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Research Article

Effect of circuit and interval trainings on selected physiological variables in women cricket players

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■ **ABSTRACT**

The purpose of the study was to find out the influence of circuit and interval trainings on selected physiological variables in women cricket players. To achieve this purpose, forty five women cricket players were randomly selected as subjects, studying in Annamalai University, India and their age ranged between 18 to 22 years. The selected subjects were divided into two experimental groups and a control group with fifteen subjects in each group. Experimental group I (CTG=15) underwent circuit training, group II (ITG=15) underwent interval training and group III served as control group (CG=15). During the training period, the two experimental groups underwent their respective training programme for 12 weeks (4 days/ week) and the training programmes were given about from 45 to 60 minutes per day. Physiological analyses were done on vital capacity and VO_2 max to find out the significant effect of training on women cricket players. The data collected from the three groups before and after the experimental training period were statistically examined to find out the significant improvement using the analysis of covariance (ANCOVA). The level of confidence, was fixed at 0.05. Hence, it was concluded that circuit training and interval training have significant increase on vital capacity and VO_2 max level.

■ **Key Words :** Circuit training, Interval training, Vital capacity, VO_2 max

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Physical exercise is any bodily activity that enhances or maintains physical fitness and overall health and wellness. It is performed for various reasons including strengthening muscles and the cardio-vascular system, honing athletic skills, weight loss or maintenance, as well as for the purpose of enjoyment (Stampfer *et al*., 2000).

Vital capacity (VC) is the the maximum amount of air that can be inhaled or exhaled from the lung. Vital capacity is equivalent to the inspiratory reserve volume (IRV) plus the tidal volume (TV) plus the expiratory reserve volume (ERV). VC = IRV + TV + ERV.

VO_2 max is the maximal oxygen uptake or the maximum volume of oxygen that can be utilized in one minute during maximal or exhaustive exercise. It is measured as millilitres of oxygen used in one minute per kilogram of body weight (ml/ kg/min). VO_2 max or maximal oxygen uptake is one factor that can determine an athlete's capacity to perform sustained exercise and is linked to aerobic endurance. A high VO_2 max may indicate an athlete's potential for excellent aerobic endurance (Costill and Wilmore, 1994).

The factors affecting VO_2 are often divided into supply and demand factors. Supply is the transport of oxygen from the lungs to the mitochondria (including lung diffusion, stroke volume, blood volume, and capillary density of the skeletal muscle) while demand is the rate at which the mitochondria can reduce oxygen in the process of oxidative phosphorylation. (Bassett and Howley, 2000).

■ METHODOLOGY

Selection of subjects :

To achieve for the purpose of this study, forty five women

cricket players were randomly selected as subjects studying in Annamalai University, India, and their age ranged between 20 to 24 years.

Experimental design :

The purpose of the present study was to find out the effects of circuit training and interval training on vital capacity and VO_2 max in women cricket players. The selected subjects were divided into three groups performing aerobic exercise and asana. The selected subjects were divided into two experimental groups and a control group with fifteen subjects in each group. Experimental group I underwent circuit training, group II underwent interval training, and group III served as control group. During the training period, the two experimental groups' underwent their respective training programme for 12 weeks (4 days/ week) and the training programmes were given about from 45 to 60 minutes per day.

Training programme :

The experimental training group consisted of 45 to 60 minute sessions divided into five stages: warm-up (5 to 10 minutes); principal training activity (30 to 40 minutes); warm- down (5 to 10 minutes) and stretching (5 minutes). Circuit training technique that involves moving from one exercise to another, each exercise working a different muscle group until each muscle has been worked. Interval training involves alternating high intensity exercise with recovery periods and there are a variety of ways to set up interval workouts.

Testing variables

The vital capacity of the subjects was measured using spirometer and VO_2 max of the subject was measured through conducting cooper 12 minutes run test.

Statistical analysis :

Vital capacity and VO_2 max were assessed before and after 12 weeks of aerobic training and asana practices. The data collected from the three groups before and after the experimental training period were statistically examined to find out the significant improvement using the analysis of covariance (ANCOVA). The significant the level of confidence was fixed at 0.05.

■ OBSERVATIONS AND DISCUSSION

Table 1 shows the mean and 'F' ratio on vital capacity of circuit training, interval training and control group.

The table values required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.22 and 3.33, respectively.

Table 1 shows that adjusted post-test mean values of vital capacity for circuit training, interval training and control group were 4.12, 4.35 and 3.53 litre, respectively. The obtained 'F' ratio value 4 for adjusted post-test means on vital capacity was greater than the table value 3.33 for significance with df 2 and 41 at .05 level of confidence.

The adjusted post-test mean values for circuit training, interval training and control group on vital capacity are also graphically presented in Fig.1.

