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IMPACT OF TRUNK ROTATION & HAND GRIP STRENGTH TRAINING ON THROWING BALL VELOCITY OF INTER COLLEGIATE LEVEL CRICKET PLAYERS.

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ABSTRACT

The purpose of the study was to find out the impact of trunk rotation strength & hand grip strength training towards the throwing ball velocity among intercollegiate level Cricket players. Total 60 intercollegiate level cricket players were selected from Chattisgarh University, of age ranged between 18-25 years. All subjects were divided into three groups as hand grip strength training (Group-I, N=20), trunk rotation strength training group (Group- II, N=20) and basic strength training group (Group-III, N=20) for this study, subjects underwent training 3 days in a week for a period of 6 weeks. Pre and post-test random group design was used for this study. The data were collected before and after the training period of 6 weeks and the data were statically analyzed by one-way between groups analysis of variance (ANOVA) to compare the mean score in throwing ball velocity between each group, to find out the significant improvement if any at 0.05 level of confidence. The post-hoc test indicated that all training group significantly different to each other. This study also concluded that additional training of Hand grip and trunk rotation are able to improve the throwing ball velocity rather than performing the basic strength training only.

Keyword: Hand grip, throwing skill, trunk rotation, Strength training, Cricket.

1.1 Introduction

The Sports Skill Training is a year-round top level sport specific training capability. Focusing on the physical, technical, tactical and psychological props of the sport, the Sport Specific Skill Training is part of drill helps to build character, knowledge and direction in all sports and refines the indispensable skills to excel at any sport. Cricket is a dynamic sport that consists of throwing, catching, batting, running and pitching. Based on the skill, throwing is one of the important skills that requires due attention in order to improve the Cricket performance since all Cricket players would have to use this skill no matter what is their positions during fielding. Basically, one of the components that enhance throwing performance is throwing ball velocity (Escamilla et al., 2012). In Cricket, In order to establish a high velocity during throwing of ball, it is important to develop the selective muscles group that involved explicitly in the throwing execution (Zawrotny, 2005). The effectiveness of selective muscle group to execute the throw will maximize the efficiency of the kinetic chain (McDaniel, 2009; Moynes, Perry, Antonelli, & Jobe, 1986). A complete ball throwing process beginning with immersion from the lower extremities and continuing up to the trunk, shoulder, elbow, wrist, and fingers (McDaniel, 2009; Moynes et al., 1986). Each of these body parts plays an important role in ball throwing execution. Szymanski (2012) reviewed 39 journal article regarding the effect of various resistance training methods on overhand throwing and based on the review, there are limited studies that emphasize the importance of hand grip strength and trunk rotation strength training.

Throwing ball velocity required the ability to grip the ball in order to create control over the ball and increase the ball spin that leads to improvement in throwing velocity (Ferragut et al., 2010). In addition, Shea (2007) has shown that the maximal hand grip strength is related to throwing ball velocity ($r=.79$). Furthermore, according to McDaniel (2009), an increment in handgrip strength not only improving the skills related to grasping the object, but also can increase the amount of force generated in the throw. Basically, the amount of force generated depends on the number of muscle group involved in that particular movement. Shea (2007) emphasized that there are 35 muscles involve in forearm and hand, with most of this muscle are related to gripping activities. Other than that, the anatomy of gripping movement consists of flexion and extension. The study highlighted that, flexor mechanism of the finger 62% stronger than extensor mechanism. Trunk rotation strength and throwing ball velocity Apart from the hand grip strength, throwing process also required the trunk rotation strength in order to transfer the energy and also generate force to increase the throwing ball velocity. To maximize throwing velocity, Aragon (2010) stated that the player should execute the skill with a proper technique. The trunk rotation can be considered as a mediator to complete the transfer of energy from lower to upper extremities. A proper throwing technique with the appearance of throwing velocity which determines the performance, it results from the effective transfer of energy from lower extremity, mediated by the trunk and forward to the upper extremity.

