INVESTIGATION OF THE CHANGES ON SELECTED PHYSIOLOGICAL PARAMETERS IN RESPONSE TO AEROBIC TRAINING BETWEEN TRAINED AND UNTRAINED WOMEN

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ABSTRACT

The purpose of the present investigation is to clarify the changes on selected physiological parameters in response to aerobic training between trained and untrained women. For this purpose, twenty-four untrained (N=12) and trained (N=12) women students in the age group of 18 to 22 years were selected as subjects from Acharya Nagarjuna University, Andhra Pradesh, India. The selected dependent variables such as resting pulse rate, systolic blood pressure and diastolic blood pressure were assessed at resting conditions and after aerobic training by using digital blood pressure monitor. To statistically analyze and compare the changes on selected physiological parameters in response to aerobic training, 't' scale was used. The analysis of data revealed that significant difference exists between untrained and trained women on blood pressure and heart rate in response to aerobic training, though the changes in diastolic blood pressure didn't vary considerably between untrained and trained women. This result suggests that untrained and trained individuals differ in their physiological capacities at rest and in response to exercise.

Key words: Aerobic training, Physiological Response, Pulse Rate & Blood Pressure.

INTRODUCTION

Exercise is an incredibly important part of a healthy person's life. Exercising regularly helps to hone one's athletic skills by strengthening the muscles across the bodies, and also by enhancing the functioning of all internal organs. For the physiological system of body to be fit they must function well enough to support the specific activity the individual is performing. Moreover different activities make different demands upon the organism with respect to circulatory, respiratory and metabolic process which are specific to the activities.

A good aerobic exercise program can help one live a longer, healthier life and enhance one's well being. Aerobic exercise is any extended activity that makes one breathe hard while using the large muscle groups at a regular, even pace. Aerobic activities help make heart stronger and more efficient. During the early part of exercise, body uses stored carbohydrate and circulating fatty acids (*the building blocks of fat molecules*) for energy.

Heart rate response is influenced by several factors, including age. There is a decline in mean maximum heart rate with age (Londeree & Moeschberger, 1984), which appears to be related to neural influences. Dynamic exercise increases heart rate more than isometric or resistive exercise. An accentuated heart rate response is observed after bed rest. Other factors that influence heart rate include body position, certain physical conditions, state of health, blood volume, and environment.

Blood pressure is dependent on cardiac output and peripheral resistance. Systolic blood pressure at maximum exertion or at immediate cessation of exertion is considered a clinically useful first approximation of the heart's inotropic capacity. The systolic arterial pressure is the peak pressure in the arteries, which occurs near the beginning of the cardiac cycle; the diastolic arterial pressure is the lowest pressure. The average pressure throughout the cardiac cycle is reported as mean arterial pressure (Poullis,1999), which has physiologic and clinical importance since it represents the perfusion pressure and it is a factor utilised in the calculation of haemodynamic variables. These measures of arterial pressure are not static, but undergo natural variations from one heartbeat to another and throughout the day; they also change in response to stress, nutritional factors, drugs, or disease. The purpose of the present study was to elucidate the changes on blood pressure and heart rate in response to aerobic training between untrained and trained women.

Methods and Procedures

Twenty-four college women students from Acharya Nagarjuna University, Andhra Pradesh, India were selected as subjects in the age group of 18 to 22 years, and they were recruited for the purpose of the study with their informed consent. Of the selected subjects, twelve each were untrained and trained. The independent variable considered in this study was aerobic training (one-mile run/walk). The selected dependent variables namely: systolic blood pressure, diastolic blood pressure and pulse rate were assessed using digital blood pressure monitor before and after

the aerobic training. The digital wrist blood pressure monitor was used to detect the basal pulse rate and arterial blood pressure, in the upright sitting position at resting conditions. Then, one-mile run/walk was used to assess the influence of it, on the changes in pulse rate and arterial blood pressure of the participants. The pulse rate and arterial blood pressure were measured soon after the aerobic training.

Experimental Design and Statistical Techniques

Static group design involving twenty-four subjects was used for the purpose of elucidating the influence of aerobic training on selected physiological parameters. To determine the significant variation between untrained and trained, if any, the data collected before and after aerobic training was subjected to mean gain method, and then the statistical analysis proceeded by using 't' test,. The level of significance was accepted at $P < 0.05$.

RESULTS

The analysis of data collected on blood pressure and heart rate at rest and in response aerobic training between untrained and trained women is presented in table 2.

