EFFECTS OF SIX-WEEK AEROBIC DANCE ON THE RESTING HEART RATE, BMI AND BLOOD GLUCOSE LEVEL OF OVERWEIGHT FEMALE ADMINISTRATIVE STAFF IN UNIVERSITY OF LAGOS

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Abstract

The purpose of the study was to determine the effects of six-week aerobic dance on the resting heart rate, Body Mass Index (BMI) and blood glucose level of overweight female administrative staff in University of Lagos. The experimental method was used for this study which utilized the pre-test post-test research design. A total of thirty-five (35) participants formed the sample for the study. They were selected using purposive sampling technique. The samples were selected from the University of Lagos community. Overweight middle-aged women were identified using their Body Mass Index. Thirty-five (35) overweight middle-aged women were selected randomly from the identified population into an experimental group and a control group. 16 participants formed the experimental group, while 19 formed the control group. A pre-test was conducted for the two groups on their BMI, resting heart rate and blood glucose level. The experimental group went through aerobic dance programme for a period of six weeks, while the control group were asked to continue with their daily routine. A post-test was conducted for the two groups after six weeks to determine the effects of six-week aerobic dance on BMI, resting heart rate and blood glucose level of overweight middle-aged women. Data from the experiment conducted was analyzed using the descriptive statistics of percentages, mean and standard deviation. While the hypotheses were tested using the inferential statistics of t-test at 0.05 alpha level. Three hypotheses tested were significant, which implies that six weeks of aerobic dance had a significant effect on the BMI, Heart Rate and blood glucose level of overweight middle-aged women. It is recommended that individuals should take part in aerobic dance 4 to 5 days in a week in other to eliminate cardiovascular risk factors.

Keywords: Aerobic dance, Blood Glucose, Body mass index, Middle Aged Women, Resting Heart Rate

Introduction

It is well known that being overweight is one of the first health problems leading to obesity. Literature has shown that overweight and obesity are among the most common and serious health problems in modern society. According to the World Health Organization (2000), there are about 1.6 billion overweight adults with a Body Mass Index (BMI) above 25 kg/m^2 worldwide. At least 400 million of them are obese, with a BMI above 30 kg/m^2. Body fat percentage, as well as BMI, have both been identified as factors responsible for the reduced physical fitness levels, among young populations (Artero, España-Romero, Ortega, Jiménez-Pavón, Ruiz & Vicente-Rodríguez, 2010).

Regular exercise is a valuable tool in easing the global burden of chronic diseases, including those associated with overweight and obesity (Bajpeyi, Reed, Molskness, Newton, Tanner, McCartney &Houmard, 2012). Nikolaidis, (2013) reported that regular exercise influences glycaemia and triglyceridaemia in healthy individuals. Church, LaMonte, Barlow and Blair, (2005) submitted that an

increase in physical activity level is beneficially associated with health with improvement in low blood pressure values, reduced insulin resistance, and normalization of lipid profile among men and women performing physical exercises.

Mak, Ho, Lo, Thomas, McManus, Day and Lam, (2010) observed that Baduanjin (and one of the most common, Chinese exercise consisting of eight types of body movements each focusing on different body part) improves lipoprotein-lipid profiles, cardiorespiratory fitness and body composition in healthy young women. It is known that elevated aerobic energy expenditure might be associated with a highly favourable stabilization of most known as traditional, as well as emerging, cardiovascular risk predictors. To corroborate this, Hashimoto, Hayashi, Yoshida and Naito, (2013) submitted that the exercise could modulate the blood lipid profile by decreasing plasma cholesterol, triglycerides, and low-density lipoprotein cholesterol concentration and increasing plasma high-density lipoprotein cholesterol concentration of non-athletes' participants compared to a group of no exercise. Moreover, Hurley (2016) reported the reduction in triglyceride concentration, but no change in total cholesterol or lipoprotein concentrations in blood of non-athletes participating in aerobic-type exercise training, as well as no changes in any lipids or lipoproteins in a group of inactive controls.

American Council on Exercise (2009) opined that aerobic exercise is a good body composition exercise that reduces body fat. Aerobics exercise of high intensity reduces more visceral fat than moderate-intensity exercise. Awopetu (2005) defined aerobic activities as a popular form of exercise that helps to improve body composition, muscular strength, endurance, flexibility and also increase cardiovascular strength. The more an individual engages in aerobics exercises, the better the body's metabolism will be able to use oxygen to generate energy. An aerobics workout should take place during a minimum of fifteen to twenty minutes, though it can be longer. Athletes are encouraged to maintain over half and up to eighty percent of their maximum heart rate during Aerobics exercise. After exercisers begin at a comfortable level, they often increase to a greater intensity. Each person's heart rate and tolerance level will differ on an individual basis.

