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Sports

TO FIND CORRELATION OF CORE STRENGTH AND THORACIC ROTATION WITH SPEED OF THROWING IN CRICKETERS

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ABSTRACT Cricket is one of the most popular games which is played all over the world and its popularity has ever been increasing in the last decade. Fielding is an important dimension of the game as is batting and bowling. With the game being so fast with the introduction of 20 overs game fielding has had an increased demand in the sport. Throwing is considered one of the major and main activities of fielding. Throwing motions involve moving objects spatially using body segments, in particular, hand and arm segments, which can be classified into overarm throws, sidearm throws and underarm throws and divided into throwing objects quickly, accurately and far away. Aim of this study was to find The Correlation of Core Strength and Thoracic Rotation with Speed of Throwing in Cricketers. 31 Cricketers were assessed for their core strength with side rotational medicine ball throws and distance measured, Thoracic rotation in lumbar locked sitting position and measuring with universal goniometer and speed of throws with a BUSHNELL Speed gun. Results of this study showed that Core Strength and Speed of Throws showed a positive, strong and significant correlation whereas Thoracic Rotation and Speed of Throws also showed a positive and significant correlation. Core Strength showed greater clinical and statistical correlation with Speed of Throws than Thoracic Rotation. This study will not only help in preventing throwing injuries but also will help to train and enhance throwing abilities and overall performance.

KEYWORDS : Core Strength, Thoracic rotation, Speed Of throwing, Throwing related Injuries, Cricketers

INTRODUCTION

BACKGROUND: -

Cricket is one such sport which has become more competitive and popular in the last decade. In cricket, fielding is one of the most important part of any match. Popular sports around the world are becoming highly professional. The game of cricket in India and the commonwealth countries is so popular, that in India, it is nothing short of a religion. Fielding is the important dimension of cricket as is batting and bowling. With the popularity of the Twenty20 format of cricket, fielding has acquired further importance[1]. Throwing is considered one of the major and main activities of fielding. Throwing motions involve moving objects spatially using body segments, in particular, hand and arm segments, which can be classified into overarm throws, sidearm throws, and underarm throws and divided into throwing objects quickly, accurately, and far away. Overarm throws are basically throwing when your arm and hand are above your shoulder and player is in upright position. Underarm throws are throws in which players crouches down to reach the ball on the ground and throws the ball from that position towards the target with arm and hand below shoulder level[2,3,4]. Many factors are involved in throwing which include proper coordination between different body segments to go about the activity. Core And thoracic mobility has found to be an important aspect in throwing[5]. This study will help to find the correlation of Core Strength and Thoracic Rotation with Speed of Throws in Cricketers.

BIOMECHANICS OF THROWING[6]

The phases of an overhead throw consist of

- wind up,
- stride,
- cocking,
- acceleration,
- deceleration and
- follow through phase

Wind-Up Phase:-

The wind-up phase is defined as the initial movement to maximum knee lift of stride leg. During the initial movements, the pitcher brings his or her hands overhead and lowers to chest level.

Stride Phase: -

Starts with end of wind-up phase and ends with foot planted in stride. The 15-degree angle of the foot away from the centre of the mound. The stride ankle also typically lands approximately 10cm away from the same midline with a distance from the rubber averaging 87% of the pitcher's height.

Cocking Phase: -

The arm cocking phase can be defined as the beginning of lead foot contact and ends at maximum shoulder external rotation. Cocking phase is further divided into

(a) Early cocking- It begins with the end of the windup phase or when the stride leg reaches its maximum height and it ends when the stride leg contacts the mound/ground. At this point, the throwing arm is in 'semi-cocked' position. With the arm approximately 90° abduction, 30° horizontal abduction, and 50° external rotation.

(b) Late cocking- This phase begins from the point where the stride leg contacts the ground to the point of maximum external rotation of the throwing arm. The shoulder is abducted about 90°, 10° to 20° horizontally adducted and laterally rotates to about 175°. The wrist is in neutral and the elbow is elevated to about shoulder height and is 90° flexed.

Arm Acceleration Phase: -

The arm acceleration phase begins at maximum shoulder external rotation and ends at ball release. During this phase, the shoulder moves into horizontal adduction and internal rotation. A rapid shoulder internal rotation takes place and shoulder moves from point of 175° of humeral external rotation to 100° of humeral internal rotation in about 42 to 58 milliseconds

Arm Deceleration Phase:-

The arm deceleration phase begins at ball release and ends at maximum shoulder internal rotation. The shoulder is abducted 100°, humeral rotation reaches 0° and arm is horizontally adducted to 35°.

