International Journal of Physical Education, Sports and Health 2017; 4(4): 402-407

P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (ISRA): 5.38
IJPESH 2017; 4(4): 402-407

www.kheljournal.com
Received: 15-05-2017
Accepted: 16-06-2017

Ranjan P
Lecturer, R V College of Physiotherapy, Bangalore, India

Pruthviraj R
Principal, R V College of Physiotherapy

Bhatbolan S
Associate professor, R V College of Physiotherapy

Sriraghunath S
Assistant Professor, R V college of Physiotherapy

Paul Daniel VK
Professor, R V College of Physiotherapy

AD Nisha
Lecturer, R V College of Physiotherapy, Bangalore, India

Correspondence
Ranjan P
Lecturer, R V College of Physiotherapy, Bangalore, India

Prevalence of scapular dysfunction in young amature cricketers with or without shoulder problem

Ranjan P, Pruthviraj R, Bhatbolan S, Sriraghunath S, Paul Daniel VK and AD Nisha

Abstract
Background: Shoulder injuries associated with the throwing and fielding demands of the game are common in cricketers. Hence, the purpose of study was to check the prevalence of scapular dysfunction in young amateur cricketers with or without shoulder problem. 150 young amateur cricketers were taken from various clubs and cricket academies. Scapular measurement taken on the basis of kibler's lateral scapula slide test in three different positions, first is 90^0, 2^{nd} is 45^0 and last is neutral position. Measurements collected at the end of all three tests. Results shows there was no prevalence of scapular dysfunction with or without shoulder problem in young amateur cricketers. The difference in the scapular position between shoulder pain group and with no shoulder pain group was not statistically significant. There was no significant pattern of involvement which is accounting to scapular dysfunction. The difference between the dominant and the non dominant side for scapular position was also not statistically significant.

Keywords: Scapular dysfunction, Shoulder problem, Kibler's lateral scapula slide test (LSST).

Introduction
Cricket has become an unofficial national game of India. No other sport is as popular as cricket in India. Shoulder injuries have been reported to comprise 5–7% of all injuries amongst elite cricketers in Australia [1, 2]. South Africa [3] and the United Kingdom [4]. It has been suggested that the incidence of shoulder pain in elite cricketers is underestimated [5]. A recent study of English county cricket players suggested that up to 23% may experience some form of shoulder injury, with the majority affected in their throwing arm. The majority of shoulder injuries in cricket are described as being related to tendon injury [1, 3, 4]. and are thought to be more likely related to fielding, particularly throwing, than bowling [3]. One study has reported that up to half of all shoulder injuries were related to fielding [6]. Cricketers with shoulder pain have been shown to have a glenohumeral internal rotation range of motion deficit [5] and weak scapula stabilizer musculature [7]. It has also been suggested that athletes in other overhead sports with altered scapular kinematics may be more susceptible to shoulder injuries [8, 9] These data suggest that factors associated with training load, team role, fielding position, flexibility, strength and scapula kinematics should be taken into account when investigating factors associated with shoulder problems in cricketers.
Scapular dysfunction has been implicated as a contributor to throwing-related pathologic internal impingement of the shoulder due to its role in increasing the contact between the greater tuberosity and posterior-superior glenoid, thereby impinging the posterior rotator cuff tendons and labrum. However, to date, no definitive data demonstrate whether scapular position and orientation would be different in throwing athletes diagnosed with pathologic internal impingement [10]. Overhead athletes are particularly susceptible to injury and with the greater emphasis on fielding activities in the modern game, shoulder injuries in cricket are likely to increase. There are two main types of shoulder injuries which affect cricketers. The first type is an overuse injury of the shoulder associated with throwing, typically referred to as "thrower's shoulder". The second type refers to acute, traumatic injuries that are especially prevalent when players fall on a shoulder while they are fielding.

There Are A Number Of Potential Causes

- Poor throwing technique
- Shoulder muscle imbalance
- Previous injury
- Shoulder instability
- Too much or too little practice
- Poor posture.

Thrower's shoulder involves injury to the tendons of the rotator cuff, and may include weakness around the scapula. There may be associated bursitis within the shoulder.

