

FREQUENCY OF SHOULDER PAIN AND FUNCTIONAL LEVEL AMONG OVERHEAD THROWING ATHLETES AT QAYYUM SPORTS COMPLEX PESHAWAR, PAKISTAN: A DESCRIPTIVE CROSS-SECTIONAL STUDY

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ABSTRACT

BACKGROUND: Shoulder pain is recognized as one of the most frequent injuries that affect both females and males. Nearly 30% of the overhead sports athletes suffer a shoulder injury in their careers. Keeping in view the significance of the topic.

OBJECTIVE: this study was designed to determine the frequency of shoulder pain among overhead-throwing athletes and the performance and functional level of these athletes.

METHODOLOGY: This descriptive cross-sectional study was conducted on overhead-throwing athletes at Qayyum sports complex Peshawar. Data were collected from 150 participants recruited through systematic random sampling. SPSS version 25 was used for data analysis. The percentage of responses for every three parts was calculated separately and presented as tables and bar charts.

RESULTS: Out of 150 participants which reported shoulder pain among which 55(36.7%) reported mild pain, 18(12%) reported moderate pain and 3(2%) participants reported severe pain. The overall functional level was normal in ¾ of the population.

CONCLUSION: It is concluded from the current study that there was a total of 95 (63.3%) participants who reported shoulder pain among which 55(36.7%) reported mild pain, 18(12%) reported moderate pain and 3(2%) participants reported severe pain. The overall functional level was normal in ¾ of the population.

KEYWORDS: Shoulder pain, overhead athlete, functional level

INTRODUCTION

As the number of youths participating in overhead sports increases, the awareness of sport specialization, as well as injury susceptibility, intensifies. As a result, there has been an observed increase in overuse pathologic conditions affecting the upper extremity requires flexibility, muscular strength, coordination, synchronicity, and neuromuscular control repetitive tensile and overloading stresses acts upon when it accedes their normal bearing capacity it led to microtrauma resulting in shoulder pain.¹ Shoulder pain is recognized as one of the most frequent injuries that affect both females and males. Nearly 30% of the overhead sports athletes suffer a shoulder injury in their careers. Female athletes relatively increased ligamentous and joint laxity having more injuries as compared to male athletes.² Almost all throwing players throw and train the dominant hand so mostly there is a 9° increase in dominant shoulder internal rotation resulting in a 36% reduction of the risk of injury on the dominant side.³ The repetitive nature of throwing in overhead athletes places physiological loads of up to 108% of body weight and humeral angular velocities upwards of 7,000 degrees/s.⁴ The overhand tennis puts tennis players at risk of developing shoulder instability in a mechanism similar to that

of overhead throwers, for this reason, tennis players also are susceptible to GIRD (Glenohumeral internal rotation deficit) and

SLAP (Superior Labrum Anterior and Posterior) tears, which may alter shoulder kinematics resulting shoulder pain.⁵

Overhead sports comprise repeated arm movements requiring muscular strength muscular imbalance or weakness between muscles is accepted as one of the factors that cause musculoskeletal dysfunction and a secondary cause of shoulder pain.⁶ Individuals who engage in sports that require repetitive overhead activities are more prone to cause Subacromial Impingement Syndrome (SIS) because there is an extreme range of abduction and external rotation in overhead-throwing sports. The height of space between the acromion and humeral head ranges from 1.0–1.5 cm the variations in this or repetitive contact between the posterior superior aspect of the glenoid labrum and greater tuberosity of humeral head pinching the underlying subacromial strictures such as biceps tendon or rotator cuff, and subacromial bursa.⁷ Shoulder biomechanics of throwing is a quite tacky and complex sequence starting with the “wind up phase” which begins at maximum knee lift of the stride leg and transfers weight to the back leg stride phase. In this phase back leg starts forward motion while the shoulder blade is apart prepared and the torso rotates toward the target. The second is the arm “cocking phase” which begins when the loading foot makes contact with the group and maximum external rotation of the shoulder. The 3rd phase is the “acceleration phase” which begins

