INFLUENCE OF AEROBIC, RESISTANCE AND CONCURRENT STRENGTH AND CONTINUOUS CYCLE ERGOMETERTRAINING PROGRAMME ON SELECTED BIOMOTOR ABILITIES

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ABSTRACT

The purpose of the study was to find out the influence of aerobic, concurrent strength and continuous cycle ergometer training programme on selected biomotor abilities namely Strength Endurance and Vo_2 Max. For the present study, sixty male subjects were selected at random from the Department of arts and Sciences, periyar maniammi University, Thanjavur, TamilNadu, India. The age of the participants ranged between 18 and 25 years. The selected subjects were divided into three experimental groups and a control group with fifteen subjects (n=15) in each group. Experimental group I (ATG=15) underwent aerobic training, Group II (RTG=15) underwent resistance training, Group III (CTG=15) underwent concurrent strength and continuous cycle ergometer training and Group IV served as control group (CG=15). All subjects were informed about the nature of the study and their consent was obtained to co-operate till the end of the experiment and testing period. Pilot study groups and experimental groups (namely ATG, RTG and CSCTG) were trained-up in which three modes of training were given independently with separate subjects in each group. Group I,II and III were underwent their respective training programme for three days per week for twelve weeks who did not underwent any special training programme apart from their regular physical education curriculum. The following variables such as strength endurance and Vo^2max were selected as criterion variables. The strength endurance was assessed by YMCA 1min bent knee sit-ups in In Numbers and Vo^2max was assessed by using Bruce Protocol Stress Test In Cubic Centimeter. All the subjects of four groups were tested on selected criterion variables at prior to and immediately after the training programme as pre and post test selected. Analysis of covariance (ANCOVA) was used to find out the significant difference if any, among the groups on each selected criterion variables separately. In all the cases, .05 level of confidence was fixed to test the significance, which was

considered as an appropriate. Analysis of covariance. Whenever the 'F' ratio was found to be significant, Scheffe's test was used as post-hoc test to determine which of the paired means differed significantly. In all cases the criterion for statistical significance was set at .05 level of confidence was fixed to test the significance, which was considered as an appropriate. There was a significant difference among (ATG) aerobic training group, (RTG) resistance training group and (CSCTG) concurrent strength and continuous cycle ergometer training g
endurance and Vo²max.

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INTRODUCTION

Regular exercise and physical activity are extremely important and beneficial for long-term health and well-being. Specificity is the principle of training that states that sports training should be relevant and appropriate to the sport for which the individual is training in order to produce a training effect. The specificity principle simply states that training must go from highly general training to highly specific training.

Successful athletes understand athletic programme and the real reason behind their efforts. It doesn't predominantly have anything to do with the improvement of their workouts and specific sport skills. The smart players are making themselves better athletes, which in turn make them better players. That is the key difference. The most successful players know that they can maintain their specific sport skills, by spending their time hitting the weights and mastering the skills of athletic performance they get to better the specific sport skills. There has obviously been a shift in priorities of these more dominant players**.**

Aerobic or endurance training is quite a broad sweeping term. It's often used interchangeably with terms like "aerobic", "anaerobic", "strength" and "speed". This section of the website focuses primarily on aerobic endurance conditioning and the various training methods that have been developed to help athletes reach peak aerobic fitness.

Endurance training is important for many sports - not just the pure distance events like running, swimming and cycling for example. While the type and amount of endurance training will change according to the specific demands of the sport, even some traditional strength and power based games demand a solid aerobic base.

Most often it's a combination of energy systems that supply the fuel needed for exercise, with the intensity and duration of the exercise

determining which method gets used when. However, aerobic metabolism fuels most of the energy needed for long duration or endurance exercises.

Athletes continually strive to push their capacity to exercise harder and longer and increase their endurance. The factors that limit sustained high intensity efforts include fatigue and exhaustion. Sport training has been shown to modify and postpone the point at which this fatigue occurs.

