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Effect of Aerobics and Zumba on Vo₂ max on young working women

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Abstract

The purpose of the present study was to find out the effect of Aerobics and Zumba on Vo₂ max (Predicted) of 20 to 25 years old working women. Total 90 working women participated in the study, out of which 30 subjects were selected at random for the Aerobics group another 30 subjects were selected at random for the Zumba group and other 30 subjects were considered as the member of the control group. The subjects were selected from various non govt. and corporate sectors office of Salt Lake and Newtown area of Kolkata.

Queen College test was applied to the subjects. Subject stepped up and down for total duration of Three minutes. Metronome was set at 88 bpm. After competition of 3 minute step up-up-down-down on the stepper at the rate of 22 steps/minutes, all the subjects were directed to stop and seat. Heart beats were counted from carotid artery for 15 second from 5 to 20 second recovery.

Predicted Vo₂ max was recorded in ml/kg/min. by using the following formula for women.

$$\text{Vo}_2\text{max.} = 65.81 - (0.1847 \times \text{step test pulse rate (bpm)}) \quad [\text{McArdle, Katch and Katch. 1972}]$$

Aerobics and Zumba training introduced for three alternative days in a week and for total duration of Twelve weeks. Pre-test and Post-test data were collected. Analysis of Covariance (ANCOVA) was conducted to identify the effect of Aerobics and Zumba on Vo₂ max (predicted).

Result indicates that there is significant difference between Aerobics and Zumba group because p-value is 0.000 which is less than 0.05 level of significance. As well as there is also significant difference between means of both Aerobics and Zumba with control group (p=0.000), in both the cases p-value is less than 0.05 level of significance. The study concluded that Vo₂ max was improved significantly after twelve weeks Aerobics and Zumba treatment. Aerobics group was superior to Zumba group for improving Vo₂ max.

Keywords: Aerobics, Zumba, Vo₂ max

Introduction

Population is on continuous rise on this planet. Natural environment is on the verge of being extinct. Complexity of civilization has made man too much dependant on machine and technology. And our physique, thus affected, is a paving the way for all kinds of hypo kinetic diseases. Today the younger generation is robbed off the provision for games and physical exercise. Aerobics or Zumba can be breath in some respite in such a situation promoting sports and physical activities even indoor.

People who are engaged in some professions that are quite time consuming, cannot afford to devote time for games and sports. The maximum effort they can come up with is to join a Gym. But soon they develop boredom. Aerobics or Zumba can be an interesting workout in such situation. Commonly, people in general prefer to dance along with music. Aerobics and Zumba provides them with the scope. The strict grammars of dance lessons are not followed here. Just people are required to catch up the rhythm of the music that is played. Aerobics and Zumba is thus a fun-packed physical fitness regime. Once can dance along with some music for fun and can retain his or her physical fitness.

Nowadays, many corporate officials, both in the private sector and the govt. sector, have to sit for a long hours at their desks. This certainly aggravates their situation of being unfit. They even remain absent from gymnasium either for the reason of being lazy or simply for lack of time. If they are made to understand the importance of Aerobics and Zumba, they will be benefited. Recently, it has already been observed that they are showing interest in such fitness

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programs. As such fitness programs can be organized within a very small space; they are growing popular in the coming days. The fitness components of aerobics or Zumba are of immense benefit and people from different walks of the society can reap them quite easily.

Aerobics is a type of exercise which is performed in the presence of oxygen. The term AEROBIC was first introduced by Dr. Kenneth H. Cooper, an Exercise Physiologist. Aerobics and Zumba both are under aerobic exercise. Aerobics is a form of physical exercise that combines all rhythmic exercise, stretching, dancing etc. it is usually performed to music. The main objectives of this rhythmic exercise is to improve cardio-vascular endurance, flexibility, muscular strength and overall physical fitness.

Aerobics exercise shortly may be described, the amount of oxygen that gets into the body is slightly more than or equal to the amount of oxygen utilized by the body. It is that type of activity in which the body produces least lactic acid, sustained activity for an extended period of time without building an oxygen debt. Aerobics increase oxygen utilization during vigorous exercise and lower heart rate during rest. (Bucher-1983)

Inactive life may lead to type 2 diabetes, obesity, coronary heart diseases as well as mental diseases like depression, insomnia, and many more. It is necessary for a child, an adult or old people to exercise daily at least half an hour to maintain their body for daily life activity. (1995 CDC/ACSM consensus statement and surgeon General's 1996 report.)

