EFFECT OF TWO MODES OF AEROBIC TRAINING ON RESPIRATORY VARIABLES OF SEDENTARY PEOPLE

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Abstract:
The purpose of this study was to investigate the effect of two modes of aerobic training (Aerobic dance and Cardio fitness) on respiratory variables between sedentary people. Sixty (60) sedentary people with age group 20 to 30 years belong to Gwalior city were purposively selected as subjects for the study. All the subjects were divided randomly into three groups, Group I (Aerobic Dance Group and Group II (Cardio Fitness Group) whereas Group III was control group & did not participate in any training except their daily routine. Experimental groups were imparted 60 minutes of training 5 times a week for duration of 12 weeks. Measurement of respiratory variables was taken at the beginning and after the experimental period of twelve weeks. Descriptive statistics (Mean, SD and Range), analysis of covariance (ANCOVA) as statistical techniques were employed. Further LSD post hoc means comparison was also used to find out which training was more effective when F value was found significant. As the calculated 'F' value 93.62 for positive breath holding capacity & 30.63 for resting respiratory rate was found higher than tabulated 'F' value 3.16 at 0.05 level of significance. As the calculated 'F' value was found to be significant at 5% level, a post hoc comparison test was applied by using LSD test and significant difference was found between aerobic dance group & cardio fitness group, it means aerobic dance program was more effective than Cardio fitness program in both the respiratory variables.

Keywords: Aerobic dance, Cardio Fitness and Sedentary People

Introduction

For the majority of our evolutionary history humans lived a hunter gatherer existence which required high levels of physical activity to acquire food and water obtain shelter and avoid predators. Over time, advances in technology and agriculture gradually reduced the energy expenditure required to fulfill these survival needs (Brown WJ & Bauman AE et al., & Katzmarzyk PT and Mason C 2009). Today, in many developed countries, large segments of the population now spend a significant proportion of their day sitting and using labor-saving devices. The benefits of a physically active lifestyle for morbidity and mortality are well established and reflected in public health guidelines and policy (The Department of Health, 2011). In many industrialized societies, occupational sitting represents the major source of sedentary behavior in adults. Sedentary time may also be accumulated whilst using motorized transport, particularly door-to-door transport in a car.Do you sit in your car while commuting to an eight-hour-a-day desk job and then unwind in front of the television all evening? Do you depend on email, direct-deposit paychecks, and online shopping to accomplish tasks that 10 or 20 years ago would have required you to run errands?. If so, then you may have "sitting disease." That's the new buzzword for a sedentary lifestyle that may put your health at risk. "The strangest thing in the world is that people spend all day scrunched in a chair. Fight sitting disease by taking steps to become more physically active. But how do you actually do that when you're locked into a lot of sitting time at work and getting around town? Manual tasks in the home have also largely disappeared. We vacuum instead of sweep; we have dishwashers instead of washing dishes by hand; we have tractors to cut the lawn. And so on. Almost all our transport is now by car. Fewer than 10 per cent of people walk or take public transport to work. The same is true of kids – 90 per cent are transported to school; they don't walk or bike. Because of sedentary life style the risk of cardiorespiratory diseases such as coronary heart disease & asthma is increased. The solution is simple movement, a little bit at a time, incorporated into our daily lives. Exercising like a maniac for an hour a day isn't going to offset 23 hours of being sedentary. But breaking up your sitting with activity, even very light activity; can have a significant impact (Andre Picard).Aerobic exercise is one of the very best things one can do to promote overall wellness and improving the functions of heart & lungs.

