



INVESTIGATION OF CORE STRENGTH TRAINING INDUCED ADAPTATIONS ON SELECTED PHYSICAL AND PHYSIOLOGICAL PARAMETERS OF CRICKET PLAYERS

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ABSTRACT

The purpose of this study was to examine the effect of eight weeks of supervised core strength training on selected physical and physiological parameters such as muscular strength, back strength, flexibility, mean arterial pressure, vital capacity, and resting pulse rate of cricket players. For these purpose 30 male cricket players, aged 18 to 22 years took part in the study. Selected subjects were randomly assigned to either core strength training (n=15) or control (n=15) group. The training regimen lasted for eight weeks. The selected dependent variables were assessed using standard tests and procedures, 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 eight weeks of core strength training had significant impact on selected physical and physiological parameters.

Key words: Core strength training, physical and physiological parameters

Introduction

Physical exercise is extremely important for maintaining physical fitness including healthy weight, building and maintaining healthy bones, muscles and joints, promoting physiological well-being and strengthening the immune system. To improve or maintain a desired level of physical fitness, there is a need to constantly administer an adequate training intensity while exercising. The physiological goal of training is to improve body function and optimize athletic performance. Training is primarily a systematic athletic activity of long duration, which is progressively and individually graded. Human physiological

functions are modeled to meet demanding tasks [1]. Training improves the functions of the circulatory, the respiratory and the muscle system. Different training methods have been commonly used to improve physical and physiological fitness and its related standards of performance of the players.

Strength training, like speed, flexibility and mental skills training have now become an important ingredient in the total programme, particularly where strength is essential in the sport. Among sport conditioning coaches, there is considerable discussion regarding the efficiency of training methods that improve body strength and



power. Strength training is a well-established training method and vital necessary for cricket players; however, there is a lack of information regarding strength training impact among cricket players. And another suggestion by the sports scientists that, the physical, and physiological changes are more involving in the increment of sports performance, but most of the cricketers are not concentrate on strength training and its importance. Strength and fitness training for cricket players is a hotly debated topic. Strength training for cricket players has been the source of debate for many years and it still unresolved. In this present study core strength training package is designed to strengthening the physical and physiological parameters of cricket players.

Core training is a very important aspect of an exercise routine for athletes. When incorporated into a proper workout routine it will help to improve neuromuscular control and hopefully reduce injuries. The trunk of the body is considered the core and is comprised of the abdominal muscles, back muscles, pelvic floor muscles and the diaphragm. The core is the basis for all

Method

Subjects and Variables

For the purpose of this study, thirty cricket specialization students studying in the Department of Physical Education, Annamalai University in the age group of 18 to 22 years were recruited, with their consent. The age, height and weight of the selected subjects averaged 20.07 ± 1.48 yr, 170.2 ± 2.68 cm, and 67.1 ± 2.41 kg respectively. All of them were healthy,

functional movements in sports, and is crucial for everything from cutting, to pivoting, to throwing, etc. Its main purposes are to allow for balance and stability, absorbing force and for the transfer of force/energy to the extremities. The transfer of force/energy affords the athlete the ability to generate additional power with various athletic activities such as a golf swing or a punch.

Incorporating proper technique and core training into a routine will facilitate improved neuromuscular athletic movement patterns which can help with maintaining correct alignment and stability of the spine and pelvis while performing an athletic activity. It will also help the athlete become more efficient with the execution of movements. The strength or weakness of the core will determine the athlete's ability to move and generate power efficiently while participating in sport. Having good core strength, stability, and efficient dynamic neuromuscular control will facilitate the opportunity for improved sports performance. To know the efficacy of core strength training and its significant contribution to one's level of fitness, it was decided to take up this study.

nonsmoking and with a negative medical history. The selected subjects were randomly assigned to both the core strength training and control groups of 15 each. The selected criterion variables were assessed using standard tests and procedures, before and after the training regimen. The instruments used for testing the dependent variables were standard and reliable as they were purchased from the reputed companies. The variables and tests used are presented in table-1.



Table 1: Dependent Variables and Tests

Sl. No.	Variables	Tests / Instruments	Unit of Measurement
1.	Muscular strength	Bent Knee Sit-ups	Number
2.	Back strength	Dynamometer	Kg
3.	Flexibility	Sit and reach test	Centimeters
4.	Mean arterial pressure	$MAP = DP + 1/3 (SP - DP)$	mmHg
5.	Vital capacity	Wet spirometer	ml
6.	Resting pulse rate	Digital blood pressure monitor	Bpm

Training Protocol

The core strength training regimen for the experimental group lasted for eight weeks for 3 days per week and 1 session of 90 minutes in the morning session. The core strength training consisting of 3 sets of 6-10 repetitions on 5 exercises that trained only core region. A percentage of each subject's one-repetition maximum for each exercise was used to determine the intensity of training. The intensity and number of repetitions performed for each exercise was progressively increased. The control group did not participate in any specialized training during the period of study.