While performance continued to improve for United States Olympic athletes through the 1980's and the early 1990's, the recent world competition has shown that this improvement has stalled. Previous improvements were, in part, the result of continued development of training methods and coaching education through increased influence of science. This particularly applies to sports medicine, sports physiology and sports psychology, as well as biomechanics. All areas of science contributed to the improved performance parameters in middle distance running. The factors that decide the performance in middle distance running are anaerobic endurance and aerobic power.

METHODOLOGY

This chapter deals with the procedure followed in the selection of the participants, selection of variables, selection of tests, instrument reliability, reliability of the data, pilot study, orientation to the participants, training programme, collection of data, test administration, experimental design and statistical procedures applied for analyzing the data.

SELECTION OF SUBJECTS

The purpose of the study was to find out the influence of aerobic, concurrent strength and continuous cycle ergometer training programme on selected biomotor abilities namely Strength Endurance and Vo2 Max. For the present study, sixty male subjects were selected at random from the Department of arts and Sciences, periyar maniammi University, Thanjavur, TamilNadu, India. The age of the participants ranged between 18 and 25 years. The selected subjects were divided into three experimental groups and a control group with fifteen subjects (n=15) in each group. Experimental group I (ATG=15) underwent aerobic training, Group II (RTG=15) underwent resistance training, Group III (CTG=15) underwent concurrent strength and continuous cycle ergometer training and Group IV served as control group (CG=15). All subjects were informed about the nature of the study and their consent was obtained to co-operate till the end of the experiment and testing period. Pilot study groups and experimental groups (namely ATG, RTG and CSCTG) were trained-up in which three modes of training were given independently with separate subjects in each group. Group I,II and III were underwent their respective training programme for three days per week for twelve weeks who did not underwent any special training programme apart from their regular physical education curriculum. The following variables such as strength endurance and Vo2max were selected as criterion variables. The strength endurance was assessed by YMCA 1min bent knee sit-ups in In Numbers and Vo2max was

assessed by using Bruce Protocol Stress Test In Cubic Centimeter. All the subjects of four groups were tested on selected criterion variables at prior to and immediately after the training programme as pre and post test selected. Analysis of covariance (ANCOVA) was used to find out the significant difference if any, among the groups on each selected criterion variables separately. In all the cases, .05 level of confidence was fixed to test the significance, which was considered as an appropriate. analysis of covariance. Whenever the 'F' ratio was found to be significant, Scheffe's test was used as post-hoc test to determine which of the paired means differed significantly. In all cases the criterion for statistical significance was set at .05 level of confidence was fixed to test the significance, which was considered as an appropriate.

SELECTION OF VARIABLES

The goals of training may be directed towards the increase in physiological qualities and strength or a combination of these variables. The investigator had gone through the relevant literature in the area of aerobic, resistance and underwent concurrent strength and continuous cycle ergometer training and their various aspects in association with the guide and other experts in this area. The variables were selected after considering the feasibility and availability of proper techniques and instruments. In this experimental study, three experimental (AGT, RTG, and CSCTG) groups with different loads of training were given while one group was kept as control group to assess the difference.

STATISTICAL ANALYSIS

The data collected from the four groups before and after the experimental period were statistically examined for significant improvement by using analysis of covariance. Whenever the 'F' ratio was found to be significant, Scheffe's test was used as post-hoc test to determine which of the paired means differed significantly. In all cases the criterion for statistical significance was set at .05 level of confidence was fixed to test the significance, which was considered as an appropriate.

STRENGTH ENDURANCE

The analysis of covariance on strength endurance of the aerobic training group (ATG), resistance training group (RTG), concurrent training group (CSCTG) and the control groups (CG) were analysed and the results are presented in table I.

