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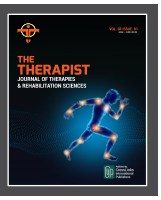

Original Article

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Association between Rotator Cuff Weakness and Shoulder Impingement Syndrome in Bowlers

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ABSTRACT

The rotator cuff comprises four muscles and their associated tendons, which function together to support the ball (head) of the upper arm bone (humerus) in the shoulder joint and allow for fluid movement and rotation of the shoulder. Because of the repeated overhead motion involved with bowling, many bowlers develop a common shoulder injury, shoulder impingement syndrome (SIS), due to overuse and/or "overloading" these structures in their shoulders. SIS occurs when the rotator cuff tendons or the bursa sac that surrounds them become compressed/irritated, resulting in pain, inflammation, and restricted shoulder function. **Objective:** To find out the association between rotator cuff weaknesses and shoulder impingement syndrome. **Methods:** Data were collected from fast bowlers at the University of Lahore, Lahore Gymkhana, Minhaj College Sports Club, and various cricket clubs and academies across Lahore. A total of 77 bowlers aged 20–35 years were selected through convenience sampling. Players with recent shoulder injuries, rotator cuff tears, or neurological conditions were excluded. **Results:** All the participants were male. Shoulder impingement was assessed using the Neer test, with 28 bowlers testing positive, all of whom exhibited severe Rotator cuff weakness and shoulder impingement syndrome among bowlers. **Conclusions:** A high prevalence of SIS was observed among fast bowlers due to the physical nature of the action. SIS can be minimized by improving the strength of the shoulder, using correct technique, and resting. Additional research should be undertaken to develop specific preventative and rehabilitation programs for fast bowlers.

INTRODUCTION

Cricket is considered one of the most popular sports around the world, with millions of players at both the amateur and professional levels [1]. One of the most physically demanding parts of this sport is fast bowling. Fast bowling is characterized by repeated overhead shoulder motion, which produces a large amount of biomechanical stress on the upper limb [2]. The shoulder joint (glenohumeral joint) is the most mobile in the body and has large degrees of freedom of motion, which can lead to instability within that joint, as a result, therefore creating risk in terms of injuries due to overuse and damage to surrounding soft tissues [3]. Shoulder pain is a frequent occurrence among overhead athletes, and it has been found that up to 70% of bowlers in cricket experience shoulder injuries during their career. Shoulder Predisposition to pain and functional impairment are usually a result of either rotator cuff tendinopathy or shoulder impingement syndrome (SIS) [4]. SIS is brought about by compression between the supraspinatus tendon (subacromial bursa) of the rotator cuff and the acromion between the humeral head and the acromion, which causes inflammation, pain, and movement limitation. Some of the contributing factors of SIS consist of excessive overhead bowling, muscle imbalances, altered scapular mechanics, and technique [5, 6]. Numerous reports worldwide have documented the frequency of agonizing injuries to the

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rotator cuff and shoulder of players participating in competitive sports due to the extreme levels of physical exertion that occur when playing sports overhead [7, 8]. With cricket being extremely popular in South Asia, evidence of increasing shoulder overuse injuries by fast bowlers is building, especially as younger players are often subjected to an enormous amount of training before the age of 17 [9]. Even structured cricket programs (such as at an academy or university) frequently demonstrate ongoing problems with the shoulder, which can lead to an athlete missing training, unable to play in scheduled matches, or, in some cases, an athlete terminating their career prematurely [10]. Although fast bowlers frequently come across the symptom of subacromial impingement syndrome (SIS) due to their repetitive motions when bowling, there are few studies investigating the relationship between SIS, bowling style, and the potential risks of intramuscular fatigue. As such, the sole means of formulating functional injury prevention plans and rehabilitation guidelines on fast bowlers affected by SIS is to determine the potential risk factors and biomechanics involved in the development of SIS among fast bowlers [11]. Shoulder impingement syndrome represents an estimated 44-65 percent of all shoulder complaints worldwide, with a high prevalence being reported in overhead athletes. In Asia and especially in the cricket-playing nations like Pakistan, recent researches claim that shoulder injuries are the most prevalent in the fast bowlers with a range of 3070, which suggests that the region is burdened [12]. The dynamics of the overhead actions that fast bowlers are exposed to put them under a lot of physical strain, and such strain needs to be countered by conditioning, technique correction, and rehabilitation; failure to do so can result in a condition conducive to chronic dysfunction of the shoulder. The rotator cuff weakness, scapular dyskinesia, and poor integration of kinetic chains have commonly been pointed out as risk factors in the development of SIS. Such biomechanical aspects as inadequate shoulder rotation and poor follow-through can also contribute to the stress on the subacromial structures during the bowling motion. Hence, they should be detected and taken care of so as to maximize performance and increase the athletic lives of fast bowlers with SIS. BMW's high levels of discomfort in the shoulder and limitation of quick bowlers because of repetitive overhead movement [13]. What is the percentage of development of SIS in fast bowlers, and what role does the bowling motion and rotator cuff activity contribute to this condition? Determine the rate of fast bowlers that develop SIS, and the substances that lead to this problem (e.g., poor mechanics and poor rotator cuffs).