Rehabilitation and correction of the cricketer's throwing technique is important to prevent the recurrence of injury [11].

There is a critical role of scapula in shoulder mechanics. In order to ensure that the head of humerus remain centred in the glenoid, the scapula must slide and rotate appropriately around the posterior chest wall. Any dysfunction in scapula movement is typically evidenced by a "winging" motion when the arm is elevated or by observing the posture of the upper back. Whether the winging comes before the injury or as a consequence is hotly debated. Either way it needs to function properly. And to complicate things even further, the thoracic spine also needs to be able to extend and rotate fully to allow the scapula to move. A kyphotic or slouched upper back are terrible for allowing the arm to reach full elevation and is a big contributor to shoulder problems. It should be clear that in order for a cricketer's shoulder to be pain-free, there needs to be a lot of dynamic strength and mobility of the upper trunk and shoulder girdle. But throwing technique is equally critical to both performance and injury prevention between the scapula and the humerus was introduced in the 1930s and termed "scapula-humeral rhythm" by Codman [12].

Inman, Saunders and Abbott were the first to measure scapulohumeral rhythm using radiography and suggested what became the widely accepted 2:1 ratio between glenohumeral (GH) elevation and scapulothoracic (ST) upward rotation. The scapula on the thorax contributes to elevation (flexion and abduction) of the humerus by upwardly rotating the glenoid fossa 50° to 60° from its resting position [13] If the humerus were fixed to the fossa, this alone would result in up to 60° of elevation of the humerus. The humerus, of course, is not fixed but can move independently on the glenoid fossa.

Clinical Relevance

Observation and examination of the scapulohumeal rhythm is commonly performed by physical therapists during postural and shoulder examinations. The notion of a proper "rhythm" is routinely used to describe the quality of movement at the shoulder complex [14].

- Alterations in scapular position and control afforded by the scapula stabilizing muscles are believed to disrupt stability and function of the glenohumeral joint [14-16] thereby contributing to shoulder impingement, rotator cuff pathology and shoulder instability [17].
- Given the role of the scapula in shoulder function, the ability to monitor the coordinated motion of the scapula and humerus, or scapulohumeral rhythm [18, 19] may have clinical implications when dealing with overhead athletes and patients with shoulder pathologies [20].

Objective of the Study

1. Prevalence of scapular dysfunction and shoulder problems in young cricketers.
2. Comparison between scapular dysfunction with shoulder problem and scapular dysfunction without shoulder problem young cricketers.
3. Comparison between the dominant and non dominant side.

Methodology

Cricket players from different sports clubs and academies were selected.

A. Research design

Cross-sectional study.

B. Setting of study

Sports clubs and cricket academies in Bangalore.

C. Sampling and sampling techniques

150 young cricket players, age 15-20 years by convenience sampling method.

D. Inclusion criteria

- Young cricketers playing in clubs or cricket academies with or without shoulder problems.
- Young cricket players playing since 2 years.
- Only young males

E. Exclusion criteria

- Players with history shoulder surgery.
- Players who are out of practice from 12 weeks.

Duration

The study will be conducted over duration of 3-4 months.

Methods of Data Collection

A. Procedure

Players identified on basis of demographic data, which includes

1. Name –
2. Age –
3. From how many years you are playing cricket -

And a question,

Have u had any problem with your shoulder in the last 12 months that have affected you training for or playing cricket?

Based on this question players with shoulder problem will be identified for further scapula measurement.

The researcher visited the different cricket academies and clubs and interview the cricketer by using the demographic data, on this basis and according to the inclusion and exclusion criteria, the young cricketer were selected for the study. The lateral scapula slide test (LSST) is used to find out the scapula position in the involved upper extremity. The prevalence of scapula dysfunction will be find out by using LSST in 150 young cricketers with or without shoulder problems.

