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Effect of series and parallel aerobic and anaerobic training on physical fitness variables of Hockey players

■ V. CHANDRASEKAR AND G. KUMARAN

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See end of the article for authors' affiliations

Correspondence to :
V. CHANDRASEKAR
Department of Physical Education and Sports Sciences, Annamalai University, Annamalainagar, CHIDAMBARAM (T.N.) INDIA

■ **ABSTRACT**

The purpose of this study was to examine the effect of series and parallel aerobic and anaerobic training on physical fitness variables of men Hockey players. For these purpose, forty five men Hockey players, aged eighteen to twenty one years took part in the study. Subjects were randomly, equally assigned to group – I series of aerobic and anaerobic training (n=15), group – II parallel aerobic and anaerobic training (n=15), group –III acted as control (n=15). Both training groups went for their respective training about twelve weeks. The selected physical fitness variables were assessed by using standard tests and procedures, before and after the training. Analysis of covariance was used to determine the significant difference existing between the groups. The analysis of data revealed that twelve weeks of series and parallel aerobic and anaerobic training had an impact on strength and cardio-respiratory endurance of series of aerobic and anaerobic training group and parallel aerobic and anaerobic training group of Hockey players.

■ **Key Words :** Series, Parallel, Aerobic and anaerobic trainings

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A good aerobic exercise programme can help one live a longer, healthier life and enhance one's well being. Aerobic exercise has been shown to benefit the cardio-vascular system and especially the processes in the body that are affected by aging. Aerobic training targets the cardio-vascular system and muscular adaptations. Furthermore, the physiological benefits of aerobic training can improve wellness in adults who just want to live a healthier life. One gets a multitude of benefits if one does one's aerobic workout on a regular basis even if the intensity is low or short in duration. Aerobic activities help make one's heart stronger and more efficient. During the early part of exercise, one's body uses stored carbohydrate and circulating fatty acids (the building blocks of fat molecules) for energy (Sinderman *et al.*,1997).

More recently, anaerobic training has become an exercise for more than body builders and football players Tesch *et al.* (1984). From adolescents to senior citizens, many have taken up anaerobic exercise and reaped its physiological benefits. Anaerobic exercise is the opposite of aerobic exercise in the sense that it does not need or use oxygen to restore energy levels. Anaerobic exercises focus attention on one specific muscle at a time. The large amount of energy that the body needs to complete anaerobic exercise cannot be provided by oxygen. Energy, instead, is replenished by the natural chemistry of the body. Anaerobic exercises do not usually cause the heart to beat particularly fast and do not leave people gasping for air. The benefits of anaerobic exercise include increased muscle mass.

■ METHODOLOGY

Subjects and variables :

For the purpose of the study, forty five men students (Hockey player) were selected from Department of Physical Education, Annamalai University, Annamalainagar with their consent. The selected subjects were healthy and normal to undergo the series of parallel aerobic and anaerobic training programme. They were randomly and equally divided into three groups. Group –I series of aerobic and anaerobic training (n=15), group – II parallel aerobic and anaerobic training (n=15), group –III acted as control (n=15). The group –I subjects went aerobic training for first six weeks and another six weeks for anaerobic training. Group –II subjects alternate weekly did the aerobic and anaerobic training for twelve weeks. The subjects participated in series of parallel aerobic training (65% of HR max) and anaerobic training (weight training) (65% of 1 RM), three days a week and 40 minutes (including warm up and warm down), a day for twelve weeks. Once in two weeks the load was increased 5 per cent for both the training groups. The data collected from the three groups prior to and immediately after twelve weeks of training. Bench press 1 RM test was used for measuring strength and Cooper's 12 minutes run/walk test was used to assess the cardio-respiratory endurance. The collected data were analyzed by ANCOVA, the level of significant fixed at 0.05.

■ OBSERVATIONS AND DISCUSSION

The adjusted post-test means on strength of series of aerobic and anaerobic training and parallel aerobic and anaerobic training and control groups were 44.81, 43.07 and 41.04, respectively (Table 1). The obtained 'F' ratio value is 5.93 of strength was greater than the required table value of 3.23 for the degrees of freedom 2 and 41 at 0.05 level of confidence. Hence, it was concluded that due to the effect of twelve weeks of series and parallel aerobic and anaerobic training of strength of the subjects was significantly improved (Fig. 1).

