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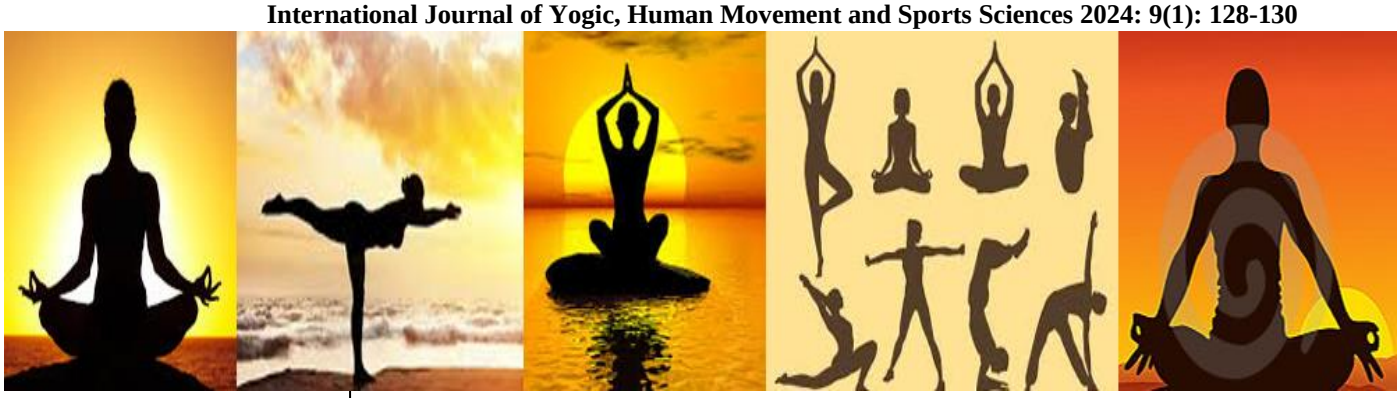

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Effects of a moderate intensity circuit training on selected motor fitness variables of college level men badminton players

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Abstract
The aim of present study was the effects of a moderate intensity circuit training on selected motor fitness variables of college level men badminton players were studied. The subjects for this study were confined from SRM Group of Institutions, Tamil Nadu, India. Their ages ranged from 20 to 25 years. 20 state level players were selected for experiment group and 20 state level players were selected for control group. The study was conducted only for men players and the motor fitness variables of agility, leg strength, and flexibility were selected for this study. The mean (M) and the standard deviation (SD) of the collected data were computed. To find out the significance of difference between the two means, the 't' ratio was determined. The level of significance was fixed at 0.05 level of confidence. Result of the study indicated that the moderate intensity circuit training programme have shown changes on the subjects. The pre-test and post-test comparisons in respect of all the selected motor fitness variables were positive and significant at 0.05 level of significance.

Keywords: Moderate intensity circuit training, agility, leg strength, flexibility

Introduction
Badminton at the top level is extremely physically demanding, requiring strength endurance, muscular power, agility, speed endurance, anaerobic power and a capacity to accelerate / decelerate. Badminton is a popular sport played all over the world. It requires quick, forceful shots as well as quick footwork. Badminton is a high-intensity sport that requires a unique movement skill and strength over relatively a small court area. It necessitates the bodies and reflexes' coordinated functioning. (Singh *et al*, 2011) [9]. Some studies found that lower body power is considered the most important component of badminton players for enhancing badminton performance (Ooi *et al*., 2000) [5]. A player's basic motor fitness, such as strength, power, muscular endurance, flexibility, coordination, and agility must be improved to perform advanced strokes or complete against ever stronger opponents (Leishout, 2002) [10]. According to Andersson *et al*. (1988) [1], well-developed strength is important in many sports context as relatively encompass the large movement of the trunk (Leishout, 2002) [10]. It is critical to identify the specific skill and parameter that contribute to badminton players' playing abilities to improve their performance. Several studies have been carried out to determine the characteristics necessary for badminton skill performance. (Singh *et al*, 2011) [9]. Coaches, trainers, and athletes are always looking for the best way to identify key factors that influence athletic performance. Thus this study was undertaken to measure and describe the selected motor fitness variables. The physical fitness is the sum of five motor abilities namely flexibility, speed, endurance, strength and to coordinative abilities and their complex from like strength endurance, maximum strength, explosive strength, maximum strength, agility which are the basic prerequisites of human motor action. Therefore the badminton performance is also depended to a greater extent on these abilities. The improvement and maintenance of specific physical fitness or condition is the main aim of sports training. Each sport requires different type and level of specific fitness as a result different types of fitness training is

required for different sports. The purpose of the study was to find out the effects of a moderate intensity circuit training on selected motor fitness variables of college level men badminton players.