at the maximum external of the shoulder end with ball release. The trunk moves into flexion from extension the opposite side paraspinal and oblique muscle come into action to increase trunk and pelvis rotation. Then is the arm “deceleration phase”, which begins with ball release and ends with internal rotation of the shoulder. The Elbow contracts eccentrically, and scapular muscles stabilize and contract to control afterward motion smoothly. The 5th phase is the “follow throw” phase in which the body continuously moves forward until the arm and shoulder ceased motion, and eccentric contractions of the shoulder blade and trunk to control movements.⁸

It has been estimated that worldwide shoulder pain is a common disabling complaint. The annual shoulder pain incidence in primary care is (14.7%) per 1000 patients. Furthermore, it has been estimated that the per year lifetime prevalence ratio is up to 72%. Performance up to (84.2%) and reduced training volume secondary to shoulder complaints up to (73.7%).⁹ A study conducted by the European Society of sports traumatology, knee surgery, and Arthroscopy (ESSKA) in the year 2017, for evaluation of the Glenohumeral range of deficit causes of shoulder pain and injuries in handball throwing players. The study revealed an internal rotation deficit causes more than 20° increase in the incidence of shoulder pain in throwing athletes, furthermore, the study concluded that an internal rotation deficit of more the 25° and a total arch of motion deficit of more than 20° increase the incidence of internal impairment 13/87- 40% and internal rotation correlation with partial rotator cuff tear 12/87-14%.^{10,11}

Due to less sports research on overhead throwers in the country and there is very limited published literature available on the mentioned topic furthermore no such study was found to be published in Peshawar. We aim to determine the frequency of shoulder pain in Peshawar Sports Complex to pay attention to researchers and high authorities to further investigate causes, and risk factors and take preventive measures to reduce the burden of shoulder pain. This study will help us gain knowledge regarding shoulder pain in overhead-throwing athletes. Not only the results of this study will help us in the understanding burden of shoulder pain in OA, but a source also creates awareness and education to take prevention measures and precautions of those factors which predispose overhead throwing athletics to specific risk factors.

METHODOLOGY

This study was a descriptive, cross-sectional survey conducted in the Qayyum sports complex in Peshawar. The total population estimated was 243. The sample size calculated was “150” using open. epi with a confidence interval of 95%. The sampling technique used was systematic random sampling. Attendance sheets were collected from the administration. Players with even registration were given the questionnaire.

Inclusion criteria were athletes who were currently playing in any sports including Cricket, Volleyball, Basketball, Tennis Badminton. Both male and female athletes were included with an age limit of

18-40. Exclusion criteria include athletes with traumatic injuries other than sports, a history of recent shoulder surgery (last 1 month), and any other medical conditions (disability, diabetes, hypertension).

Ethical approval was awarded from the NCS university system. Permission was taken from the Director of the Qayyum sports complex before data collection. The nature and purpose of the study were explained and informed consent was signed by each subject participating in the study, after taking approval and ethical clearance from the NCS research committee.

The data collection tool used was a self-administered questionnaire in the English language. The questionnaire was well explained by the researchers and distributed among participants of the study. The questionnaire included four parts, 1) Demographics (Name, age, gender,) 2) Questions related to shoulder pain in overhead throwers 3) KJOCH (Kerlan-Jobe Orthopedic Clinic Shoulder and Elbow Score) for assessing the performance, functions of athletes, and intensity of the pain (31). The KJOCH consisted of 11 variables and 10 questions on an 11-point numeric pain rating scale (0,1,2,3, 4,5,6,7,8,9,10).

- 0 for normal,
- 1-3 for mild pain,
- 4-6 for moderate pain,
- 7 to 10 for severe pain.

