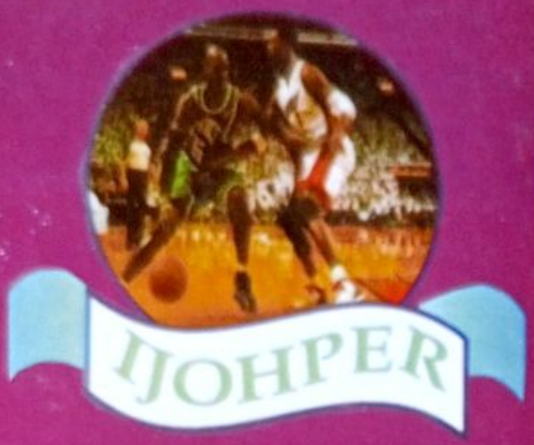


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EFFECTS OF EXERCISE DURATION ON BODY COMPOSITION OF INACTIVE OBESE FEMALE UNDERGRADUATE STUDENTS IN UNIVERSITY OF ILORIN, NIGERIA

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Abstract

Duration is an integral component of exercise prescription that must be considered in achieving a dose response health and fitness benefits from exercising. Timing is a major factor that determines effective participating in exercise. Therefore, the objective of the study was to find out the effect of 20 and 30 minutes of jogging on Weight, BMI, Percent Body Fat and Waist/Hip Ratio. Experimental research design was adopted for the study. Multi stage sampling procedure was used to select 60 female participants for this study. Standardized instruments were used for data collection. One hypothesis was postulated for this study. Data were analysed using descriptive statistics and inferential statistics of Analysis of Variance (ANOVA). The hypothesis was tested at .05 level of alpha. The study found that; no significant difference between the two experimental groups based on body composition variables of the participants. This means that 20 and 30 minutes of jogging had the same effect on the body composition variables of the participants. There was also no significant difference between the experimental groups and the control group. This means that the treatment was not effective on the experimental group's body composition variables. It was concluded that 20 and 30 minutes of the same intensity of jogging tend to yield similar results on body composition variables of these participants. Therefore, there is need to engage in various aerobic exercise and female young adults in Ilorin should include healthy dietary pattern in their lifestyle as exercise alone may not give desired result within 0-6 weeks of aerobic exercise.

Keywords: Body Composition, Health, Obese, Female Undergraduate and Exercise Duration

Introduction

Healthy living and general physical wellness depends on individuals' lifestyle and to a large extent determines the quality of life each individual will enjoy in his/her life time (Raija, 2010). Example of such lifestyle includes engaging in physical exercise, proper dieting and adequate rest. Unfortunately, busy work schedules including other tasks towards achieving the comforts of life continuously, drives individuals from creating time to adopt a profitable lifestyle of regular exercise, thereby, resulting in sedentary lifestyle which increases the risk of body composition-related ailments (Biswas *et al.,* 2015). Regular exercising at least within 60-90 minutes a week will promote cardiovascular health and minimize the risks of suffering of non-communicable diseases like diabetes, stroke, rheumatoid arthritis to mention a few.

Mach *et al.* (2005) explained that to achieve a healthy living, exercise duration is a key factor to be considered. It is simply the time spent during any physical exercise. Gary (2012) added that exercise duration is the time used for aerobic/anaerobic workout which may range from

8 to 60 minutes usually with an inverse relationship between duration and workout intensity. The time spent in one session of aerobic workout is known to be duration of exercise (Andrea, 2014). Based on the recommendation of America College of Sport Medicine (ACSM), for adults to derive health benefits, they should either increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate and vigorous-intensity activity (Kaminsky, 2005; John, 2015).