According to Plowman and Smith (2007) many individuals today enrolled in a fitness class that utilizes aerobics principles. Many doctors have prescribed aerobics activities as a way to get healthier. For example, an intense aerobics workout can be very favourable to mental health by helping get rid of stress and also help reduce heart problems. It is highly recommended that most people take part in Aerobics exercise 3-4 days a week for 45 minutes a day. Ajiduah (1998) opined that Nigerians should realize that it is cheap to maintain a healthy and strong body than to maintain a sick and weak body in hospital. They must realize that one of the best ways to reduce the harmful effect of stress is exercise and to take part in sporting activities. Lack of physical activity and an uncontrolled diet cause excessive weight gain, which leads to obesity and other metabolic disorders. Studies have indicated that brisk walking and aerobics are the best methods for controlling and reducing weight and body mass index (Rosemary & Jill, 2006).

Aerobic dance are usually done with oxygen use and they can be performed indoor or outdoors. Aerobic dance could also be of high or low impact and this type of activity has been proven by several researches as beneficial to the overall health and wellbeing of individuals, especially overweight people as it helps to reduce excessive body weight and certain risk factors to hypertension, diabetics, among others. There is little research documented on the effects of aerobic dance on the body mass index, resting hear rate and blood glucose level of overweight female administrative staff. Therefore, the need to examine **the** effect of six-week aerobic dance exercise on blood glucose level, BMI and resting heart rate of overweight female administrative staff in University of Lagos.

Hypotheses

The following research hypotheses were raised for this study:

1. Six weeks aerobic dance will not have significant effect on the blood glucose level of overweight female administrative staff in University of Lagos.
2. Six weeks aerobic dance will not have significant effect on the body mass index of overweight female administrative staff in University of Lagos.
3. Six weeks aerobic dance will not have significant effect on the resting heart rate of overweight female administrative staff in University of Lagos.

Methodology

The experimental method was used for this study. The pre-test post-test control group research design was used for this study. This study was made up of one (1) experimental group (the Aerobic dance group) and one (1) control group. A pre-test was conducted for the two groups on their blood glucose level, BMI, and Resting heart rate. The experimental group went through aerobic dance programme for a period of six weeks, while the control group were asked to continue with their daily routine. A post-test was conducted for the two groups after six weeks to determine the effects of six-weeks aerobic dance on blood glucose level, BMI and Heart Rate of overweight female administrative staff in University of Lagos.

The population for this study comprised all overweight female administrative staff in University of Lagos. A total of thirty-five (35) participants participated in the study. They were selected through purposive sampling technique. The samples were selected from the University of Lagos. Overweight women were identified using their Body Mass Index. Women who had a BMI of above 30 were selected for the study. Thirty-five (35) overweight women were selected randomly from the identified population into an experimental group and a control group. 16participants formed the experimental group, while 19 formed the control group.

The following test and equipment were used in this study; Fasting Blood Sugar (Using *Omron* HGM-112 Glucometer), Resting Heart Rate (Using Omron Blood Pressure Monitor), Height (Using Stadiometer), Weight (Using a weigh Scale), Body Mass Index (Weight/Height^2) Kg/m^2, Music box (Aerobics Dance), Physical Activity Readiness Questionnaire, Informed Consent, Data entry form and

Writing Material. The test was conducted early in the morning, before the dance programme for the experimental group. It was conducted for the two groups before and after the six weeks duration.

A pre-test was conducted for the two groups (1 Experimental and 1 Control Group) on their blood glucose level, BMI, and Resting heart rate. The experimental group then went through aerobic dance programme for a period of six weeks, while the control group was asked to continue with their daily routine. The aerobics dance programme was carried out three times in a week for a total of 60 minutes for each session. The programme started with low intensity aerobics dance (for a week) then moved to moderate intensity aerobics dance (for two weeks) and high intensity aerobics dance (for three weeks) including warm up and cool down. A post test was conducted for the two groups after six weeks. Data from the experiment conducted was analysed using the descriptive statistics of frequency, percentages, mean and standard deviation. While the hypotheses were tested using the inferential statistics of t-test at a 0.05 alpha level.

