



Efficacy of Brisk Walking and Elliptical Training on Cardiorespiratory Endurance and Mean Arterial Blood Pressure among Sedentary Women

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Abstract

The aim of this study was to find out the effect of brisk walking and elliptical training on selected physiological variables among sedentary women. To achieve the purpose, 30 sedentary women were randomly selected and assigned into three groups, brisk walking group (BWG), elliptical training group (ETG) and Control group (CG) consisting of 10 in each. After assessing the cardiorespiratory endurance and mean arterial blood pressure initially, the experimental groups underwent respective treatments for eight weeks. After the completion of eight weeks experimental period, all the subjects were measured of their selected variables. The results proved that brisk walking improved cardiorespiratory endurance of sedentary women (6.20), elliptical training improved (7.70) and control group (1.00), comparing to initial and final scores; brisk walking reduced mean arterial blood pressure (1.64) and elliptical training reduced (2.35) and the control group there was a slight increase of (0.17). The differences were found significant $P < 0.05$. The comparisons proved that elliptical training was significantly better than brisk walking group in improving cardiorespiratory endurance and reducing mean arterial blood pressure. Thus, it was concluded that sedentary women may use elliptical training than brisk walking to improve their physiological levels of cardiorespiratory endurance and mean arterial blood pressure.

Keywords: Brisk walking, Elliptical Training, Cardiorespiratory Endurance, Mean Arterial Blood Pressure.

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Introduction

To maintain a healthy lifestyle, the importance of physical activity cannot be underestimated. It is the single most important endeavor that one can participate in to promote health throughout a lifetime. For decades, epidemiological research has accumulated highlighting the health benefits associated with regular physical activity. Furthermore, there is overwhelming research illustrating the morbid and mortal consequences of being sedentary. The benefits of a proper exercise regimen increase in the efficiency of cardiovascular and respiratory function. 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 systemic arteriovenous oxygen difference. Thus, aerobic exercise imposes primarily a

volume load on the myocardium (Lind and McNicol, 1967).

Blood pressure (mmHg) is determined by multiplying the cardiac output by the total peripheral resistance. Total peripheral resistance is defined as the frictional resistance, or impedance to blood flow in the vascular system. Total peripheral resistance increases with overall vasoconstriction and decreases with overall vasodilation. Although there is abundant vasoconstriction during exercise in the vessels described above, peripheral resistance actually decreases due to the massive vasodilation of vessels supplying working skeletal muscle. This would lead one to believe that exercise causes blood pressure to go down. On the contrary, although there is an overall decrease in peripheral resistance, the increases in cardiac output are substantial enough to cause an overall increase in blood pressure. For example, a normal individual has a cardiac output of 5 liters per minute at rest. This can increase 400% to 20 liters per minute during maximum exercise. While at the same time, total peripheral resistance may have dropped to only a third of resting values. An increase in blood pressure is vital during exercise to meet the supply of increasing demand on the musculoskeletal system. Endurance training seems to be more effective in decreasing resting heart rate and blood pressure (Smith, et al, 2006).

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Mean arterial blood pressure increases in response to dynamic exercise, largely owing to an increase in systolic blood pressure, because diastolic blood pressure remains at near-resting levels. Systolic blood pressure increases linearly with increasing rates of work, reaching peak values of between 200 and 240 millimeters of mercury in normotensive persons. Because mean arterial pressure is equal to cardiac output times total peripheral resistance, the observed increase in mean arterial pressure results from an increase in cardiac output that outweighs a concomitant decrease in total peripheral resistance. This increase in mean arterial pressure is a normal and desirable response, the result of a resetting of the arterial baroreflex to a higher pressure. Without such a resetting, the body would experience severe arterial hypotension during intense activity (Rowell 1993).