According to Dunstan and Owen (2012), Non-communicable Diseases (NCDs) are highly attributed to physical inability. Physical inability directly affects the body composition by exposing individuals to various body composition related health challenges, which are the major cause of mortality worldwide. More than 36 million people die annually from NCDs (63% of global deaths), including 14 million people who die too young before the age of 70. More than 90% of these preventable premature deaths from NCDs occur in low and middle-income countries. Most premature deaths are linked to common risk factors such as physical inactivity, unhealthy diet, and inability to have adequate rest (Karimé, Jorge, & José 2017). In Africa, over one third of African women and a about quarter of African men are suffering from either over weight or over fatness related diseases and based on this, the World Health Organization (WHO) predicted a rise to 41% and 30% for women and men respectively in the next ten years (Adefule, Adu, Ogundahunsi, Caxton-Martins, Otulana & Adesanya (2014).

Robart and Barnard (2005) considered body composition as a systematic way of measuring the amount of fat versus lean muscle tissue in the human body. This is usually expressed as a percentage of a person's total weight. Body weight alone is not a clever indicator of good health because it does not distinguish how many pounds or kilograms are from lean body mass (Robart & Barnard, 2005). Body composition is more preferable since it is a very vital and cogent measurement of health and fitness level for everybody irrespective of status, age and gender (Hewitt, 2007). A healthy adult male's body should have between 6 and 24% fat and a female should have 14-31% and levels significantly above these amounts may indicate excess body fat. Findings reveals that excessive fat in the body system increases health risks and could lead to health problems such as diabetes mellitus, hypertension, elevated blood Lipids (fat and cholesterol), cardiovascular related disease, respiratory dysfunction, gall bladder disease, and some joint disease are all related to obesity (National Cancer Institute, 2010).

Karimé *et al.* (2017), noted that the prevalence of overweight and obesity among adults all over the world is becoming alarming and many people die each year from overweight and obesity related disease (high blood pressure, diabetes, heart failure among others) as a result of physical inactivity. In 2014, over 1.9 billion adults aged 18 years and above were overweight. Of these over 600 million adults were obese. Overall, about 13% of the world's adult population (11% of men and 15% of women) was obese in 2014 while 39% of adults aged 18 years and over (38% of men and 40% of women) were overweight. The worldwide prevalence of obesity more than doubled between 1980 and 2014 (WHO, 2016).

Numerous studies (Biswas, Faulkner, Bajaji, Silver, Mitchell & Alter, (2015; WHO, 2010; Karimé *et al.*, 2017) have shown that inactivity is the most important factor responsible for this disease and can be easily prevented by being active physically. Physical activity specifically exercise has been noted as one of the most suitable ways to prevent and control overweight and obesity. WHO (2016) defined overweight and obesity as abnormal or excessive fat accumulation that may impair health in several ways. Kaushik, Mithu & Ashish (2007), added that obesity is a disease in which excess body fat has accumulated such that health may be adversely and severely affected. The cause of overweight and obesity can be related to two major factors which are dietary and inactive lifestyle (sedentary) factors. The fundamental basis is an imbalance between energy intake and energy expenditure. Overweight and obesity caused by lack of physical activity can be avoided via regular physical exercise which will in turn promote physical fitness. Physical exercise is physical activity that is planned, structured, and repetitive for the purpose of conditioning the body (Ravikiran, Swapnali, Anitha & Chandrakala 2012).

Overweight is a Body Mass Index (BMI) greater than or equal to 25 while obesity is BMI greater than or equal to 30. BMI gives the most useful population-level measure of overweight and obesity for all adults regardless of gender and age. Gill, King and Caterson (2005) corroborated that obesity is an excessive accumulation of fats in the adipose tissue which in turn leads to adverse health consequences. The measurements of Percent Body Fat (PBF) and BMI are the commonly used methods for determining obesity. BMI is the simpler of both methods and commonly used measurement to estimate the ratio of body weight to body height. BMI is calculated by dividing a person's weight in kilograms by the square of his or her height in meters (National Cancer Institute, 2010).