RESULTS

Descriptive statistics were conducted using SPSS version 25. Among the total participants 150, the mean age of the participants was 21.9 ±4.22 including 113(75.3%) males and 37(24.7%) females. Total 41(27.3%) were cricket players, 26(17.3%) were volley ball players, 30(20.0%) were tennis players, 19(12.7%) were basketball players, and 34(22.7%) were badminton players as shown in figure 1. Among the total participants, 116(77.3%) had a dominant right hand while the remaining 34(22.7%) had a dominant left hand (Figure 1).

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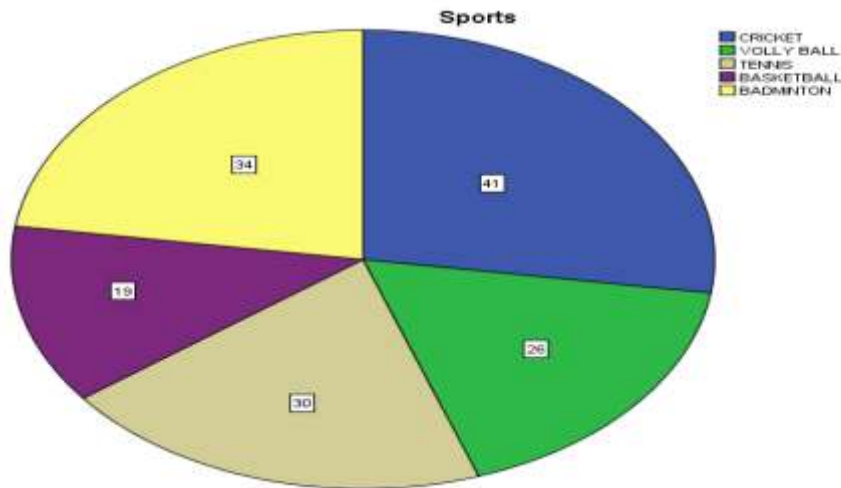


Figure 1: Types of players from different sports.

Among a total of 150 participants, 55(36.7%) participants the severity of pain was normal, 74(49.3%) presented with mild pain, 18(12.0%) had moderate pain and 3(2%) players had a severe type of pain (Table 1).

Table 1 Severity of Pain

	Frequency	Percent
Normal	55	36.7%
Mild	74	49.3%
Moderate	18	12.0%
Severe	3	2%
Total	150	100%

Out of total 150 participants, 77(51%) participants were competing on provincial level, 37(24.7%) were district level players while remaining 36(24.0%) were national level players.

Following responses were received via the questionnaire (Table 2) (Table 3).

Table 2 Are you currently active in your sport?

Question	Yes	No
Are you currently active in your sport?	144 (96%)	6 (4%)
Have you missed game or practice time in the last year due to an injury to your shoulder?	36 (24%)	114 (76%)
Have you been diagnosed with an injury to your shoulder?	15 (10%)	135 (90%)
Have you received treatment for an injury to your shoulder?	25 (16.7%)	125 (83.3)
What is the highest level of competition you have participated at?	79 (52.7)	36 (24)

Table 3 Frequency of injury to arm/shoulder

If your current level of competition is not the same as your highest level, do you feel it is due to an injury to your arm?	Playing without any shoulder trouble	124 (82.7%)
	Playing but with shoulder trouble	23 (15.3%)
	Not playing due to shoulder trouble	3 (2%)

Among 150 participants, pain followed the patterns and intensity illustrated in (Table 4).

