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Cardio respiratory endurance responses of continuous and interval training in college level football players

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Abstract

The aim of the study was to find out the cardio respiratory endurance responses of continuous and interval training in College level football players. The study, forty-five men students studying master's degree in the department of physical education and sports, Pondicherry central university, Puducherry, were selected as subject and they were divided into three equal groups of fifteen subjects each at random. Group I underwent continuous training and group II Interval training for three days per week for twelve weeks and group III acted as control who did not undergo and experimental training program apart from their regular physical education program of the curriculum. All the subjects of the three groups were tested on cardio respiratory endurance were tested through Cooper's 12-minute run/walk test at prior and after the training programmed as pre and posttest respectively. Pre and post test was conducted before and after the twelve weeks, weekly five days- per day 60 minutes of experimental training. The analysis of covariance (ANCOVA) was used to analyze the significant difference, if any among the three groups. The 0.05 level of significance was fixed to test the 'F' ratio obtained by the analysis of covariance, which was considered as an appropriate. The result of the study revealed that there was a significant difference among continuous training group, interval training group and control group on cardio respiratory endurance. It was found that there was a significant improvement on cardio respiratory endurance due to continuous training and interval training then the control group whereas the improvement was in favor of continuous training group.

Keywords: continuous training, interval training, cardio respiratory endurance, ANCOVA, Scheffe's Post Hoc test and college level football players

Introduction

Physical activities are an important ingredient in the quality of life because it increases energy and promote physical, mental and psychological wellbeing in additional to conferring worthy health habits. Physical inactivity is considerably more dangerous than physical activity. Training has of been explained a programme of exercise designed to improve the skill and increase energy capacities of an athlete for a particular event training has been a port of human life science ancient times. It denotes the process of preparation from some tasks through systematic training programme can improve his fitness both physically and mentally.

Interval training

Interval training involves a repeated series of exercise work bouts interspersed with rest or relief periods. This method is popular among athletes because it allows the athlete to exercise at higher relatives' intensities during the work interval then are possible with long duration, continuous training.

Interval training programs also can be designed to improve speed and endurance as well as aerobic endurance simply by means of modifications in the exercise intensity and length of the work and relief intervals (Fox and Methews, 1974) [74].

Interval training has been used by athletes for years to build fitness. Interval training combines short, high-intensity bursts of speed, with slow, recovery phases, repeated during one exercise session. An early form of interval training, fartlek (a Swedish term meaning "speed play") was casual and unstructured (Elizabeth Quinn, 2020) [3].

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Interval training has since evolved into a more structured and sophisticated way of fast tracking your fitness training. Unlike Fartlek training, which causes a temporary build-up of lactic acid, interval training involves alternating periods of activity and recovery. Recovery is achieved by maintaining movement throughout the entire workout, which facilitates the removal of lactic acid and other waste products. Interval training programs are also designed scientifically and specifically for individual athletes. Physiologists and trainers measure precise periods of activity that much the athlete's sport and current level of fitness. For example, the intensity and duration of these periods of activity are usually determined by AT (anaerobic threshold) testing, which also measures the blood-lactate of the athlete during intense exercise (Brad Walker, 2008).

Continuous training

Exercise is done for long time without any break or pause because of the long duration of work the intensity is low (Hardayal Singh, 1991) [5].

The most popular continuous training is walking, jogging, or running and cycling. Exercise programs using walking, jogging and cycling provide similar cardiovascular benefits (Megel *et al.* 1974).

Involves low-intensity exercise for long periods of time without a rest or break. A performer normally performs continuous training for a minimum of 20 minutes in their aerobic training zone (60-80% of heart rate max). An example continuous training workout could be a 30-minute run at 60% heart rate max. Adjusting the pace or effort of the activity can vary the exercise intensity, for example instead of running at 60% heart rate max, increase to 70% (<https://www.teachpe.com/training-fitness/training-methods>).

Cardio respiratory endurance

Cardio respiratory endurance is the body's ability to deliver oxygen effectively to the working muscles so that an individual can perform physical activity. The performance of sustained vigorous physical activities is influenced by the efficiency of the cardio respiratory system.

