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EFFECTS OF AEROBIC EXERCISE ON THE ECG CHEST LEADS, PULSE RATE AND BLOOD PRESSURE OF OBESE UNDERGRADUATE STUDENTS OF UNIVERSITIES IN RIVERS STATE OF NIGERIA

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ABSTRACT

The purpose of this study was to determine the effects of aerobic exercise a stress test, on the ECG Chest leads, Pulse rate and Blood Pressure of obese undergraduate male and females. Sixty-eight obese undergraduate students were purposively and randomly selected from three universities in Rivers state comprising twenty-seven males and forty-one females for the study. The study adopted the pre-test post-test randomized group study design. A standard informed consent was used to seek their voluntary consent to participate in the study. Descriptive statistics were used to answer the research questions while the analysis of covariance (ANCOVA) was used to determine the level of significance at 0.05. (1) In the male, significant decreases were observed in V1 and V2 while V3 and V6 were not significantly decreased. V2 and V4 were significantly increased. In the female VI significantly decreased while V3 and V5 were not. On the other hand, V2, V4 and V6 were significantly increased. (2) Both male and female heart rates showed significant increases. (3) Significant increased were record in systolic male and female but a non-significant dropped was seen in the female. Base on this outcome, the researcher recommended close monitoring of obese student before physical exercise are embark upon. It was also suggested that other aspects of the study be replicated in other parameters as well as categories of participants.

Keywords: Chest leads, heart rate, blood pressure, aerobic exercise and obesity.

Introduction

Obesity according to Sweetney (2007) is a medical condition in which excess body fat has accumulated to the extent that it may have negative effect on health, leading to reduced life expectancy and increased health problems. Also, Drenick, Bale and Johnson (2001) stated that in advanced countries, people are considered obese when their body mass index (MBI), a measurement obtained by dividing a person's weight by the square of the person's height exceeds 30KG/$M^{2,}$ with the range 25-30KG/$M^{2,}$ are defined as overweight. According to WHO (2000) obesity increases the likelihood of various diseases, particularly heart disease, type2diabetes, obstructive sleep apnea, certain types of cancer, and osteoarthritis. Sweetney (2007) stated further that obesity is most commonly caused by a combination of excessive food energy intake, lack of physical activity, and genetic susceptibility, although a few cases are caused primarily by genes, endocrine disorders and medications especially in psychiatric illness. Evidence to support the view that, some obese people eat little yet gain weight due to slow metabolism is limited. On the average people have greater energy expenditure than their counterparts due to the energy required to maintain an increased body mass(Froelicher and Myers, 2000).

The electrocardiogram (ECG) is the records of electrical activities of the heart.

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The Limb Leads, the Chest Leads, the Augmented Leads, Lead Segments and Leads Intervals are categories of ECG cardiovascular variables that are prone to variations under physical activities. These waves measured in millimeters and seconds are the outcome of impulses generated as the heart contracts and is examined closely in the study.

Average resting Heart Rate is 72-80 beats per minute in a female and *64 -72* beats per minute in a male. It rises to as high as 160 b/pm in a fetus. The more physically fit the individual, the heart rate tends to be slower. A well- trained athlete can have a resting rate as low as 40 beats per minute, but the hearts stroke volume is higher, thus the cardiac output stays adequate. In healthy people, a resting heart rate less than 60 b/pm (bradycardia) is a sign of good conditioning. On the other hand, tachycardia (a resting heart rate faster than 100 b/pm) is a bad sign, and might incline the heart towards ventricular fibrillation (Marcelo,2012).

Blood Pressure according to Jouven (2005) is the force exerted against the walls of the blood vessels. It is measured in millimeter per mercury (mmHg). There are two methods of measuring blood pressure. The direct and the indirect methods. The indirect method
requires the use of cannulas inserted directly into the blood vessels to determine blood pressure on a mercury manometer. It is only practicable in lower animals. The indirect method is the clinical method in humans and was used for this study.

