

ACUTE EFFECT OF SINGLE BOUT OF AEROBIC DANCE EXERCISE ON HEART RATE

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It is obvious, when physical activity included in our daily routine, results an overall development of cardiovascular health status. Measurement of heart rate has been used widely for assessing the pattern of cardiac autonomic function in various exercise condition. Aerobic dance movement is a modern type of physical exercise which helps to improve cardiovascular fitness. The purpose of the study was to observe the immediate effect of a schedule aerobic dance exercise as a moderate exercise intervention on heart rate in different physiological conditions. Fifteen (n=15) physically active male adults (age=24.47±1.03) pursuing the Bachelor of Physical Education (B.P.ED) course were recruited as subjects of this study. For the collection of data purposive sampling method was used. They were provided a ten-minute aerobic dance exercise protocol before the test. The heart rate (HR) was recorded as pre-dance exercise (resting HR), just after ten minutes of dance exercises (exercise HR) and post dance exercise (recovery HR) up to ten minutes more. Continuous measurement of heart rates (HR) were done by the Holter machine. The mean resting heart rate was recorded as 55.53±7.75 beats/min, which after ten minutes of aerobic dance exercise reached up to 136.93±13.92 beats/min and again in 10th minute of recovery, it came down to 65.26±6.04 beats/min. RM of ANOVA shows that there was a significant difference in resting heart rate, exercise heart rate and recovery heart rate. Aerobic dance exercise shows significant change of heart rate among pre, during and post exercise session.

Keywords: Physical Activity. Cardiovascular Fitness. Exercise Intervention. Cardiac Autonomic Function, Purposive Sampling

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Introduction

Technological advancement has made us physically less active and allures to lead luxurious life-style. Consequently, this comfort of life calls in various health hazards in life. That is why physical exercise has been nowadays a popular medicine to lead a healthy life.

American heart Association prescribes for physical exercise across the week at least for a period of thirty minutes keeping range from moderate to strenuous based on the individuals' physical ability. It has been evident that performing various form of physical activities can be benefitted for us. It may be classified sports, conditioning or any other dance or exercise form which should be in such a design that it can serve the best possible health purposes.

Aerobic dance gratifies both approaches i.e. maintaining aspirational physical fitness along with fun and gradually becoming popular mode of exercise especially among women. Aerobic dance is a choreographed movements performed with music aiming to improve and maintain cardiovascular fitness. To measure this fitness, Heart Rate has been undoubtedly proved to be a one of the significant physiological marker. Scientific literatures evidence that HR directly indicates the cardiovascular fitness and its variations depends on the nature and intensity of the exercise form. Intensity of the dance is directly proportional up to the certain level increasing of HR. This HR arises due to increasing demand of the oxygen supply to the working muscles.

Aerobic exercise should be of at least a ten minutes duration. Provided that one can add more time and greater intensity which proclaim more calories. Research literatures demonstrate that aerobic dance with low intensity requires 4 to 5 Kcal/min. meanwhile aerobic dance with high intensity requires 10 to 11 Kcal/min. A moderate intensity aerobic exercise is usually prescribed by all health practitioners to maintain a good health. Among sedentary women, aerobic dance program renders direct benefit on cardiovascular fitness. It has been proved that different games and sports those are aerobic in nature, have great impact on heart function. Even karate training is also an aerobic exercise which positively improves cardiac health.

Lacking in proper scientific research work is one of

The drawbacks to validate the hypothesis that can confirm the aerobic dance to be a moderate aerobic physical activity. The researcher is here with some empirical steps to support the hypothesis. If it is possible, this form of physical exercise can also be a tool for conditioning program.

Objective of the study

The main aim of this study was to investigate the immediate effect of single bout of aerobic dance exercise through a continuous assessment of heart rate.

Materials and methods

Study location and subjects.

The present experimental study was conducted in the Exercise Physiology Laboratory in the Department of Physical Education, Jadavpur University, Kolkata, West Bengal, India. Moreover, for the data collection, technical instruments along with technical experts were provided by the Ayush Diagnosis center, Dhakuria, Kolkata, West Bengal, India. The students of B.P.ED of Jadavpur University were considered as sampled subject for the study. A total of fifteen (N = 15) active male students (age-22 to 25) were selected and an individual consent was taken from each of the participants. The participants had been practicing the aerobic dance exercise for last 6 month, as it was included in their course, (B.P.ED.). The whole study design was approved by the concern subject expert, Department of Physical Education, Jadavpur University.