The responsibility of a physical educationist is not only to educate the student who is engaged in physical education classes or courses but also to be responsible for the people, for the nation. The researcher tried to see whether a three-month aerobic program can be helpful or not for those people who are very busy with their daily work schedule.

Zumba is also a rhythmic aerobic fitness program. Zumba involves dance and all components of aerobics. In the mid-1990s, Beto Perez, once he forgot to bring his traditional aerobic music for the particular class he was teaching. Then he started the aerobic class without the specific aerobic music. He played some Colombian music and introduced some local dance forms. As he previously announced that class would be a special class. Basically, he used some local traditional dance forms and music like, Cumbia, Salsa, Reggaeton, meringue etc. Very rapidly, this form of exercise spread not only in Latin America but also all over the world. The dance forms basically used in Zumba are Cumbia, Salsa, Reggaeton, Samba, Hip Hop, Mambo, Merengue etc. (www.zumba.com)

Basically, aerobics and Zumba programs involve beats, music and organized pre-planned movements or dance steps. Thus, the pupil hardly loses their interest and attention from the activity.

Aerobics History

Before 1968 we did not know that why some people who have

greater muscular body and strength, still they are poor in cardiovascular type of exercise, like long distance running, swimming, bicycling etc. Dr. Kenneth H. Cooper worked on that topic. He was puzzled when he faced the problem. He started investigation systematically, to measure human performance; he measured human ability to use oxygen. He used bicycle ergometer test. In 1968 Dr. Kenneth H. Cooper published AEROBICS, a book that helps to understand the fitness form weakness or inactive life. Aerobics became worldwide famous again when Jane Fonda, an aerobic trainer, released her aerobic videos in 1982. (Wikipedia.org/wiki/Aerobics)

Research Methods

Selection of participants

Total ninety (N=90) young working women aged from 20 to 25 years old were selected at random from Kolkata metropolitan city, West Bengal, India, as subjects for the study. Total subjects were divided into three equal groups, such as Aerobics group, Zumba group, and Control group. Each group consisted of 30 subjects. The age of the subjects was recorded from MP/ School final/ 10th Class board Exam Admit card. Permission was taken from the subject to collect the data and for conducting research.

Experimental design

In the present study, ninety (N=90) subjects were selected at random from 20 years to 25 years age group female. Total number of selected subjects divided into three equal groups: i) Aerobics group, ii) Zumba group and iii) Control group. Pre-test were conducted on the criterion measures. Twelve weeks training was employed among Aerobics and Zumba groups. No treatment was employed on the Control group. Post-test were conducted on Aerobics, Zumba and Control groups after completion of twelve weeks. Therefore, Pre-test - post-test randomized group design was followed in this experiment.

Collection of Data

The data of all the subjects were collected by testing them on the Queens College Test. Subject stepped up and down for a total duration of three minutes. Metronome was set at 88 bpm. After completion of 3-minute step up-up-down-down on the stepper at the rate of 22 steps/minutes, all the subjects were directed to stop and seat. Heart beats were counted from the carotid artery for 15 seconds from 5 to 20 second recovery.

Predicted Vo₂ max was recorded in ml/kg/min. by using the following formula for women.

$$Vo_{2max} = 65.81 - (0.1847 \times \text{step test pulse rate (bpm)})$$

[McArdle, Katch and Katch, 1972]

Two sets of data were collected for the study. The first set of data was collected successively for three days and the second set of data was recorded in the same order which was recorded in the first set.

Training Program

Table 1: Selected training program is listed in table 1.

Time Duration	Warm Up	Aerobics Group			Zumba Group		Cooling Down	
		Mon	Wed	Fri	Tue	Thu	Sat	Sun
1 st week	(20 min.) Jogging, Running, Back Running, Bending, Floor exercise and Stretching.	(30 min) Steps and Choreograph introduced to the subjects from Jane Fonda's Low impact Aerobics and Stretch, personal trainer Series. Audio and Video CD			(30 min) Steps and choreograph introduced from Zumba fitness Basic steps level 1 mash up DVD. Two songs 1. Tigre(meringue) 2. Hala(reggaeton)		(10min.) Stretching, Breathing, limbering down.	