Methodology

The study was conducted on 40 numbers college male students. All subjects were fully informed of the risks and discomfort associated with the investigation before accepting their willingness to act as subjects. Subjects were randomly selected into two group of 20 subjects each. Group A, the experimental group participated in moderate intensity circuit training. Group B, the control group were allowed to perform their regular physical activities but denied for participation in moderate intensity circuit training. The training stimuli adopted for a six week long included moderate intensity circuit training exercises as follows, Side-to-side shuffles-10 repetitions, Squat jumps-10 repetitions, Zigzag cone drills-2 repetitions, Lateral Jumps/Skater jumps-20 repetitions, Ladder drills-Perform 2 sets of ladder hops (one each leg), 2 sets of quick feet (stepping both feet into each space) and 2 sets of ladder jumps (jumping both feet into each space), Split Jumps-20 repetitions, Double-unders (jump rope)-50 repetitions, and Box Jumps-10 repetitions. The Circuit: Perform the exercises in a circuit format, moving from one exercise to the next with 15-30 seconds rest between each exercise. Complete 2-3 rounds of the circuit, resting for 1-2 minutes between each round. The above stated moderate intensity circuit exercises were performed thrice in a week for one hour in the afternoon under the direct supervision of the investigator. Prior to practicing the exercises the subjects were being asked for getting warmed-up for 10 minutes and to follow the demonstration of each exercise.

Table 1: Type of variables, test and unit of measurements

S. No.	Variables	Test / Equipment	Unit of Measurements
1.	Agility	40 meter agility (4x10 shuttle run)	Seconds
2.	Leg strength	Vertical jump	Centimeters
3.	Flexibility	Sit and reach	Centimeters

Statistical Analysis

Test scores were subjected to statistical analysis. Indices like means and standard deviations were computed for comparison. The mean and standard deviation values were calculated for the three motor fitness variables: (a) agility, (b) leg strength, and (c) flexibility. To find out significance of the difference or the change that occurred between pre-and-post tests, 't' test was applied.

Results of the Study

Table 2: Mean, SD scores and result of the test of significance ('t') in respect of motor fitness variables of experimental and control groups

Motor fitness Variables	Groups	Pre-Test		Post-Test		't'
		Mean	SD	Mean	SD	
Agility	Group A	13.93	0.77	12.15	0.53	14.52*
	Group B	13.83	0.65	13.68	0.59	1.82
Leg Strength	Group A	66.60	3.60	79.40	3.48	19.78*
	Group B	66.35	4.04	66.60	3.84	1.04
Flexibility	Group A	24.60	3.48	24.90	3.14	1.55
	Group B	23.85	2.66	24	2.64	0.62

Table 2 indicates significant differences between pretest and posttest of the experimental group (Group A) on all the motor fitness variables namely agility and leg strength. Whereas no significant difference were observed between pretest and posttest of flexibility, and the control group (Group B) on all stated motor fitness variables. The agility of experimental group (A) the obtained 't' value was 14.52 and found to be greater than the required 't' value 2.09 and significant at 0.05 level of significance with 19 degrees of freedom. The leg strength of experimental group (A) the obtained 't' value was 19.78 and found to be greater than the required 't' value 2.09 and significant at 0.05 level of significance with 19 degrees of freedom and the flexibility of experimental group (A) the obtained 't' value was 1.55 and found to be not greater than the required 't' value 2.09 and it was not significant at 0.05 level of significance with 19 degrees of freedom.

Discussion on findings

Circuit training is an important method for improving upper limb and lower limb strength, running speed and agility (Mohanta *et al*., 2019) [11]. A relatively small dose of exercise required to elicit improvements in repeated-sprint performance (Burgomaster *et al* 2005) [4]. Six week plyometric training achieved greater improvement in agility of badminton players (Heang *et al* 2012) [8]. The high intensity interval circuit training appears to lead to worthwhile increases in jumping for distance by two foot with badminton players (Sarhang 2014) [14]. The hip extension training and improvement in ankle plantar flexion strength may improve agility (Sonoda, Takuya, *et al*. 2018) [15]. Badminton is a sport that is strength-related rather than strength-limited in the sense that a player's performance is influenced by strength rather than limited by it (Frohlich *et al*., 2014) [7]. The more the leg power player has the more he can able to jump high to play an overhead stroke and will generally appear swift and mobile on the badminton court (Omosegaard, 1996) [13]. The influence of the trapping circuit training method on strength, speed and agility abilities. which was given the trapping circuit training with 80% intensity at 1:1/2 intervals, with changes in strength increasing by 43.78%, and agility increased by 9.66%. (Nugroho *et al*., 2021) [12]. In this present study the results shows that the effects of a moderate intensity circuit training group shows significant changes on selected motor fitness variables of agility and leg strength of college level men badminton players compared to the control group.

Conclusion

The six week long of a moderate intensity circuit training programme on the college level men badminton players have proved to be effective on selected motor fitness variables of agility and leg strength, and it was significant at 0.05 level of significance.

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