The hypothesis was to concentrate on the relationship between rotator cuff weakness and SIS because in this study, bowling mechanics were not evaluated in terms of their rotator cuff weakness have a higher likelihood of developing SIS. To establish the scope and determinants of SIS, so that they can be addressed through methods of early screening, focused strength training, injury prevention schemes, and enhancement of the athlete's career through injury-free and long-lasting careers. This study aims to determine the association between rotator cuff weakness and shoulder impingement syndrome among fast bowlers, to provide evidence for early screening and preventive strategies.

METHODS

This cross-sectional study has data that were collected from bowlers in the University of Lahore, Lahore Gymkhana, Minhaj College Sports Club, and various cricket clubs and academies across Lahore. A total sample size of 77 participants was calculated using Epitool software, and a convenience sampling technique was employed. Data were collected after obtaining written informed consent from all participants, in accordance with the ethical principles outlined in the Declaration of Helsinki. Data were collected from January 2024 to June 2024. Male bowlers aged 20–35 years who had played 2–3 matches at the district or state level in the last six months, or who regularly played at local levels and trained 4–5 days per week for 4–6 hours daily, were included in the study. The sample size (n=77) was calculated using Epitool with 95% confidence level, 5% margin of error, and an expected prevalence of prevalence 35% [14]. The calculation has been presented in a screenshot in the form of an addition. To minimize selection bias and enable an adequate evaluation of the null hypothesis that rotator cuff weakness and SIS are associated, inclusion criteria were changed to encompass bowlers with shoulder pain irrespective of the outcome of the impingement test. Participants with a history of previous surgery or trauma to the affected shoulder, diagnosed glenohumeral or acromioclavicular arthritis, symptoms of cervical radiculopathy, or any known inflammatory or neurological disorders were excluded.

All the data were input and analyzed using IBM Statistical Package for Social Sciences (SPSS) version 25.0. Descriptive statistics were calculated to generalize the participant characteristics, where the continuous variables were in the form of mean and standard deviation, and the categorical variables in the form of frequency percentage. The Shapiro-Wilk test was used to test the normality of the continuous data. Based on the distribution of data, Pearson correlation analysis was applied for normally distributed variables, while Spearman's rank correlation was used for non-normally distributed variables to assess the relationship between Constant-Murley and SPADI scores. Independent sample t-test or Mann–Whitney

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U test was used, where appropriate, to compare mean scores between participants with positive and negative impingement test findings. Effect size (Cohen's d) was calculated to determine the magnitude of differences between groups. A 95% confidence interval was reported for key estimates, and a p-value of <0.050 was considered statistically significant.

RESULTS

A total of 77 fast bowlers participated in the study, with no missing data. The mean age of participants was 24.44 ± 1.64 years, ranging from 22 to 30 years, with the majority of bowlers clustered around 24 years of age (Table 1).

Table 1: Mean Age of Participants

Variables	Values
Valid	77
Missing	0
Mean ± SD	24.44 ± 1.642
Minimum	22
Maximum	30

Mostly, bowlers were under the age of 24. While a small number lie under the age of 28 or 30 (Figure 1).

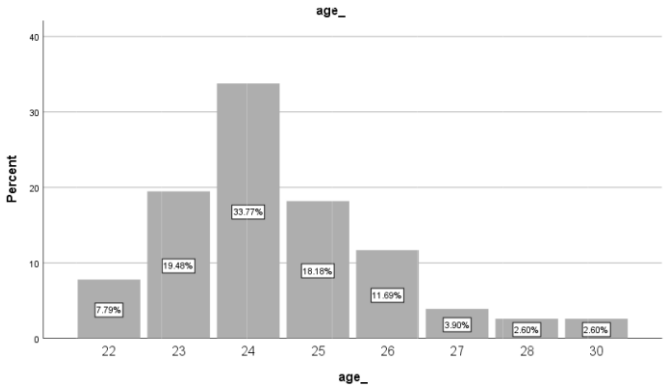

Figure 1: Age of Participants

Regarding anthropometric characteristics, most participants fell within the height range of 166–170 cm (40.3%), followed by 171–175 cm (32.5%). Smaller proportions were observed in the 161–165 cm (15.6%) and 155–160 cm (11.7%) categories (Table 2).

