EFFICACY OF MODERATE INTENSITY AEROBIC TRAINING ON SELECTED PHYSIOLOGICAL PARAMETERS OF VOLLEYBALL PLAYERS

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ABSTRACT

The primary purpose of this study was to determine whether moderate intensity aerobic training has an effect on physiological parameters of women volleyball players. To achieve these purpose 30 women volleyball players, aged 18 to 22 years took part in the study. Subjects were randomly assigned to either moderate intensity aerobic training (n=15) or control (n=15) group. The training regimen lasted for eight weeks. The selected dependent variables such as resting pulse rate, mean arterial pressure and Vo_2max were assessed using standard tests and procedures, before and after the training regimen. Analysis of covariance was used to determine the significant difference existing between pretest and posttest on selected dependent variables. The analysis of data revealed that due to the impact of eight weeks of moderate intensity aerobic training the selected physiological parameters of women volleyball players have significantly changed.

Key words: *Aerobic training, physiological parameters and volleyball players*

INTRODUCTION

Intensity, the qualitative component of work an athlete performs in a given time, is also an important component of training. The more work the athlete performs per unit of time, the higher the intensity. Intensity is a function of the strength of the nerve impulses the athlete employs in training. The strength of a stimulus depends upon the load, speed of performance, and the variation of intervals or rest between repetitions. Muscular work and central nervous system involvement through maximum concentration determine the intensity during training or competition. Intensity varies according to the specifics of the sport, because the level of intensity varies in most sports and games. It is important to establish and use varying degrees of intensity in training. Several methods are available to measure the strength of the stimuli and thus the intensity (Bompa, 1999).

During training, athletes experience various levels of intensity. The body adapts by increasing physiological functions to meet the training demand. To develop certain biomotor abilities the intensity of stimulus must reach or exceed a threshold level beyond which significant training gains take place. Low level loads in training leads to slow development, but ensure sufficient adaptation and consistency of performance. High intensity exercises result in quick progress, but lead to less stable adaptation and a lower degree of consistency. Using only intensive exercises is not the most effective way to train, and alternating training volume and intensity is necessary. The high volume of low intensity training athletes experience during the preparatory phase provides the foundation for high intensity training and enhances performance consistency.

The aerobic training holds a very conspicuous place in the field of training methods, because it is one of the most powerful methods that ensure and improve the health, endurance and so on. The objective of aerobic training is to develop the energy production system(s) to meet the demands of the event. For continuous exercise, ATP must be re-synthesized at the same rate as it is utilized. Aerobic training has been proved to be best training for endurance, especially so-called “interval-training” has been the subject of many pedagogic and medical paper (Kral, 1964). A sound basis of aerobic endurance is fundamental for all events (Gastin, 2001).

An additional cardiovascular benefit of aerobic exercise is that it helps to normalize blood pressure, especially in people whose blood pressure is somewhat elevated. Aerobic exercise makes the heart stronger and a more efficient pump. Resting heart rate usually decreases after exercise training because the heart can pump more blood per beat. Therefore, it needs to beat fewer times to circulate the amount of blood. In many ways, exercise is the antithesis of aging. Aerobic exercise gives us the ability to maintain an independent lifestyle and increases the likelihood that we will enjoy during post-retirement years (Brehm, 2010).

In aerobic exercise the heart rate increases substantially, but never reaches its maximum level. The heart is always able to deliver sufficient oxygen-rich blood to muscles, so that they can derive energy from fat and glycogen aerobically. Aerobic exercises builds stamina for sports and it also is the most important form of exercise for health, since it increases

the efficiency of heart, circulation and muscles. Aerobic exercise is the keystone of fitness by doing aerobics it increases the capillary network in the body. To do any work we need energy and even while at rest some physiological functions have to be carried within our body and for that purpose some calories of energy will be burnt. As the intensity and duration of work increases the demand for the fuel in the working muscles also increases.

METHODOLOGY

Subjects and Variables

The purpose of this study was to examine the effect of moderate intensity aerobic training on physiological parameters among women volleyball players. For the purpose of this study, thirty women volleyball players from various colleges affiliated to Thiruvalluvaruniversity in the age group of 18 to 22 years were recruited, with their consent. The age of the selected subjects averaged 20.15 ± 1.65 years. The selected participants were randomly assigned to both the moderate intensity aerobic training and control groups of 15 each. The selected dependent variables were assessed using standard tests and procedures, before and after the training regimen. The variables and tests used are presented in table-I.

Table I: Dependent Variables and Test

Sl. No.	Variables	Tests / Instruments	Unit
1.	Resting Pulse Rate	Blood Pressure Monitor	Counts
2.	Mean Arterial Pressure	Blood Pressure Monitor	mmHg
3.	Maximum Oxygen Consumption	One mile run	ml /kg / min

Training Protocol

The experimental group underwent the moderate intensity aerobic training programme three days per weeks for eight weeks. Training sessions consist of a 30-minute aerobic exercise period with a warming-up and cooling-down period of 5 and 3 minutes, respectively. The cardiovascular load during the training period is individually adjusted and increased from a level of 65% to 80% of the heart rate reserve (HRR). HRR is the difference between the predicted maximum heart rate and the measured resting heart rate.

Experimental Design and Statistical Procedure

The experimental design used for the present investigation was random group design involving thirty subjects. Analysis of covariance (ANCOVA) was used as a statistical technique to determine the significant difference, if any, existing between pretest and posttest data on selected dependent variables. The level of significance was accepted at $P < 0.05$.

RESULTS

The descriptive analysis of data collected on selected physiological parameters before and after eight weeks of moderate intensity aerobic training is presented in table-II.