Follow-through Phase: -

Follow-through is the phase where the body continues to move forward until the arm has ceased motion. The elbow undergoes a rebound effect and is approximately flexed to 45°. During this phase, the rest of the body catches up with the arm and it culminates with the pitcher in a fielding position.

COMMON INJURIES WHILE THROWING[6]

Shoulder Injuries: -

Injuries to the shoulder are most common baseball pitching and more particularly in the late cocking and deceleration phase. Following is the list of potential shoulder injuries in different phases of pitching.

- Windup - No injuries are common.
- Cocking - Anterior subluxation, internal impingement, glenoid labrum lesions, subacromial impingement.
- Acceleration - Shoulder instability, labral tears, overuse tendinitis, tendon ruptures.
- Deceleration - Labral tears at the attachment of long head of biceps, subluxation of the long head of biceps by tearing off a transverse ligament, lesions of the rotator cuff.

- Follow Through - Tear of the superior aspect of glenoid labrum at the origin of the biceps tendon, subacromial impingement.

Elbow Injuries: -
Elbow injuries are the second most common injuries in baseball pitching.

- Excessive valgus strain at the elbow during the late cocking phase can lead to medial elbow injuries such as muscle tear, avulsion fractures, ulnar nerve damage and most commonly UCL strain or tear. In addition to the valgus strain injuries also follow due to lateral compartment at the elbow such as avascular necrosis, osteochondritis dissecans, osteochondral chip fractures or any combination of this injury [1].
- During the acceleration phase, secondary to the excessive elbow extension peak velocity, olecranon can impinge against the medial aspect of the trochlear groove and fossa which may form posteromedial osteophyte and loose bodies formation leading to valgus extension overload syndrome.

AIM
To find correlation of core strength and thoracic rotation with Speed of throwing in cricketers

OBJECTIVE
1) To find correlation of core strength and Speed of throws
2) To find correlation of thoracic rotation and Speed of throws

NEED OF STUDY
Throwing can cause numerous injuries at shoulder and elbow due to force produced at these joints to propel the ball to the target. This study will help us to better understand key roles played by Core Strength and Thoracic Mobility on Speed of Throws and reducing forces acting on the joint and also reducing risk of injuries.

METHODOLOGY
Study Population: - Cricketer

Sample Size: - 31 cricketers

Study Design: - Cross-Sectional Study

Materials Used: - 2kg Medicine ball, Universal Goniometer, Cricket Ball, Speed gun (BUSHNELL)

Inclusion Criteria: -
1. Players who have not had shoulder injuries in past 3months
2. Players over the age of 14years
3. Professional Players

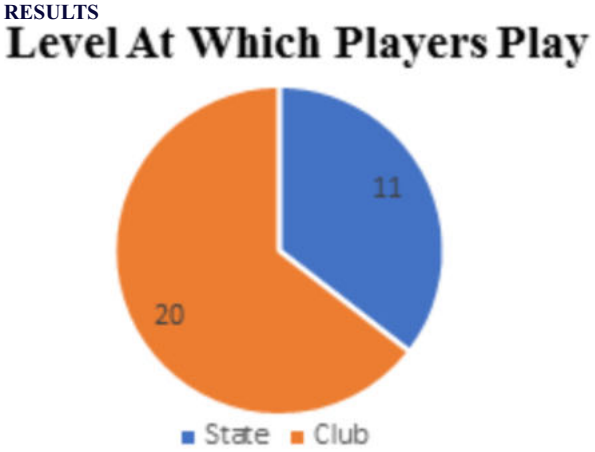
Exclusion Criteria: -
1. Players who play cricket as a leisure activity
2. Wicketkeepers

Players who fulfilled the inclusion criteria were selected for the study from various elite level clubs who have either represented the state team or have represented the club. Subjects participating in this voluntarily and consent forms were taken from them to include their details in this study. Players were assured that their information would be kept anonymous and confidential. Players were informed about the study and were also told about the assessments that would be taken. They were also informed that they could opt out of the study at any given point of time.