Table 2: Height Frequency

Variables	Frequency (%)
155-160	9 (11.7%)
161-165	12 (15.6%)
166-170	31 (40.3%)
171-175	25 (32.5%)
Total	77 (100.0%)

Assessment of shoulder pain scores revealed varying severity levels among bowlers. Approximately 27.3% reported no pain, while 26.0% experienced mild pain. Moderate pain was reported by 31.2% of participants, whereas 10.4% and 5.2% experienced severe and worst pain, respectively, indicating that nearly half of the bowlers suffered from moderate to severe shoulder discomfort during daily activities (Table 3).

Table 3: Assessment for Shoulder Pain Score (0-15)

Variables	Frequency (%)
0 No Pain	21 (27.3%)
1-5 (Mild)	20 (26.0%)
6-10 Moderate	24 (31.2%)
10-14 Severe	8 (10.4%)
15 Worst	4 (5.2%)
Total	77 (100.0%)

A Pearson correlation was conducted to assess the relationship between Total Constant Score (total constant) and variable total spadi. There was a strong, positive correlation, r(77) = 0.899, p<0.001, indicating that increases in one score were associated with increases in the other (Table 4).

Table 4: Pearson Correlation Analysis

Variables		Total Constant	Total Spadi
Total Constant	Pearson Correlation	1	0.899**
	Sig. (2-tailed)	—	<0.001
	N	77	77
Total Spadi	Pearson Correlation	0.899**	1
	Sig. (2-tailed)	<0.001	—
	N	77	77

Correlation is significant at the 0.01 level (2-tailed)

Clinical diagnostic testing showed that 36.4% of bowlers tested positive for both Neer and Hawkins-Kennedy impingement tests. Positive apprehension and scarf tests were observed in 14.3% of participants, while 16.9% demonstrated positive Jobe and Yocum tests. However, 32.5% of bowlers had no positive diagnostic findings (Table 5).

Table 5: Diagnostic Tests

Variables	Frequency (%)
Positive Neer impingement and Hawkins Kennedy test	28 (36.4%)
Positive apprehension and scarf test	11 (14.3%)
Positive Jobe and Yocum test	13 (16.9%)
None of the tests are Positive	25 (32.5%)
Total	77 (100.0%)

DISCUSSION

The purpose of the current study was to examine the relationship that exists between rotator cuff weakness and shoulder impingement syndrome (SIS) in bowlers, who are a highly susceptible population to shoulder stress. The research results showed that there was a strong and significant correlation between rotator cuff weakness, which was measured by Constant-Morley Score, and

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shoulder disability measured by SPADI (Shoulder Pain and Disability Index) score, which was significant and statistically significant. The correlation coefficient of Pearson achieved 0.899 at a p-value of less than 0.001, which is very strong, and the two variables have a very strong and statistically significant correlation in a sample of 77 bowlers. The correlation is high, indicating that bowlers who have greater weakness in rotator cuffs will have higher chances of demonstrating symptoms that are in line with shoulder impingement syndrome. These data are in line with the existing literature that suggests that dysfunction in the rotator cuff muscles, particularly the supraspinatus and infraspinatus muscles, plays a major role in the altered shoulder mechanics and subacromial impingement [14]. Rotator cuff muscles play a significant part in the stabilization of the glenohumeral joint, and their weakness may result in the superior migration of the humeral head, hence a reduction in the subacromial space, and the development of impingement symptoms [15]. Twenty-eight bowlers (36.6 per cent) in this study were positive on special tests suggestive of SIS, such as Neer, Hawkins-Kennedy, and Yocum tests. Meanwhile, 13 percent gave positive Jobe and Full Can tests that suggested supraspinatus involvement, although not conclusively found. It implies that some athletes may demonstrate isolated rotator cuff weakness without clinical impairment. Further, 14.3 percent had positive Apprehension and Scarf tests, which are more indicative of anterior instability and AC joint pathology, respectively, and 32.5 percent of bowlers did not have any positive clinical test results. These distributions support the idea of multifactorial shoulder pathology in overhead athletes because rotator cuff impairment, joint instability, and structural impingement can all contribute to the development of pain and dysfunction [16, 17]. A variety of clinical implications have been achieved in this study. First of all, the weakness of the rotator cuff is closely interrelated with SIS, which confirms the necessity to screen and introduce particular strengthening strategies to bowlers, particularly those with the first signs of fatigue or mechanical disorder. The rehabilitation program should be aimed at restoring the muscular strength, particularly the rotator cuff and scapular stabilizers, to prevent the occurrence of subacromial impingement. It has some evidence to back the efficacy of such interventions that have been used in enhancing the shoulder function and reducing the pain [5, 18]. In addition, these findings indicate the relevance of the combination of these clinical assessment tools, including Constant-Murley Score and SPADI, with the specific physical examination tests to identify the presence of at-risk athletes. These reliable functional scores can be used to give precise indications of pathology in the shoulder where imaging might not be easily accessible or cost-efficient [19, 20]. It was found that this is a negative correlation, implying that an enhanced shoulder functioning (high Constant-Murley score) is correlated with low pain and disability (low SPADI score).

