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PHYSICAL EDUCATION

EFFECT OF CONCURRENT STRENGTH AND ENDURANCE TRAINING PACKAGE ON SELECTED BIO-MOTOR ABILITIES OF CRICKET PLAYERS

Dr. A. Gunalan

Assistant Director of Physical Education, SCSVMV University, Kanchipuram, Tamilnadu, India.

Abstract

To investigate the effect of concurrent strength and endurance training package on selected bio-motor abilities, an experiment was conducted with thirty cricket players. The selected subjects were from SCSVMV University, Kanchipuram,, and their age ranged from 20 to 23 years. Subjects were randomly assigned to either concurrent strength and endurance training (n=15) or control (n=15) group. The training regimen lasted for twelve weeks. The selected dependent variables were assessed using standard tests and procedures, prior to and immediately after the training programme. Analysis of covariance was employed to establish degree of significant modification on chosen dependent variables. The findings of the study revealed that twelve weeks of concurrent strength and endurance training had an effectiveness of 15.93% on muscular strength and 8.80% on cardio respiratory endurance. These findings suggest that the concurrent strength and endurance training programme has a statistically significant influence in developing the selected dependent variables of cricket players.

Keywords: Concurrent strength and endurance training, Bio-motor abilities

Introduction

Traditionally, cricket has been perceived as a relatively mild sport from a physiological point of view. The intermittent nature of the game with its long rest intervals provides plenty of recovery time between any short spells of higher intensity activity. However, the demands of cricket may be underestimated (Noakes & Durandt, 2000). Fitness aside, cricket players are susceptible to overuse injury (Leary & White, 2000; Finch, Elliott & McGrath, 1999; Orchard et al., 2005). Strength and endurance training plays an important role in chronic and acute injury prevention, particularly in asymmetrical sports such as cricket. Conditioning for cricket should not only be sport specific but also position specific. Fast bowlers require different preparation from spin bowlers for example. Of course, there are many aspects of cricket training applicable to all players as each individual will be required to bat and field during a game.

Batsman aims to stay at the crease for as long as possible, sometimes for periods of over 4 hours. In order to occupy this position, a good bats man must be able to stay focused, have good ball / eye skills, and have the strengths and fitness to make each shot played count. Fielders need the ability to sustain a concentrated effort for a 6 hour plus period without fatigue, in sometimes very warm conditions. Their bodies must be capable of explosive bursts at any given time - such as racing for a ball, jumping for a catch. Bowlers require both explosive strength and speed, combined with good muscular endurance, in order to be able to maintain a high number of over's. Poor fitness and muscular strength will result in inaccurate bowling, and greater risk of injury, especially for high speed bowlers. Batting, bowling and fielding are athletic movements that demand a high level of strength, endurance and power.

A substantial volume of research has been dedicated to examining training induced improvements in musculoskeletal strength and cardiorespiratory endurance in response to strength and endurance training programs performed concurrently as compared to either strength or endurance programs performed separately. Many people, athletes and non-athletes, take part in a combination of resistance and endurance training. These people are expecting to experience the benefits that these two different types of training have to offer. A number of studies have shown that performing these two types of training simultaneously can be detrimental to the gains that might be made in performing one type of training alone (Bell et al., 2000). To know the efficacy of concurrent strength and endurance training and its significant contribution to cricket player's level of fitness, it was decided to take up this study.

Methods

Subjects and Variables

For the purpose of this study, thirty male cricket players from SCSVMV University, Kanchipuram, Tamilnadu, India, in the age group of 20 to 23 years were recruited, with their consent. The selected subjects were

randomly assigned to both the concurrent strength and endurance training and control groups of fifteen each. The selected dependent variables were assessed prior to and immediately after the training regimen. The selected dependent variables muscular strength and cardio respiratory endurance were assessed by bent knee sit-ups and Cooper's 12 minutes run/walk test respectively.

Training Protocol

The experimental group performed both the strength and endurance training programs three sessions per week on alternative days for 12 weeks. The strength training program was a total body workout consisting of 3 sets of 6-10 repetitions on 8 exercises that trained all the major muscle groups. A percentage of each subject's one-repetition maximum for each exercise was used to determine the intensity of each week. The intensity and number of repetitions performed for each exercise was progressively increased once in two weeks. The endurance training consists of 20-40 minutes running with 65- 80% HRR. The running intensity was determined by a percentage of heart rate reserve (HRR). The duration of each session was increased once in two weeks as training progressed. Every odd numbered week they performed the strength training in the morning session and endurance training in the evening session. Every even numbered week they performed endurance training in the morning session and strength training in the evening session.

Experimental Design and Statistical Procedure

The experimental design used for the present study was pre and post test random group design involving thirty subjects. Analysis of covariance (ANCOVA) was used as a statistical procedure to establish the significant difference, if any, existing between pretest and posttest data on selected dependent variables. The level of significance was accepted at $P < 0.05$.

Results and Discussion

The descriptive analysis of data collected on selected biomotor abilities prior to and immediately after 12 weeks of concurrent strength and endurance training is presented in table-I.

Table I. Descriptive Analysis of the Pre and Post Test Data and Percentage of Changes on Selected Bio-motor Abilities of Experimental and Control Groups

Variables	Group	Test	Mean	SD	MD	Percentage of Changes
Muscular strength	Experimental Group	Pre Test	32.20	2.78	5.13	15.93%
		Post Test	37.33	3.41		
	Control Group	Pre Test	32.67	3.12	0.73	2.23%
		Post Test	31.94	3.24		
Cardio respiratory endurance	Experimental Group	Pre Test	2249.33	115.17	198.0	8.80%
		Post Test	2447.33	84.55		
	Control Group	Pre Test	2254.67	93.42	17.34	0.77%
		Post Test	2237.33	65.63		

Table-I shows that the mean, standard deviation and mean difference values of the pre and post test data collected from the experimental and control groups on muscular strength and cardio respiratory endurance. The result of the study produced 15.93% of changes in muscular strength and 8.80% of changes in cardio respiratory endurance due to concurrent strength and endurance training. Analysis of covariance (ANCOVA) was employed to determine the significant impact of concurrent strength and endurance training on selected biomotor abilities and it is presented in table-II.