Results

Table 1: Physical and Physiological Data of Respondents

Variables	N	Mean	S. D
Age (yrs.)	35	47.17	2.43
Height (cm)	35	160.19	6.82
Weight (kg)	35	92.48	9.75
Blood Glucose Level(mg/dl)	35	93.93	4.38
BMI (Kg/m^2)	35	31.09	3.18
Resting Heart Rate (bpm)	35	85.34	4.31

Table 1 show that the participants had a mean age of 36.17 years. The table also shows the mean height of participants as 160.19cm. It can also be observed from the table that the participants had a mean weight of 92.48kg, a mean blood glucose level of 93.93mg/dl, a mean BMI of 31.09kg/m^{2}and a mean resting heart rate of 85.34 beats per minute.

Hypothesis 1: Six weeks aerobic dance will not have significant effect on the blood glucose level of overweight female administrative staff in University of Lagos.

Table 2: Effect of Six Weeks Aerobic Dance on Blood Glucose Level

Experimental Group	Mean	N	S. D	Df	t-calc	t-crit	Remark
Glucose Level Pre-Test	95.37mg/dl	16	6.83	14	7.149	2.14	Significant
Glucose Level Post Test	90.41 mg/dl	16	9.78				
Control Group	**Mean**	**N**	**S. D**	**Df**	**t-calc**	**t-crit**	**Remark**
Glucose Level Pre-Test	94.68mg/dl	19	8.09	17	0.328	2.11	Not
Glucose Level Post Test	95.22 mg/dl	19	7.28				Significant

Table 2 above shows that the t-calc value of 7.149 is greater than the t-crit value of 2.14 at a 0.05 level of significance for the experimental group pre-test and post-test while the t-calc value of 0.328 is lesser than the t-crit value of 2.11 for the control group pre-test and post-test. Therefore, the null hypothesis is rejected. This implies that six weeks of aerobic dance has a significant effect on the blood glucose level of female administrative staff in University of Lagos.

Hypothesis 2: Six weeks aerobic dance will not have significant effect on the body mass index of overweight female administrative staff in University of Lagos.

Table 3: Effect of Six Weeks Aerobic Dance on BMI

Experimental Group	Mean	N	S. D	Df	t-calc	t-crit	Remark
BMI Pre Test	31.87 kg/m^2	16	2.72	14	3.091	2.14	Significant
BMI Post Test	26.04 kg/m^2	16	2.68				
Control Group	**Mean**	**N**	**S. D**	**Df**	**t-calc**	**t-crit**	**Remark**
BMI Pre Test	33.34 kg/m^2	19	4.81	17	1.309	2.11	Not
BMI Post Test	33.09 kg/m^2	19	6.63				Significant

Table 3 above shows that the t-calc value of 3.091 is greater than the t-crit value of 2.14 at a 0.05 level of significance for the experimental group pre-test and post-test while the t-calc value of 1.309 is lesser than the t-crit value of 2.11 for the control group pre-test and post-test. Therefore, the null hypothesis is rejected. This implies that six weeks of aerobic dance has a significant effect on the body mass index of overweight female administrative staff in University of Lagos.

Hypothesis 3: Six weeks aerobic dance will not have significant effect on the resting heart rate of overweight female administrative staff in University of Lagos.

Table 4: Effect of Six Weeks Aerobic Dance on Resting Heart Rate

Experimental Group	Mean	N	S. D	Df	t-calc	t-crit	Remark
Resting H.R Pre-Test	88.39 bpm	16	0.93	14	3.461	2.14	Significant
Resting H.R Post Test	81.24 bpm	16	0.84				
Control Group	**Mean**	**N**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Resting H.R Pre-Test	86.09 bpm	19	0.31	17	1.349	2.11	Not
Resting H.R Post Test	85.67 bpm	19	0.18				Significant

The table above shows that the t-calc value of 3.461 is greater than the t-crit value of 2.14 at a 0.05 level of significance for the experimental group pre-test and post-test while the t-calc value of 1.349 is lesser than the t-crit value of 2.11 for the control group pre-test and post-test. Therefore, the null hypothesis is rejected. This implies that six weeks of aerobic dance has a significant effect on the resting heart rate of female administrative staff in University of Lagos.

Discussion of Findings

The results of hypothesis testing on effects of aerobic dance on the blood glucose level of overweight female administrative staff in University of Lagos. Using the inferential statistics of paired sample t-test concluded that six weeks of aerobic dance has a significant effect on the blood glucose level of overweight female administrative staff in University of Lagos.

