EFFECT OF CIRCUIT TRAINING ON STRENGTH ENDURANCEAMONG PLAYERS OF DIFFERENT TEAM GAMES

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Abstract

This study was investigated about the impact of circuit training on muscular strength endurance between trained untrained players. To achieve this purpose of the study, thirty women (n = 30) students were selected from different area of Chennai club players. The selected players were divided in to two equal groups included of fifteen players (n = 15), namely, experimental was Circuit training Group-I (*CTG*), and Control Group-II (*CG*). Experimental Group underwent eight weeks of circuit training, and the control group did not involve any special training apart from their regular activities and practices.Strength endurance was selected as criterion variable for this study and it was measured by using bent knee situps. Analysis of covariance (*ANCOVA*) was applied as statistical tool. In all cases 0.05 level of confidence was fixed to test the significance, which was considered as an appropriate. It was concluded from the result of the study that there was a significant improvement ($p \leq 0.05$) due to circuit training on strength endurance as compared to control group.

Keywords: Circuit training, strength endurance, female players.

Introduction

Physical fitness refers to the ability of your body systems to work together efficiently to allow you to be healthy and perform activities of daily living. Being efficient means doing daily activities with the least effort possible. A fit person is able to perform schoolwork, meet home

responsibilities, and still have enough energy to enjoy sport and other leisure activities (us.humankinetics.com).Physical fitness is nowadays considered as one of the most important health markers in childhood (Ortega et al., 2005). Consequently, in the last decades several countries have been promoting physical fitness improvement among young people in different ways (Department of Health and Human Services, 1990). In many circumstances, schools have been considered the best setting in which children with low fitness levels can be identified and a healthy lifestyle can be promoted (Ortega et al., 2005). Therefore, one of the main strategies of the government was focused on modifying school health a more important role in the Educational System. Schools are mainly attempting to increase the pupils' health level by using measures such as the improvement of their physical fitness through physical education (Ciencia, 2006).

Circuit training is an everlasting and evolving training exercise program that was developed by R.E. Morgan and G.T. Anderson in 1953 at the University of Leeds in England (Kravitz, 1996). The term circuit refers to a number of carefully selected exercises arranged consecutively. In the original format, 9 to 12 stations comprised the circuit. This number may vary according to the design of the circuit. Each participant moves from one station to the next with little (15 to 30 seconds) or no rest, performing a 15- to 45-second work-out of 8 to 20 repetitions at each station (using a resistance of about 40% to 60% of 1RM). It is known that planning long-term fitness programs is the best way to improve these components (Donnelly et al., 2009).The program may be performed with exercise machines, hand-held weights, elastic resistance, calisthenics or any combination. The circuit training effectively reduces the time devoted to training while allowing an adequate training volume to be achieved (Ramón et al., 2008). Moreover, it permits a greater motor engagement time (Lozano et al., 2009), which is a very important requirement for the success of a PE program.

Circuit routines allow the athlete or coach to create an endless number of workouts and add variety to routine training programs. Through circuit training the athletes may increasing their strength and endurance by increasing the repetitions of exercise at each station or by doing the required frequencies of exercise in a shorter length of form. The term circuit training describes the way a workout is structured rather than the type of exercise performed. It typically consists of a series of exercises or stations completed in succession with minimal rest in between. If the work load is kept constant, the athletes can develop strength and

endurance by gradually decreasing the time taken to go through the circuit. Circuit training is a program in an athlete moves from one exercise station to another planned sequence and in the shortest possible form. In planning a circuit training programme exercise are chosen to fit the needs of the individuals each of these exercise them numbered and assigned to a certain area called station.Strength endurance is the specific form of strength displayed in activities which require a relatively long duration of muscle tension with minimal decrease in efficiency" (Stiff, 2000).

Materials and Methods

To achieve this purpose of the study, thirty women (n = 30) students were selected from different area of Chennai club players and the age of students were between 19 and 24 years. The selected players were divided in to two equal groups included of fifteen players (n = 15), namely, experimental was Circuit training Group-I (*CTG*), and Control Group-II (*CG*). Experimental Group underwent eight weeks of circuit training, and the control group did not involve any special training apart from their regular activities and practices. Strength endurance was selected as criterion variable for this study and it was measured by using bent knee sit ups. These are the exercises used as a circuit 1. Spot running, 2. Burpees, 3. Crunches, 4. High knee, 5. Half squat, 6. Triceps dips, 7. Butt kicks, 8. Superman, 9.Push-ups, 10.Lunges. The collected data were statistically examined by analysis of covariance (ANCOVA). The confidence level was fixed at 0.05 levels, which is appropriate to the present study.

