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EFFECT OF AEROBIC TRAINING RESISTANCE TRAINING AND CONCURRENT TRAINING ON ERYTHROCYTES AMONG COLLEGE BOYS

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Abstract:

The purpose of the study was to find out the effect of aerobic training, resistance training and concurrent training on erythrocytes among college boys. To achieve this purpose of the study, sixty college students were selected as subjects who were from the Sri Renganathar Institute of Engineering and Technology, Coimbatore. The selected subjects were aged between 18 to 22 years. They were divided into four equal groups of fifteen each, Group I underwent aerobic training, Group II underwent resistance training, Group III underwent concurrent training and Group IV acted as control that did not participate in any special training apart from their regular curricular activities. The subjects were tested on selected criterion variable such as erythrocytes prior to and immediately after the training period. The selected criterion variable such as erythrocytes was determined through blood samples analyzed through laboratory tests. The analysis of covariance (ANCOVA) was used to find out the significant differences if any, between the experimental group and control group on selected criterion variable. In all the cases, 0.05 level of confidence was fixed to test the significance, which was considered as an appropriate. The result of the present study has revealed that there was a significant difference among the experimental and control group on erythrocytes.

Index Terms: Erythrocytes, Aerobic Training, Resistance Training & Concurrent Training

1. Introduction:

The primary objective of sports training is to stress various bodily systems to bring about positive adaptation in order to enhance sporting performance. To achieve this objective, coaches and athletes systematically apply a number of training principles including overload, specificity and progression, organized through what is commonly termed periodisation. The application of these principles involves the manipulation of various programme design variables including choice of exercise, order of training activities/exercises, training intensity (load and repetition), rest periods between sets and activities/exercises and training frequency and volume in order to provide periods of stimulus and recovery, with the successful balance of these factors resulting in positive adaptation (1). Aerobic exercise refers to exercise that involves or improve oxygen consumption by the body. Aerobic training increased cardio-respiratory endurance, which in turn increased Vo_2 max (2). Resistance training is an integral part of an adult fitness program and of a sufficient intensity to enhance strength, muscular endurance and maintain fat free mass. Resistance training involves exercise in which the muscles exert a force against an external load. It is most commonly referred to as weight training. Such a training program should be individualized, progressive and specific in terms of the way muscles are likely to be used in the chosen sport. Resistance training over time causes a general increase in the number, diameter, and density of collagen fibers (3). Numerous recreational exercisers complete their cardiovascular and strength training workouts either during the same training session

or within hours of each other. This sequential exercise regime is referred to as "concurrent training. The "fatigue hypothesis," which theorizes that strength performance is reduced due to fatigue caused by the prior cardiovascular work. Muscle fatigue is a multifactorial phenomenon, however, caused by an increase in cellular protons (due to acidosis), a decrease in energy-providing substrates and neural drive, and structural damage to the muscle cells (4). The physiological response to dynamic aerobic exercise is an increase in oxygen consumption and heart rate that parallels the intensity of the imposed activity and a curvilinear increase in stroke volume. There is a progressive increase in systolic blood pressure, with maintenance of or a slight decrease in the diastolic blood pressure and a concomitant widening of the pulse pressure. Blood is shunted from the viscera to active skeletal muscle, where increased oxygen extraction widens the systematic arteriovenous oxygen difference. Thus aerobic exercise imposes primarily a volume load on the myocardium (5). Blood is a tissue. The essential act of blood is to maintaining of hemostasis of internal tissues of body. A lot of actions are done in the body which changes the internal environment of chemical component, for example some changes will occur by contraction of muscles (6). A cell that contains hemoglobin and can carry oxygen to the body. Also called a red blood cell (RBC). The reddish color is due to the hemoglobin. Erythrocytes are biconcave in shape, which increases the cell's surface area and facilitates the diffusion of oxygen and carbon dioxide. This shape is maintained by a cytoskeleton composed of several proteins. Erythrocytes are very flexible and change shape when flowing through capillaries. Immature erythrocytes, called reticulocytes, normally account for 1-2 percent of red cells in the blood. Hemoglobin is a protein of 200 to 300 million nearly spherical molecules in each red blood cell, having a molecular weight of 64,458 based on the chemical structures of its alpha and beta chains (7).

1. 1 Objectives of the Study:

The main objective of the study was to assess the effect of aerobic training, resistance training and concurrent training on erythrocytes which would help to enhance physical fitness of college boys. The present study was designed to obtain the data on the college boys from Sri Renganathar Institute of Engineering and Technology, Coimbatore.

1. 2 Statement of the Problem:

The purpose of the study was to determine the effect of aerobic training, resistance training and concurrent training on erythrocytes among college boys.

1. 3 Delimitations:

1. The study was delimited to Sri Renganathar Institute of Engineering and Technology, Coimbatore.
2. The study was delimited to 60 college students; their age was 18 to 22 years.
3. The study was restricted to the dependent variable is erythrocytes and independent variables are aerobic training, resistance training and concurrent training.