Overweight/over fatness and obesity are mostly caused by sedentary behaviour. Sedentary behaviour is referred to as any waking behaviour characterized by an energy expenditure less than or equal to 1.5 metabolic equivalents, resting or conformed style of living. Sedentary behaviour among the female undergraduate students of Nigeria ranges from prolonged sitting in lecture rooms to lack of participation in sports, physical exercise, long strolling/walking among others (Fariola & Bazan, 2011).

Participating in aerobic exercise and to use exercise as a preventive measures for body composition related conditions among the university students has not been encouraging, hence physical exercise and fitness are considered key factors affecting overall risk of non-communicable diseases (Adewale, Suleiman, Adetoyeje, & Babatunde 2017). The demand at tertiary institutions has been burdensome mostly in this 21st century. Lecture timing, various forms of school assignments and domestic chores are part of the depriving factors limiting people most especially the female counterpart from active participation of exercise. However, the interest is there as it is observed that most weekends young female adults come out to jog by the road side, but the weekend exercise is perceived not enough to achieve their desired goals ranging from weight control to general fitness. Therefore, making out required time, frequency and intensity for exercising are discouraging factors to the people.

Many research works, organizations and associations suggests at least 30 minutes of moderate intensity aerobic exercise mainly for health purposes (ACSM, 2006) and World Health Organization (WHO, 2005). With the assumption that most people love exercising in Nigeria but time is one of the discouraging factors, therefore, this research work seeks to verify the effect of 20 minute moderate intensity exercise compare to the 30 minutes of moderate intensity exercise on the body composition of inactive obese female undergraduate students of university of Ilorin.

Objectives of the Study

The objective of this research work is to investigate if 20 minutes of moderate intensity aerobic exercise could be substituted for the recommended 30 minutes moderate intensity aerobic exercise which is the recommendation of (ACSM, 2006; WHO, 2005) for body composition fitness in order to mediate the effect of over fat or obesity.

Research Question

What is the effect of 20 or 30 minutes of moderate aerobic exercise on the body composition variables BMI, percent body fat and waist/hip ratio?

Hypothesis

There will be no significant difference between the effect of 20 and 30 minutes of six weeks moderate intensity aerobic exercise on body composition variables BMI, percent body fat and waist/hip ratio among the female undergraduates of university of Ilorin.

Methodology

The pre-test and post-test experimental research design consisting of three groups (one control group and two experimental groups) was used for the study. The population comprised of all 15,025 registered female undergraduate students from the 15 Faculties of University of Ilorin 2017/2018 academic session (University of Ilorin, 2017). Multistage sampling procedure was used to select the participants for the study. Stage one, out of the 15 Faculties in University of Ilorin, there are eight (8) Faculties in main campus with more than three (3) Departments and have four academic years only, (100 level to 400 level). The remaining seven (7) Faculties are Faculties who are either not in main campus, have less than three (3) Departments or more than four academic years (500 or 600 level). Therefore, in order to maintain homogeneity of respondents and have easy access to participants, the eight (8) Faculties in main campus with more than three (3) Departments and just four academic years (100-400 level) were purposively selected for the study based on their uniform features. The total number of female students in the selected eight Faculties was 12,433. Stage two, simple random sampling technique of fish bowl method was used to select four (4) Faculties from the purposively selected eight (8) Faculties. This method allow unbiased selection of the Faculties whereby the names of the (8) Faculties were written in 8

pieces of paper and well folded up, four out of this 8 folded pieces of paper where picked randomly by another person. The picked faculties had 8052 total number of female students. Third stage, simple random sampling technique of fish bowl method was also used to select three Departments each from the selected Faculties. The total numbers of female students in these departments were 4894 as at the time of this study.

