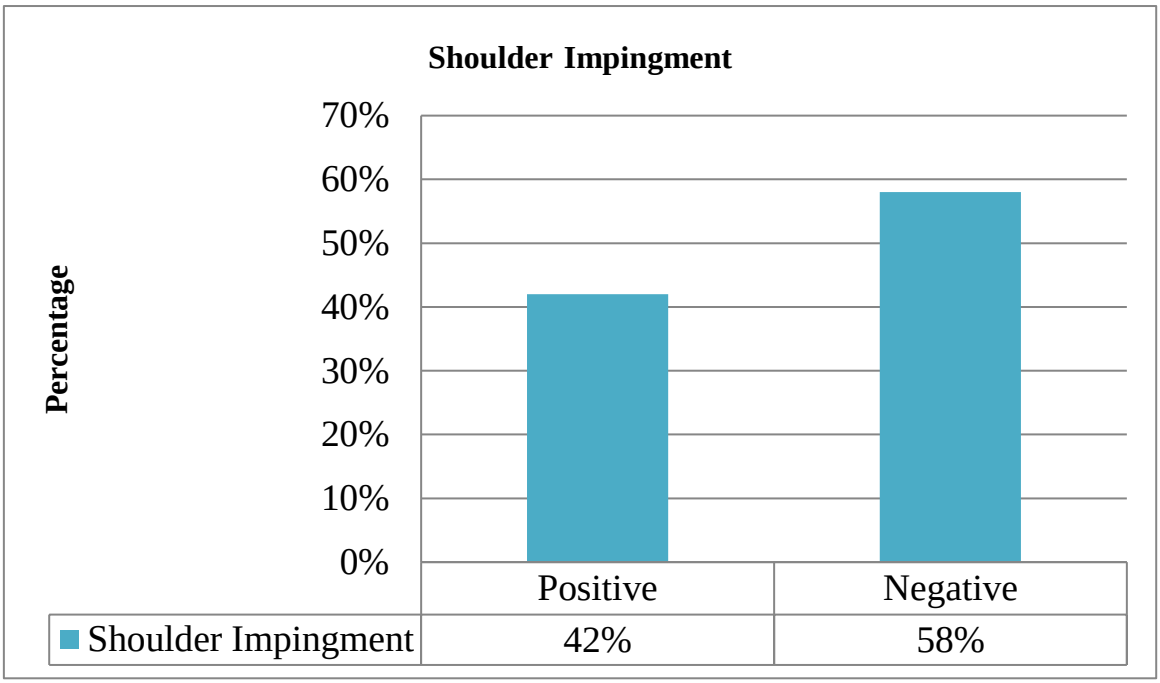

Figure 1: Frequency of Shoulder Impingement

Figure 1 shows the bar chart of shoulder impingement. Shoulder impingement was diagnosed in 49(42%) of the cricketers in sport academies of Faisalabad. And 67(58%) of the players showed negative results.

Table 2 showed the cross tabulation of training volume with shoulder impingement. Shoulder impingement was found in 10.34% players who had a training volume of 1 to 10 hours per week, 25.86% who had a training volume of 11 to 20 hours per week and 6.03% who had a training volume of greater than 20 hours per day.

Table 2: Cross Tabulation of Training Volume and Shoulder Impingement

Training Volume * Shoulder Impingement Cross tabulation				
		Shoulder Impingement		Total
		Positive	Negative	
Training Volume	1-10h	12(10.34%)	48(41.3%)	60(51.72%)
	11-20h	30(25.86)	17(14.65%)	47(40.51%)
	>20h	7(6.03%)	2(1.72%)	9(7.75%)
Total		**49(42.24%)**	**67(57.75%)**	**116(100%)**

Table 3 shows the association of shoulder impingement with training hours. Chi- square test results revealed a p-value of less than 0.05, which means that a statistical significant association was found between shoulder impingement and training volume among cricketers of sport academies in Faisalabad.

Table 3: Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	25.802[a]	2	.000
Likelihood Ratio	26.910	2	.000
Linear-by-Linear Association	23.875	1	.000
N of Valid Cases	116		
a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.80.			

Discussion

Cricketers are vulnerable to high-risk injuries. Throwing and striking are the two activities that put the most strain and effort at the shoulder joint and leads to shoulder impingement and other problems (1). The aim of the study was to explore the prevalence of shoulder impingement and its association with training volume among cricketers in sport academies of Faisalabad. According to literature, roughly one third of all the athletes experience shoulder discomfort at some point throughout the course of the season (19). A study by M Dutton et al. found that 18% of cricketer players suffered a shoulder injury, with 0.19 injuries per player in one year (20).

In the recent study, out of 116 players that were interviewed and screened, the shoulder impingement was found to be present in 49(42%) of the cricketers in sport academies of Faisalabad. E Rahman et al. supported the findings of the recent study and discovered that, out

of 100 total players, 40% of the participants had pain from shoulder injuries, and 25% of bowlers were suffered from rotator cuff injuries (21). Another study conducted in 2019 by M Mohammad Rashaduzzaman et al. on cricketers of city Dhaka, revealed that 97 cricketers experienced musculoskeletal pain, with the most reported pain being in the upper limb (33.3% in shoulders) (8). G. Pritchard et al. discovered that one of the most prevalent shoulder injuries in female cricketers were rotator cuff injuries (3.9 per 100 players per-season) (9).

In current study, chi- square test results revealed a statistical significant association ($p<0.05$) between shoulder impingement and training volume among cricketers of sport academies in Faisalabad. M Mohammad Rashaduzzaman et al. found that batsmen who play four or more sessions in one week are the most common victims of upper extremity MSK pain in clubs of Dhaka city (8). In recent study, shoulder impingement was found in 10.34% players who had a training volume of 1 to 10 hours per week, 25.86% who had a training volume of 11 to 20 hours per week and 6.03% who had a training volume of greater than 20 hours per day. CJ According to Christie et al., there is a dose-response relationship between the bowling volume and the frequency of cricketer injuries. An increased risk of injury was associated with low acute workload, low chronic workload, medium to severe chronic workload, and a moderate to minimal acute:chronic ratio (22).

The limited sample size of 116 players may not represent the entire population of cricketers in Faisalabad. The study focuses on the association of shoulder impingement with only one factor-training volume and not sees its association with other risk factors. The study focuses only the cricketers of Faisalabad city so the results may not be generalized to the entire cricketers.

CONCLUSION AND RECOMMENDATIONS

Conclusion

In conclusion, the study revealed that shoulder impingement had a prevalence of 42% in cricketers of Faisalabad. A statistical significant association was found between shoulder impingement and training volume among cricketers of sport academies in Faisalabad.

Recommendation

- Further studies with diverse sample size are recommended to enhance the generalizability of the findings.
- Further research is recommended with focusing on other risk factors including biomechanical differences, training regimens, history of previous injuries.
- It is recommended to use the study's findings to develop targeted injury prevention strategies in cricket players.

Conflict of interest: None

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