Scapular Associated Impairments in Bowlers

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Abstract : Bowling has been found to be a major cause of cricket injuries. Cricket bowlers like other throwing sports involve repeated forceful ballistic arm actions which will put a great deal of eccentric load on the shoulder rotator cuff muscles predisposing them to injuries.The Outcome measures evaluated were Pectoralis minor length, Posterior soft tissue tightness, Glenohumeral Internal Rotation and External Rotation ROM and Scapular Muscle strength (Serratus anterior bias, Upper trapezius bias, Middle trapezius bias, Lower trapezius bias, Shoulder internal and external rotators strength), scapular dyskinesia by scapular dyskinesis test (SDT), Close kinetic chain upper extremity stability test & Neural tissue tightness of upper limb.The scapular associated impairments in bowlers: Posterior soft tissue tightness and Weak scapular musculature. In our study, with this assessment protocol the scapular associated impairments can be identified in the early stages. So, the impairments can be addressed and early intervention is possible which can help in preventing injury and thus enhancing performance among athletes.

Key words: bowlers, scapular impairment, posterior soft tissue, scapular dyskinesia

1 Introduction

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predisposing them to injuries (Stretch, 2001).[1]

Bowling has been found to be the major cause of cricket injuries with 38% to 47.4% of schoolboy bowlers sustaining injuries in cricket (Stretch, 1995 & Honcock & Hawkins, 1996).[2,3]

Scapular instability is found in as many as 68% of rotator cuff problems and 100% glenohumeral problems. The abnormal scapular biomechanics that occur as a result of this dysfunction create imbalance between agonist and antagonist muscles and predispose the shoulder to injuries (Voight & Thomson, 2000).[4]

The thrower's shoulder must be lax enough to allow excessive external rotation, but stable enough to prevent symptomatic humeral head subluxations, thus requiring a delicate balance between mobility and functional stability. We refer to this as the "thrower's paradox." This balance is compromised, which leads to injury(Kevin et al).[5] Hence scapular muscles play vital role in overhead motion. Proper scapular movement and stability are imperative for asymptomatic shoulder function.

2 Method

2.1 Materials: Soft measure tape, Inclinometer (Baseline), Universal goniometer, Push-Pull dynamometer, 3lbs and 5lbs weights. Approval was taken for the study by the Institutional Ethics Committee.

2.2 Research Design: Cross- sectional study: Subjects comprised of 30 male professional bowlers from Mumbai Grade A and B level. All participants completed written consent prior to participation. Data collection consisted of a Questionnaire and a Clinical assessment sheet which documented various Scapular based assessment.

The Outcome measures evaluated were Pectoralis minor length(PML,John B 2008)[6], Posterior soft tissue tightness(PST,Lin et al 2006)[7], Glenohumeral Internal Rotation(IR) and External Rotation(ER) ROM and Scapular Musculature strength (Serratus anterior bias, Upper trapezius bias, Middle trapezius bias, Lower trapezius bias, Glenohumeral internal and external rotators strength,Turner et al 2009)[8], scapular dyskinesia by scapular dyskinesis test (SDT,Philip McClure 2009)[9], Close kinetic chain upper extremity stability test(Tod et al 2009)[10] & Neural tissue tightness of upper limb.
Scapular musculature and Glenohumeral rotators strength was assessed using Push - Pull dynamometer in Kgs. The manual muscle testing described by Hislop and Montgomery for glenohumeral rotators and scapular musculature were adapted in this study.

2.3 Scapular dyskinesis test (SDT)[10]

Participants were asked to simultaneously elevate their arms overhead as far as possible to a 3-second count using the ''thumbs up'' position and then lower to a 3-second count. Tests were performed with athletes grasping dumbbells according to body weight 3 pounds for those weighing less than 68.1 kg and 5 pounds for those weighing 68.1 kg

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or more. Athletes were viewed while performing weighted shoulder flexion and abduction. The right and left side were rated independently as normal, subtle dyskinesis or obvious dyskinesis using scapular dyskinesis test.

3. Result

Table No 1: Comparison of Pectoralis minor length (PML) in dominant and non dominant shoulder:

	Bowlers				
	Dominant		Non Dominant		
Muscle length	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**P-Value**
Pectoralis minor Length(PML)	17.48	1.32	17.26	1.17	0.0830(NS)

Table No 2: Comparison of Posterior soft Tissue Tightness (PST) and Internal and External roattion ROM in dominant and non dominant shoulder:

	Bowlers				
	Dominant		Non Dominant		
PST	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**P-Value**
Horizontal Adduction	29.4	4.09	33.2	5.64	0.0003(ES)
ER ROM	95.61	2.20	95.31	2.33	0.1024(NS)
IR ROM	76.86	3.47	77.86	3.36	0.1972(NS)