Kibler measured the position of the scapula by deriving the difference in side-to-side measurements of scapular distance in 3 test positions. Position 1 involves placement of the shoulder in glenohumeral joint neutral. In position 2, the humerus is placed in a position of medial rotation, with 45 degrees of shoulder abduction in the coronal plane. In position 3, the upper extremity is placed in a position of maximal medial rotation, with 90 degrees of shoulder abduction in the coronal plane. Measurements of scapular position are taken bilaterally from the inferior angle of the scapula to the spinous process of the thoracic vertebra in the same horizontal plane

(the reference vertebra) in all 3 test positions. A bilateral difference of greater than 1.0 cm in scapular distance measurements was the original criterion used by Kibler to determine a positive LSST, that is, abnormal. scapular asymmetry associated with weakness of the stabilizing musculature. More recently, that threshold has been shifted by Kibler to a bilateral difference of greater than 1.5 cm.

Measurement of scapula in neutral position
Measurement of scapula position in 45^{o}
Measurement of scapula position in 90^{0}

B. Statistical test
Student t test

Result analysis

Table 1: Age distribution of subjects studied

Age in years	No. of subjects	%
14-16	33	22.0
17-20	117	78.0
Total	150	100.0

Mean ± SD: 17.81±1.61

In this table the age distribution of subjects summarized. Among the total number of subjects that is 150, 33 subjects were seen to be between the age of 14 and 16. 117 were between the age of 17 and 20. The percentage of subjects between the age 14 and 16 were 22% and the percentage of subjects between the age 17 and 20 were calculated as 78%. The mean value is ± SD: 17.81±1.61.

Table 2: Prevalence of shoulder problem in subjects studied

With or without shoulder problem	No.of subjects	%
No shoulder problem	92	61.3
Shoulder problem	58	38.7
Total	150	100.0

This table shows the prevalence of shoulder problem in subjects. Out of 150 total number of subjects, 92 subjects reported with no shoulder problem which accounted for 61.3%. 58 subjects presented with history of shoulder problem which accounted for 38.7%.

Table 3: Age distribution of subjects studied

Age in years	With or without shoulder problem		Total
	No shoulder problem	Shoulder problem	
14-16	17(18.5%)	16(27.6%)	33(22%)
17-20	75(81.5%)	42(72.4%)	117(78%)
Total	92(100%)	58(100%)	150(100%)
Mean ± SD	18.01±1.52	17.48±1.71	17.81±1.61

In this table the age distribution of subjects is summarized. Among the total number of subjects that is 150, 33 subjects were seen to be between the age of 14 and 16. 117 were between the age of 17 and 20. The percentage of subjects between the age 14 and 16 were 22% and the percentage of subjects between the age 17 and 20 were calculated as 78%.
Out of the 33 subjects between the age 14 and 16, 17 (18.5%) reported with no shoulder problems whereas 16 (27.6%) complained of shoulder problems. Out of 117 subjects between the age of 17 and 20, 75 (81.5%) reported with no shoulder problems whereas 42 (72.4%) complained of shoulder problems.

Table 4: Kibler's lateral scapular slide test on Dominant side

Kibler's lateral scapular slide test: Dominant side	With or without shoulder problem		Total	P value
	No shoulder problem	Shoulder problem		
Neutral	10.35±1.71	10.11±1.63	10.26±1.68	0.393
45^{0}	10.30±1.59	10.14±1.87	10.24±1.70	0.561
90^{0}	10.43±1.67	10.12±1.60	10.31±1.64	0.264

The tabulated column shows Kibler's Lateral Scapular Slide Test on the dominant side. When the test was conducted in neutral position, subjects with no shoulder problem had a mean value of 10.35±1.71, subjects with shoulder problems had a mean value of 10.11±1.63. the average of the two values was 10.26±1.68 and P value was 0.393.
When the test was conducted in 45^{0}, subjects with no shoulder problem had a mean value of 10.30±1.59, subjects with shoulder problems had a mean value of 10.14±1.87. the average of the two values was 10.24±1.70 and P value was 0.561.
When the test was conducted in 90^{0}, subjects with no shoulder problem had a mean value of 10.43±1.67, subjects with shoulder problems had a mean value of 10.12±1.60. the average of the two values was 10.31±1.64 and P value was 0.264.