TABLE I

ANALYSIS OF COVARIANCE ON STRENGTH ENDURANCE OF AEROBIC, RESISTANCE AND CONCURRENT STRENGTH AND CONTINUOUS CYCLE ERGOMETER TRAINING AND CONTROL GROUPS

Test		ATG	RTG	CTG	CG	SOV	SS	df	MS	F
Pre-Test	Mean	43.00	40.87	46.33	39.13	B	432.533	3	144.178	3.91*
	SD	4.78	4.47	8.56	5.59	W	2062.8	56	36.836	

Post-Test	**Mean**	47.66	46.40	54.47	40.27	**B**	1526	3	508.667	**21.07***
	SD	4.53	3.66	6.22	4.89	**W**	1351.6	56	24.136	
Adjusted Post-Test	**Mean**	47.39	46.99	52.84	41.56	**B**	803.924	3	267.975	**14.55***
						W	1012.845	55	18.415	

* Significant at .05 level of confidence.

(The table value required for 0.05 level of significance with f 3, 56 and 3, 55 are 2.76 and 2.78 respectively)

Table I shows that the pre-test means on strength endurance of aerobic training group (ATG), resistance training group (RTG), concurrent strength and continuous cycle ergometer training group (CSCTG) and control groups (CG) are 43, 40.87, 46.33 and 39.13 respectively. The obtained "F' ratio of 3.914for pre-test means on strength endurance was greater than the required table value 2.76 for significance at .05 level of confidence with df 3 and 56.

The post test means on strength endurance of aerobic training group (ATG), resistance training group (RTG), concurrent strength and continuous cycle ergometer training group (CSCTG) and control groups (CG) are 47.66, 46.4, 54.47 and 40.27 respectively. The obtained "F' ratio of 21.07 for post-test mean on strength endurance was greater than the required table value 2.76 for significance at .05 level of confidence with df 3 and 56.

The adjusted post test means on strength endurance of aerobic training group (ATG), resistance training group (RTG), concurrent strength and continuous cycle ergometer training group 47.39, 46.99, 52.84 and 41.56 respectively. The obtained "F' ratio 14.55 for adjusted post-test means on strength endurance was greater than the required table value 2.78 for significance at .05 level of confidence with df 3 and 55.

It indicates that there was a significant difference among the adjusted posttest means of strength endurance of the aerobic (ATG), resistance (RTG), concurrent strength and continuous cycle ergometer training (CSCTG) and the control groups (CG).

To find out which of the paired means had a significant difference, the Scheffe's post-hoc test is applied and the results are presented in table I.

TABLE II

SCHEFFE'S TEST FOR DIFFERENCES OF THE ADJUSTED POST-TEST PAIRED MEANS OF STRENGTH ENDURANCE

Adjusted Post-test means				**Mean Differences**	**Confidence Interval**
ATG	**RTG**	**CTG**	**CG**		
47.397	46.994			**0.403**	4.47

47.397		52.846		**5.449***	
47.397			41.563	**5.834***	
	46.994	52.846		**5.852***	
	46.994		41.563	**5.431***	
		52.846	41.563	**11.283***	

* Significant at .05 level.

Table II shows that the adjusted post-test mean difference in strength endurance between ATG and CSCTG, ATG and CG, RTG and CSCTG, RTG and CG and between CSCTG and CG are 5.449, 5.843, 5.852, 5.431 and 11.283, which are statistically significant at 0.05 level of confidence.

Table II also shows that the adjusted post-test mean difference in strength endurance between ATG and RTG is 0.403 which is less than the confidence interval value at .05 level. It is concluded that there is no significant difference on strength endurance between ATG and RTG.

However, concurrent strength and continuous cycle ergometer training is found to be better in increasing strength endurance time than ATG and RTG.

VO_2 MAX

The analysis of covariance on VO_2Max of the aerobic training group (ATG), resistance training group (RTG), concurrent strength and continuous cycle ergometer training group (CSCTG) and the control groups (CG) were analysed and the results are presented in table III.

