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EFFECT OF ISOLATED AND PARALLEL CORE STRENGTH AND MOBILITY TRAINING ON REACTION TIME OF CRICKET PLAYERS

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ABSTRACT

The purpose of this study is to investigate the effect of isolated and parallel core strength and mobility training on reaction time of cricket players. To achieve the purpose of this study forty eight men cricket players studying various courses in Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya University, Kanchipuram, Tamil Nadu, India, during the academic year 2014-2015 was selected as subjects and their age ranged from 20 to 25 years and they were divided into four equal groups of twelve each (n=12) at random. Experimental group-I underwent core strength training, experimental group-II underwent mobility training and experimental group-III underwent parallel core strength and mobility training and group-IV acted as control. The training regimen lasted for twelve weeks for four days per week. The selected dependent variable reaction time was assessed by conducting Reaction Time Ruler Test, before and after the training regimen. Analysis of covariance was used to determine the significant difference existing between pretest and posttest on selected dependent variables. The analysis of data revealed that the reaction time of cricket players has significantly improved due to the effect of core strength training (16.42%), mobility training (18.27 %) and parallel training (23.32 %) however, parallel training is significantly better than isolated mobility training and core strength training in improving reaction time.

Key Words: *Core strength training, mobility training and reaction time*

INTRODUCTION

In various team and individual sports, regulation and improvement of motor skills and psychomotor processes is a requirement for success. In a dynamic sport like cricket that requires an intensive training load, there is a need to satisfy the high demands placed on the athletes. Cricket requires special skills like bowling, batting, and fielding. Among these; batting, a highly individualistic skill can be considered as the most contributing skill for determining the outcome of the game. Self confidence and concentration helps the player to make the shot in a relaxed state. In cricket, delayed decision making (slow reactions) will hinder the skill, which may ultimately predict the outcome of the game. Since batting is a fast moving skill, the players have to react as quickly as possible for execution of the shot. Execution of a perfect shot requires processing of multiple relevant cues and signals at the same time, so a performer has to react as quickly as possible to more than one stimulus.

Psycho-physiological research has also substantiated the relationship between psychomotor efficiency and physiological activity (Bazanova & Shtark, 2007). The improvements in quickness and response time have become high priorities in the coaching and conditioning of athletes in the present era. Although many athletes try hard to make themselves focus or concentrate, few fully understand the meaning of concentration, and are often left wondering. There are varieties of methods available for improving response time: Mental rehearsal, selective attention practice, improved fitness, identifying cues before movement, warm up and creating optimum levels of arousal. The literature is really sparse when it comes to exploring the influence of training in optimizing psychomotor activity in sports.

A notable achievement in the development of cognitive and motor tasks is to learn skills to accomplish success and effectively cope with stress and pressure of the game. The state of mental readiness achieved through training helps the subject to combat stress and recognize, understand as well as improve his attention level. Subconscious thoughts like tension and pressure of performing “perfect” impairs the attention of an athlete. Thus, training helps by gaining a control over his ability to concentrate and focus on a desired task, accomplishing maximal performance. The potential interaction of psychomotor skills (response time) with psychological processes (concentration) can mentally and physically tune the performer to respond with a quiet and ready mind.

Most of life's skills are continuous and complex and contain a multitude of integrated components; however, these complex skills may be analyzed by examining their component parts. In the laboratory, a subject's reaction time is measured as the time between the presentation of some kind of stimulus and the performer's initial response. The individual's speed of reaction depends upon a number of variables, including the intensity of the stimuli. For example, a person will initiate a movement more quickly to increasingly louder sounds until a limit is reached. When the sounds become too loud, however, the noise delays the onset of the movement. A longer reaction time will also be recorded if the subject must choose among a number of stimuli before initiating a movement or if the required act involves a complex movement. The purpose of the present study is to compare the isolated and parallel core strength and mobility training for differences in their effectiveness on reaction time of Cricket players.

