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

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Abstract

The present exploration is projected to elucidate the changeability on selected physiological parameters in response to aerobic activity between untrained and trained women. For this purpose, twenty-four untrained (N=I2) and trained (N=I2) women college students in the age group of 18 to 22 years were selected as participants' from Tamilnadu Physical Education and Sports University. The selected dependent variables such as systolic blood pressure, diastolic blood pressure and pulse rate, were appraised at resting conditions and after aerobic activity (one mile jog) by using Oscillometric method and instruments of scientific standards. To statistically analyze and compare the changes on selected physiological parameters in response to aerobic activity, two-way analysis of variance with repeated measures on last factor was used. The analysis of data revealed that systolic blood pressure and pulse rate altered considerably in response to aerobic activity irrespective of groups. Furthermore, the finding indicates that significant difference exists on pulse rate between untrained and trained groups irrespective of testing conditions. This result suggests that untrained and trained individuals differ in their physiological capacities.

Key words: Aerobic activity, physiological response.

Introduction

Exercise, a common physiological stress, can elicit cardiovascular abnormalities not present at rest. Dynamic exercise is preferred for testing because it puts a volume stress rather than a pressure load on the heart and because it can be graduated. 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, blood pressure, and pulmonary ventilation are maintained at reasonably constant levels (Rowell, 1986). The body's response to dynamic exercise consists of a complex series of cardiovascular adjustments to provide active muscles with the blood supply appropriate for their metabolic needs, to dissipate the heat generated by active muscles, and to maintain the blood supply to the brain and the heart.

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. An increase in heart rate due to a decrease in vagal outflow is an immediate response of

The cardiovascular system to exercise; this increase is followed by an increase in sympathetic outflow to the heart and systemic blood vessels. During dynamic exercise, heart rate increases linearly with workload and Vol. During low levels of exercise and at a constant work rate, heart rate will reach steady state within several minutes. As workload increases, the time necessary for the heart rate to stabilize will progressively lengthen.

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. 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).

Blood pressure is dependent on cardiac output and peripheral resistance. 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 vasodilatation 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 purpose of the present study was to elucidate the changes on selected physiological parameters in response to aerobic activity between untrained and trained women.

Methods and Procedures

Twenty-four college women students from Tamilnadu Physical Education and Sports University were selected as participants 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 participants, twelve each were untrained and trained.

The independent variable considered in this study was aerobic activity (one-mile jog). The participants' jogs one mile in nine minutes or longer at an easy, steady pace (George et al., 1993). Immediately after the completion of one mile the participant's blood pressure and heart rate was recorded. The selected dependent variables namely: systolic blood pressure, diastolic blood pressure and pulse rate were assessed using calibrated and standardized instruments and procedures before and after the aerobic activity. The dependent variables and method used are presented in table-1.

Table-1: Dependent Variables

S.No	Variables	Method	Units of Measurement
1	Systolic blood pressure	Oscillometric method	mmHg
2	Diastolic blood pressure	Oscillometric method	mmHg
3	Pulse rate	Oscillometric method	Number

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 jog 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 activity.

Experimental Design and Statistical Techniques

Static group design involving twenty-four participants was used for the purpose of elucidating the selected physiological parameters response to aerobic activity. To determine the significant variation between untrained and trained .--articipants, the data collected before and after aerobic activity was subjected to o-way analysis of variance with repeated measures on last factor. The level of zonfidence was fixed at 0.05 for significance.

Results and Discussion

The descriptive analysis of data collected on blood pressure and pulse rate at rest and in response to aerobic activity between untrained and trained women is presented in table - 2.

Table - 2: Descriptive Analysis on Selected Physiological Parameters between Untrained and Trained Women

Variables	Groups	N	$\bar{x}$	σ
Systolic at Rest	Untrained	**12**	**121.167**	**7.791**
	Trained	**12**	**115.333**	**4.619**
Systolic after Exercise Untrained	Untrained	**12**	**145.167**	**13.496**
	Trained	**12**	**139.833**	**7.371**
Diastolic at Rest	Untrained	**12**	**81.167**	**5.670**
	Trained	**12**	**76.417**	**8.251**
Diastolic after Exercise	Untrained	**12**	**83.333**	**6.372**
	Trained	**12**	**77.750**	**6.032**
Pulse Rate at Rest	Untrained	**12**	**73.000**	**5.608**
	Trained	**12**	**68.500**	**5.729**
Pulse Rate after Exercise	Untrained	**12**	**139.583**	**7.983**
	Trained	**12**	**132.333**	**8.424**

The data on systolic blood pressure have been analyzed by two-way factorial ANOVA (2 x 2) with repeated measures on last factor and the obtained results are presented in table - 3.