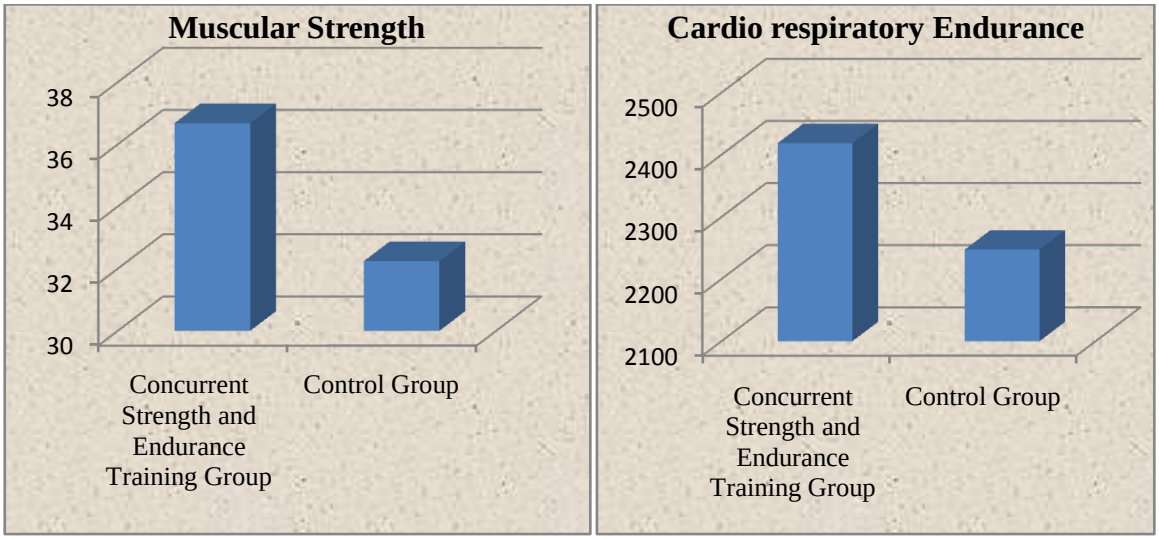
Table II. Analysis of Covariance on Selected Bio-motor Abilities of Experimental and Control Groups

Variables	Groups	Adjusted Mean	SoV	Sum of Squares	df	Mean Square	'F' ratio
Muscular Strength	Control	32.24	B	79.54	1	79.54	16.68*
	Experimental	36.68	W	128.76	27	4.77	
Cardio respiratory endurance	Control	2247.33	B	171153.3	1	171153.3	31.46*
	Experimental	2418.66	W	146890.3	27	5440.38	

Required table value for significance at 0.05 level of confidence for df of 1 and 27 is 4.21
* Significant at 0.05 level.

The findings of the study shows that significant difference existing between control group and concurrent strength and endurance training group on muscular strength and cardio respiratory endurance, since the obtained 'F' ratio value for adjusted post test means 16.68 and 31.46 respectively are greater than the required table value of 4.21 for significance at 0.05 level of confidence for df of 1 and 27. Hence it is concluded that, due to the effect of twelve weeks of concurrent strength and endurance training the selected bio-motor abilities such as muscular strength and cardio respiratory endurance are significantly improved.

Figure-I. Diagram Showing the Adjusted Post Test Means .n Muscular Strength and Cardio Respiratory Endurance of Experimental and Control Group



Previous studies have reported the beneficial effects concurrent strength and endurance training on bio-motor abilities. The results of the present study are also in line with the observation by Mazzzetti et al., (2000) that the changes in maximal strength, power and muscular endurance after 12 weeks of periodized resistance training and found greater strength gain. Wilson and Newton (1994) found that traditional weight training is intended to enhance muscular strength. Strength training as an exercise programme where free or stationary weights are used for the purpose of increasing muscular strength, muscular endurance and power, through which skills can be improved (Moran & Mchlynn, 1996). Therefore, it is observed from the above findings that the early strength gains achieved during a strength training program have been attributed to increases in neuromuscular function rather than initial muscular hypertrophy (Hickson et al., 1988; Tan, 1999). The neuromuscular status of the muscle is altered through resistance training by enabling either a greater muscle fibre recruitment or by increasing the firing frequency of the motor units (Docherty & Sporer, 2000).

Strength increases in the concurrent group were of the same magnitude of the increases only in the strength training group (McCarthy et al., 1995). The increases of 1 RM leg press and in 1 RM bench press in the resistance training and concurrent training groups are also similar to the magnitude of change reported by earlier investigators (Hennessy & Watson, 1994; McCarthy et al., 1995). The result of the study indicates that the cardio respiratory endurance of the experimental group improved significantly by underwent the twelve weeks of concurrent training programme. These results are conformity with the following findings. Concurrent training improves endurance performance, both with trained cyclists (Paton & Hopkins, 2005) and other trained athletes (Hoff et al., 1999; Johnston et al., 1997; Millet et al., 2002).

Conclusions

It is concluded that, properly performed concurrent strength and endurance training can provide significant functional benefits and improvement in muscular strength and cardio respiratory endurance of cricket players.

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