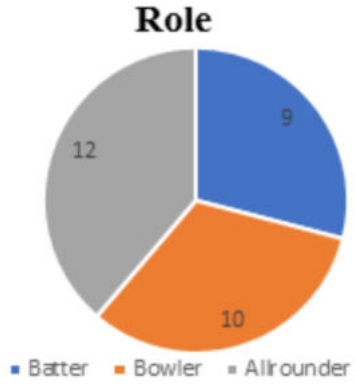
Three assessments were taken of every player who were included in this study.
1) Core strength was assessed with the help of medicine ball side throws. Using a 2kg Medicine Ball, the player was told to perform side rotational medicine ball throws and distance was measured in meters(m) from the player to the ball landing on the ground.
2) Thoracic rotation was assessed by seated trunk rotation test in lumbar locked position. Player was made to sit on a chair or a stool and told to cross his arms like adduct the shoulder and keep hands on opposite shoulder. A ball was placed between the knees for Lumbar locked position so that no rotation occurs at lumbar level. Player is told to rotate his torso and degrees were measured using universal goniometer by keeping it on T2-T3 level and also on the head to confirm the degree of rotation.
3) Throw velocity was assessed with the help of Bushnell speed gun. Player was told to throw Overarm and the speed was noted by keeping the gun perpendicular to the moving arm.

All the three assessments were noted down. Statistics were done and correlation and significance were found between the three assessments.

RESULTS



Pie Diagram 1:- This Diagram shows that Out of the 31 players included in the study, 20 players had represented various elite level clubs and 11 players had represented state team.



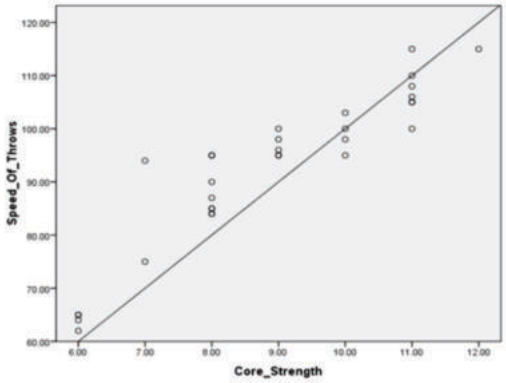
Pie Diagram 2:- This Diagram shows that Out of 31 players included in the study, 12 players were All-Rounders, 10 were Bowlers and 9 were Batters.

CORRELATION OF CORE STRENGTH AND SPEED OF THROWS

Correlations

		Core_Strength	Speed_Of_Throws
Core_Strength	Pearson Correlation	1	.925**
	Sig. (2-tailed)		.000
	N	31	31
Speed_Of_Throws	Pearson Correlation	.925**	1
	Sig. (2-tailed)	.000	
	N	31	31

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



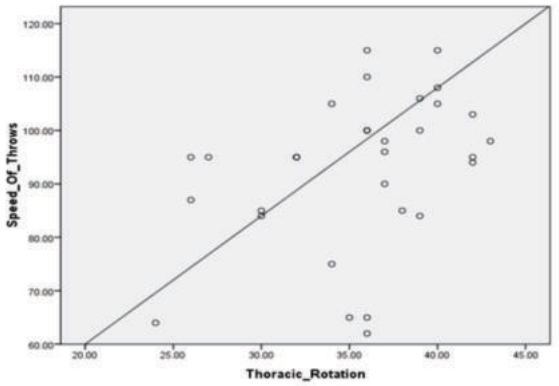
Interpretation: - p-value for Pearson's Correlation between Core Strength and Speed of Throws is lesser than 0.05 with correlation value 0.000 indicates significant and strong association between Core Strength and Speed of Throws.

CORRELATION OF THORACIC ROTATION AND SPEED OF THROWS

Correlations

		Thoracic_Rotation	Speed_Of_Throws
Thoracic_Rotation	Pearson Correlation	1	.374*
	Sig. (2-tailed)		.038
	N	31	31
Speed_Of_Throws	Pearson Correlation	.374*	1
	Sig. (2-tailed)	.038	
	N	31	31

*. Correlation is significant at the 0.05 level (2-tailed).



Interpretation:- p-value for Pearson's Correlation between Thoracic Rotation and Speed of Throws is lesser than 0.05 with correlation value 0.038 indicates significant association between Thoracic Rotation and Speed of Throws.