This study focused on female young adults who are students and within the age of 20-35 years, this age bracket is assumed to be more active in the labour market and is mostly occupied with domestic chores thereby given them little or no time for exercising especially in Nigeria (Isaac & Oyeniyi, 2012). For this reasons 300 and 400 level are the assumed most appropriate level to find the suitable participants for the study. Therefore purposive sampling technique was used to select 1341 female participants who were in 300 and 400 level from the twelve (12) selected Departments. Since the study focused on some specific features of the participants which includes, age group 20-35 years, BMI specification of 25 and above and physical activity level which is relatively non-active individual. A researcher's structured questionnaire was distributed to all the 1341 female participants in 300 and 400 level in order to elicit demographic information such as; name, age, athlete or non-athlete, height, weight, physical activity level using 655 + (4.3 × weight in pounds) + (4.7 × height in inches) - (4.7 × age in years) and medical history that could help the researcher in the choice of suitable participants for the study. The collation of the information gathered from the questionnaire enabled the researcher to select the required participants for the study. Only those who met the inclusion criteria which were not physically active within age 20-35, 25 BMI and above were chosen as the final participants for the study. The total number of 60 female participants was finally used for the study. Lastly, systematic sampling technique was used to classify the participants into three groups (experimental group A, B and control group C). The participants were all asked to pick a number from 1-3 where all one (1) fell to group A, two (2) group B and three (3) group C (control group). This method allowed fair distribution of participants into the three (3) groups.

Aerobic exercise of jogging only was used as the treatment. The participants warmed up for 5 minutes before the commencement of the treatment. Each group jogged at same intensity (moderate). The treatment took place in the morning and starts between 6:00AM-7:00AM it lasted for six weeks of three days per week. Participants were asked to maintain their daily lifestyle without any extraneous factors such as nutritional change during the six weeks of the study.

The instruments and instrumentation used were: Digital weight scale (14192-398a - Constant) was used to measure the weight of the participants. Each participant was weighed in light clothing and without footwear, with the participant standing on the weighing scale platform erect and feet together. The reading was recorded to the nearest 0.01kilogram (Kg). A horizontal meter rule calibrated in meters was used to determine the height. The reading was recorded to the nearest 0.01 meter (m). The height was measured without footwear, hats and scarves. The participant stood in anatomical position facing the meter rule of the scale. The horizontal bar (pointer) on the ruler was made to touch the head

without exerting pressure. The readings from the height and weight were calculated using the equation weight (Kg) divided by the square of the height in meter (M) to calculate the body mass index. As represented by the equation Weight (Kg) / Height^2 (M). University of Ilorin oval shaped international track was used. It is well measure and demarcated with accuracy of distance. (Genius - United Kingdom) calibrated in seconds and minutes was used to determine all time-dependent tests.

A non- stretch measuring tape calibrated in centimeters and meters was used to measure waist/hip circumference. Measurements will be to the nearest 0.1m (1cm). Waist circumference was measured at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest using a stretch-resistant tape while hip circumference was measured around the widest portion of the buttocks, with the tape parallel to the floor. The participants wore light clothing, stand with feet close together, arms at the side and body weight evenly distributed. The participants were relaxed, and the measurements were taken at the end of a normal expiration. Each measurement was repeated twice, in a situation where the measurements were within 1 cm of one another, the average was calculated. Percent body fat was computed using the technique described by livestrong.com (2014) to estimate body fat percentage (1.20 x BMI) + (0.23 x age) – (10.8 x gender) – 5.4.

Results

The analysis of the data descriptive statistics of mean and standard deviations and inferential statistics of the one-way Analysis of Variance (ANOVA) was used to test the differences. Scheffe post hoc test was used to identify the exact group with differences.

Table 1: Descriptive and Inferential Statistics for Pretest Data on Body Composition Variables (N=60).