Variables studied

In the present study, age, height, weight, BMI and heart rate were measured consciously.

Study design

In the present study single group with repetitive (pre, during, post) assessment model was adopted (Fig 1).

Enclosed as Annexure 01

Administration of the test

To minimize possible circadian influences, measurements were performed at the time between 14 and 16 h. The electrodes were placed one by one on the selected sites, which include Right Arm (RA), Left Arm (LA), Ventral (V), Right Leg (RL), Left Leg (LL) of each subject such that the heart rate

Could systematically be recorded in the Holter machine. The complete detail of the experimental sessions of recording the data have been shown in Table 1

Enclosed as Annexure 02

In this position, ten-minute rest were given to each subject, so that resting heart rate can be measured. Then the subjects were instructed to perform the aerobic dance exercise protocol, shown in Table 2. Various types of aerobic dance steps were included with submaximal intensity. After ten minute of constant aerobic dance intervention, exercise heart rate was measured through Holter Machine. Then after which they again laid down in supine position to take rest and recovery heart rate was recorded in every one minute interval for ten minutes. When the stipulated ten minutes completed, all the electrodes were removed smoothly. The recorded data was downloaded and analyzed using ARYTELL- D and 3 - CHANNEL respectively.

Table 2. Details of Aerobic Dance exercise protocol

Enclosed as Annexure 03

Statistical application

Mean and standard deviation were used as descriptive statistics. In the present study the repeated measures of analysis of variance (RM ANOVA) was used for data analysis. Repeated measures of ANOVA are an extension of t-test. Here RM ANOVA was used to find out the significant difference between the three different phases i.e. before exercise (resting phase), during exercise (exercise phase) and after exercise (recovery phase). Further Post Hoc Comparisons were done accordingly.

Result

In the present study a continuous heart rate was recorded before, during and after aerobic dance exercise. Heart rate after a single bout of aerobic dance exercise (exercise HR) has shown a significant difference between pre-exercise heart rate (resting HR) and post-exercise heart rate (recovery HR) values. Here the researcher represents the descriptive data in the form of mean and \pm SD in table 3 and also a graphical representation of resting HR, exercise HR, and recovery HR in Fig. 2.

Enclosed as Annexure 04

Fig. 2. Line Graph Represents the mean values of heart rate in rest, exercise and recovery period

Enclosed as Annexure 05

Table 4. Represents the analysis of repeated measures of analysis of variance (RM ANOVA) results, and along with Table 5 and Table 6 represented the Post Hoc analysis results respectively.

Table- 4: Repeated measure ANOVA of the heart rate within pre, during and post exercise period.

Enclosed as Annexure 06

Table 5: Pairwise comparisons among resting heart rate with other (exercise and recovery) experimental periods.

Enclosed as Annexure 07

Table - 6: Pairwise comparisons of the experimental exercise heart rate with other experimental periods (resting and recovery).

Enclosed as Annexure 08

Data in Table 4 reveals that significant difference was observed within the groups i.e. before exercise (resting phase), during exercise (exercise phase), and after exercise phase (recovery phase) for a period of ten minutes and that the calculated F-value was 86.031 whereas tabulated F-value was 1.87. It further interpreted that there was a significant difference that exists and Post-hoc comparisons need to be done.

Pairwise comparisons are presented in Table 5 and 6. It clearly shows that a significant difference was observed among resting heart rate, exercise heart rate and recovery heart rates of 1 -10 min time period.

Discussion

The present study is an experimental research work and the main emphasis was to observe the immediate effect of single bout of aerobic dance on heart rate. In this study aerobic dance exercise was used as an exercise module, on a group of fifteen active male adults (age = 24.47 ± 1.03) with minimum six months aerobic dance experience. Results show that there is a significant change among pre, during and post exercise heart rate measurements. Heart rate which was 55.53 ± 7.75 beats/ minute in resting period,

Tremendously increased to 136.93±13.92 beats/minute with ten minutes aerobic dance exercise. And recovery heart rate was again recorded in 10th minutes, which came down to 65.26±6.04 beats/minute. Repeated measure of ANOVA highlighted a significant difference in recovery heart rates from one to ten minutes.