METHODOLOGY

Subjects and Variables

To achieve the purpose of this study forty eight men Cricket players studying various courses in Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya University, Kanchipuram, Tamil Nadu, India, during the academic year 2014-2015 was selected as subjects and their age ranged from 20 to 25 years. The selected subjects were randomly assigned to experimental and control groups of 12 each. The selected dependent variable reaction time was assessed by conducting Reaction Time Ruler Test, before and after the training regimen.

Training Protocol

Training programme was administered to the Cricket players for twelve weeks with four training units per week. Experimental group-I underwent core strength training, experimental group-II underwent mobility training and experimental group-III underwent parallel core strength and mobility training. The core strength training group performed six core-related exercises alternatively four days in a week (Monday, Tuesday Thursday and Friday) for twelve weeks. The training load was progressively increased once in two weeks. The mobility training group performed six exercises four days in a week (Monday, Tuesday Thursday and Friday) for twelve weeks. The subjects of experimental group-III performed the combination of core strength and mobility training in parallel four days (Monday, Tuesday Thursday and Friday) in a week for twelve weeks. The parallel training group subjects performed the same volume, intensity and frequency of training as isolated core strength and mobility training group however, they performed core strength training during every Monday and Thursday, and mobility training during every Tuesday and Friday in a week for 12 weeks.

Experimental Design and Statistical Technique

The experimental design used in this study was random group design involving 48 subjects, who were divided at random into four groups of twelve subjects each. The data collected from the four groups prior to and post experimentation on selected dependent variable was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four groups were involved, whenever the obtained 'F' ratio value was found to be significant for adjusted post test means, the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases the level of confidence was fixed at 0.05 for significance.

RESULTS

The descriptive analysis of the data showing mean and standard deviation, range, mean differences, 't' ratio and percentage of improvement on reaction time of experimental groups are presented in table-I.

Table – I: **DESCRIPTIVE ANALYSIS OF THE PRE AND POST TEST DATA AND 't' RATIO ON REACTION TIME OF EXPERIMENTAL GROUPS**

Group	Test	Mean	Standard Deviation	Range	Mean Differences	't' ratio	Percentage of Changes
Core Strength Training	Pre test	0.201	0.033	0.09	0.033	7.58*	16.42 %
	Posttest	0.168	0.027	0 .08			
Mobility Training	Pre test	0.208	0.031	0.10	0.038	13.46*	18.27 %
	Posttest	0.170	0.031	0.09			
Parallel Training	Pre test	0.193	0.027	0.08	0.045	14.34*	23.32 %
	Posttest	0.148	0.022	0.7			

*Table t-ratio at 0.05 level of confidence for 11 (df) =2.20 *Significant*

Table-I shows that the mean, standard deviation, range and mean difference values of the pre and post test data collected from the experimental groups on reaction time. Further, the collected data was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post data on reaction time. The obtained 't' values of core strength training, mobility training and parallel training groups are 7.58, 13.46 and 14.34 respectively which are greater than the required table value of 2.20 for significance at 0.05 level for 11 degrees of freedom. It revealed that significant differences existed between the pre and post test means of experimental groups on reaction time.The result of the study also produced 16.42% of improvement due to core strength training, 18.27% of improvement due to mobility training and 23.32% of improvement due to parallel training.

The pre and post test data collected from the experimental and control groups on reaction time is statistically analyzed by using analysis of covariance and the results are presented in table–II.

Table – II: **ANALYSIS OF COVARIANCE ON REACTION TIME OF EXPERIMENTAL AND CONTROL GROUPS**

	Core Strength Training Group	**Mobility Training Group**	**Parallel Training Group**	**Control Group**	**S oV**	**Sum of Squares**	**df**	**Mean squares**	**'F' ratio**
Pre test Mean	0.201	0.208	0.193	0.202	B	0.001	3	0.0001	0.70
SD	0.033	0.031	0.027	0.024	W	0.037	44	0.001	
Post test Mean	0.168	0.170	0.148	0.206	B	0.021	3	0.007	9.74*
SD	0.027	0.031	0.022	0.025	W	0.031	44	0.001	
Adjusted Post test Mean	0.168	0.164	0.155	0.205	B	0.018	3	0.006	51.26*
					W	0.005	43	0.0001	

