

Correlation between Hand Grip Strength and Core Muscle Strength in Cricket Players

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Abstract: *The purpose of this study was to find the correlation between the hand grip strength and the core muscle strength in cricket players of age group 17, 18 and 19. A sample of 100 subjects was assessed, which includes 43 subjects of 17 years; 26 subjects of 18 years and 31 subjects of 19 years. All the participants were assessed for the height, weight, BMI, the hand grip strength of the dominant hand and the non-dominant hand and core muscle strength. Hand grip strength was assessed with a hydraulic hand held dynamometer and the core muscle strength was assessed with Pressure Biofeedback Unit. The results of this study indicated that there is weak correlation between the hand grip strength of dominant hand and non-dominant hand with core muscle strength.*

Keywords: Cricket players, Hand grip strength, Hand dynamometer, Core muscle strength, Pressure Biofeedback Unit

1. Introduction

Cricket is a game which demands high level of physical fitness and technical skills like bat grip and ball grip with different movements of different joints for overall performance. All movements of the body either originates in or are coupled through the trunk, and this coupling action is created by a strong core. This becomes vital when the goal is high-level athletic performance since without adequate core strength and stability of the lumbar spine, the athlete will not be able to properly apply extremity strength^{22,23}

The core musculature like the muscles of the trunk and pelvis that are responsible for the maintenance of stability of spine and pelvis and help in the generation and transfer of energy from large to small body parts during many sports activities¹⁻². The core of the body is broadly considered to be the torso. Functional movements are highly dependent on this part of the body, and lack of core muscular development can result in a predisposition to injury³. The spine is an important component of the kinematic chain, transferring force from the lower to the upper limbs, as well as functioning as a force generator capable of accelerating the arm⁴.

In the kinematic chain of the throwing athlete the force delivery mechanism is the arm while the shoulder functions as a funnel, which regulates the force. The generators of the force are the ground, legs, and trunk. The throwing force generating capability of the shoulder in itself is not large, viz for the shoulder segment to function properly in these athletes, contributions are required from other body segments to generate the necessary forces for ball propulsion as well as to transfer the forces to more distal segments (Burkhart et al., 2003)⁵.

During both the movements (ie. Batting and Bowling) hand grip plays the most important role for best performance. The power of hand grip is a result of forceful flexion of all finger joints with maximum voluntary force that subject is able to exert under normal bio kinetic conditions^{6,7}. Hand grip

strength is a significant predictor of performance in various sports activities, viz. lawn tennis⁸. Hand grip strength is often used as an indicator of overall physical strength⁹⁻¹⁰, hand and forearm muscle performances¹¹ and as a functional index of nutritional status¹²⁻¹³ and physical performance¹⁴⁻¹⁵. One of the key factors in cricket bowling is the grip; variation in grip has a major influence on the outcome of a delivery¹⁹. There is positive correlation between the hand grip strength and the shoulder power¹⁶. Hand grip strength can be used as predictor of shoulder power¹⁷. A Reliable and valid evaluation of hand strength can provide an objective index of general upper body strength. Hand dynamometer is the most valid and reliable tool to measure grip strength. Thus in this study hydraulic hand dynamometer is used as an outcome measure for evaluation of grip strength^{6, 18}

There are studies which states training grip strength with resistance as well as the free weight exercises were equally effective for improving the hand grip strength in cricket players²⁰. One of the study states that importance should also be given on rehabilitation of grip strength along with shoulder strength, of both the dominant and non-dominant hands post a soft tissue shoulder injury in a cricket player, since the sport demands overall strength of the entire upper extremity²¹.

Given the demands of this sport, it can be inferred that it challenges core muscles and hand grip strength. There are many studies done on the grip strength and the core muscle strength separately in different sports. But there are very few studies done on correlation between the grip strength and the core muscle strength, hence the need of this study was to find the correlation between the grip strength and the core muscle strength in male cricket players.

2. Problem Definition

Aim

The purpose of the study is to determine the correlation between hand grip strength (in dominant hand and non-dominant hand) and core muscle strength in Cricket players.