2 nd week	(15 min.) Jogging, Running, Back Running, Bending, Floor exercise and Stretching.	(35 min) Steps and Choreograph introduced to the subjects from Jane Fonda's Low impact Aerobics and Stretch, personal trainer Series. Audio and Video CD	(35 min) Steps and choreograph introduced from Zumba fitness Basic steps level 1 mash up DVD. Three song 1.Tigre(meringue) 2. Hala(reggaeton) 3.Bla Bla Bla (cumbia)	(10min.) Stretching, Breathing, limbering down.
3 rd and 4 th week	(10 min.) Jogging, Running, Back Running, Bending, Floor exercise and Stretching.	(40 min.) The whole music from Jane Fonda's Low impact Aerobics and Stretch, personal trainer Series played repeatedly for 40 minute. Steps and movement corrected.	(40 min.) Four songs from Basic steps level 1 mash up DVD. 1.Tigre(meringue) 2. Hala(reggaeton) 3.Bla Bla Bla (cumbia) 4. Un solo pueblo(salsa)	(10min.) Stretching, Breathing, limbering down.
5 th and 6 th week	(10 min.) Jogging, Running, Back Running, Bending, Floor exercise and Stretching.	(40 min.) The whole music from Jane Fonda's Low impact Aerobics and Stretch, personal trainer Series played repeatedly for 40 minute.	(40 min.) Five songs from Basic steps level 1 mash up DVD. 1.Tigre(meringue) 2. Hala(reggaeton) 3.Bla Bla Bla (cumbia) 4. Un solo pueblo(salsa) 5. Tu Boquito Techno (cumbia)	(10min.) Stretching, Breathing, limbering down.
7 th and 8 th week	(10 min.) Jogging, Running, Back Running, Bending, Floor exercise and Stretching.	(40 min.) Music played for 20 min. from Jane Fonda's Low impact Aerobics and Stretch, personal trainer Series and another 20 min. music played from Jane Fonda's Complete Workout. Movement and choreograph practiced step by step.	(40 min.) Six songs from Basic steps level 1 mash up DVD. 1.Tigre(meringue) 2. Hala(reggaeton) 3.Bla Bla Bla (cumbia) 4. Un solo pueblo(salsa) 5. Tu Boquito Techno (cumbia) 6.Singue gozando con Zumba(Salsa)	(10min.) Stretching, Breathing, limbering down.
9 th and 10 th week	(10 min.) Jogging, Running, Back Running, Bending, Floor exercise and Stretching.	(40 min.) Music played from Jane Fonda's Complete Work Out audio video CD. Movements and steps corrected.	(40 min.) Seven songs from Basic steps level 1 mash up DVD. 1.Tigre(meringue) 2. Hala(reggaeton) 3.Bla Bla Bla (cumbia) 4. Un solo pueblo(salsa) 5. Tu Boquito Techno (cumbia) 6.Singue gozando con Zumba(Salsa) 7.El Amor, El Amor(reggaeton)	(10min.) Stretching, Breathing, limbering down.
11 th and 12 th week	(10 min.) Jogging, Running, Back Running, Bending, Floor exercise and Stretching.	(40 min.) Music edited from Jane Fonda's above mentioned Two CD s without changing Choreography and Steps and played for 40 min.	(40 min.) Eight songs from Basic steps level 1 mash up DVD. 1.Tigre(meringue) 2. Hala(reggaeton) 3.Bla Bla Bla (cumbia) 4. Un solo pueblo(salsa) 5. Tu Boquito Techno (cumbia) 6. El Amor, El Amor(reggaeton) 7. Singue gozando con Zumba(Salsa) 8. Zumba Mami(reggaeton)	(10min.) Stretching, Breathing, limbering down.

Results

The mean and standard deviation of Vo₂ max (Predicted) of

young working women are presented in table 2.

Table 2: Descriptive Statistics of Post-Test of Aerobics, Zumba and Control Group in Vo₂ Max.

Groups	Mean	Std. Deviation	N
Aerobics	40.14	2.39	30
Zumba	39.21	1.79	30
Control	38.12	2.85	30
Total	39.16	2.50	90

The value of the means (unadjusted) and standard deviation for the data on Vo₂ Max. in Aerobics, Zumba and control groups during post test are shown in Table 2. The mean value of Vo₂ max. for aerobics, zumba and Control groups are 40.16 ml/kg/min+/-2.39, 39.21 ml/kg/min.+/- 1.79 and 38.12

ml/kg/min.+/- 2.85 respectively.