Table 5: Kibler's lateral scapular slide test: Non-Dominant Side

Kibler's lateral scapular slide test: Non-Dominant side	With or without shoulder problem		Total	P value
	No shoulder problem	Shoulder problem		
Neutral	9.97±1.21	10.14±1.21	10.03±1.21	0.401
45^{0}	10.22±1.36	9.91±1.64	10.10±1.48	0.201
90^{0}	10.38±1.26	9.99±1.44	10.23±1.34	0.094

P=0.050*, Significant, Student t test

The tabulated column shows Kibler's Lateral Scapular Slide Test on the non dominant side. When the test was conducted in neutral position, subjects with no shoulder problem had a mean value of, 9.97±1.21 subjects with shoulder problems had a mean value of 10.14±1.21. the average of the two values was 10.03±1.21 and P value was 0.401.
When the test was conducted in 45^{0}, subjects with no shoulder problem had a mean value of 10.22±1.36, subjects with shoulder problems had a mean value of 9.91±1.64. the average of the two values was 10.10±1.48and P value was

0.201.
When the test was conducted in 90^0, subjects with no shoulder problem had a mean value of 10.38±1.26, subjects with shoulder problems had a mean value of 9.99±1.44. the average of the two values was 10.23±1.34and P value was 0.094.

Table 6: Kibler's lateral scapular slide test (Difference of Dominant and Non-Dominant)

Kibler's lateral scapular slide test: Difference	With or without shoulder problem		Total	P value
	No shoulder problem	Shoulder problem		
Neutral	1.16±0.77	1.25±0.85	1.19±0.80	0.493
45^0	1.01±0.72	1.09±0.76	1.04±0.73	0.497
90^0	1.12±0.90	0.87±0.65	1.02±0.82	0.069

The tabulated column shows Kibler's Lateral Scapular Slide Test difference of dominant and on the non-dominant side. When the test was conducted in neutral position, subjects with no shoulder problem had a mean value of1.16±0.77subjects with shoulder problems had a mean value of 1.25±0.85. the average of the two values was 1.19±0.80and P value was 0.493.
When the test was conducted in 45^0, subjects with no shoulder problem had a mean value of 1.01±0.72, subjects with shoulder problems had a mean value of 1.09±0.76. the average of the two values was 1.04±0.73and P value was 0.497.
When the test was conducted in 90^0, subjects with no shoulder problem had a mean value of 1.12±0.90, subjects with shoulder problems had a mean value of 0.87±0.65. the average of the two values was 1.02±0.82and P value was 0.069.

Statistical Methods
Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data is made, Assumptions: 1.Dependent variables should be normally distributed, 2.Samples drawn from the population should be random, Cases of the samples should be independent [21].
Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters [22].

Significant figures
+ Suggestive significance (P value: $0.05<P<0.10$)
* Moderately significant (P value:$0.01<P\leq 0.05$)
** Strongly significant (P value : $P\leq 0.01$)

Statistical software: The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1,Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc [23].

Discussion
Normal scapular function is a pre-requisite for the normal movement of the shoulder, where the scapular function in turn is dependent upon the normal functioning of the scapular stabilising muscles which include the upper and lower trapezius, rhomboids and the serratus anterior muscles. Normal shoulder biomechanical function requires an intact kinetic chain and various scapular muscles to create the energy and produce the forces to cause movement around the shoulder joint and to stabilise the joint [55]
The scapula has somewhat competing functions, in that on one hand significant mobility is required to move through a substantial arc of motion but on the other hand it must be a stable base for arm function. The motion is required to maintain optimal muscle length tension relationship and glenohumeral joint alignment during elevation of arm.
It was reported that weakness of the scapular stabilizer muscles will lead to the lateral displacement of the scapula over the thoracic rib cage. Due to scapular stabilizer muscles weakness there is observable alterations in the position of the scapula and patterns of scapular motion in relation to the thoracic cage. These alterations of scapular position and scapular movement pattern is known as scapular dyskinesis. Lower fibers of serratus anterior and lower trapezius are positioned to produce posterior tilting and the middle trapezius are positioned to produce external rotation weakness in these muscles has been clearly associated with scapular winging, which is attributed to excessive tilting and scapular internal rotation.
The scapulothoracic musculature is critical to providing both motion and stability to the shoulder girdle complex to allow for proper function of the glenohumeral joint. In particular, the serratus anterior muscle can contribute to scapular upward rotation, external rotation, and posterior tilting during arm elevation. Furthermore, the serretus anterior acts to stabilize the medial boarder and inferior angle of the scapula against the thorax to prevent scapular "winging" during the arm elevation. Decreased serratus anterior muscle function has been observed in patients with shoulder pathology. Thus, exercises focusing on restoring scapular mobility and stability are an important part of rehabilitation of patient with shoulder pathologies. Because of its critical functional role, serratus anterior muscle is a component of many therapeutic exercise protocols.
The relatively 38% of players reporting shoulder problems in our study is more than previous reports of 23% of English county players. Both the groups have shown variations for all the three test position, that is neutral, 45^0 and 90^0.
There was no significant pattern of involvement which is accounting to scapular dysfunction. Several participants with shoulder problem and without shoulder problem demonstrated the value of more than 1.5cm at three test positions to qualify as a positive Kibler's Lateral Scapular Slide Test. It is therefore unclear that scapular position itself is a factor to be considered separately.
The difference between the dominant and the non-dominant side for scapular position was also not statistically significant and is contrary to the finding of Kibler's Lateral Scapular Slide Test, who had noted that subject's dominant side had greater scapular abduction than the non-dominant side. The plausible explanation for this could be that Kibler used only the overhead athletes and throwers as his subject of study and in this study the subjects were selected from various cricket academics and clubs. In the game of cricket, the players are involved in more than one activity like bowling, fielding, throwing, diving and batting during their play. Therefore, they might use their non-dominant side as well for these activities as mentioned above. Recently, Kibler asserted that a bilateral