Generally**, s**trenuous exercise is a severe test of homeostasis. Oxygen consumption and carbon dioxide production can increase to 10 times normal, mostly due to increased oxygen demand by the muscles (Shepard, 2009). Accordingly Yan et al, (2013) illustrated that, if we were insects, oxygen could diffuse directly to tissues via the tracheal tubes. But because we depend on our circulatory system to deliver oxygen to our tissues, this large increase in gas exchange is a circulatory system story. According to Guyton (2006), blood flow to exercising muscles increases from about 1 L/min at rest to over 20 L/min. This tremendous increase in flow is called exercise hyperemia. Exercise hyperemia comes about mainly because the muscle capillary beds (normally about 20-25% open) all open up. This dramatic change is caused by local adaptation. While resting muscles are high in oxygen and low in carbon dioxide, most precapillary sphincters are contracted. However, when the muscle start consuming oxygen, the precapillary sphincters open and blood surges into all the muscle capillaries (Collis et al, 2014).

According to Laughlin (2009), a poorly-conditioned, sedentary person might only be able to increase his oxygen consumption 3 times (rather than 10 times in the trained athlete), mainly because of the circulatory system that can't carry as much blood to the muscles. This tremendous increase in oxygen consumption and carbon dioxide production has dramatic consequences for the circulatory system. Heart rate can triple, mainly because of an increase in heart rate, cardiac output increases by 5 times, or up to 7 times in the trained athlete (Shepard, 2009).

This work looked at the effects of aerobic exercise on the ECG limb leads, pulse rate and blood pressure of obese and largely sedentary undergraduate male and female students of universities in Rivers State of Nigeria. Specifically, the cycling types of aerobic exercise was utilized among other common aerobic exercises like: jogging, brisk walking, swimming, laps, lifting training, etc. This was because it is more specific to the target of the study. Aerobic exercise according to Okura and Tunaka (2005), can consume body weight loss effect. They went further to state that, several studies suggested that aerobic exercise is the most effective strategy to prevent and treat obesity and its co-morbidities.

Statement of the Problem

Lack of exercise causes muscles atrophy: that is shrinking and weakening of the muscles and accordingly increase susceptibility to physical injury(Amy,

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Janssen and Mark, 2008). Physical fitness according to Lopez et al, (2009) is associated with immune system's functions; a reduction in physical fitness is generally accompanied by a weakening of the immune system. Furthermore, Goodman (2005), stated that most cardiologists suggest that since illness or injury is associated with prolonged periods of in-active life style, such sedentariness has physiologically become linked to life-preserving metabolic and stress related responses, such as inflammation that aid recovery during illness and injuries, but, which due to being non adoptive during health may lead to chronic disease.

This study was boned against the backdrop of the fact that university undergraduate students portray largely sedentary life style, especially with the advent of different kinds of electronic devices now on board in the country. These sedentary activities are known to promote obesityand other health conditions among the populace. Sedentary life-style or inactive life-styles are all risk factors that can cause health problem or medical condition of obesity. This research study therefore ascertained campus life-style as it relates to this new endemic health problem among university students.

Research Questions

The following research questions guided the conduct of the study.

1. What would be the effects of aerobic exercise on the ECG Chest Leads of obese male and female undergraduate students in Rivers State?
2. What would be theeffects of aerobic exercise on the Heart Rate of obese male and female undergraduate students in Rivers State?
3. What would be the effects of aerobic exercise on the blood pressure of obese male and female undergraduate students in Rivers State?

Hypotheses

The following null hypotheses were postulated for the study at 0.05 levels of significance.

1. There is no significant effect of aerobic exercise on the ECG Chest Leads of obese male and female undergraduate students in Rivers State.
2 There is no significant effect of aerobic exercise on the Heart Rate of obese males and female undergraduate students in Rivers State.
3. There is no significant effect of aerobic exercise on the blood pressure of obese undergraduate students in Rivers State

Research Method

Experimental research design was used for the study. This was used because, this design in nature attempts to isolate cause effects, relationships and eliminate alternative explanations of observed relationships between variables. Specifically, the laboratory type of experimental research design was adopted for this study. According to Coolican (2009) in a true laboratory experiment an independent variable is manipulated and all other salient variables are controlled, including the random allocation of participants to conditions. The effect of the independent variable on a carefully observed and managed dependent variable is recorded. Furthermore, Kendall (2005), also opined that in experimental design, subjects are studied in a closed setting so that researchers can maintain as much control as possible over the subjects.

In addition, Coolican(2009) went further to observe that, experimental design method is considered one of the most powerful way of doing research because it eliminates a lot of alternative explanations which can occur with other kinds of evidence. It is most likely than other methods to demonstrate a relatively unambiguous, connection between cause and effect and these connections are what science tries to establish. Going by the above

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positions, the researcher was convinced beyond doubt the suitability of the design for the study.