Adjusted means for data on Vo₂ Max. Of different groups during posttest shows in table 3

Table 3: Adjusted post means of aerobics, Zumba and control group in Vo2 Max

Groups			95% Confidence Interval	
	Mean	Std. Error	Lower Bound	Upper Bound
Aerobics	41.310 ^a	0.19	40.94	41.68
Zumba	38.770 ^a	0.18	38.41	39.13
Control	37.389 ^a	0.18	37.03	37.75

a. Covariates appearing in the model are evaluated at the following values: Pretest VO2 max. = 37.6570.

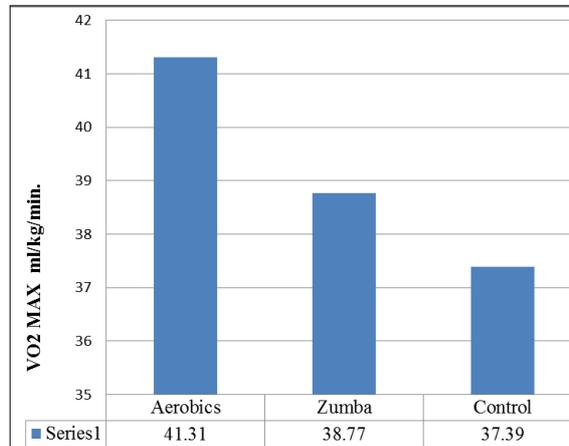


Fig 1: Graphical representation of Vo2 max. of the adjusted mean for Aerobics, Zumba and Control group.

Table 4: Analysis of Co-variance of Comparison of Adjusted Post Test Means of Aerobics, Zumba And Control Group In Vo2 Max

Source	Type I Sum of Squares	df	Mean Square	F	p value
Corrected Model	473.827 ^a	3	157.94	167.08	.000
Intercept	137990.44	1	137990.44	145972.66	.000
Pre_VO2	266.65	1	266.65	282.07	.000
Groups	207.18	2	103.59	109.58	.000
Error	81.30	86	0.95		
Total	138545.57	90			
Corrected Total	555.13	89			

a. R Squared = .854 (Adjusted R Squared = .848)

In table 4 (Test between subjects) shows that the F-value for the adjusted of two groups during post test. Since p-value of groups is less than 0.05 level of significance, which indicates that there is significant difference in adjusted means of Vo2 Max among three groups.

Since, the analysis of covariance for Vo2 Max scores was found significant difference among groups. Therefore, Post Hoc comparison LSD test was applied and presented in table number 5.

Table 5: post hoc comparison (LSD) of Adjusted Post Test Means of Aerobics, Zumba and Control Group in Vo2 Max

(I) Groups	(J) Groups	a			95% Confidence Interval for Difference ^a	
		Mean Difference (I-J)	Std. Error	p value ^a	Lower Bound	Upper Bound
Aerobics	Zumba	2.512*	0.26	.000	2.00	3.02
	Control	3.894*	0.26	.000	3.38	4.41
Zumba	Aerobics	-2.512*	0.26	.000	-3.02	-2.00
	Control	1.382*	0.25	.000	0.89	1.88
Control	Aerobics	-3.894*	0.26	.000	-4.41	-3.38
	Zumba	-1.382*	0.25	.000	-1.88	-0.89

Based on estimated marginal means
 *. The mean difference is significant at the .05 level.
 a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table 5 indicates that there is significant difference between Aerobics and Zumba group because p-value is 0.000 which is less than 0.05 level of significance. As well as there is also significant difference between means of both Aerobics and Zumba with control group (p=0.000), in both the cases p-value is less than 0.05 level of significance.

Discussion of Findings

Maximal aerobic power or Vo2 max provides important information on the individual's capacity of the long term energy system. Maximal oxygen consumption increases as a result of specific aerobic training or endurance training. The magnitude of increase depends on the type of training program. In the present study Aerobics and Zumba groups

improve significantly in Vo₂ max following Twelve weeks treatments. LSD Post Hoc test shows Aerobics group was superior to Zumba for improving Vo₂ max.

In this study the adjusted pre training Vo₂ max was 37.657 ml/kg/min. After twelve weeks Aerobics and Zumba training the post mean of Vo₂ max were 41.31 and 38.77 ml/kg/min. for aerobics and Zumba group respectively. This shows an average improvement of 9.69% and 2.95% for Aerobics and Zumba group respectively.

Considering the adjusted mean values of Aerobics and Zumba it shows that Aerobics group is superior than Zumba group for improving Vo₂ max following twelve's weeks treatments.

Conclusion

Vo₂ max was improved significantly after twelve weeks Aerobics and Zumba treatment. Aerobics group was superior to Zumba group for improving Vo₂ max.

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