Experimental Design and Statistical Procedure

The experimental design used for the present investigation was random group

design involving thirty subjects for training effect. Analysis of covariance (ANCOVA) was used as a statistical technique to determine 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

The descriptive analysis of data collected from the experimental and control groups on selected physical and physiological variables before and after eight weeks of core strength training is presented in table-2.

Table-2: Computation of Mean and Standard Deviation on Selected physical and Physiological Variables

Variables	Groups	Pretest		Posttest	
		$\bar{x}$	σ	$\bar{x}$	σ
Muscular strength	Experimental	30.10	3.41	38.00	3.20
	Control	29.80	2.74	33.40	2.76
Back strength	Experimental	82.40	3.98	90.30	5.42



	Control	81.20	3.68	82.00	4.14
Flexibility	Experimental	32.20	2.86	42.20	5.12
	Control	34.00	3.56	35.20	4.34
Mean Arterial Pressure	Experimental	98.25	5.05	93.30	2.08
	Control	98.01	3.28	98.07	2.89
Vital Capacity	Experimental	2436.59	64.28	2784.12	69.25
	Control	2502.13	63.73	2552.34	61.23
Resting Pulse Rate	Experimental	66.14	4.32	63.27	4.19
	Control	69.15	4.46	68.42	4.10

The data collected during the pre and post test period was statistically analyzed by Analysis of Covariance to determine the impact of core strength training on selected physical physiological variables and it is presented in table-3.

Table-3: Analysis of Covariance on Selected physical and Physiological Variables of Experimental and Control Groups

Variables	Groups	Adjusted Mean	SOV	Sum of Squares	df	Mean Square	'F' ratio
Muscular strength	Experimental	38.00	B	268.64	1	268.64	150.66*
	Control	30.40	W	30.31	27	1.78	
Back strength	Experimental	90.30	B	236.39	1	236.39	43.05*
	Control	82.00	W	93.36	27	5.49	
Flexibility	Experimental	42.20	B	376.92	1	376.92	39.55*
	Control	35.20	W	162.00	27	9.53	
Mean Arterial Pressure	Experimental	93.26	B	175.79	1	175.79	34.78*
	Control	98.11	W	136.46	27	5.05	
Vital Capacity	Experimental	2618.66	B	710518.0	1	710518.0	200.92*
	Control	2487.32	W	95479.6	27	3536.28	
Resting Pulse Rate	Experimental	65.48	B	31.67	1	31.67	20.97*
	Control	68.63	W	40.73	27	1.51	

(* Significant at 0.05 level, required table value for significance at 0.05 level of confidence for df of 1 and 27 is 4.21).

The findings of the study shows that significant difference existing between core strength training and control group on muscular strength, back strength, flexibility,



mean arterial pressure, vital capacity and resting pulse rate, since the obtained „F“ ratio of 150.66, 43.05, 39.55, 34.78, 200.92 and 20.97 respectively were 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 eight weeks of core strength training can produce significant changes in muscular strength, back strength, flexibility, mean arterial pressure, vital capacity and resting pulse rate of cricket players.

Discussion

The results of this study suggest that eight weeks of core strength training have a detrimental effect on selected physical fitness variables. Strength is one of the most important components in physical fitness and a vital necessity for many sports. 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 [2]. Coutts and others (2004) [3] observed that 12 weeks of direct supervision of resistance training in young athletes results in greater training adherence and increased muscular strength, power, and running speed. Similarly, LeMura and others (2002) [4] observed 16 weeks of various modes of resistance training and found significant improvement in upper and lower body strength. Dorgo and others (2009) [5] found significant improvements in muscular strength and muscular endurance of the manual resistance training and weight resistance training groups.

The literature thoroughly supports the evidence that core strength training has been shown to change the physiological

parameters. Most of the previous research confirmed the finding of the present study. It is apparent that training adaptations are very specific to the movement pattern, velocity of movement, contraction type and contraction speed [6]. Studies have shown decreases in diastolic blood pressure [7] and decreases in systolic blood pressure [8,9]. The extent of the decrease in blood pressure is dependent on the time the contraction is held, the intensity of the contraction, and the amount of muscle mass involved in the contraction.

Miller and Morehouse (1971) [10] state that repeated and continuous physical exercises may produce extensive change in the respiratory system, the increased stretching of the lung tissue can accommodate more air. So the amount of vital capacity may be increased after a period of training programme. Heart rate is acutely elevated immediately following a work bout and affected by the amount of resistance, the number of repetitions and the muscle mass involved in the contraction [11]. It is suggested that the adaptational changes of core strength training are very dynamic and variable to each individual. For long-lasting change, there needs to be a systematic administration of a sufficient stimulus, followed by an adaptation of the individual, and then the introduction of a new, progressively greater stimulus.

Conclusions

The result of this study demonstrated that, core strength training had significant impact on muscular strength, back strength,



flexibility, mean arterial pressure, vital capacity and resting pulse rate of cricket players. The results of this study highlight the physical and physiological adaptations that occur with core strength training programs.

Hence it is suggested that core strength training should be considered as an effective component of sport or fitness program in addition to the previous system.

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