Table 4 Pain patterns and intensity

Question	Normal	Mild	Moderate	Severe
How difficult is it for you to warm up before playing?	68(45.3%)	52(34.7%)	28 (18.7%)	2 (1.3%)
How much pain do you experience in your shoulder?	93(62.0%)	34(22.7%)	16(10.7%)	7 (4.7%)
How much weakness and/or fatigue (ie, loss of strength) do you experience in your shoulder?	73(48.7%)	58(38.7%)	12(8%)	7 (4.7%)
How unstable do your shoulder feel during competition?	81(48.7%)	44 (29.3%)	18(12%)	7 (4.7%)
How much have shoulder problems affected your relationship with your coaches, management, and agents?	81(48.7%)	46 (30.7%)	21 (14%)	2 (1.3%)
How much have you had to change your throwing motion, serve, stroke, etc., due to your shoulder?	59(39.3%)	54 (36%)	30 (20%)	7 (4.7%)
How much has your velocity and/or power suffered due to your shoulder?	41 (27.3%)	57 (38%)	39 (26%)	13 (8.7%)
What limitation do you have in endurance in competition due to your shoulder?	54 (36%)	52 (34.7%)	35 (23.3%)	9 (6%)
How much has your control (of pitches, serves, strokes, etc.) suffered due to your shoulder?	61 (40.7%)	37 (24.7%)	40 (26.7%)	12 (8%)
How much do you feel your shoulder affects your current level of competition in your sport (i.e. is your arm holding you back from being at your full potential)?	41 (27.3%)	28 (18.7%)	59 (39.3%)	22 (14.7%)

DISCUSSION

The main purpose of this study was to find out the frequency of shoulder symptoms in overhead active sports players. We found the prevalence was high among throwers, especially in the shoulder, neck, and upper back areas. The prevalence of such symptoms than the sports who do not need overhead activities much; In addition, high repetitive stress, overuse, training error, muscular imbalance, and improper rehabilitation are significantly associated with shoulder and upper back pain. In our study out of 34 badminton players (49.3%) who have reported mild symptoms, 12% often feel mild pain (2.0%) and experience moderate pain in stroke motion or repetitive overhead activities, while 3% had severe symptoms. A study conducted at the Institute of Sport, Senshu University Japan. The study reported incidences of shoulder injuries in approximately 1.4–19.0% of badminton players moreover Shoulder pain was approximately 27.0–52.6% of badminton players experienced shoulder pain in forehand overhead stroke motion¹¹ This study supports the results of the current study as results of the current study fall in

the mentioned range of for mentioned study.

In our study the frequency of shoulder pain in volleyball was reported at 26 (17.3%), 49% experienced only mild pain, 12% had moderate pain, and 2.0% have severe pain without any traumatic event. A Study conducted in USA year, 2017 suggests that in overhead sports i.e. volleyball 175 (40%) players experienced shoulder pain due to repetitive overuse. Over a part of the total population (27%) described the shoulder pain as reoccurring more regularly (“sometimes” or “often”).¹² This study also supports the results of the current study as both studies found almost the same ratio of shoulder pain. The similarity in results could be due to the same population. In our study total of 150 overhead sports were included among them 116 (77.3%) were right-hand dominate while 34 (22.3%) were left-hand dominant players. A study was conducted in the Department of Rehabilitation, Tohoku Fukushi University, in the year 2017, The prevalence of pain in the elbow and/or shoulder comprised 10.2%, in the elbow 5.3%, the shoulder 6.5% and both the elbow and shoulder 1.7% (n = 37), respectively. The prevalence of pain in

the non-dominant elbow and shoulder was 0.8% (n = 17) and 0.3% (n = 7), respectively.¹³

In the current study, the study sample was 150 among which 41(27.3%) were cricket players, 26(17.3%) volleyball, 30(20.3%) tennis, 19(12.3%) basketball, 34(22.7%) players were badminton players. When asked about the pain whether they were “playing without any shoulder trouble, playing with shoulder trouble or not playing due to shoulder trouble” in response to this question 124 (82.2%) reported that they play without significant trouble in their shoulder currently, 23 (15.3%) reported that are playing with pain, however, 3(2.0%) reported that they take a break from their sports and do not play due to shoulder trouble. A study is conducted on Turkish overhead-throwing athletes. A total of 134 overhead-throwing athletes completed a survey regarding the demographic characteristics, sports participation, injury history, current status of the presence of upper extremity problems and sports involvement, pain existence and severity, disability, and functional status. Athletes including those playing without any arm trouble (58.2%); those playing, but with arm trouble (28.4%); and not playing due to arm trouble (13.4%) were compared (p>0.05). The sample was participating in volleyball (35.1%), handball (15.7%), tennis (12.7%), basketball (18.7%), swimming (9.7%), and water polo (8.2%). No differences were found in the ASES and DASH scores.¹⁴