The study has limitations. The design is cross-sectional, which does not provide the opportunity to make a causative conclusion, and it is not evident whether the weakness of the rotator cuff is a predetermined outcome or an outcome of impingement. This will entail longitudinal research to examine the causality and the relationship over time. In addition, all the samples were male bowlers; it was not representative of the rest of the population, e.g., female athletes or people who are engaged in other overhead games. In conclusion, it is possible to state that the rotator cuff weakness and shoulder impingement syndrome are closely related, and the correlation between the two variables is high ($r=0.899$, $p<0.001$). This means that the two variables are related. Due to the great functional demand of the shoulder joint in the course of bowling, the early identification and management of rotator cuff deficiency may be critical in the prevention of SIS and preservation of athletic performance. More research would be done on the applicability of preventive and rehabilitative interventions to enable the reduction of the occurrence of shoulder impingement among bowlers and other overhead athletes.

CONCLUSIONS

This study, in this conclusion, has shown that the rotator cuff weakness is substantially related to the shoulder impingement syndrome in fast bowlers. In this population, it is suggested to use early screening and specific strengthening programs to decrease the dysfunction of the shoulder and enhance its performance.

Authors' Contribution

Conceptualization: SZ
Methodology: SZ[2]
Formal analysis: SZ[2]
Writing and Drafting: SZ[1], ST, TA, SZ[2], MAR
Review and Editing: SZ[1], ST, TA, SZ[2], MAR, HS

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

All the authors declare no conflict of interest.

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REFERENCES

[1] Naqvi SM, Sharif A, Javed L, Gul M, Bilal H, Arsh A. Clinical Tests Accuracy in Diagnosing Subacromial Impingement Syndrome: A Systematic Review. Journal of Pakistan Medical Association. 2023 Apr; 73(4): 843. doi: 10.47391/JPMA.5529.

[2] Lädermann A, Collin P, Zbinden O, Meynard T, Saffarini M, Chiu JC. Diagnostic Accuracy of Clinical Tests for Subscapularis Tears: A Systematic Review and Meta -Analysis. Orthopedic Journal of Sports Medicine. 2021 Sep; 9(9): 23259671211042011. doi: 10.1177/23259671211042011.

[3] Fernandes DA, Melo G, Contreras ME, Locks R, Chahla J, Neves FS. Diagnostic Accuracy of Clinical Tests and Imaging Exams for Femoroacetabular Impingement: An Umbrella Review of Systematic Reviews. Clinical Journal of Sport Medicine. 2022 Nov; 32(6): 635-47. doi: 10.1097/JSM.0000000000000978.

[4] Zhao Q, Palani P, Kassab NS, Terzic M, Olejnik M, Wang S *et al.* Evidence-Based Approach to the Shoulder Examination for Subacromial Bursitis and Rotator Cuff Tears: A Systematic Review and Meta-Analysis. BioMed Central Musculoskeletal Disorders. 2024 Dec; 25(1): 1028. doi: 10.1186/s12891-024-08144-z.

[5] Rafferty K. Risk Factors and Shoulder Dysfunction in Elite Male Fast Bowlers in South Africa. 2020.

[6] Khan FI, Naveed K, Maryam Z, Mehdi S, Ahmed MG, Mehmood MH *et al.* Association Between Overhead Athletic Activities and Shoulder Impingement Syndrome Among University Athletes. Insights-Journal of Health and Rehabilitation Учредители: Health and Research Insights. 2025; 3(3): 471-8. doi: 10.71000/cp161d79.