difference of 1.5 cm should be the threshold for deciding whether scapular asymmetry is abnormal. Regardless of the threshold, Kibler contended that the injured side should exhibit a greater scapular distance than the uninjured side. Kibler4 and Kibler and Chandler noted differences when they measured symmetry with the shoulder placed in positions of either 45 or 90 degrees of abduction and medial rotation. Inferences drawn by Kibler and Kibler and Chandler about scapular asymmetry and shoulder pathology, however, are based largely on unpublished work. Moreover, sensitivity and specificity for determining the presence of impairment have never been reported for either of the threshold criteria. The difference in the scapular position between shoulder pain and with no shoulder pain was also not statistically significant. Scapular kinematics need not necessarily accompany shoulder problem as found with our results. However, in comparative study it is not possible to say whether altered scapular kinematics is a cause of shoulder pain or response to it.

Conclusion

The major findings were:

1. The difference in the scapular position between shoulder pain group and with no shoulder pain group was not statistically significant.
2. There was no significant pattern of involvement which is accounting to scapular dysfunction.
3. The difference between the dominant and the non-dominant side for scapular position was also not statistically significant.

Alteration in scapular kinematics is observed in considerable number of young cricketers. However alteration in the scapular kinematics was also seen in the non-dominant side in Young cricketers and it was also seen in the young cricketers without any shoulder problems.

Recommendation

1. Above finding suggests that further investigations are required to find out the nature of contribution of scapular mechanics in development of shoulder problems.
2. Experimental studies with a larger sample can be done.

Summary

A study was done on the topic “Prevalence of Scapular dysfunction in young amateur cricketers with or without shoulder problem”. This study was done to find out shoulder and scapular problems in the young amateur cricketers. There were 150 cricketers taken for the study from various sports club and academies between the age group of 14 and 20 years. Shoulder and scapular problems are usually seen in all the players involving themselves with the overhead throwing activities. Kibler’s LSST (Lateral Scapular Slide Test) was chosen to test the subjects. The test was done in three different positions, at $0^0$of abduction, 45^0 of abduction and 90^0 of abduction. The test was performed on the dominant as well as on the non-dominant side. The test was done on subjects with and without shoulder problems.

Kibler had concluded that if the difference between the reading of both the arms in all the three positions while performing LSST were more than 1.5cms then it could be qualified as Scapular Dyskinesis. Out of 150 subjects, 33 subjects were between the age group of 14 and 16, 17 reported with shoulder problem and 117 subjects were between 17 and 20, 75 reported with shoulder problem. Therefore, overall 58 subjects were reported with shoulder problem and remaining 92 did not have any shoulder problem. Scapular dyskinesis was seen in both dominant and non-dominant side as the cricketers are involved in many activities like bowling, throwing, fielding, and batting. So it has been shown that they tend to use their non-dominant side as well for overhead activities.