In our study data were collected from 41(23.3%) cricketers in our research when asked how much pain they experience in their shoulder during overhead throwing 93(62.0%) reported they do not experience any pain in their shoulder, 34(22.7%) experienced mild pain, 16(10.7%) reported moderate pain, while (10.7%) reported severe pain in overhead throwing. A study is conducted on 15 January 2019. The study reported that 17% (95%CI: 9.24%) of cricketers sustained an injury during the 2016/2017 season. Two of the 17 screening tests predicted seasonal dominant shoulder injury (p < 0.05): a dominant supraspinatus tendon thickness of 5.85 mm and a non-dominant pectoralis minor length of 12.85 cm.¹⁵ In current study players were asked about weakness or loss of muscular strength in the shoulder complex in competitive sports the results show that 73(48.7%) reported that they do not experience the loss of muscular strength during their game, moreover, 58(38.7%) reported mild weakness in their shoulder, furthermore, 12(8.0%) reported moderate weakness, and 7(4.7%) athletes complain of severing muscular strength loss in the shoulder in overhead throwing sports. A study was conducted to assess the shoulder girdle muscle strength and functional performance of fast cricket bowlers. Based on inclusion criteria 70 fast cricket bowlers between the age group of 18-35 years. Values were obtained for muscle strength using sphygmomanometers. The normal value for internal rotators was 190 mm/hg. External rotators were 160mm/hg and for scapular retractors, the normal value was 160 mm/hg. The study concludes that reduced strength of shoulder girdle muscle, poor the performance of fast cricket bowlers. Thus,

the study showed that a fast bowler reveals a low score on the SPADI index reduces values for the strength of shoulder girdle muscles and reduces the rate of performance.¹⁶ This study supports the results of the current study as the current study also reported almost the same results.

A study was conducted in March 2018 aimed to compare shoulder injury risk between male and female athletes. There was limited evidence for an increased risk of shoulder injuries in male high school and college lacrosse players compared with female players. There was limited evidence of no sex differences in shoulder injuries among elite handball players and college tennis players, and limited evidence of a decreased risk of shoulder injury among male college water polo players compared with female players.¹⁷ In the current study 58 (38.7%) athletes reported fatigue during involved in their concerned sports. A study was conducted on 14 pitchers whose results showed that both total strike percentage and first pitch strike percentage decreased at a perceived fatigue level of “moderate” (52.4% and 49.8%) and further at the “severely” fatigued (45.3% and 40.0%) perceived level.¹⁸ In the present study when asked how often athletes experience instability during their game so a total of 44 (29.3%) participants reported instabilities. In 2007, Owens et al reported that subluxation may comprise up to 85% of instability events. Additionally, in this series of patients, all of whom were U.S. military cadets, 41% of instability events were noncontact in nature.

CONCLUSION

It is concluded from the current study that there was a total of 95 (63.3%) participants who reported shoulder pain among which 55(36.7%) reported mild pain, 18(12%) reported moderate pain and 3(2%) participants reported severe pain. The overall functional level was normal in ¾ of the population. Furthermore, it has been recommended that Government setups should cooperate with the researchers in data collection.

REFERENCES

- 1.Oliver GD, Downs JL, Barbosa GM, Camargo PR. Descriptive profile of shoulder range of motion and strength in youth athletes participating in overhead sports. *International Journal of Sports Physical Therapy*. 2020;15(6):1090.
- 2.Kamalden TFT, Gasibat Q, Samsudin S, Joseph JA. Occurrence of Muscle Imbalance and Risk of Injuries in Athletes using Overhead Movements: A Systematic Review. *Sport Mont*. 2021;19(3):Ahead of Print.
- 3.Shitara H, Yamamoto A, Shimoyama D, Ichinose T, Sasaki T, Hamano N, et al. Shoulder stretching intervention reduces the incidence of shoulder and elbow injuries in high school baseball players: a time-to-event analysis. *Scientific reports*. 2017;7(1):1-7.
- 4.Muto T, Inui H, Ninomiya H, Tanaka H, Nobuhara K.