Table – I: Computation of Data on Blood Pressure and Heart Rate between Untrained and Trained Women

Variables	Location	N	$\bar{\chi}$	σ	DM	σDM	't' ratio
Systolic at Rest	Untrained	12	117.17	7.79	12.00	3.096	3.88*
	Trained	12	105.17	7.37			
Diastolic at Rest	Untrained	12	79.75	2.99	9.00	1.671	5.39*
	Trained	12	70.75	4.96			
Pulse Rate at Rest	Untrained	12	78.00	5.61	5.83	1.957	2.98*
	Trained	12	72.17	3.81			
Systolic after Exercise	Untrained	12	144.08	5.58	8.58	2.611	3.29*
	Trained	12	152.67	7.11			
Diastolic after Exercise	Untrained	12	81.25	3.31	6.92	1.948	3.55*
	Trained	12	74.33	5.88			
Pulse Rate after Exercise	Untrained	12	129.58	7.98	8.75	3.350	2.61*
	Trained	12	138.33	8.42			

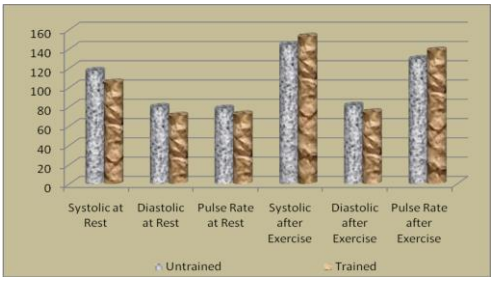
** Significant at 0.05 level Required table value for significance at 0.05 level of confidence for df of 22 is 2.07*

The table-I reveals that significant difference exists on systolic pressure, diastolic pressure and pulse rate at rest and in response aerobic training between untrained and trained women, since the obtained 't' ratio of 3.88, 5.39, 2.98, 3.29, 3.55 and 2.61 is greater than the required table value of 2.07 for significance at 22 degrees of freedom.

From the above findings, it is also observed that basal values of systolic, diastolic and pulse rate of trained were lower than that of untrained, but systolic blood pressure and pulse rate after aerobic training is greater for trained than that of untrained women.

The data on systolic, diastolic and pulse rate at rest and after exercise of untrained and trained women students are graphically represented in figure-I.

Figure-I: **Graphical Representation of the Mean Values on Systolic, Diastolic and Pulse Rate at Rest and After Exercise of Untrained and Trained Women Students**



The analysis of data on the changes in selected physiological parameters in response aerobic training between untrained and trained women is presented in table-II.

Table - II: Mean Gain on Blood Pressure and Heart Rate in Response to Aerobic Activity

Variables	Location	N	$\bar{\chi}$	σ	DM	σDM	't' ratio
Systolic Pressure	Untrained	12	26.9167	8.3716	20.58	3.76	5.510*
	Trained	12	47.5000	9.8673			
Diastolic Pressure	Untrained	12	1.5000	3.9886	2.08	1.47	1.416
	Trained	12	3.5833	3.1754			
Pulse Rate	Untrained	12	51.5833	7.3418	14.58	3.59	4.058*
	Trained	12	66.1667	10.0529			

** Significant at 0.05 level Required table value for significance at 0.05 level of confidence for df of 22 is 2.074*

Table – II clearly specifies that the mean gain on systolic blood pressure and pulse rate differ significantly, whereas, diastolic blood pressure didn't vary significantly between untrained and trained women.

DISCUSSION

In this study systolic blood pressure, diastolic blood pressure and pulse rate differed considerably at rest and after exercise between untrained and trained women, despite the mean gain on the changes in diastolic blood pressure had shown no significant difference between untrained and trained women.

As cardiac output increases with dynamic exercise, peripheral resistance increases in organ systems and tissues that do not function during exercise and decreases in active muscles (Higginbotham, 1988). Arterial blood pressure increases only mildly; thus, flow can increase as much as fivefold. The increase in flow is much more than the pressure that results in a decrease in systemic vascular resistance. Heart rate is acutely elevated immediately following a work bout (Fleck, 1988). Interestingly, in terms of chronic adaptations, there appears to be a reduction in heart rate from training, which is considered beneficial (Stone et al., 1991). When dynamic exercise is begun or increased, oxygen uptake by the lungs quickly increases. After the second minute, oxygen uptake usually remains relatively stable at each intensity of exercise. During steady state of exercise, heart rate, cardiac output and blood pressure are maintained at reasonably constant levels (Rowell, 1986).

Systolic blood pressure rises with increasing dynamic work as a result of increasing cardiac output, whereas diastolic pressure usually remains about the same or may be heard to zero in some normal subjects. The slight decrease in diastolic blood pressure is due primarily to the vasodilation of the arteries from the exercise bout. During exercise bout, systolic and diastolic blood pressures may show dramatic increases (Stone et al., 1991). The extent of the increase in blood pressure is dependent on the time and intensity of the exercise bout, and the amount of muscle mass involved (Fleck, 1988). More dynamic forms of training are associated with reductions in blood pressure. The SBP elevated during the exercise, while the DBP reached lowest values in both. Several studies (MacDougall et al., 1992; Stone et al., 1991; Fleck, 1988) confirm the findings of this study.

CONCLUSIONS

The present investigation displays that the individuals with lower basal blood pressure and pulse rate will exhibit their maximum blood pressure and pulse rate in response to exercise, since they possess better potential to perform physical activity than those with higher basal blood pressure and pulse rate. It implies that individuals can be designated as untrained and trained based on these physiological parameters.

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