To our knowledge, no studies exist that have addressed the efficacy of Brisk walking and elliptical cross training on Cardiorespiratory Endurance and Mean Arterial Blood Pressure in sedentary individuals. Many individuals participate in brisk walking and other type of endurance training programs, yet limited information is known about the effect of this type of training on Cardiorespiratory Endurance and Mean Arterial Blood Pressure. Therefore, the purpose of this study was to examine the influence of walking and elliptical cross training on Cardiorespiratory Endurance and Mean Arterial Blood Pressure among sedentary women.

Methodology

Thirty sedentary women were selected from Chidambaram, Cuddalore district. They were in the age group of 30 – 40 years. The study was formulated as a true random group design consisting of a pre-test and post test. The subjects (N=30) were randomly assigned to three equal groups of ten sedentary women each. The groups were assigned as experimental group I – (Brisk walking exercises), Experimental Group II (Elliptical cross training) and control group respectively. Pre tests were conducted for all the 30 subjects on cardiorespiratory endurance and mean arterial blood pressure. Cardiorespiratory Endurance was assessed through Harvard step test. Mean Arterial Blood Pressure was measured through Sphygmomanometer and stethoscope. After the experimental period of eight weeks post test were conducted and the scores were recorded. The differences between the initial and final scores were considered as the effect of brisk walking and Elliptical cross training on selected variables. The obtained data were statistically analysed using

ANCOVA.

Exercise Program

The program included 1) warming up and stretching, 2) Brisk walking part, 3) cool down and stretching. Warming-up phase for 5 minutes of stretching exercises, 30 minutes walking at 60-80% of maximum heart rate and cooling-down phase for 5 minutes of stretching, three times a week for 2 months. The brisk walking exercise accompanied by music. The exercise intervention was not limited with any nutrition restriction or modification. A target heart rate ranged between 60-80% of age adjusted maximum heart rate, intensity was calculated by each walker from her age and walking supine resting heart rate. Heart rate was measured with an electronic polar heart rate monitor. Walking is the most significant physical activity in the lives of most persons, walking was taken as the reference activity. The control group did not participate in any activity aerobic dance exercise program during the eight-week period in two months.

Elliptical training

Following the warm up, the training programme was applied alternately with intensive and relaxed effort. The intense muscular effort was set with the pedal rates of 50 to 55 revolutions per minute (rpm) were repeated 5 times on the elliptical cross trainer. Every intense effort lasted for 2 minutes. Initial loading was set at approximately 60% of the maximum ability. The resistance of the load was checked by the corresponding heart rate. Loads were then increased every two week by 5 % and were estimated by the maximum load every individual performed at the end of the week testing. For the first two weeks the target intensity was 60%- 65% of maximum heart rate (MHR) for 20 minutes. For 3-4th weeks the intensity progressively increased 65% - 70% of MHR for 25 minutes. For 5-6th weeks the intensity increased 70% - 75% of MHR for 30 minutes and for 7-8th weeks the intensity increased 75% - 80% of MHR for 35 minutes.

The results presented in Table I proved that there was a significant difference due to brisk walking and elliptical cross training on Cardiorespiratory Endurance and Mean Arterial Blood Pressure as the obtained F values 24.17 and 9.19 as the obtained F values were greater than the required F value of 3.37 to be significant at 0.05 level. Since significant results were obtained multiple comparisons of adjusted means Cardiorespiratory Endurance and Mean Arterial Blood Pressure comparing the efficacy of brisk walking and elliptical cross training were presented in Table II.