The legs included hip rotation and trunk contributes almost as much to throwing velocity as the arm itself. The importance of trunk rotation strength in throwing velocity have been supported by Stodden, Campbell, and Moyer (2018) where this study stated that increase in throwing ball velocity associated with improvement of pelvis and trunk rotation velocity. This is because the increment in pelvis and trunk rotation velocity allows greater force generation to the throwing arm that leads to an increase in the throwing ball velocity. Moreover, Stodden et al. (2018) also stated that muscular strength in trunk rotation could create dynamic stabilization during throwing. In addition, lack of training on trunk rotation may lead to muscle imbalance and caused injury to the athletes. In response to the existing gap in knowledge, this study aims at identifying the effect of hand grip strength training and trunk rotation strength training towards the throwing ball velocity among intercollegiate level Cricket players.

2. Methodology

The purpose of the study was to find out the impact of trunk rotation strength & hand grip strength training towards the throwing ball velocity among intercollegiate level Cricket players. For this study 60 subjects were selected from Chattisgarh University, of age ranged between 18-25 years. The participant was divided equally into three groups with 20 participants in each group. Participants with existing or past injuries and sicknesses that would place them at risk in performing resistance training and throwing were omitted.

2.1 Research Design

All subjects were divided into three groups as hand grip strength training (Group-I, N=20), trunk rotation strength training group (Group- II, N=20) and basic strength training group (Group-III, N=20) for this study, subjects underwent training 3 days in a week for a period of 6 weeks.

2.2 Criterion Measures

Ball velocity was measured using a radar gun (Bushnell Speedster Speed Gun; Bushnell Inc, Lenexa, KS) with accuracy 1.61 kph (1 mph) (Bowman, Hart, McGuire, Palmieri, & Ingersoll, 2016). A pre-investigation identified the intraclass correlation coefficient (ICC) of the radar gun was reported at .95 which is high reliability.

The specific yoga training program was conducted for 45 minutes for a session in a day, 3 days in a week for a period of twelve weeks duration. These 45 minutes included 10 minutes warm up, specific skill training with Strength training for 25 minutes and 10 minutes warm down. Every next week of training 5% of intensity of load was increased from 65% to 80% of work load. The volume of training prescribed based on the number of

sets and repetitions. The intensity of training was tapered, so that fatigue would not be a factor during post testing.

2.3 Collection of Data

The data were collected prior and after training period of 6 weeks on the above said measures to observe the effects of training.

3. Analysis of Data

3.1 Statistical Procedure

Data were statistically analyzed with (SPSS) program software version 20.0. In order to identify the significant difference between the three groups, first, the result score was converted from mph to m/s and then mean calculated and One-way ANOVA on mean increased score was conducted to compare the significant difference between groups on the main variables of this study. In all cases the criterion for statistical significance was set at 0.05 level of confidence.

Table 1 below shows the comparison of mean scores of pretest and post-test result according to the group

Table:1

Comparison of mean scores of pre-test and post-test result according to the group for throwing ball velocity of Cricket Players

Group		Mean	SD	N	Mean	SD
HGSTST (Group-I)	Pre Test	16.71	(2.27)	20	(1.47)	(.38)
	Post Test	18.18	(2.65)			
TRST (Group-II)	Pre Test	16.78	(2.07)	20	(1.67)	(.48)
	Post Test	18.45	(2.55)			
BST (Group-III)	Pre Test	16.81	(2.05)	20	(.97)	(.32)
	Post Test	17.78	(2.37)			

HGSTST = Hand grip strength training group, TRST = Trunk rotation strength training group, BST = Basic strength training group

Fig. 1 The graphical representation of mean and SD of pre test and post test scores on throwing ball velocity of GROUP -1 Cricket Players



Fig. 1 The graphical representation of comparison of mean and SD of pre test and post test scores on throwing ball velocity of GROUP -1 Cricket Players