Objective

- 1) To measure handgrip strength of cricket players on dominant hand.
- 2) To measure handgrip strength of cricket players on non-dominant hand.
- 3) To measure core muscle strength of cricket players.
- 4) To correlate hand grip strength of dominant and non-dominant with core muscle strength.

3. Methodology

3.1 Study Population - Cricket players

3.2 Sample size - 100

3.3 Sampling Method – Convenient Sampling

3.4 Study Setting

- 1) D. Y. Patil sports academy.
- 2) Achiever’s Academy Chembur.
- 3) Nerul Gymkhana.
- 4) Matunga Gymkhana Cricket ground.

3.5 Inclusion criteria

- 1) Cricket players in Age group of 17 – 19 years old.
- 2) Right hand dominant players (using right hand for batting as well as bowling)

3.6 Exclusion criteria

- 1) Any acute soft tissue and traumatic injury players.
- 2) Age above or below 17-19 years.

3.7 Ethical Approval

The study was approved by the Institutional Ethics and Research Committee at D Y Patil University. Written informed consent was taken from all the subjects and their identification information that was collected during the study was kept strictly confidential.

3.8 Procedure

Demographic details of the subjects such as age, height and weight were collected and BMI was calculated. The subjects were well informed about the need for this study. Hand grip strength of the subject was assessed in dominant and non-dominant hand by using hydraulic hand held dynamometer with the following position and procedure: Hand Grip Strength Test: A calibrated Hydraulic Hand Dynamometer with adjustable grip was used. The subjects were seated with their shoulder adducted and neutrally rotated, elbow flexed at 90°, forearm and wrist in neutral position. Subjects were asked to hold dynamometer alternatively in right and then left hand (i.e. dominant and non-dominant hand), at their side without touching rest of the body, and squeeze it forcefully. Three trials were given, and the mean of the three trials was calculated and taken as mean grip strength. An initial instruction with explanation and demonstration was given to the subjects. While the core muscle strength was measured by using Pressure Biofeedback Unit by the following procedure:-

Place the three-chamber pressure cell under the lumbar spine of the subject and inflate to a baseline of 40mmhg (orange band). Draw in the abdominal wall without moving the spine or pelvis. Pressure should remain at 40mmhg (ie. No movement of the spine). Hold for 10-15 seconds; breathe normally. Three trials were given, and the mean of the three trials was calculated and taken as core muscle strength. An initial instruction with explanation and demonstration was given to the subjects.

Table 1: Descriptives									
		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Dom grip strength	17	43	33.60	6.476	.988	31.61	35.60	18	50
	18	26	34.00	6.403	1.256	31.41	36.58	23	49
	19	31	36.01	8.020	1.440	33.07	38.95	18	57
	Total	100	34.45	6.983	.698	33.07	35.84	18	57
Non Dom grip strength	17	43	31.97	6.682	1.019	29.91	34.02	18	48
	18	26	33.81	7.003	1.373	30.98	36.64	18	56
	19	31	36.00	8.482	1.523	32.89	39.11	13	53
	Total	100	33.70	7.490	.749	32.21	35.18	13	56
Core Muscle Strength	17	43	40.43	2.762	.421	39.58	41.28	36	49
	18	26	40.19	2.723	.534	39.09	41.29	37	51
	19	31	40.27	3.406	.612	39.02	41.52	35	55
	Total	100	40.32	2.938	.294	39.73	40.90	35	55

4. Results

Inference: The table 1 descriptive data shows the ranges of the dominant hand grip strength, non-dominant hand grip strength and core muscle of the male players of age group 17, 18 and 19 years. It also shows their mean and standard deviation

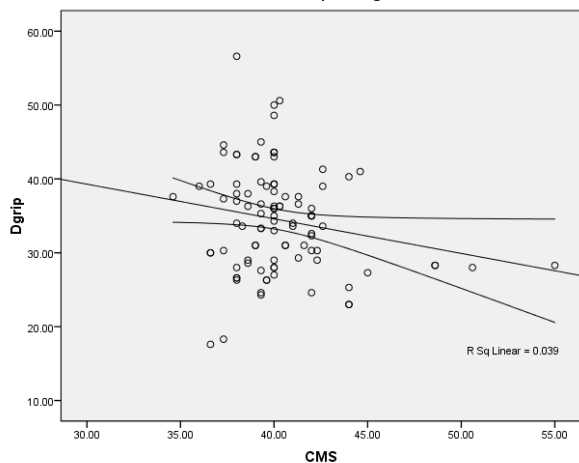


Figure 1: Scatter Diagram showing correlation between Core muscle strength and Dominant Hand Grip strength.