Table No 3: Measurement of Scapular musculature and glenohumeral rotators strength in dominant and non dominant side:

	Bowlers				
	Dominant		Non Dominant		
Scapular Muscles	Mean	Standard Deviation	Mean	Standard Deviation	P-Value
Serratus anterior bias	26.2	7.85	23.36	5.82	0.0005(ES)
Upper trapezius bias	22.16	5.87	20.6	4.94	0.0523(NS)
Middle trapezius bias	22.43	4.88	20.7	3.84	0.0053(VS)
Lower trapezius bias	20.06	5.14	18.86	3.67	0.0392(S)
Internal rotators	12.86	3.18	12.7	3.09	0.7120(NS)
External rotators	11.3	2.80	9.93	2.80	0.0009(ES)

ES-Extremely Significant, VS-Very Significant, S-Significant, NS-Not Significant

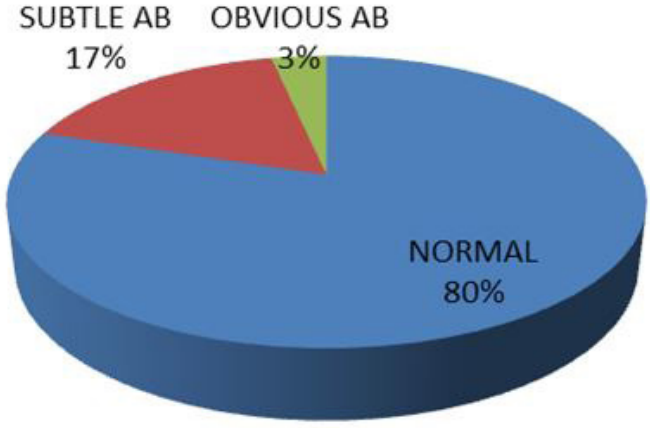

Figure 1 Scapular Dyskinesis test

Closed kinetic chain upper extremity stability test in bowlers results showed that 20.66 as the mean value suggesting that bowlers have significant endurance and speed in their upper extremity. Upper extremity neural tissue tightness testing showed normal findings in bowlers with none of the subjects having any significant abnormality.

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3. Discussion

In our study there was no statistically significant difference in pectoralis minor tightness when compared between dominant side and non-dominant side among bowlers. The method of propelling the ball-bowling hinges on the rule that the elbow must be fully extended at the moment of release of the ball which passively lengthens the pectoralis minor during the active scapular upward rotation, external rotation, and posterior tipping that usually occurs with bowling.

In our study we found extremely significant difference in the horizontal adduction range of motion between dominant and non-dominant side among bowlers. Many studies have documented that decrease in horizontal adduction leads to shoulder pathologies. Research states that deceleration phase of the throwing motion creates large compressive forces on the shoulder. These repetitive forces have been speculated to result in secondary changes, such as contracture of the posterior shoulder capsule. This contracture may contribute to alterations in shoulder rotation, such as decreased internal and increased external rotation. The scapular stabilizer muscles work together to coordinate the balance of movement between the shoulder joints, thereby maintaining scapulohumeral rhythm. When the muscles are weak or fatigued, scapulohumeral rhythm is compromised, and shoulder dysfunction results. This dysfunction can cause microtrauma in the shoulder muscles, capsule, and ligamentous tissue and lead to impingement (Balasubramanium 2009)[11].

Normal function of the serratus anterior, trapezius, and rhomboid muscles is required to achieve the necessary scapular positioning. Loss of function due to nerve injury, weakness, and/or fatigue leads to glenohumeral hyperangulation and a relative increase in glenoid anteversion, placing the anterior capsular structures at risk. Associations between scapular dyskinesia and anterior instability and impingement have been documented by several authors.(Sepp et al 2009)[12].

In our study we found that closed kinetic chain upper extremity stability test in bowlers showed significant endurance and speed which can be attributed to regular practice, professional training and repetition of the same strokes over a prolong period of time.
In our study we found that Bowlers had posterior soft tissue tightness, weak scapular musculature specifically (serratus anterior, middle trapezius, lower trapezius and external rotators), and scapular dyskinesis suggesting (3 percent obvious abnormality). Though 80 percent of bowlers did not have scapular dyskinesia they had other significant scapular impairments such as posterior soft tissue tightness & weak scapular musculature which may predispose them to injury.

These scapular associated impairments need to be identified and well-structured rehabilitation program need to be administered to reduce shoulder injury.

4. Conclusion

The scapular associated impairments in bowlers: Posterior soft tissue tightness and Weak scapular musculature

5. Clinical Implications

In our study, with this assessment protocol the scapular associated impairments can be identified in the early stages. So, the impairments can be addressed and early intervention is possible which can help in preventing injury and thus enhancing performance among athletes.

This assessment protocol should be performed periodically to identify scapular

associated impairments and appropriate treatment strategies can be incorporated.

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