DISCUSSION

Cricket is a very dynamic and competitive sport. It mainly has 3 dimensions that is Batting, Bowling and Fielding. Fielding is one of the main aspects of game. Fielding alone can win you matches as the famous quote goes 'Catches Win Matches'. Throwing is an aspect under fielding where you grab the ball and throw towards a target either hit the stumps or pass it to the other player. Throwing is a motion which is not only performed by arms but also uses a coordinated movement of multiple segments to carry out the action. There are two main types of throwing a) Underarm Throws where your arm and hand are below the shoulder level and b) Overarm Throws where your arm and hand are above your shoulder level. Throwing needs, a lot of force production. Trunk stabilizes the arm and helps in force generation. Hence trunk mobility and strengthening helps in increasing the ability to throw more efficiently. Attention to core strengthening has been increasing, not only for injury prevention and treatment, but also for improving exercise performance ability and activities of daily living. The core can be explained as a region consisting of the abdominal muscles in the front, the paraspinal muscles and gluteal muscles in the rear, the diaphragm on the top, and the pelvic floor muscles on the bottom. Core muscles are known to be force producing muscles which will help throwing speeds better as well as reduce forces and stresses on other joints decreasing the chance of injuries at other joints like shoulder and elbow. The core also provides the support necessary to stabilize the trunk and vertebral column, and it is the basis or driving force of all limb movements. Hence, a weak core can affect the throwing ability and increase the risk of injuries. Thoracic Mobility is also very important aspect of throwing as your torso rotates produces energy and then propels the ball forward. Decreased thoracic mobility can cause shoulder and other segments to overwork. Hence both Core Strength and Thoracic Rotation play a very important part in throwing and easing everything for the player. So, it is very important to train these two aspects as well to focus on injury reduction and help the player to be functionally better on the field. It was a study that assessed Core Strength and Thoracic Rotation and their correlation with Speed of Throws.

For,

a) Core Strength Assessment, Rotational Medicine side ball throws were taken with a 2kg medicine ball. In a study, when compared with other common rotational core exercises, the side rotational MBT exercise produced the highest pelvis and upper trunk rotational velocities and thus displayed a very good sport-specific applicability to throwing [8]. Side rotational medicine ball was also a functional test where the player gets into a functional position which is very similar to throwing. Also, the sequence of muscle activation that takes place while a player throw is very similar to side rotational medicine ball throws. This activated the gluteal muscles (both Gluteus Maximus and Medius) the best compared to any other movement which is vital in a throwing athlete [8]. In this test, the player was told to side rotational MBT throw and distance was measured in meters(m) from the player to the ball landing on the ground. The distance was noted down. This test when compared to standard ways of assessing Core Strength was rated superior as it puts the player in a functional position, is very sport specific drill and also has muscle activation very similar to throwing

b) Thoracic Rotation was measured using seated trunk rotation test in lumbar locked position. Player was seated on a chair holding a ball between his knees avoiding any movement at lumbar segments. Patient was told to rotate and the ROM was measured using a goniometer. This test was a reliable test and would give a good insight on ROM and mobility at thoracic segments.

c) Speed of the throws were measured using a BUSHNELL speed gun. The gun was kept perpendicular to the moving arm and ball and the speed was measured. Players were allowed to take a start as standing in a position and throwing would have been difficult for players. It would have affected the speeds of the throws thus affecting the study.

Results showed that core strength had a positive, strong and significant correlation with speed of throws with thoracic rotation also showing positive, significant correlation with speed of throws showing that these aspects should be worked on every throwing athlete to increase the functional outcomes and decreasing their risk of injuries. Core strengthening and thoracic mobility should be a part of every player conditioning and should be assessed frequently to find any discrepancy. Not only core strength and thoracic mobility would affect throwing positively but also help player in all aspects of the sport and make the player be at the top of his game.

LIMITATIONS AND FUTURE SCOPE OF STUDY

One of the main limitations of the study was the population was small and maybe a bigger sample size would help us find a better insight into the study.

Lack of female cricketers included in this study and including only male cricketers. Inclusion of that would help us know if this study is significant in that population too.

Inclusion of a wide criteria of age group and maybe the study should have included how this study would have been significant in different age groups.

CONCLUSION

Core Strength and Speed of Throws showed a positive, strong and significant correlation whereas Thoracic Rotation and Speed of Throws also showed a positive and significant correlation. Core Strength showed greater clinical and statistical correlation with Speed of Throws than Thoracic Rotation

CLINICAL IMPLICATIONS

This study will help the player and also the coaches and trainers to have a good trunk mobility and core strength program to reduce the stresses on the shoulder joint avoiding injuries and also maximizing the overall performance of the player.

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