- Characteristics and clinical outcomes in overhead sports athletes after rotator cuff repair. *Journal of Sports Medicine*. 2017;2017. 2018;52(20):1312-9.
- 5.DeFroda SF, Goyal D, Patel N, Gupta N, Mulcahey MK. Shoulder instability in the overhead athlete. *Current sports medicine reports*. 2018;17(9):308-14. 17.Birfer R, Sonne MW, Holmes MW. Manifestations of muscle fatigue in baseball pitchers: a systematic review. *PeerJ*. 2019;7:e7390.
- 6.Suner-Keklik S, Çobanoğlu G, Savas S, Seven B, Nihan K, GÜZEL NA. Comparison of Shoulder Muscle Strength of Deaf and Healthy Basketball Players. *International Journal of Disabilities Sports and Health Sciences*. 2020;3(1):20-7. 18.DeFroda SF, Goyal D, Patel N, Gupta N, Mulcahey MK. Shoulder instability in the overhead athlete. *Current sports medicine reports*. 2018;17(9):308-14.
- 7.Creech JA, Silver S. Shoulder impingement syndrome. *StatPearls [Internet]*. 2020.
- 8.Dutton M, Gray J, Prins D, Divekar N, Tam N. Overhead throwing in cricketers: A biomechanical description and playing level considerations. *Journal of sports sciences*. 2020;38(10):1096-104.
- 9.Kay J, Memon M, Rogozinsky J, Simunovic N, Seil R, Karlsson J, et al. Level of evidence of free papers presented at the European Society of Sports Traumatology, Knee Surgery and Arthroscopy congress from 2008 to 2016. *Knee surgery, sports traumatology, arthroscopy*. 2017;25(2):602-7.
- 10.Kraan RB, De Nobel D, Eygendaal D, Daams JG, Kuijjer PPF, Maas M. Incidence, prevalence, and risk factors for elbow and shoulder overuse injuries in youth athletes: A systematic review. *Translational Sports Medicine*. 2019;2(4):186-95.
- 11.Frisch KE, Clark J, Hanson C, Fagerness C, Conway A, Hoogendoorn L. High prevalence of nontraumatic shoulder pain in a regional sample of female high school volleyball athletes. *Orthopedic journal of sports medicine*. 2017;5(6):2325967117712236.
12. Sekiguchi T, Hagiwara Y, Momma H, Tsuchiya M, Kuroki K, Kanazawa K, et al. Coexistence of trunk or lower extremity pain with elbow and/or shoulder pain among young overhead athletes: a cross-sectional study. *The Tohoku journal of experimental medicine*. 2017;243(3):173-8.
- 13.Turgut E, Tunay VB. Upper extremity health profile in Turkish overhead throwing athletes: the effect of the current level of play, sports participation, sports type, and previous injury. *Journal of Exercise Therapy and Rehabilitation*. 2017;4(2):61-6.
- 14.Dutton M, Tam N, Brown JC, Gray J. The cricketer's shoulder: Not a classic throwing shoulder. *Physical therapy in sport*. 2019;37:120-7.
- 15.Desai P, Yeole U, Waghmare A, Andhare N. Assessment of Shoulder Girdle Muscles Strength and Functional Performance in Fast Cricket Bowlers. 2019.
- 16.Asker M, Brooke HL, Waldén M, Tranaeus U, Johansson F, Skillgate E, et al. Risk factors for, and prevention of, shoulder injuries in overhead sports: a systematic review with best-evidence synthesis. *British journal of sports medicine*.