Cardio respiratory endurance is concerned with the aerobic efficiency of the body. Aerobic efficiency is the body's ability to supply fuel and oxygen to the muscles (Deborah A. Wuest & Charles A. Bucher. 2010) [2].

Statement of the problem

The study was to find out the cardio respiratory endurance responses of continuous and interval training in college level football players.

Hypothesis

It was hypothesized that there would be a significant improvement on cardio respiratory endurance due to the continuous and interval training in college level football players.

Review of related literature

Naves *et al.* (2019) [2] study was to compare the acute physiological responses of two high intensity interval training (HIIT) and one moderate intensity continuous training (MICT) protocol in young men. A randomised cross-over study with 10 men age, 28.3 ± 5.5 years; weight, 77.3 ± 9.3 kg; height, 1.8 ± 0.1 m; peak oxygen consumption (VO_2 peak), 44 ± 11 mL.kg⁻¹.min⁻¹. Participants performed a cardiorespiratory test on a treadmill to assess VO_2 peak, velocity associated with VO_2 peak ($v\text{VO}_2$ peak), peak heart rate (HR peak) and perceived exertion (RPE). VO_2 peak in Long HIIT was significantly higher than Short HIIT and MICT (43 ± 11 vs 32 ± 8 and 37 ± 8 mL.kg⁻¹.min⁻¹, respectively, $P < 0.05$), as well as peak HR (181 ± 10 vs 168 ± 8 and 167 ± 11 , respectively, $P < 0.05$), and RPE (17 ± 4 vs 14 ± 4 and 15 ± 4 , respectively, $P < 0.05$), with there is no difference between Short HIIT and MICT. In conclusion, Long HIIT promoted higher acute increases in VO_2 , HR and RPE than Short HIIT and MICT, suggesting a higher demand on the cardiorespiratory system. Short HIIT and MICT presented similar physiologic and perceptual responses, despite Short HIIT being performed at higher velocities.

Methodology

The study was to find out the cardio respiratory endurance responses of continuous and interval training in college men. Forty-five men students from master's degree in the Puducherry, were selected as subjects and they were divided into three equal groups of fifteen subjects each at randomly. Group I and Group II underwent interval training and continuous training respectively for three days for week of twelve weeks and Group III acted as control group who did not undergo any special training program apart from their regular physical education program of the curriculum. All the three groups were tested on cardio respiratory endurance-12 minutes run/walk test (Cooper, 1968) [1] in meters at prior and immediately after the programme as pre and post-test respectively. All the subject of three group were tested on selected dependent variables at prior to and immediately after the training program. Pre and post test were conducted before and after the twelve weeks, weekly five days- per day 60 minutes of experimental training.

Statistical technique

The analysis of co variance (ANCOVA) was used to analyse the significant deference, if any among the groups. The 0.05 level of significant was fixed as to test the 'F' ratio obtained by the analysis of co-variance, which considered as an appropriated.

Analysis of data

The analysis of covariance on cardio respiratory endurance of pre and post tests for interval training, continuous training and control groups was analysed and presented in table 1.

Table 1: Analysis of covariance on cardio respiratory endurance of pre and post-test in college level football players

Variables	Test	Mean			SV	SoS	df	MS	Obtained F
		Ex. Grp I (Interval training group)	Ex. Grp II (Continuous training group)	Control group					
Cardio Respiratory Endurance (Meters)	Pre	1217.99	1217.92	1219.90	B	0.069	2	0.034	0.650
					W	2.23	42	0.053	
	Post	1397.43	1438.26	1220.85	B	2.73	2	1.36	35.18*
					W	1.63	42	0.038	
	Adjusted	1397.39	1437.27	1219.88	B	3.09	2	1.54	247.15*
					W	0.148	42	0.003	

*Significant at 0.05 level of significance for df 2 and 42, 2 and 41 are 3.222 and 3.226.