Table — 3: ANOVA on Systolic Blood Pressure at Rest and After Exercise of Untrained and Trained Groups

Source of Variance	Sum of Squares	df	Mean Squares	F-ratio
A Factor (Groups)	374.08	1	374.08	3.04
Group Error	2701.17	22	122.78	
B factor (Tests)	7056.75	1	7056.75	193.45*
AB factor (Interaction) (Groups and Tests)	0.75	1	0.75	0.021
Error	802.50	22	36.48	

*Significant at .05 level of confidence

Table value required for significance at .05 level of confidence with df 1, 22 is 4.30. From the table 3, the obtained 'F' ratio for factor A (Groups) is 3.047, which is lesser than the table value of 4.30 with df 1 and 22 required for significance at .05 level of confidence. The result of the study indicates that no significant difference exists on systolic blood pressure between untrained and trained groups irrespective of testing conditions. Further, the obtained 'F' ratio for factor B (Testing conditions) is 193.456, which is greater than the table value of 4.30 with df 1 and 22 required for significance at .05 level of confidence. The result of the study indicates that systolic blood pressure differs significantly between testing conditions irrespective of groups. Following this, when examining the obtained 'F' ratio (0.021) of interaction (Groups x Testing conditions) , it fails to reach the table value of 4.30 with df I and 22 required for significance at .05 level of confidence. The result of the study shows that no significant difference exists on systolic blood pressure between groups at each testing condition and also no significant difference between tests for each group.

Table — 4: ANOVA on Diastolic Blood Pressure at Rest and After Exercise of Untrained and Trained Groups

Source of Variance	Sum of Squares	df	Mean Squares	F-ratio
A factor (Groups)	320.33	1	320.333	4.150
Group Error	1698.33	22	77.197	
B factor (Tests)	36.75	1	36.750	3.219
AB factor (Interaction) (Groups and Tests)	2.083	1	2.083	0.182
Error	251.167	22	11.417	

*Significant at .05 level of confidence

Table value required for significance at .05 level of confidence with df 1, 22 is 4.30. From the table 4, the obtained 'F' ratio for factor A (Groups) is 4.150, which is lesser than the table value of 4.30 with df 1 and 22 required for significance at .05 level of confidence. The result of the study indicates that no significant difference exists on diastolic blood pressure between untrained and trained groups irrespective of testing conditions. Further, the obtained 'F' ratio for factor B (Testing conditions) is 3.219, which is lesser than the table value of 4.30 with df 1 and 22 required for significance at .05 level of confidence. The result of the study indicates that diastolic blood pressure didn't differs significantly between testing conditions irrespective of groups.

However, the obtained 'F' ratio value of interaction (Groups x testing conditions) is 0.182, which is lesser than the table value of 4.30 with df I and 22 required for significance at .05 level of confidence. The result of the study shows that no significant difference exists on diastolic blood pressure between groups at each testing condition and also no significant difference between tests for each group.

Table — 5: ANOVA on Pulse rate at Rest andAfter Exercise of Untrained and Trained Groups

Source of Variance	Sum of Squares	df	Mean Squares	F-ratio
A factor (Groups)	414.18	1	414.18	5.947*
Group Error	1532.29	22	69.65	
B factor (Tests)	51025.52	1	51025.52	1710.461*
AB factor (Interaction) (Groups and Tests)	22.68	1	22.68	0.761
Error	656.29	22	29.83	

*Significant at .05 level of confidence

Table value required for significance at .05 level of confidence with df 1, 22 is 4.30.

From the table 5, the obtained 'F' ratio for factor A (Groups) is 5.947, which is greater than the table value of 4.30 with df 1 and 22 required for significance at .05 level of confidence. The result of the study indicates that significant difference exists on pulse rate between untrained and trained groups irrespective of testing conditions.

Further, the obtained 'F' ratio for factor B (Testing conditions) is 1710.461, which is greater than the table value of 4.30 with df 1 and 22 required for significance at .05 level of confidence. The result of the study indicates that pulse rate differs significantly between testing conditions irrespective of groups. However, the obtained 'F' ratio value of interaction (Groups x testing conditions) is 0.761, which is lesser than the table value of 4.30 with df I and 22 required for significance at .05 level of confidence. The result of the study shows that no significant difference exists on pulse rate between groups at each testing condition and also no significant difference between tests for each group.

In this study systolic blood pressure and pulse rate altered considerably in response to aerobic activity irrespective of groups. Furthermore, the finding indicates that significant difference exists on pulse rate between untrained and trained groups irrespective of testing conditions. Several studies (Simao, Polito & Lemos, 2003; MacDougall et al., 1992; Stone et al., 1991; Fleck, 1988) confirm the findings of this study.

Conclusion

The present investigation displays that the individuals those who are trained didn't feel the stress of exercise as much as untrained individual in elevating the physiological parameters in response to exercise, since they possess better potential to perform physical activity. It

implies that individuals can be designated as untrained and trained based on these physiological parameters.

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