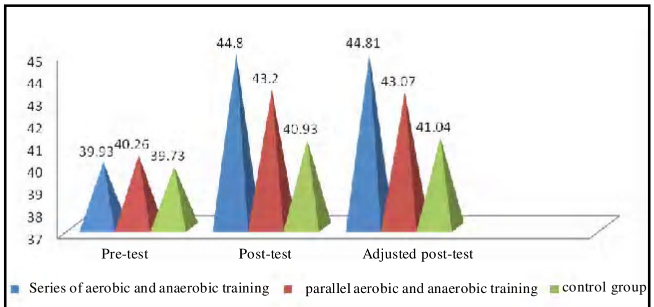

Fig. 1 : Mean value on strenght of series of aerobic and anaerobic and anaerobic training and parallel aerobic and anaerobic training and control groups

The adjusted post-test means on cardio-respiratory endurance of series of aerobic and anaerobic training and parallel aerobic and anaerobic training and control groups were 2645.09, 2709.72 and 2444.84, respectively. The obtained 'F' ratio value 36.68 of cardio-respiratory endurance was

Table 1 : Analysis of covariance on strength of series of aerobic and anaerobic training and parallel aerobic and anaerobic training and control groups

Test	Series of aerobic and anaerobic training	Parallel aerobic and anaerobic training	Control group	SOV.	Sum of squares	D.f.	Mean squares	'F' ratio
Pre -test	39.93	40.26	39.73	B	2.17	2	1.08	0.39
Mean S.D.	1.48	1.57	2.05	W	124.80	42	2.97	
Post- test	44.80	43.20	40.93	B	113.24	2	56.62	6.04*
Mean S.D.	4.19	2.65	1.86	W	393.73	42	9.37	
Adjusted post-test mean	44.81	43.07	41.04	B	106.99	2	53.49	5.93*
				W	369.72	41	9.01	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 42 is 3.22 and degree of freedom 2 and 41 is 3.23.)
*Significant at .05 level of confidence

Table 2 : Analysis of covariance on cardio-respiratory endurance of series of aerobic and anaefobic training and parallel aerobic and anaerobic training and control groups

Test	Series of aerobic and anaerobic training	Parallel aerobic and anaerobic training	Control group	SOV	Sum of squares	df	Mean squares	'F' ratio
Pre-test mean S.D.	2447.66	2440.66	2443.01	B	381.11	2	190.55	0.03
	109.06	77.78	41.82	W	275726.66	42	6564.92	
Post-test mean S.D.	2644.33	2710.34	2445.01	B	572457.77	2	286228.88	36.38*
	113.21	77.12	69.51	W	330366.67	42	7865.87	
Adjusted post- test mean	2645.09	2709.72	2444.84	B	572174.34	2	286087.17	36.68*
				W	319721.66	41	7798.08	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 42 is 3.22 and degree of freedom 2 and 41 is 3.23) greater than the required table value of 3.23 for the degrees of freedom 2 and 41 at 0.05 level of confidence. Hence, it was concluded that due to the effect of twelve weeks of series and parallel aerobic and anaerobic training of cardio-respiratory endurance of the subjects was significantly improved (Fig. 2).

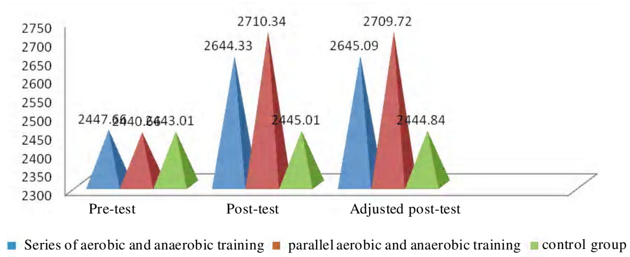

Fig. 2 : Mean value on cardio-respiratory endurance of series of aerobic and anaerobic training and parallel aerobic and anaerobic training and control groups

When performing a set of aerobic exercises we are causing the body to utilize oxygen in order to create energy. The oxygen is needed to breakdown glucose. Glucose is the fuel needed to create energy. However, the opposite applies to anaerobic exercises. In anaerobic exercises the body creates the energy without oxygen. This basically is because the body's demand for energy is greater so that it will find natural body chemicals to create it.

The intensity of a game increases, and we need additional anaerobic power from fast twitch muscle fibres, we don't switch off aerobic metabolism to let slow twitch fibres take a break. The demand for energy is greater. No one gets a break, so anaerobic training can also be highly aerobic, because we are using oxygen to supply much of the energy (MacDougal, 1998).

Aerobic exercise relies on oxygen for fuel. Any activity that consistently elevates the heart rate to 50 per cent to 80 per cent of maximum for 20 minutes or more can be aerobic. Anaerobic exercise is brief bursts of maximal effort. Lactic acid builds up in the muscles during all-out effort, resulting in the burning sensation that's the hallmark of anaerobic training. Anaerobic exercise training, such as weight lifting, achieved significant improvements in body weight and muscle strength (Strauss *et al.*, 1987). The result of the study stated that due to the twelve weeks of series and parallel aerobic and anaerobic training influenced the strength and cardio-respiratory endurance of the men Hockey players.

Authors' affiliations:

G. KUMARAN, Department of Physical Education and Sports Sciences, Annamalai University, Annamalainagar, CHIDAMBARAM (T.N.) INDIA

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