Results and Discussion

Table - I

Analysis of Covariance on Strength endurance of Training Group and the Control Group

Test		Training Group	Control Group	SOV	SS	df	MS	*F*
Pretest	Mean	17.88	18.15	B	4.42	1	4.13	.57
	SD	3.42	2.64	W	282.8	28	8.73	
Post test	Mean	24.00	19.14	B	365.13	1	436.24	44.35*

	SD	2.30	2.72	W	176.73	28	5.45	
Adjusted Post test	Mean	23.47	18.63	B W	432.73 117.51	1 27	437.51 4.06	64.18*

F = (df 1, 28) (0.05) = 4.20; (P ≤ 0.05), F = (df 1, 27) (0.05) = 4.21; (P ≤ 0.05)

Mean, Standard deviation analysis of covariance (ANCOVA) were used for the analysis of data, and statistical significance was fixed at 0.05 levels. The analysis of covariance on strength endurance among experimental and control group were described in Table 1. The pre test mean values of strength endurance of training and control groups were 17.88 and 18.15. The obtained 'F' value of 0.57 was lesser than the table value of 4.20, there was insignificant among the groups in pre test result of strength endurance. The post test means of the groups were 24 and 19.14 respectively, and the obtained 'F' value of 44.35 was greater than the table value, and there was a significant difference in strength endurance between the training and control groups among the male high school level basketball players. The obtained adjusted post test F value also greater the table value of 4.21 for df 1 and 27 required for significant at 0.05 level.

The pre, post and adjusted post test mean values of training group and the control group of strength endurance was graphically represented in Figure 1.

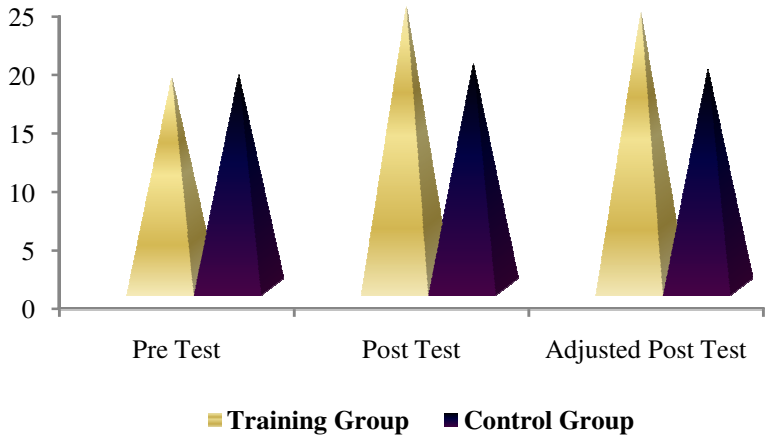

Figure 1: The pre, post and adjusted post test mean values of training group and the control group on Strength Endurance

The results of this study revealed that there was a significant difference in strength endurancedue to eight weeks of circuit training. From the results of the present study and literature, it is concluded that dependent variable such as strength endurance was significantly improved due to the circuit training.

Strength endurance is considered as one of the determinants of sports performance. The improvement of muscle power and successful performance in emergencies need a high level of fitness of respiratory system, cardio-vascular system and physiological components.Circuit training group was improved in abdominal strength endurance. Pollack *et al.* (1993) and Collin & Snow (1993) pointed out that circuit resistance training is the best method to improve strength endurance. Many research studies revealed that the use of different training loads elicits different training adaptations and further it indicate that it also includes the volume specific adaptations in strength variable (Christou, 2006) Teixeira *et al*. (2001) pointed out that resistance training three times per week is an effective as five times per week. Waller *et al*. (2011) and Tanaka &Swensen (1998) concluded that the improvement of strength endurance depends on the modalities of resistance training and circuit weight training is helps to improve strength endurance. Resistance exercises are one of the best methods for improving upper body strength endurance, many studies supported to this statement (Hickson*et al*., 1980, Chtara*et al*, 2008 &Faigenbaum*et al*., 1999). The various training components (E.g. sets, repetitions, rest, intervals) could be manipulated the training loads used from the most important factor that determine the training stimuli and the consequent training adaptations(Myer *et al*., 2006 & Jones *et al*.,2001). From the results of the present study and literature, it is concluded that the dependent variable such as abdominal strength endurance was significantly improved due to the influence circuit resistance training.

Conclusion

The result of the study revealed that the training group has significant improvement in strength enduranceamong different team female players after the circuit training protocol. It was also concluded that the circuit training is one of the best training methods for improving the strength endurance. The results of the present study show that it is possible to develop strength endurance by means of an eight week circuit training program. With the circuits method the pupils can easily reach the minimum motor engagement time (Lozano et al., 2009)

at the same time they execute many types of exercises.Hence the researcher found a statistically significant improvement for strength endurance when the circuit training was complemented with endurance training. In conclusion, the present study suggests that it is possible to develop and maintain strength endurance through a short-term program for women players.

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