Table F-ratio at 0.05 level of confidence for 3 and 44 (df) = 2.82, 3 and 43 (df) = 2.82
**Significant*

Table-II shows that the pre-test means and standard deviation on reaction time of core strength training, mobility training, parallel training and control groups are 0.201 $\pm$ 0.033, 0.208 $\pm$ 0.031, 0.193 $\pm$ 0.027 and 0.202 $\pm$ 0.024 respectively. The obtained 'F' value 0.70 of reaction time is lesser than the required table value of 2.82 at 3, 44 df at 0.05 level of confidence, which proved that the random assignment of the subjects were successful and their scores on reaction time before the training were equal and there was no significant differences.

The post-test means and standard deviation on reaction time of core strength training, mobility training, parallel training and control groups are 0.168 $\pm$ 0.027, 0.170 $\pm$ 0.031, 0.148 $\pm$ 0.022 and 0.206 $\pm$ 0.025 respectively. The obtained 'F' value of 9.74 on reaction time is greater than the required table value of 2.82 at 3, 44 df at 0.05 level of confidence. It implied that significant differences exist between the four groups during the post test on reaction time.

The adjusted post-test means on reaction time of core strength training, mobility training, parallel training and control groups are 0.168, 0.164, 0.155 and 0.205 respectively. The obtained 'F' value of 51.26 on reaction time is greater than the required table value of 2.82 of 3, 43 df at 0.05 level of confidence. Hence, it is concluded that significant differences exist between the adjusted post test means of core strength training, mobility training, parallel training and control groups on reaction time.

Since, the obtained 'F' value in the adjusted post test means is found to be significant, the Sc

heffe's test is applied as post hoc test to find out the paired mean difference, and it is presented in table-III.

Table –III: **SCHEFFE'S POST HOC TEST FOR THE DIFFERENCES AMONG PAIRED MEANS OF EXPERIMENTAL AND CONTROL GROUPS ON SPEED**

Core strength Training Group	Mobility Training Group	Parallel Training Group	Control Group	Mean Difference	Confidence Interval
0.168	0.164			0.004	0.012
0.168		0.155		0.013*	0.012
0.168			0.205	0.037*	0.012
	0.164	0.155		0.009*	0.012
	0.164		0.205	0.041 *	0.012
		0.155	0.205	0.050*	0.012