TABLE III

ANALYSIS OF COVARIANCE ON VO²MAX OF AEROBIC RESISTANCE CONCURRENT STRENGTH AND CONTINUOUS CYCLE ERGOMETER TRAINING AND CONTROL GROUPS

Test		ATG	RTG	CTG	CG	SOV	SS	df	MS	F
Pre-Test	**Mean**	36.33	35.40	35.80	36.13	**B**	7.51	3	2.50	**1.97**
	SD	0.97	1.45	1.01	0.99	**W**	71.06	56	1.26	
Post-Test	**Mean**	41.20	38.46	43.06	37.46	**B**	294.05	3	98.01	**59.14***
	SD	1.56	1.24	1.43	0.74	**W**	92.80	56	1.65	
Adjusted Post-Test	**Mean**	41.07	38.75	43.10	37.40	**B**	291.085	3	97.028	**61.83***
						W	86.316	55	1.569	

* Significant at .05 level of confidence.

(The table value required for 0.05 level of significance with f 3, 56 and 3, 55 are 2.76 and 2.78 respectively)

Table III shows that the pre-test means on VO_2 Max of aerobic training group (ATG), resistance training group (RTG), concurrent strength and

continuous cycle ergometer training group (CTG) and control groups (CG) are 36.33, 35.40, 35.80 and 36.13 respectively. The obtained "F' ratio of 1.97 for pre-test means on VO^2Max was less than the required table value 2.76 for significance at .05 level of confidence with df 3 and 56.

The post test means on VO_2 Maxof aerobic training group (ATG), resistance training group (RTG), concurrent strength and continuous cycle ergometer training group (CTG) and control groups (CG) are 41.20, 38.46, 43.06 and 37.46 respectively. The obtained "F' ratio of 59.14 for post-test mean on VO^2Max was greater than the required table value 2.76 for significance at .05 level of confidence with df 3 and 56.

The adjusted post test means on VO^2Max of aerobic training group (ATG), resistance training group (RTG), concurrent strength and continuous cycle ergometer training group 41.07, 38.75, 43.10 and 37.40 respectively. The obtained "F' ratio 61.83 for adjusted post-test means on VO^2Max was greater than the required table value 2.78 for significance at .05 level of confidence with df 3 and 55.

It indicates that there was a significant difference among the adjusted posttest means of VO_2Max of the aerobic (ATG), resistance (RTG), concurrent strength and continuous cycle ergometer training (CSCTG) and the control groups (CG).

To find out which of the paired means had a significant difference, the Scheffe's post-hoc test is applied and the results are presented in table IV.

TABLE IV
SCHEFFE'S TEST FOR DIFFERENCES OF THE ADJUSTED POST-TEST PAIRED MEANS OF VO^2MAX

Adjusted Post-test means				Mean Differences	Confidence Interval
ATG	RTG	CTG	CG		
41.07	38.75			**2.45***	1.31
41.07		43.10		**2.03***	
41.07			37.40	**3.67***	
	38.75	43.10		**4.48***	
	38.75		37.40	**1.35***	
		43.10	37.40	**5.70***	

* Significant at 0.05 level.

Table IV shows that the adjusted post-test mean difference in VO_2 between ATG and RTG, ATG and CSCTG, ATG and CG, RTG and CSCTG,

RTG and CG, CSCTG and CG are 2.45, 2.03, 3.67, 4.48, 1.35 and 5.70 which were greater than the confidence interval value 1.13 at .05 level of confidence. Hence there was a significant difference between paired means on VO^2max.

However, concurrent strength and continuous cycle ergometer training group (CSCTG) is found to be better in VO2 max than ATG and RTG.

CONCLUSION

1. Aerobic, resistance and concurrent strength and continuous cycle ergometer training programme have significantly improved on biomotor abilities when compared with control group.
2. Aerobic, resistance and concurrent strength and continuous cycle ergometer training programme have significantly improved on Strength Endurance and Vo^2 Max level when compared with control group.
3. Concurrent strength and continuous cycle ergometer training programme have significant increased of positive improvement on Strength Endurance when compared with Aerobic and resistance training programs.
4. Concurrent strength and continuous cycle ergometer training programme have significant increased of positive improvement on Vo^2Max level when compared with Aerobic and resistance training programs.

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