Variables	20 min. grp $\bar{X} \pm SD$	30 min. grp $\bar{X} \pm SD$	Control grp $\bar{X} \pm SD$	F-ratio	Sig.	Rmk
BMI (kg/m^2)	28.37 ± 2.10	27.81 ± 3.25	27.42 ± 1.92	.76	.472	NS
Weight (kg)	74.44 ± 7.50	72.39 ± 7.30	73.85 ± 5.53	.43	.653	NS
Waist/Hip Ratio	0.79 ± 0.05	0.77 ± 0.05	0.76 ± 0.06	2.39	.101	NS
BF (%)	34.74 ± 2.62	34.05 ± 4.02	33.60 ± 2.21	.73	.486	NS

$p < 0.05$, S=Significant, NS=Not Significant.

Table 1 shows the mean, standard deviation and ANOVA analysis of the participants at the pre-test stage. The analysis shows there was no significant difference between the 3 groups at baseline measurements. This table shows that the participants are overweight, over fat or obese.

Table 2: Descriptive and Inferential Statistics for Post-Test Data of Body Composition Variables (N=60).

Variables	20 min. grp X and SD	30 min. grp X and SD	Control grp X and SD	Cal. F ratio	Sig.	Rmk
BMI (kg/m^2)	27.49 ± 2.11	26.89 ± 3.18	27.50 ± 1.92	.371	.692	NS
Weight (kg)	72.17 ± 7.48	70.12 ± 7.21	74.12 ± 5.62	1.591	.213	NS
Waist/Hip Ratio	0.76 ± 0.05	0.74 ± 0.05	0.76 ± 0.05	.658	.522	NS
BF (%)	33.84 ± 2.75	32.98 ± 3.93	33.70 ± 2.20	.421	.658	NS

$p < 0.05$,=Critical F-ratio=3.17

Table 2 shows the mean, standard deviation and ANOVA analysis of the participants at the post-test data stage. The analysis revealed that there was no significant difference between the two experimental groups and the control group.

Table 3: Descriptive and Inferential Statistics for Week 0-6 Data on Body Composition Variables (N=60)

Variables		20 min. grp X and SD	30 min. grp X and SD	Control grp X and SD	F-ratio	Sig.
BMI (kg/m^2)	Week 0	28.37 ± 2.10	27.81 ± 3.25	27.42 ± 1.92	.761	.472
	Week 2	28.38 ± 2.14	27.88 ± 3.23	27.44 ± 1.90	.749	.478
	Week 4	27.99 ± 2.14	27.47 ± 3.20	27.68 ± 1.96	.209	.812
	Week 6	27.49 ± 2.11	26.89 ± 3.18	27.50 ± 1.92	.371	.692
Weight (kg)	Week 0	74.44 ± 7.50	72.39 ± 7.30	73.85 ± 5.53	.430	.653
	Week 2	74.46 ± 7.57	72.52 ± 7.36	74.01 ± 5.67	.398	.674
	Week 4	73.45 ± 7.50	71.59 ± 7.29	74.04 ± 5.66	.627	.538
	Week 6	72.17 ± 7.48	70.12 ± 7.21	74.12 ± 5.62	1.591	.213
Waist/Hip Ratio	Week 0	0.79 ± 0.05	0.77 ± 0.05	0.76 ± 0.06	2.391	.101
	Week 2	0.78 ± 0.05	0.75 ± 0.05	0.76 ± 0.06	1.435	.247
	Week 4	0.77 ± 0.05	0.74 ± 0.05	0.76 ± 0.06	1.035	.362
	Week 6	0.76 ± 0.05	0.74 ± 0.05	0.76 ± 0.05	.658	.522
Body Fat (%)	Week 0	34.74 ± 2.62	34.05 ± 4.02	33.60 ± 2.21	.732	.486
	Week 2	34.76 ± 2.67	34.13 ± 3.99	33.63 ± 2.20	.718	.492
	Week 4	34.29 ± 2.63	33.64 ± 3.96	33.76 ± 2.16	.266	.767
	Week 6	33.84 ± 2.75	32.98 ± 3.93	33.70 ± 2.20	.421	.658

$p < 0.05$

Table 3 reveals the rate of progression across the groups for the period of six weeks. It is shown in the table that there is no significant difference between the two experimental groups (20 and 30 minutes) as indicated by the mean values and standard deviation. The table also revealed that there is no significant difference between the pre and post data of the experimental and control group.