[7] Ferdinands RE and Deshpande Y. Kinetics of the Front-Arm Technique in Cricket Fast Bowling. International Journal of Sports Science and Coaching. 2023 Dec; 18(6): 2205-15. doi: 10.1177/17479541221124073.

[8] Funakoshi T, Takahashi T, Shimokobe H, Miyamoto A, Furushima K. Arthroscopic Findings of the Glenohumeral Joint in Symptomatic Anterior Instabilities: Comparison Between Overhead Throwing Disorders and Traumatic Shoulder Dislocation. Journal of Shoulder and Elbow Surgery. 2023 Apr; 32(4): 776-85. doi: 10.1016/j.jse.2022.10.005.

[9] Giri A, O'Hanlon D, Jain NB. Risk Factors for Rotator Cuff Disease: A Systematic Review and Meta-Analysis of Diabetes, Hypertension, and Hyperlipidemia. Annals of Physical and Rehabilitation Medicine. 2023 Feb; 66(1): 101631. doi: 10.1016/j.rehab.2022.101631.

[10] Gouveia K, Kay J, Memon M, Simunovic N, Ayeni OR. Glenohumeral Internal Rotation Deficit in the Adolescent Overhead Athlete: A Systematic Review and Meta-Analysis. Clinical Journal of Sport Medicine. 2022 Sep; 32(5): 546-54. doi: 10.1097/JSM.0000000000000945.

[11] Harsløf I, Poulsen I, Larsen K. New Dynamics of Disability and Rehabilitation. Palgrave Macmillan. 2019. doi: 10.1007/978-981-13-7346-6.

[12] Alqunaee M, Galvin R, Fahey T. Diagnostic Accuracy of Clinical Tests for Subacromial Impingement Syndrome: A Systematic Review and Meta-Analysis. Archives of Physical Medicine and Rehabilitation. 2012 Feb; 93(2): 229-36. doi: 10.1016/j.apmr.2011.08.035.

[13] Kim MS, Kim IW, Lee S, Shin SJ. Diagnosis and Treatment of Calcific Tendinitis of the Shoulder. Clinics in the Shoulder and Elbow. 2020 Nov; 23(4): 210. doi: 10.5397/cise.2020.00318.

[14] Seitz AL, McClure PW, Finucane S, Boardman III ND, Michener LA. Mechanisms of Rotator Cuff Tendinopathy: Intrinsic, Extrinsic, or Both? Clinical Biomechanics. 2011 Jan; 26(1): 1-2. doi: 10.1016/j.clinbiomech.2010.08.001.

[15] Michener LA, McClure PW, Karduna AR. Anatomical and Biomechanical Mechanisms of Subacromial Impingement Syndrome. Clinical Biomechanics. 2003 Jun; 18(5): 369-79. doi: 10.1016/S0268-0033(03)00047-0.

[16] Kibler BW, Sciascia A, Wilkes T. Scapular Dyskinesis and Its Relation to Shoulder Injury. Journal of the American Academy of Orthopedic Surgeons. 2012 Jun; 20(6): 364-72. doi: 10.5435/JAAOS-20-06-364.

[17] Hoppe MW, Brochhagen J, Tischer T, Beitzel K, Seil R, Grim C. Risk Factors and Prevention Strategies for Shoulder Injuries in Overhead Sports: An Updated Systematic Review. Journal of Experimental Orthopedics. 2022; 9(1): 78. doi: 10.1186/s40634-022-00493-9.

[18] Mudassir M, Ul Mustafa A, Ullah U, Aslam M, Ghaffar T, Zartasha A *et al.* Cross-Sectional Study to Explore the Prevalence of Shoulder Impingement and Its Association with Training Volume among Cricketers in Sport Academies of Faisalabad. European Journal of Health Sciences. 2023; 9(3): 26-34. doi: 10.47672/ejhs.1594.

[19] Roy JS, MacDermid JC, Woodhouse LJ. Measuring Shoulder Function: A Systematic Review of Four Questionnaires. Arthritis Care and Research: Official Journal of the American College of Rheumatology. 2009 May 15; 61(5): 623-32. doi: 10.1002/art.24396.

DOI: https://doi.org/10.54393/tt.v7i2.299

[20] Manzi JE, Nicholson A, Dowling B, Black GG, Krichevsky S, Quan T *et al.* Relationships Between Throwing Mechanics and Shoulder Anterior Force in High School and Professional Baseball Pitchers. Shoulder And Elbow. 2024 Mar; 16(1_suppl): 17-23. doi: 10.1177/17585732221098721.