Fig. 2 The graphical representation of mean and SD of pre test and post test scores on throwing ball velocity of GROUP-2 Cricket Players

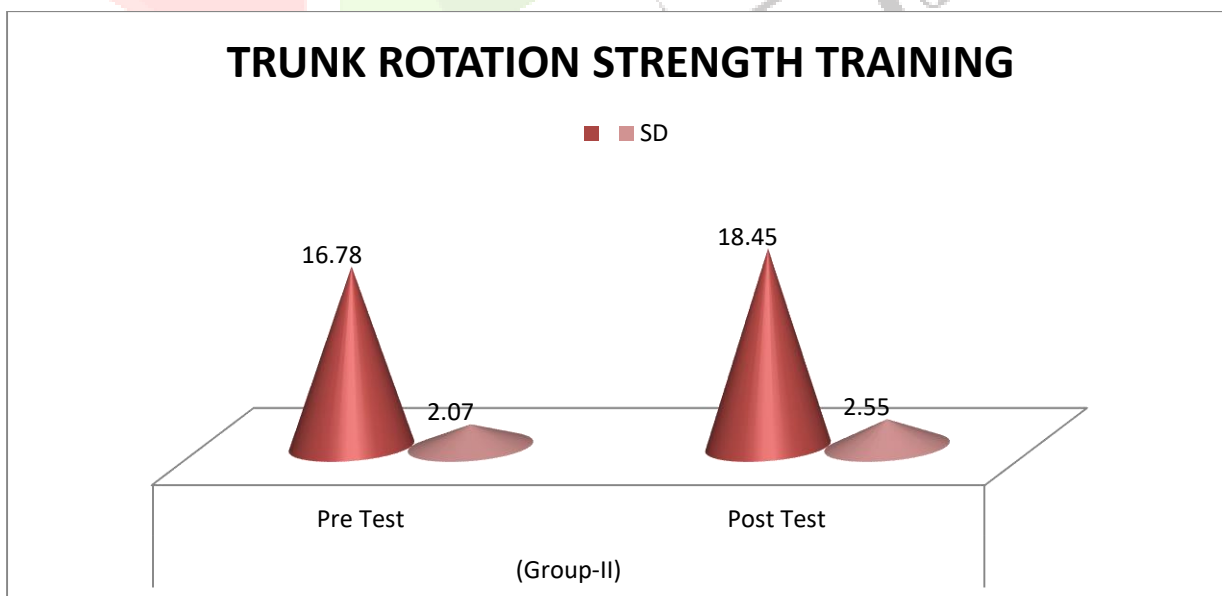


Fig. 2 The graphical representation of comparison of mean and SD of pre test and post test scores on throwing ball velocity of GROUP-2 Cricket Players

Fig.3 The graphical representation of mean and SD of pre test and post test scores on throwing ball velocity of GROUP-3 Cricket Players