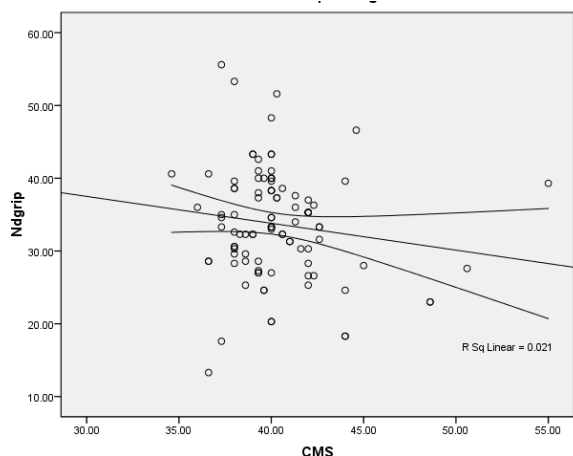


Figure 2: Scatter Diagram showing correlation between Core muscle strength and Non-Dominant Hand Grip strength.

Inference: The above scatter diagram [Figure 1] shows weak correlation between core muscle strength and dominant hand grip strength. [Figure 2] also shows weak correlation between core muscle strength and non-dominant hand grip strength.

5. Discussion

In this study, a total strength of 100 players were taken. The objectives of the study were (a) To measure handgrip strength in dominant hand (b) To measure handgrip strength in non-dominant hand (c) To measure core muscle strength (d) To correlate hand grip strength and core muscle strength.

In this study BMI matching cricket players were selected in the age group of 17 – 19 yrs.

The findings of this study reveals that the mean range of dominant hand grip strength in the age group of 17 yrs lie between 31.61kg – 35.60kg, for age group 18 yrs it lies between 31.41kg – 36.58kg and for age group 19 yrs it lies in range of 33.07kg – 38.95kg. Whereas the mean range of dominant hand grip strength in the age group of 17 – 19 yrs lie between 33.07kg – 35.84kg.

The findings of this study reveals that the mean range of non-dominant hand grip strength in the age group of 17 yrs lie between 29.91kg – 34.02kg, for age group 18 yrs it lies between 30.98kg – 36.64kg and for age group 19 yrs it lies in range of 32.89kg – 39.11kg. Whereas the mean range of non-dominant hand grip strength in the age group of 17 – 19 yrs lie between 32.21kg – 35.18kg.

Similar handgrip measurements were seen in study done by Sathya et al., 2016 with the mean range of dominant hand and non-dominant hand using hydraulic handheld dynamometer¹⁶. Hand grip strength in dominant hand and non-dominant hand in all the three age groups ie. 17 – 19 yrs is more or less the same.

The findings of this study also reveals that the mean range of core muscle strength in the age group of 17 yrs lie between 39.58mmhg – 41.28mmhg, for age group 18 yrs it lies between 39.09mmhg – 41.29mmhg and for age group 19 yrs it lies in range of 39.02mmhg – 41.52mmhg. Whereas the mean range of core muscle strength in the age group of 17 – 19 yrs lie between 39.73mmhg – 40.90mmhg. Core muscle strength in all the three age groups ie. 17 – 19 yrs was more or less the same.

According to the fourth objective of this study we found out that there was weak correlation between hand grip strength (in dominant hand as well as non-dominant hand) and core muscle strength in age group of 17 – 19 yrs of male cricket players. The finding of this study was consistent with a study done by Bülent et al., 2009.²⁴

6. Conclusion

This study concludes that there was weak correlation between dominant and non-dominant hand grip strength with core muscle strength. However further study can be done to check the correlation by increasing the sample size.

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