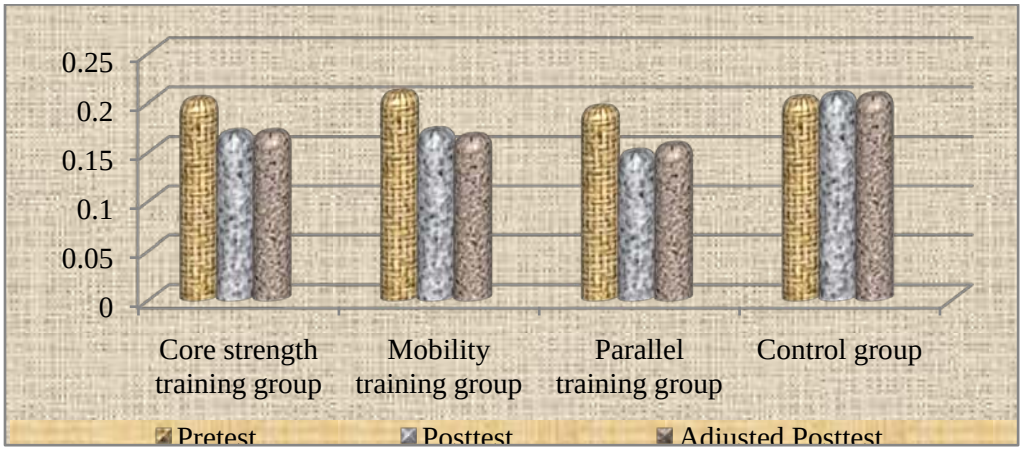
**Significant at .05 level*

As shown in table-III the Scheffe's post hoc analysis proved that significant mean differences existed between core strength and parallel training groups, core strength training and control groups, mobility and parallel training groups, mobility training and control groups, parallel training and control groups on reaction time since, the mean differences 0.013, 0.037, 0.009, 0.041 and 0.050 are higher than the confident interval value of 0.012 at 0.05 level of significance. However, there was no significant difference between core strength and mobility training groups, since, the mean differences 0.004 is lesser than the confident interval value of 0.012 at 0 .05 level of significance.

Hence, it is concluded that due to the effect of isolated and parallel core strength and mobility training the reaction time of the subjects is significantly improved. It is also concluded that parallel training is better than isolated training in improving reaction time however, there is no significant differences found between isolated core strength and mobility training.

The pre, post and adjusted post test mean values of experimental and control groups on reaction time is graphically represented in figure-I.

Figure – I: DIAGRAM SHOWING THE MEAN VALUES ON REACTION TIME OF EXPERIMENTAL AND CONTROL GROUPS



Discussion

The result of the study proved that due to the effect of isolated and parallel core strength and mobility training the reaction time of the cricket players has significantly improved. These results of the present study are in consistent with findings of the previous studies. Even though cricket is one of the oldest organized sports, there are very few studies on the physical demands of the game (Woolmer & Noakes, 2008; Christie & King, 2008; Christie *et al*., 2008). Batting and bowling are intermittent in nature with the demands placed on the players being dictated by the type of match being played. Due to this stop-start nature of cricket, accurate assessments are often difficult and as such, research is sparse and as a consequence, there are few scientifically sound training programmes for cricketers. In fact, the idea that cricketers need to be well trained is a relatively new one (Woolmer & Noakes, 2008).

To participate in a competitive sport, such as cricket, one of the main aspects any coach should always keep in mind is that it is vital to

achieve the best possible performance from the whole body – including the visual system (Wilson & Falkel, 2004). Accuracy, balance, concentration and co-ordination, are a few of the visually related abilities a player uses during sports event. In recent years, there has been a growing acceptance that perceptual skills precedes and determines skilful actions in sport and other contexts (Harris & Jenkin, 1998; Williams, Davids & Williams, 1999). In particular, the visual system plays a crucial role in guiding the player's search for essential information underlying skilful behavior. It is a perceptual- motor skill that involves the integration and processing of visual information in the central nervous system so that purposeful motor movements can be made (Abernethy, 1987).

Visual reaction time is the time the athlete receives information from the environment and decides to act on it in a certain way (Abernethy, 1991). Tate *et.al.,* (2008) concluded that the visual training program improves visual skills such as reaction time, depth perception, accommodation and saccadic eye movements of cricketers, which could lead to improvement in the batting performance. According to Planer (1994)"if play encourages normal gross motor development and improves eye-hand and eye-body co-ordination and peripheral vision helps develop these basic motor skills, it is then clear that vision and motor skills are linked to sports performance". Hence, in order to maintain optimal training levels and take advantage of the potential benefits, it is suggested that core strength and mobility training sessions not be missed by the cricket players. Parallel core strength and mobility training has been proven to boost psychomotor variables, which are essential to cricket players.

CONCLUSIONS

The result of this study demonstrated that, Due to the effect of isolated and parallel core strength and mobility training the reaction time of the subjects is significantly improved. It is also concluded that parallel training is better than isolated training in improving reaction time however, there is no significant differences found between isolated core strength and mobility training. The result of the study also produced 16.42% of improvement due to core strength training, 18.27% of improvement due to mobility training and 23.32% of improvement due to parallel training. Based on the outcome of the study, the investigator recommended that the parallel core strength training and mobility training can be given to cricket players, in order to improve their psychomotor abilities.

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