Discussion of Finding

The results from table 2 indicated that the effect of exercise on both experimental groups' body composition is same and there is no significant difference in the result compared to the control group. This implies that jogging for either 20 minutes or 30 minutes would the same response to body composition within the time frame of six weeks. When combined with lifestyle modifications such as healthy choice of nutrition, adequate sleep and rest, 6 weeks routine jogging exercise programme might be sufficient to reduce the risk associated with excess body fat especially for clients who are beginners in an exercise therapy programme. The study conformed to the findings of Phillipa, Mark, Neil, Robert, and John (2009), which found out that exercise alone, is not sufficient to gain the required healthy body composition variables but with the help of change in lifestyle and dietary or nutritional pattern would assist. Adeoye, Dominic and Yusuf (2017) explained that the benefits in living an active lifestyle will not only reduce the risks of being obese or over fat and the health complications attached to over fat/obese conditions but it will in turn improve the cardiovascular health of the individual.

Considering body weight, BMI and waist hip ratio on table 3, slight changes were observed. There was an increase in the value of the body weight and BMI among the respondents of both experimental groups at weeks 2 and decreased at weeks 4-6. This could be as a result of increase in muscle mass within the period of week 0-2. This is in line with the assertion of Dominic, Onifade and Lajide (2010) and Talabi, Emiola and Ogunsakin (2003) that response to physical activities includes increase in muscle mass, reduction in body fat and may in turn lead to increase in body weight since muscle mass is known to weigh more than the fat mass. However, though minimal, there was a consistent reduction in waist-hip ratio from weeks 2-6. This has implication for reduction in abdominal adiposity (fat) which is a major indicator of cardiovascular health status. It could be deduced therefore that the six weeks jogging programme that the participants were exposed to had effect on the reduction of cardiovascular disease risk. Agrawal (2004) affirmed that BMI and WHR are one of the major body composition variables that need to be monitored per time. Agrawal (2004) found out that people with high value of BMI (25 and above) and WHR are highly prone to arthritis and high blood pressure and the best way to avoid and control this morbidity indices is through change of lifestyle from being sedentary to becoming physically active as well as change in dietary pattern.

Foster-Schubert, Alfano, Duggan, Xiao, & McTiernan (2011) corroborated that exercise and diet is the best way to control and help to prevent non-communicable related disease that could be accrued from abnormal body composition value in the body. Foster-Schubert *et al.* (2011) added that the imbalance between declining energy expenditure due to physical inactivity and high consumption of unhealthy diets (excess calories whether from sugar, starches or fat) is the main determinant of the body composition epidemic. Over fat and obesity contribute to a large proportion of NCDs, reducing life expectancy and severely affecting quality of life. Increasing physical activity with reducing intakes of foods high in fat

and drinks high in sugars can prevent unhealthy weight gain and controlled body composition variables. (Foster-Schubert *et al*, 2011).

Conclusion

The facts from this study have shown that to achieve a desired body composition, the use of one form of aerobic exercise (jogging) alone is not sufficient irrespective of the duration either 20 or 30 minutes spent exercising, however there is need to change or have an adjustment in the dietary/nutritional habit. For a good and healthy body composition, duration of exercise programme should be at least 20 minutes with a frequency of 3 or 4 times a week. The intensity of the exercise should be moderate and proper diet monitoring should be employed.

Recommendation

Based on the findings of this study, it is therefore, suggested that people who are obese, over fat, and overweight should not just participate in aerobic exercise but also include a healthy dietary change in their lifestyle plans. Also, fitness instructors should not strain obese people for a long period of time, 20 minutes of active workout is as good as 30 minutes.

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