Method and Materials

The purpose of this study was to find out the effect of two modes of aerobic training (Aerobic dance and Cardio fitness) on respiratory variables between sedentary people. Sixty (60) sedentary people with age group 20 to 30 years belong to Gwalior city were purposively selected as subjects for the study out of

which 30 male and 30 female, Further the subjects were divided randomly into three groups, each group consisting of 10 male & 10 female subjects. Group I (Aerobic Dance Group) was chosen to perform exercise like "step -touch", "side-to-side", "V-step", walking back and front etc. and group II (Cardio Fitness Group) perform exercises with modern fitness equipments like Treadmill , Elliptical trainer , Stationary bike and rowing machine whereas control group did not participate in any training program except their daily routine. Experimental groups were imparted 60 minutes of training 5 times a week for duration of 12 weeks. Measurement of positive breath holding capacity and resting respiratory rate were taken at the beginning and after the experimental period of twelve weeks. Both the respiratory variables was measured by stop watch and scores of resting respiratory was recorded in numbers/min where as positive breath holding capacity was recorded in seconds. The experiment was conducted at Lakshmibai National University of Physical Education, Gwalior in the year 2011.

Results

In order to compare the effect of two modes of aerobic training (Aerobic dance & Cardio fitness) on resting respiratory rate and positive breath holding capacity between sedentary people, descriptive statistics (Mean ,SD and Range), analysis of covariance (ANCOVA) as a statistical technique were employed. Further LSD post hoc means comparison was also used to find out which training was more effective when F value was found significant.

The descriptive statistics was used between experimental groups & control group with regard to positive breath holding capacity is presented in table-1

Table-1
DESCRIPTIVE STATISTICS OF PRE & POST-TEST PERFORMANCE IN POSITIVE BREATH HOLDING CAPACITY AMONG EXPERIMENTAL GROUPS & CONTROL GROUP

Groups		Mean	SD	Min.	Max.
Aerobic Dance Group	Pre-test	35.6	9.26	24	61
	Post-test	44.75	9.8	36	75
Cardio Fitness Group	Pre-test	32.4	12.0	20	60
	Post-test	39.6	10.45	28	65
Control Group	Pre-test	29.75	10.47	19	58
	Post-test	29.9	10.26	20	56

Table 1 depicts total mean and standard deviation pertaining to all three groups. For aerobic dance group, pre test mean and standard deviation of subjects was 35.6 ± 9.26, post test mean and standard deviation of subjects was 44.75 ± 9.8. For cardio fitness group, pre test mean and standard deviation of subjects was 32.4 ± 12, post test mean and standard deviation of subjects was 39.6 ± 10.45 and for control group, pre test mean and standard deviation of subjects was 29.75 ± 10.47, post test mean and standard deviation of subjects was 29.9 ± 10.26.

The analysis of covariance (ANCOVA) was used to find out the significant difference between experimental groups & control group after eliminating the effects of covariate is presented in table-2.

Table-2
ANALYSIS OF CO-VARIANCE OF ADJUSTED POST TEST MEANS IN POSITIVE BREATH HOLDING CAPACITY AMONG EXPERIMENTAL GROUPS & CONTROL GROUP

	Sum of Squares	Df	Mean Square	F-Value
Contrast	923.55	2	461.78	93.62*
Error	276.22	56	4.93	

* Significant at 5% level. $F_{.05}(2, 56) = 3.16$

Table-2 clearly revealed that there was a statistically significant difference among experimental groups (aerobic dance group & cardio fitness group) and control group as the calculated 'F' value 93.62 was found higher than tabulated 'F' value 3.16 in case of positive breath holding capacity at 0.05 level of significance. This proved that there was a significant difference among the means due to twelve weeks of varied aerobic training on positive breath holding capacity. As the calculated 'F' value was found to be significant at 5% level a post hoc comparison test was applied by using LSD test. The result of the post hoc test is shown in table-3.

Table-3
POST HOC COMPARISON OF ADJUSTED POST TEST MEANS IN POSITIVE BREATH HOLDING CAPACITY AMONG EXPERIMENTAL GROUPS AND CONTROL GROUP

Aerobic Dance group	Cardio Fitness Group	Control Group	Mean Difference
41.93	39.77		2.161*
41.93		32.55	9.386*
	39.77	32.55	7.225*

* Significant at 5% level i.e., 1.40.