Table II: Computation of Mean and Standard Deviation on Selected Physiological Parameters

Variables	Groups	Pretest		Posttest	
		Mean	SD	mean	SD
Resting Pulse Rate	Experimental	71.03	3.27	67.14	1.76
	Control	70.63	2.15	70.16	1.46
Mean Arterial Pressure	Experimental	98.19	2.60	95.92	2.56
	Control	98.46	1.86	98.73	2.54
Maximum Oxygen Consumption	Experimental	2.99	0.16	3.28	0.23
	Control	3.02	0.15	3.03	0.11

Analysis of Covariance was used to determine the significant impact of moderate intensity aerobic training on selected physiological parameters and it is presented in table-III.

The findings of the study shows that significant difference existing between moderate intensity aerobic training and control group on resting pulse rate, systolic blood pressure, diastolic blood pressure and Vo_2max, since the obtained 'F' ratio of 31.30, 39.02, 127.49 and 11.75 respectively were greater than the table value of 4.21 for significance at 0.05 level of confidence for df of 1 and 27. It was concluded that eight weeks of moderate intensity aerobic training significantly altered the selected physiological parameters of volleyball players.

The adjusted post test mean values on selected physiological parameters namely resting pulse rate, systolic blood pressure, diastolic blood pressure and Vo_2max are graphical represented in figure-I.

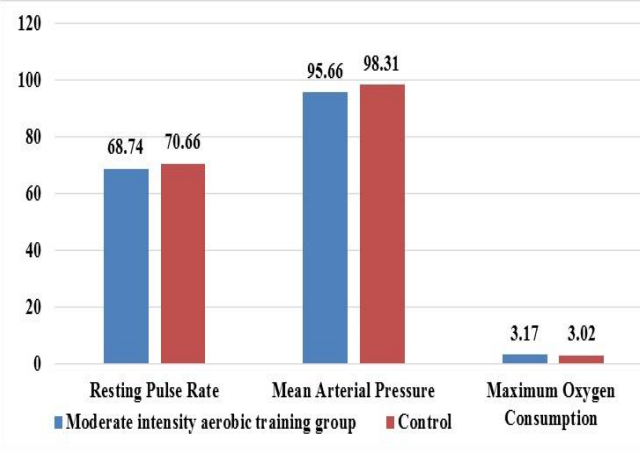
Table III: Analysis of Covariance on Selected Physiological Parameters of Moderate Intensity Aerobic Training and Control Groups

Variables	Groups	Adjusted Mean	SoV	Sum of Squares	df	Mean Square	'F' ratio
Resting Pulse Rate	Experimental	68.74	B	64.03	1	64.03	31.30*
	Control	70.66	W	55.23	27	2.05	
Mean Arterial Pressure	Experimental	95.66	B	187.68	1	187.68	39.02*
	Control	98.31	W	129.79	27	4.81	
Maximum Oxygen Consumption	Experimental	3.17	B	0.94	1	0.94	11.75*
	Control	3.02	W	2.28	27	0.08	

Required table value for significance at 0.05 level of confidence for df of 1 and 27 is 4.21

** Significant at 0.05 level.*

Figure-I: **Adjusted Post Test Mean Values on Selected Physiological Parameters**



DISCUSSION

Aerobic training results in the improvement of functioning of various organs and system of the human body. This in turn improves the ability to recover quickly from training and competition load. At the same time aerobic activities enable the sportsmen to better resist the fatigue i.e., to delay the fatigue. The ability to withstand fatigue and to recover faster from fatigue enables the sportsmen to tackle higher training volumes with higher intensity in a training session, week, month or year. Higher training load leads to improvement in performance.

The physiological changes made by aerobic training are, increase in number of capillaries, increased maximal oxygen uptake per minute, lactic acid is decreased for a standard sub maximal workload while there is an increased capacity for lactic acid during maximal work, pulmonary ventilation is decreased for a standard sub maximal work load and increased for a maximal work load, increased respiratory efficiency , increased lung volume and diffusion capacity, increased neuromuscular efficiency, increased myoglobin concentration, ST and FT fibers are better suited for producing ATP for aerobic work and increased skeletal muscle capacity for oxidizing carbohydrates and fats.

Aerobic training is a progressive physical conditioning programme that stimulates cardio respiratory activity for a time period sufficiently long to produce beneficial changes in the body. Aerobic exercises builds stamina for sports and it also is the most important form of exercise for health, since it increases the efficiency of heart, circulation and muscles. Aerobic exercise is the keystone of fitness by doing aerobics it increases the capillary network in the body. In this present study pulse rate, breath holding time, systolic blood pressure, diastolic blood pressure and Vo_2max are altered considerably after exercise. Several studies (Simao, Polito & Lemos, 2003; MacDougall et al., 1992; Stone et al., 1991; Fleck, 1988) confirm the findings of this study.

Most of the previous studies also show a substantial increase in maximum oxygen consumption following aerobic training. During exercise, VO_2max increases in direct proportion to the rate of work. A person's Vo_2max is in part genetically determined; it can be increased through training until the point that the genetically possible maximum is reached (Jorgensen et al., 1977). Increase in VO_2max generally range from 15 to 20 percent following a 6-month training period (Wilmore & Costill, 1994). A six-week training period can result in increases in Vo_2max in participants undergoing moderate intensity (Hicksonet al., 1981) and lower intensity training (Cunningham & Cantu, 1990).

CONCLUSION

The result of the present study shows that due to the effect of eight weeks of moderate intensity aerobic training the selected physiological parameters namely resting pulse rate, mean arterial pressure and Vo_2max of the volleyball players have significantly changed.

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