This finding is in line with Ezema, Onwunali, , Ezugwu, Amaeze, and Nwankwo, (2014) who in their study of 77 subjects with type 2 diabetic in the Hatha yoga exercise group were matched with a similar number of type 2 diabetic patients in the conventional aerobic exercise and control groups. Fasting blood glucose (FBG) was determined at baseline and at two consecutive 3 monthly intervals. They reported a significant reduction in the concentrations of FBG in the Hatha yoga and conventional aerobic exercise groups after 6 months. FBG decreased by 29.48% and 27.43% respectively (*P*< 0.0001). They demonstrated the efficacy of Hatha yoga exercise and conventional aerobic exercises on in patients with type 2 diabetes and suggest that Hatha yoga exercise and conventional aerobic exercise may have therapeutic preventive effects on diabetes mellitus.Gulve, (2008) who discussed that aerobic exercise facilitates the clearance of glucose from the circulation and metabolism of glucose in exercised skeletal muscle. Specifically, blood glucose levels are lowered during and immediately after exercise by glucose oxidation and improved insulin sensitivity. It also enhances the ability of insulin to activate glucose transport into exercised muscles facilitating re- synthesis of glycogen, an effect lasting for hours following exercise cessation. Aerobic exercise stimulates blood glucose utilization during and after exercise and exercise induces a substrate shift between free fatty acids, glycogen stores, and circulating glucose; exact balance varies with duration and intensity of physical activity. With repeated bouts of

aerobic exercise, the recruited muscles undergo adaptations that improve synthesis of key components (intracellular transporters and enzymes) needed for glucose uptake and metabolism. Aerobic exercise at low to moderate intensities results in decreased insulin secretion during exercise and a decline in blood glucose and insulin levels. Glucose uptake is stimulated by previously activated muscle fibres when insulin sensitivity has been enhanced by exercise (Gulve, 2008).

The result of hypothesis testingon effects of aerobic dance on the body mass indexof overweight female administrative staff in University of Lagos. Using the inferential statistics of paired sample t-test concluded that six weeks of aerobic dance has a significant effect on the body mass index of overweight female administrative staff in University of Lagos.

This finding correlates with that ofAbass and Moses (2013) who discussed that exercise reduces the body mass index and percentage body fat of individuals. They also showed a decrease in %BF and BMI due to the trainings which indicate ability of the trainings to attenuate unset of excess accumulation of adipose tissues. Rosemary and Jill, (2006) also discussed that brisk walking and aerobics are the best methods for controlling and reducing weight and body mass composition. This finding also agrees withMariotti, Rossato, Fröehlich and Limberger (2013) who believed other forms of exercise may have a greater impact on body mass index of individuals. For example, emerging research examining aerobic exercise indicates that it may be more effective at reducing subcutaneous and abdominal body fat than other types of exercise. The mechanisms underlying the fat reduction induced by aerobic exercise, however, are undetermined. Regular aerobic exercise has been shown to significantly increase both aerobic and anaerobic fitness. Aerobic exercise also significantly lowers insulin resistance and results in a number of skeletal muscle adaptations that result in enhanced skeletal muscle fat oxidation and improved glucose tolerance. Aerobic exercise programs have been reported to improve body composition, lipid profile and lipid utilization in the body of normal and obese subjects (*Blaak, 2002*). The result of hypothesis testingon effects of aerobic dance on the resting heart rateof overweight female administrative staff in University of Lagos. Using the inferential statistics of paired sample t-test concluded that six weeks of aerobic dance has a significant effect on the resting heart rate of overweight female administrative staff in University of Lagos.

This finding **i**s in line with Fein (2007) who submitted that aerobics training consists of lengthy duration and low intensity which significantly helps in reducing an individual's resting heart rate. Some popular aerobics activities include aerobics dance, biking, cross-country skiing, jogging, walking, and swimming. Most fitness centers also host courses to target certain areas, help participants lose weight, or instruct a specific method of working out. Consistent Aerobics exercise is extremely beneficial to the human body. The consistent breathing strengthens the lungs, keeps the heart at maximum efficiency, and enlargesthe heart muscle. This allows it to pump more blood with less effort, so it reduces the

resting heart rate. A healthy heart benefits the body's blood circulation and blood pressure. This naturally increases the red blood cell count, which helps the blood transport oxygen throughout the body. Over time, muscles will build endurance because they will be increasing their storage of fats and carbohydrates for energy. Muscles will be able to train harder and for longer periods of time (Kelly, 2012).

Recommendations

The following recommendations were made from the results in the study and they include;

1. Female administrative staff should embrace aerobic dance in order to eliminate risk of getting excessive high blood glucose level.

2. Aerobic dance exercise should be introduced to sedentary overweight women in order to promote their fitness level and reduce body fat.

3. Aerobics classes should be introduced in various local government areas to encourage women participation in aerobic dance exercise.

4. Women should participate in aerobic dance at least three times in a week.

5. Introduction of aerobic dance in weekly work routine can eliminate risk of getting cardio vascular problems by improving the cardio respiratory system.

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