Table-3 shows adjusted post-test means of experimental groups & control group. The adjusted means of aerobic dance group, cardio fitness group & control group were 41.93, 39.77 & 32.55 respectively. The mean difference between aerobic dance group & cardio fitness group was (2.161) while the mean difference between experimental groups (aerobic dance group & cardio fitness group) and control group was (9.386 & 7.225). The LSD critical value was 1.40 hence there was the significant difference among experimental groups & control group where as significant difference was also found between aerobic dance & cardio fitness group. As significant difference was found between aerobic dance group & cardio fitness group it means aerobic dance program was more effective than cardio fitness group program because mean value 41.93 of aerobic dance group was found higher than mean value 39.77 of cardio fitness group. The descriptive statistics was used

between experimental groups & control group with regard to resting respiratory rate is presented in table-4

Table-4
DESCRIPTIVE STATISTICS OF PRE & POST-TEST PERFORMANCE IN RESTING RESPIRATORY RATE AMONG EXPERIMENTAL GROUPS & CONTROL GROUP

		Mean	SD	Min.	Max.
Aerobic Dance Group	Pre-test	19.8	1.74	18	24
	Post-test	17.75	1.83	15	22
Cardio Fitness Group	Pre-test	19.75	1.89	17	24
	Post-test	18.55	1.57	16	22
Control Group	Pre-test	20.20	1.89	17	24
	Post-test	19.95	1.76	17	23

Table 4 depicts total mean and standard deviation pertaining to all three groups. For aerobic dance group, pre test mean and standard deviation of subjects was 19.8 ± 1.74, post test mean and standard deviation of subjects was 17.75 ± 1.83. For cardio fitness group, pre test mean and standard deviation of subjects was 19.75 ± 1.89, post test mean and standard deviation of subjects was 18.55 ± 1.57 and for control group, pre test mean and standard deviation of subjects was 20.20 ± 1.89, post test mean and standard deviation of subjects was 19.95 ± 1.76.

The analysis of covariance (ANCOVA) was used to find out the significant difference between experimental groups & control group after eliminating the effects of covariate is presented in table-5.

Table-5
ANALYSIS OF CO-VARIANCE OF ADJUSTED POST TEST MEANS IN RESTING RESPIRATORY RATE AMONG EXPERIMENTAL GROUPS & CONTROL GROUP

	Sum of Squares	df	Mean Square	F-Value
Contrast	34.42	2	17.2	30.63*
Error	31.46	56	0.56	

* Significant at 5% level. $F_{.05}(2, 56) = 3.16$

Table-5 clearly revealed that there was a statistically significant difference among experimental groups (aerobic dance group & cardio fitness group) and control group as the calculated 'F' value 30.63 was found higher than tabulated 'F' value 3.16 in case of resting respiratory rate at 0.05 level of significance. This proved that there was a significant difference among the means due to twelve weeks of varied aerobic training on resting respiratory rate.

As the calculated 'F' value was found to be significant at 5% level a post hoc comparison test was applied by using LSD test. The result of the post hoc test is shown in table-6.

Table-6
POST HOC COMPARISON OF ADJUSTED POST TEST MEANS IN RESTING RESPIRATORY RATE AMONG EXPERIMENTAL GROUPS AND CONTROL GROUP

Aerobic Dance Group	Cardio Fitness Group	Control Group	Mean Difference
17.85	18.69		0.842*
17.85		19.71	1.861*
	18.69	19.71	1.018*

* Significant at 5% level of significance i.e., 0.473

Table-6 shows adjusted post-test means of experimental groups & control group. The adjusted means of aerobic dance group, cardio fitness group & control group were 17.85, 18.69 & 19.71respectively. The mean difference between aerobic dance group & cardio fitness group was (0.842) while the mean difference between experimental groups (aerobic dance group & cardio fitness group) and control group was (1.861 &1.018). The LSD critical value was 0.473 hence there was the significant difference among experimental groups & control group where as significant difference was also found between aerobic dance & cardio fitness group. As significant difference was found between aerobic dance group & cardio fitness group it means aerobic dance program was more effective than cardio fitness group program because mean value 17.85 of aerobic dance group was found lower than mean value 18.69 of certain cardio fitness group. A lower and easier resting respiratory rate improves cell oxygen content while over breathing lead to reduce cell oxygenation. The graphical representation of means among experimental groups and control group of positive breath holding capacity and resting respiratory rate are presented in Figure-1.