1. 4 Significance of the Study:

1. The findings of the study may be helpful for college students to apply aerobic, resistance and concurrent training which will help in better health and fitness.
2. The findings of the study would be helpful for the exercise physiologist to know the role of erythrocytes influence their physical fitness.
3. The results of the study may be helpful to fitness trainers, coaches, physical educationist and exercise physiologists to design proper training protocol for other populations.

2. Methodology:

In the present study all the students studying in higher educational institutions' of Sri Renganathar Institute of Engineering and Technology area were considered as population for the study. A representative sample of 60 college students in the age of 18-22 years was chosen as sample for the study. The selected participants were divided into four groups. Group I underwent aerobic training, group II underwent resistance training, group III underwent concurrent training and group IV act as control group. The experimental groups underwent eight weeks of training in their particular workout. For this study dependent variable is erythrocytes.

2. 1 Test Administration – Estimation of Erythrocytes:

Capillary blood was collected up to the mark 0.5 in the RBC pipette and diluted. A 1:200 dilution of blood was done by washing 20 ml of blood taken in to micro pipette in to 4 ml of diluting fluid, contained in a glass 75 × 12 mm tube. After sealing the tube tightly fitting rubber cork the diluted blood was mixed by hand for at least two minutes by titling the tube through an angle of about 120 combined with rotation, thus allowing the air bubble to mix the suspension, the improved Neuvears counting chamber, with its cover glass already in position, with filled without delay. This was simply accomplished with the aid of a Rasteur pipette. The chamber was left undisturbed for two minutes for the cells to settle. The cells were counted, using 4 mm dry objective and × 10 eyepieces. The cell counting was done from the four corners and one central smaller sequence of the red cell corpuscles counting area. So eighty smallest squares of 1/400 sq mm area each were counted (7).

2. 2 Analysis of Data:

The data obtained were analyzed by analysis of covariance (ANCOVA). Analysis of covariance was computed for any number of experimental groups, the obtained 'F' ratio compared with critical F value for significance. When the F ratio was found to be significant, scheffe's post hoc test was used to find out the paired mean significant difference (8).

3. Results:

The statistical analysis comparing the initial and final means of blood parameter, erythrocytes due to aerobic, resistance and concurrent training have been presented in Table I.

TABLE I
COMPUTATION OF ANALYSIS OF COVARIATION ON ERYTHROCYTES

TEST	E.G. I	E.G. II	E.G. III	C.G.	F
PRE TEST	4.98	4.84	4.83	4.80	1.44
POST TEST	5.36	5.18	5.22	4.81	12.54*
ADJUSTED	5.27	5.20	5.24	4.86	23.57*

(The table value required for significance at .05 level with df 3 & 56 is 2.70 and 3 & 55 is 2.72).

Table I shows the analysed data of erythrocytes. The erythrocytes pre means were 4.98 for the aerobic training group, 4.84 for the resistance training group, 4.83 for concurrent training group and 4.80 for the control group. The resultant 'F' ratio of 1.44 was not significant at .05 levels indicating that the three groups were no significant variation. The post test means were 5.36 for the aerobic training group, 5.18 for the resistance training group, 5.22 for concurrent training group and 4.81 for the control group. The resultant 'F' ratio of 12.54 at 0.05 level indicating that was a significant

difference. The difference between the adjusted post-test means of 5.27 for the aerobic training group, 5.20 for the resistance training group, 5.24 for concurrent training group and 4.86 for the control group yield on 'F' ratio 23.57 which was significant at.05 level.

The results of the study indicate that there is a significant difference among aerobic training, resistance training, concurrent training and control groups on the erythrocytes. To determine which of the paired means had a significant difference, Scheffe's post-hoc test was applied and the results are presented in Table II.

Table II

SCHEFFE'S TEST FOR THE DIFFERENCE BETWEEN THE ADJUSTED POST-TEST PAIRED MEANS OF ERYTHROCYTES

Adjusted Post-Test Means				Mean Diff.	Class Interval
Aerobic Training	Resistance Training	Concurrent Training	Control Group		
71.98	73.27			1.29	1.35
71.98		72.34		0.36	
71.98			76.15	4.17*	
	73.27	72.34		0.93	
	73.27		76.15	2.88*	
		72.34	76.15	3.81*	

The adjusted post test mean difference of erythrocytes between aerobic training and control group (4.17), resistance training and control group (2.88), concurrent training and control group (3.81) were greater than the required confidence interval of 1.35. The results of the study indicate that there were significant differences between control group and experimental groups and there was no significant difference between the experimental groups.

4. Discussion/Conclusions:

The results of the study proved that there were significant differences between control group and aerobic training, resistance training and concurrent training group. The eight weeks of experimental treatment significantly influence on erythrocytes content in college students. However, there were no significant difference berween experimental groups. The above results are supported by (Kilgoe and others (9) and Arazi and others (10).

5. Recommendations:

1. It was recommended that adequate steps may be taken to include aerobic, resistance and concurrent training in the physical education curriculum as these exercises significantly improves the erythrocytes of the subjects.
2. Similar study may be conducted on a larger population.
3. Similar study may be undertaken and its influence on psychological and biochemical parameters may be assessed.

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