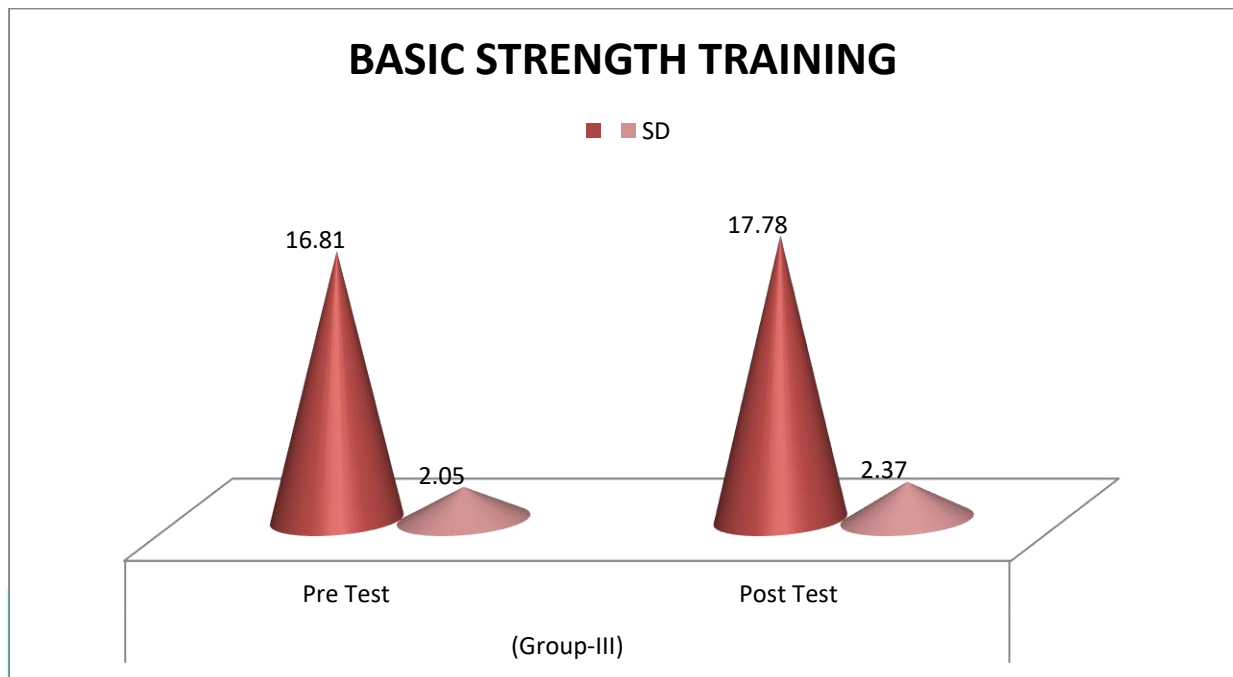


Fig.3 The graphical representation of comparison of mean and SD of pre test and post test scores on throwing ball velocity of GROUP-3 Cricket Players

3.2 Discussion of Findings

Table I reveals the computation of mean, standard deviation. Group 2(TRST) shows the greatest changes with the mean difference of 1.67, followed by Group 1(HGST) with a mean difference score of (1.47). Meanwhile, Group 3 (BST) showed the lowest score with the mean difference of .97. for at the 0.05 level of significance. The result shows that there is a statistically significant difference at the $p < .05$ level in throwing ball velocity for the three groups: $F(2, 51) = 14.93, p = .000$. Multiple comparisons with confidence interval adjustment using the Tukey HSD test were used in post-hoc analysis to compare the entire three groups (HGST, TRST, and BST).

3.3 Result

On the basis of findings it was found that there was no significant difference between HGST and TRST with $p=.30$. Meanwhile, the mean difference score for HGST and BST showed a significant difference where ($p=.001$). It was also revealed significant differences between TRST and BST with ($p=.000$). Also all the three groups were significant to each other except for the HGST and TRST groups. Researcher found no significant difference between HGST group and TRST group after 6 weeks of training on throwing ball velocity. This

indicates that the increase in throwing ball velocity mean score between these two groups is approximately equivalent. HGST group improves about (1.47) m/s while TRST group increases to (1.67) m/s and both of the group`s throwing ball velocity mean score only showed a difference of (0.20) m/s.

4. Conclusion

It was concluded that those 6 weeks hand grip strength and trunk rotation strength training significantly enriched the hand grip strength and trunk rotation strength of intercollegiate level Cricket players. Above training provides the most appropriate revenues to bring about the desirable changes over physiological variables of Cricket players. Hence, suggested that coaches and the experts compact with Cricket players to incorporate hand grip strength and trunk rotation strength training as a component in their training program. Overall, this study emphasizes that the throwing velocity was influenced by the hand grip strength and trunk rotation strength and later made an impact on Cricket performance. Since the hand grip and trunk rotation strength had increased the average throw velocity, both training should be included in the training management of the athletes.

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