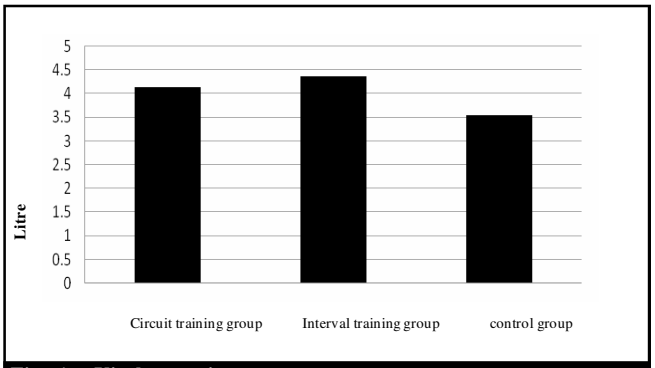

Fig. 1 : Vital capacity

Table 1 : ANCOVA of vital capacity between circuit training, interval training and control group

Test	Circuit training group	Interval training group	Control group	Source of variance	Sum of squares	D.f.	Mean squares	Obtained 'F' ratio
Pre-test								
Mean	3.27	3.47	3.33	Between	0.31	2	0.16	0.18
S.D.	0.79	0.99	0.98	Within	36	42	0.86	
Post-test								
Mean	4.13	4.33	3.53	Between	5.2	2	2.6	3.79*
S.D.	0.74	0.62	1.06	Within	28.8	42	0.69	
Adjusted post-test								
Mean	4.12	4.35	3.53	Between	5.39	2	2.69	4*
				Within	27.61	41	0.67	

*Significant at .05 level of confidence. The table values required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.22 and 3.33, respectively

Table 2: ANCOVA of Vo_2 max between circuit training, interval training and control group

Test	Circuit training group	Interval training group	Control group	Source of variance	Sum of squares	D.f.	Mean squares	Obtained 'F' ratio
Pre-test								
Mean	40.47	40.73	40.33	Between	1.24	2	0.62	1.31
S.D.	0.52	0.46	0.98	Within	20	42	0.48	
Post-test								
Mean	43.67	44.4	40.13	Between	156.13	2	78.07	144.65*
S.D.	0.82	0.63	0.74	Within	22.67	42	0.54	
Adjusted post-test								
Mean	43.66	44.43	40.11	Between	152.58	2	76.29	140.31*
				Within	22.29	41	.54	

*Significant at .05 level of confidence. The table values required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.22 and 3.33, respectively

VO_2 max :

Table 2 shows the mean and 'F' ratio on VO_2 max of circuit training, interval training and control group.

Table 2 show that adjusted post-test mean values of VO_2 max for circuit training, interval training and control group were 43.66, 44.43 and 40.11ml/kg/min., respectively. The obtained 'F' ratio value 140.31 for adjusted post-test means on Vo_2 max was greater than the table value 3.33 for significance with df 2 and 41 at .05 level of confidence.

The adjusted post-test mean values for circuit training, interval training and control group on VO_2 max were graphically presented in Fig. 2 .

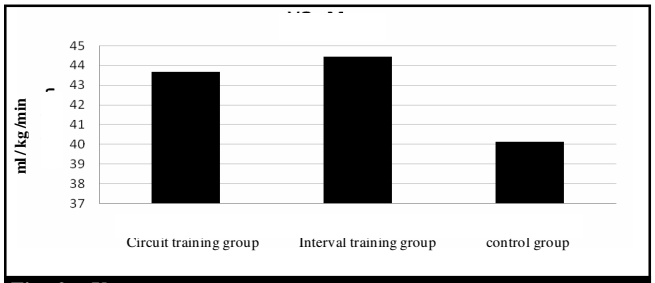

Fig. 2 : Vo_2 max

These results suggest that older coronary patients respond to aerobic conditioning with remarkable improvements in submaximal endurance capacity, out of proportion to the more modest increases in VO_2 max. Measurements of serum lactate, respiratory exchange ratio, and ventilation during steady-state exercise document that at an identical absolute work load after conditioning, exercise is performed using aerobic substrate to a greater degree, and ventilatory response to a given work load is lessened (Ades *et al.*, 1993).

Niinimaa and Shephard (1978) have demonstrated that training produced no significant changes in any of the pulmonary variables tested, despite a 10 per cent increase of maximum oxygen intake seen in those members of the group who progressed to intensive training (heart rate 145-155/min). This reflects the fact that oxygen transport depends more on blood transport than on the respiratory system.

Conclusion :

The results indicated that a 12-week training programme had significantly increased of positive improvement on vital capacity and VO_2 max in women cricket players. There was a significant increased on vital capacity and VO_2 max due to circuit training and interval training. The results of the current study suggest that both the training programmes were found to be better than control group. Hence, it was concluded that interval training improved better than circuit training on vital capacity and VO_2 max level in women cricket players.

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