The table 1 show that the adjusted post-test means of interval training group, continuous training group and control group on cardio respiratory endurance were 1397.39, 1437.27 and 1219.88 respectively. The obtained F ratio for adjusted post-test of 247.15 which was more than the table value of 3.226 with df 2 and 41 required for significance at .05 level of confidence.

The result of the study indicated that there was a significant

difference on cardio respiratory endurance among the adjusted post-test means of interval training group, continuous training group and control group.

Since, three groups were compared, whenever they obtained F ratio for adjusted post-test was found to be significant, the Scheffe's test to find out the paired mean differences and it was presented in table 2.

Table 2: Scheffe's Post Hoc test for the differences between paired means on cardio respiratory endurance in college level football players

Ex. Grp I (Interval training group)	Ex. Grp II (Continuous training group)	Control group	MD	CI
1397.39	1437.27	-	39.88*	11.26
1397.39	-	1219.88	177.51*	
-	1437.27	1219.88	217.39*	

*Significant at 0.05 level of significance.

The table 2 shows that the mean difference between interval training group and continuous training group, interval training group and control group and continuous training group and control group 39.88, 177.51 and 217.39 respectively on cardio respiratory endurance which were greater than the required confidence interval value

11.26 for significance. Naves *et al.* (2019) [2] examined High Intensity Interval Training promoted higher acute increases in

VO₂, HR and RPE than Short HIIT and MICT, suggesting a higher demand on the cardiorespiratory system. The results of this study showed that there was a significant difference exists between interval training group and continuous training group, interval training group and control group and continuous training group and control group on cardio respiratory endurance.

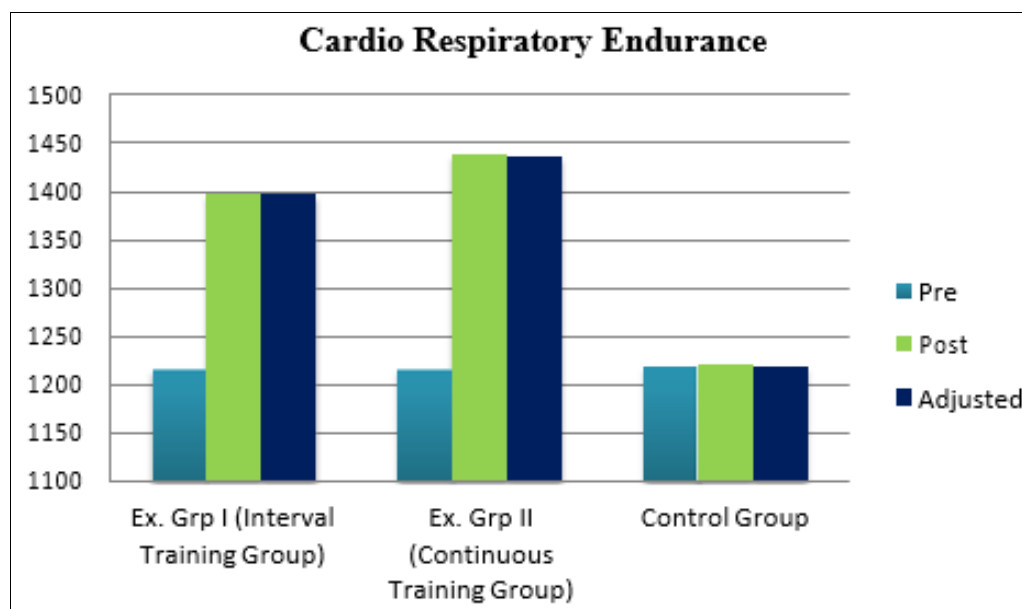


Fig 1: Bar diagram shows on pre, post and adjusted means of cardio respiratory endurance

Results and Discussions

1. The interval training and continuous training groups showed significant improvement on cardio respiratory endurance when compared to control group.
2. And also, the improvement on cardio respiratory endurance was in favour for continuous training group than interval training group. The result of this study was in agree with the results of Naves *et al.* (2019) [2], in which they got the significant improvement on selected criterion variables due to interval and continuous training.

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