Results

Table I. Efficacy of brisk walking and elliptical cross training on Selected Physiological Variables among sedentary women

CARDIORESPIRATORY ENDURANCE (Scores in pulse rate)								
	BWG	ECTG	CG	S V	SS	df	MS	Obtained F
Pre Test	78.00	76.00	77.60	B	22.40	2	11.20	0.47
				W	644.40	27	23.87	
Post Test	84.20	83.70	78.60	B	192.07	2	96.03	3.70*
				W	700.10	27	25.93	
Adjusted	83.45	84.83	78.22	B	240.66	2	120.33	24.17*
				W	129.46	26	4.98	
Mean Gain	6.20	7.70	-1.00					
MEAN ARTERIAL BLOOD PRESSURE (Scores in mmHg)								
Pre Test	93.63	94.35	93.54	B	3.94	2	1.97	1.14
				W	46.75	27	1.73	
Post Test	91.99	92.00	93.37	B	12.60	2	6.30	4.76*
				W	35.73	27	1.32	
Adjusted	92.10	91.74	93.52	B	16.96	2	8.48	9.19*
				W	24.00	26	0.92	
Mean Gain	1.64	2.35	0.17					

*Significant at 0.05 level of confidence for 2 and 27 (df) = 3.35, 2 and 26 (df) = 3.37

Table II. Multiple Comparison of Paired Adjusted Means of Selected Physiological Variables due to brisk walking and elliptical cross training

CARDIORESPIRATORY ENDURANCE				
ADJUSTED MEANS			Mean Difference	Required C I
Brisk walking Group	Elliptical cross Training Group	Control Group		
78.22	83.45		5.22*	2.07
78.22		84.83	6.61*	2.07
	83.45	84.83	1.38	2.07
MEAN ARTERIAL BLOOD PRESSURE				
93.52	92.10		1.43*	0.89
93.52		91.74	1.78*	0.89
	92.10	91.74	0.35	0.89

* Significant at 0.05 level.

Discussions

The results presented in Table I proved that while brisk walking improved Cardiorespiratory Endurance of sedentary women (6.20), elliptical cross training improved (7.70) and control group (1.00), comparing to initial and final scores. The ANCOVA results proved that these differences were significant at 0.05 level. The comparison of effects of brisk walking and elliptical cross training (Table II) proved that while both the experimental protocols significantly improved

Cardiorespiratory Endurance of sedentary women, it was found that elliptical cross training was significantly better than brisk walking. Similarly elliptical cross training stabilized Mean Arterial Blood Pressure (1.60) and brisk walking stabilized (2.35) and the control group, there was a slight increase of (0.17). These differences were found to be significant at 0.05 level. The comparison of efficacy of brisk walking and elliptical cross training among sedentary women proved that elliptical cross training significantly better in reducing

Mean Arterial Blood Pressure. The findings of this study are in agreement with the findings of Grant, et al, (2002) compared the obtained effects of two different aerobic exercise models on the functional abilities of women (the exercise models consisted of aerobic dance and walking). The results of the research have indicated that the aerobic dance program had a better effect on VO₂max and maximal heart rate frequency than the walking program. Whelton, Chin, Xin and He (2002) studied how physical activity is connected to the decrease in arterial blood pressure. The analysis of random control tests was carried out in order to determine the effects of aerobic exercise on arterial blood pressure. The authors have concluded that aerobic exercise is connected to a significant decrease in systolic and diastolic arterial blood pressure (on average, 3, 84 mmHg for systolic blood pressure and 2, 58 mmHg for diastolic blood pressure).

Conclusions

It was concluded that sedentary women may use brisk walking and elliptical cross training to improve their cardiorespiratory endurance and mean arterial blood pressure. The exercises are intimately connected with our State of Health and improper cardiorespiratory endurance and mean arterial blood pressure will often reflect various disturbances of body and mind. The brisk walking and elliptical cross training had significant effect on the cardiorespiratory endurance and mean arterial blood pressure. The most easily accessible form of exercise is walking. It may not involve high loading, but it is accessible to majority of all women. Moreover, weight bearing exercise is also recommended due to the

positive stimulus of the mechanical pull of the muscles. Although walking and other types of elliptical cross training can provide many other health benefits. This study demonstrated that elliptical cross training was better than brisk walking exercise in improving cardiorespiratory endurance and reducing mean arterial blood pressure of the sedentary women.

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