A study by Mohd Faridz Ahmad (2015) reported that aerobic dance exercise program improves cardiovascular fitness of middle-aged women (2).

Another study provides evidence that a structured dance program can improve different physical and psychological health status in orderly persons (3).

There is a study have also evidenced that aerobic dance is highly effective on cardiovascular fitness of sedentary women (6).

Therefore, in the present study our main objective was to observe the changes in heart rates and to see if they were significant, to establish aerobic dance exercise as an alternative activity for improvement of cardiovascular fitness.

Finally, it can be concluded that aerobic dance exercise is a type of moderate aerobic exercise which can be practiced for achieving cardiovascular fitness of the individual. Therefore, we can use this exercise for maintaining our general health as well as cardiovascular fitness.

Conclusion

After analyzing the results of this study, it seems that the aerobic dance exercise protocol shows a significant change in heart rate among pre, during and post exercise periods. Therefore, on the basis of this result, we can interpret that aerobic dance exercise is a valid mode of moderate exercise intervention to maintain cardiovascular fitness and health status. However, this is probably the first study which provides a scientific data and establishes the significance of aerobic dance exercise as a moderate exercise intervention.

Annexure

Annexure 01

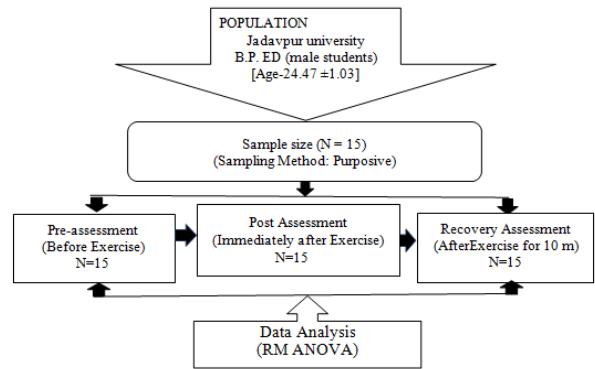


Fig. 1. The schematic model of the design of the study.

Annexure 02

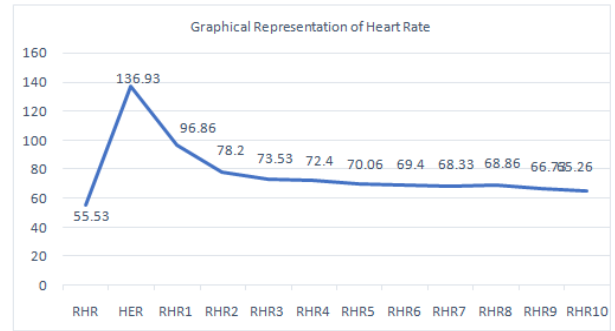
Table 1. Experimental sessions of continuous recording of the heart rate.

Resting heart rate assessment	Supine rest for 10 min
Exercise heart rate assessment	Immediate after ten min of exercise
Recovery heart rate/1 min assessment	Recovery heart rate/1 min
Recovery heart rate/2 min assessment	Recovery heart rate/2 min
Recovery heart rate/3 min assessment	Recovery heart rate/3 min
Recovery heart rate/4 min assessment	Recovery heart rate/4 min
Recovery heart rate/5 min assessment	Recovery heart rate/5 min
Recovery heart rate/6 min assessment	Recovery heart rate/6 min
Recovery heart rate/7 min assessment	Recovery heart rate/7 min
Recovery heart rate/8 min assessment	Recovery heart rate/8 min
Recovery heart rate/9 min assessment	Recovery heart rate/9 min
Recovery heart rate/10 min assessment	Recovery heart rate/10 min

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Annexure 03

Sl no	Dance steps	times	Total time
1	Hoping	30 seconds	Total time 10 minutes
2	Step touch	30 seconds	
3	Hoping	30 seconds	
4	V shape	30 seconds	
5	Hoping	30 seconds	
6	Forward kick	30 seconds	
7	Hoping	30 seconds	
8	Forward walk & knee bent	30 seconds	
9	Hoping	30 seconds	
10	Cross step	30 seconds	
11	Hoping	30 seconds	
12	Forward bent side to side	30 seconds	
13	Hoping	30 seconds	
14	Side step	30 seconds	
15	Hoping	30 seconds	
16	Forward punch & back kick	30 seconds	
17	Hoping	30 seconds	
18	Forward step & punch	30 seconds	
19	Hoping	30 seconds	
20	Hop with clap	30 seconds	