Scapular dyskinesis according to kiblers criteria was found to be present in many cricketers which was of clinical importance but it did not have any statistical significance. Therefore further studies need to be done for finding out the prevalence of scapular dyskinesis with shoulder problems in cricketers using more reliable tool having good sensitivity and specificity.

Reference

1. Orchard J, James T, Alcott E. Injuries in Australian cricket at first class level1995/1996 to 2000/2001. Br J Sports Med. 2002; 36(4):270-274.
2. Orchard J, James T, Portus M. Injuries to elite male cricketers inAustralia over a 10-year period. J Sci Med Sport. 2006; 9(6):459-467.
3. Stretch RA. Cricket injuries: a longitudinal study of the nature of injuries to SouthAfrican cricketers. Br J Sports Med. 2003; 37(3):250-253.
4. Leary T, White J. Acute injury incidence in professional county club cricket players (1985–1995). Br J Sports Med. 2000; 34(2):145-147.
5. Giles K, Musa I. A survey of glenohumeral joint rotational range and non-specificshoulder pain in elite cricketers. Phys Ther Sport. 2008; 9(3):109-116.
6. Ranson C, Gregory P. Shoulder injury in professional cricketers. Phys Ther Sport. 2008; 9(1):34-39.
7. Bell-Jenje T, Gray J. Incidence, nature and risk factors in shoulder injuries ofnational academy cricket players over 5 years - a retrospective study. S Afr JSports Med 2005; 17(4):22-28.
8. Laudner KG, Myers JB, Pasquale MR. Scapular dysfunction in throwerswith pathologic internal impingement. J Orthop Sports Phys Ther. 2006; 36(7):485-494.
9. Lukasiewicz A, McClure P, Michener L. Comparison of 3-dimensionalscapular position and orientation between subjects with and withoutshoulder impingement. J Orthop Sports Phys Ther. 1999; 29:574-583.
10. Alberta F, ElAttrache N, Bissell S. The development and validation of a functionalassessment tool for the upper extremity in the overhead athlete. Am JSports Med. 2010; 38(5):903-911.
11. Janine Gray. (BSc (physio), BSc (Med)(Hons) Exercise Science. Lecturer at the University of Cape Town and affiliated to the High performance Centre at Cricket South Africa.)
12. Codman EA. The Shoulder, Boston: G.Miller amp; Company, 1934.
13. McClure P. Direct 3-dimensional measurement of scapular kinematics during dynamic movements *in vivo*. J Shoulder Elbow Surg 2001; 10:269-277.
14. Itoi E. Scapular inclination and inferior stability of the shoulder. J Shoulder Elbow Surg. 1992; 1:131-139.
15. Kibler WB. The role of the scapula in athletic shoulder function. Am J Sports Med 1998; 26:325-337.
16. Weiser WM, Lee TQ, McMaster WC, McMahon PJ. Effects of simulated scapular protraction on anterior glenohumeral stability. Am J Sports Med. 1999; 27:801-805.

17. Ludewig PM, Reynolds JF. The association of scapular kinematics and glenohumeral joint pathologies. J Orthop Sports Phys Ther. 2009; 39:90-104.
18. Codman E. Chapter II: Normal motions of the shoulder. Boston, MA. 1934, 32-63.
19. Lockhart RD. Movements of the Normal Shoulder Joint and of a case with Trapezius Paralysis studied by Radiogram and Experiment in the Living. J Anat. 1930; 64:288-302.
20. McQuade K, Smidt G. Dynamic scapulohumeral rhythm: The effects of external resistance during elevation of the arm in the scapular plane. J Orthop Sports Phys Ther. 1998; 27:125-133.
21. Bernard Rosner Fundamentals of Biostatistics, 5th Edition, Duxbury, 2000, 80-240
22. Robert H Riffenburg. Statistics in Medicine, second edition, Academic press. 2005, 85-125.
23. Sunder Rao PSS, Richard J. An Introduction to Biostatistics, A manual for students in health sciences, New Delhi: Prentice hall of India. 4th edition, 2006, 86-160.