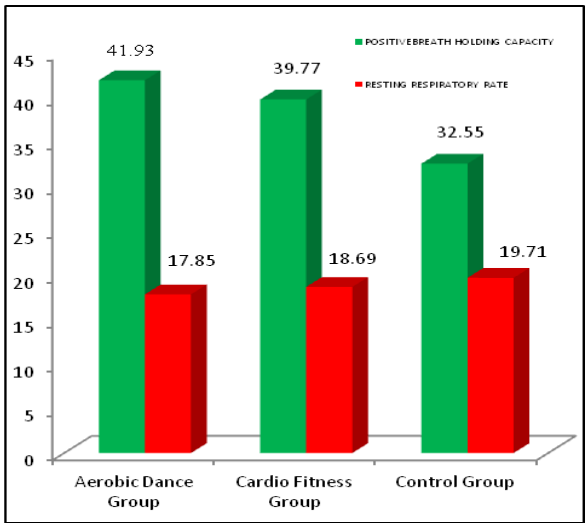

Figure-1:- Graphical Comparison of the Adjusted Mean of Positive Breath Holding Capacity and Resting Respiratory Rate of Control Group & Experimental Groups

Discussion

This study investigated the effect of two modes of aerobic training on respiratory variables of sedentary people. Significant reduction was found in resting respiratory rate whereas in case of positive breath holding capacity a significant improvement was also found in sedentary male and female reflecting improvements in respiratory function due to the two modes of aerobic training programme. In both the respiratory variables aerobic dance program was more effective in compare to cardio fitness program. It may be attributed due to the fact that aerobic dance program consisted of a combination of numerous movements such as step-touch, side to side, v-step, walking front and back, kick steps, skips, jumps, turn, balance and flexing in all different directions & various combination of the aforementioned steps including hand & body movements that are used to increase or decrease intensity. Combination of different movements simultaneously activated body parts and where each exercise was repeated four to eight times (K. Radmila & Meta 2005). These repeated various movements of aerobic dance consistently increased the demand of oxygen and therefore required optimum efficiency in term of rate and force of breathing which played a key role in increasing the capacity of heart and lungs.Respiration includes the inhale, exhale and air exchange that happens in the lungs. Exercise lends to immediate and permanent changes in respiration function.Regular aerobic dance strengthens and tones the heart and lungs, enabling the pulmonary system to increase the maximum amount of oxygen that the lungs can handle because of this reason lungs also improve their ability to attract and retain a larger volume of air inside the lungs that resulted in increased the breath holding capacity. Prolonged participation in aerobic dance resulted in strengthening the muscles involved the respiration to facilitate the flow of air in and out of the lungs. In other words with every breath, air flow volume is improved after exercise program compared with the volume prior to an exercise program. This may be probable reason of lowering of resting respiratory rate.Over time, with consistent aerobic exercise, resting respiration rate slows. This is a result of enhanced respiratory muscle endurance and strength. With every breath, air flow volume is improved compared with the volume prior to an exercise program. In other words, one becomes a more efficient breather. The study conducted by Denis E et al. (1998) also found this result to be true in those who suffer from chronic airflow limitation disorders. In case of cardio fitness group training was mainly done with treadmill, elliptical trainer, stationary bike and rowing which comprised of cyclic movements and does not offer variation of movements? Because of cyclic pattern of movements, it could not produce significant effect on circulation of blood, involvement of heart & lungs and muscles of body was not work efficiently as compared to aerobic dance whereas in case of aerobic dance varied movements of arms & legs resulted higher demand of oxygen & blood throughout the body. Exercise can, however, increase the strength of respiratory muscles and decrease the fatigue associated with prolonged increases in breathing rate (Michael G. Levitsky, 2003).

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