Annexure 06

Repeated measure ANOVA					
Source of variation	SS	df	MS	F- Ratio	CD
Total	98863.64	179		86.031	6.415
Between subject	12146.98	14	867.641		
Within subject	86716.67	165	525.556		
Treatment	74580.04	11	6780.004		
Residual or interaction	12136.62	154	78.809		

*. Significant at the 0.05 level
 $F_{.05} = (11,154) = 1.87$

Annexure 07

Measure: Heart rate of recovery period.						
(I)TIME	(J) TIME	Mean difference(I-J)	Std. Error	Sig. ^b	95% confidence interval for difference	
					Lower bound	Upper bound
Resting heart rate	Exercise HR	-81.400*	4.175	.000	-90.353	-72.447
	Recovery HR1	-41.333*	7.555	.000	-57.538	-25.129
	Recovery HR2	-22.667*	4.513	.000	-32.346	-12.987
	Recovery HR3	-18.000*	2.777	.000	-23.957	-12.043
	Recovery HR4	-16.867*	2.392	.000	-21.997	-11.736
	Recovery HR5	-14.533*	2.042	.000	-18.913	-10.153
	Recovery HR6	-13.867*	1.937	.000	-18.021	-9.713
	Recovery HR7	-12.800*	1.733	.000	-16.516	-9.084
	Recovery HR8	-13.333*	1.914	.000	-17.439	-9.228
	Recovery HR9	-11.200*	1.525	.000	-14.471	-7.929
	Recovery HR10	-9.733*	1.485	.000	-12.918	-6.549

- Based on estimated marginal means.
- *. The mean difference is significant at the .05 level.
- b. adjusted for multiple comparisons: Least significant difference (equivalent to no. adjustments)

Annexure 04

Sl.No	Variable – Heart rate (beats/min)	Mean Standard Deviation ±	N
1	Resting Heart Rate (RHR)	55.53±7.75	15
2	Exercise Heart Rate (EHR) (After 10 minutes)	136.93±13.92	15
3	Recovery Heart Rate 1 (RHR 1)	96.86±26.21	15
4	Recovery Heart Rate 2 (RHR 2)	78.20±15.75	15
5	Recovery Heart Rate 3 (RHR 3)	73.53±9.59	15
6	Recovery Heart Rate 4 (RHR 4)	72.40±10.41	15
7	Recovery Heart Rate 5 (RHR 5)	70.06±8.89	15
8	Recovery Heart Rate 6 (RHR 6)	69.40±8.64	15
9	Recovery Heart Rate 7 (RHR 7)	68.33±8.14	15
10	Recovery Heart Rate 8 (RHR 8)	68.86±6.95	15
11	Recovery Heart Rate 9 (RHR 9)	66.73±6.29	15
12	Recovery Heart Rate 10 (RHR 10)	65.26±6.04	15

Table 3. Descriptive statistics of the data.

Annexure 05

Annexure 08

Measure: Recovery heart rate						
I (Time)	J (Time)	Mean difference (I-J)	Std. Error	Sig. ^b	95% confidence interval for difference ^b	
					Lower bound	Upper bound
Exercise Heart Rate	Resting HR	81.400*	4.175	.000	72.447	90.353
	Recovery HR 1	40.067*	5.443	.000	28.393	51.740
	Recovery HR 2	58.733*	3.678	.000	50.845	66.622
	Recovery HR 3	63.400*	2.658	.000	57.699	69.101
	Recovery HR 4	64.533*	2.883	.000	58.349	70.717
	Recovery HR 5	66.867*	2.955	.000	60.529	73.205
	Recovery HR 6	67.533*	2.932	.000	61.244	73.823
	Recovery HR 7	68.600*	3.181	.000	61.776	75.424
	Recovery HR 8	68.067*	3.230	.000	61.139	74.994
	Recovery HR 9	70.200*	3.225	.000	63.283	77.117
Recovery HR10	71.667*	3.186	.000	64.834	78.499	

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

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