The study adopted the experimental laboratory design, using pre-test/post-test randomize grouping to determine the effects of aerobic exercise, a stress test on the resting ECG (electrocardiogram), heart rate and blood pressure of obese undergraduate students in Universities in Rivers State. The pre-test scores served as the resting (control) while, the post-test scores served as the test scores. This gave room to study closely between groups and between parameters.

Experimental Procedures

Subjects were advised to relaxed, wear light clothing and take their normal meals 2-3hrs before the study. The tests were divided into two parts referred to as Pre and Post Test. Each of the test consisting of Body Mass Index (BMI) determination, pulse rate and blood pressure, as well as ECG measurements as follows;

1. The weights were determined using the standiometer scale in kilogram and the height in meters. The BMI is then determined by dividing the weight in kilogram by the square of the height. The BMI value was then determined by locating the status on the classification table, to determine if the subject was normal weight or obese. Only subjects that were obese proceeded to the next step of the experiment.
2. Pulse Rate determination. While in a relaxed sitting positions the radial pulse was determine per minute and recorded.
3. The next step was to determine the blood pressure by rapping the armlet around the arm and with the aid of the stethoscope the blood pressure was measured by the indirect method.
4. The fourth step was the ECG determination proper. With the assistance of trained research assistants, subjects were instructed to remove all the metals objects they wore and in possession, examples are watches, necklaces, earrings, rings, belts, mobile phones, etc. They were also asked if they had artificial teeth, iron in their legs or any part of their body as result of accident or whatever the reason, since these metallic objects could interfere with the process and cause errors in the ECG results.

Subjects were instructed to lie down on the couch (hospital bed), facing upward (ventrally) while recording their data. Services of a qualified physician were hired for the periods of the study to handle any emergency that may arise. Recordings were carried out according to the specifications of the American Heart Association, with recording done at 25mm/sec, calibrated at 1omm/mv. The age-predicted maximal heart rate (HRMax) was first calculated using the formula, HRMax = 220 – 85% (sub maximal level) of this value is the heart rate the subject aims to achieve during the stress test (Ogedengbe et al, 2012).

ECG Recording

Placement of Electrodes

The placement of the first electrode which is C1 red in colour is by locating the fourth (4th) intercostals space at the right side of the chest or at the fourth (4th) intercostals space to the right side of the sternum.

C2, C3, C4, C5 and C6 were all placed at the left side of the chest.

C2 is yellow in colour and was placed on the fourth (4th) intercostals space on the left side of the sternum.

C3 which is green in colour was placed midway between C2 and C4.

C4 which is brown in colour and was placed at the midst of C3 and C5 right under the nipple.

C5 which is black in colour placed at the anterior axillaries line at the same level as C4.

C6 which is purple in colour and placed at the axillaries line at the same level with C4 and C5.

The upper limbs which are the right and left hands were fixed next following the completion of the placement of chest leads C1 to C6.

The upper limb clipped with RR which is red in colour, was place at the right arm.

RL which is yellow in colour was placed at the ankle of the left arm. Following the completion of the upper limbs electrodes the lower limbs were fixed next.
LL which is green in colour placed at the left leg.
LR which is neutral was placed at the right ankle of the leg.
The ECG machine was then switched on and allow for a few seconds. It is then check if the electrodes on the subject were placed properly and also checked the wave lines appearing on the ECG machine if they were normal. The 'start' button on the machine panel was then pressed and allowed to record and then the result was printed out for that subject as pre-test score. The subject then stated riding slowly and gradually increased the speed, until the attainment of 85% age-predicted HRMax or when exhausted and could not continue due to fatigue (modified McArdle protocol) (McArdle et al, 1994). The subject at exhaustion was then asked to walk around the room slowly for a minutes. The recordings of all the previous parameters was then repeated for the post-test scores. The subjects who were included to participate gave their written informed consent for participating in the study. The study was done in according to the Helsinki Declaration of June 1964 and amended in Seoul in October 2008. This study is in line with the Helsinki declaration. Thus, requestwas made and ethical approval obtained from the ethical committee of the University of Port Harcourt before commencement.

Precautionary Measures of Test Procedures

It was ensured that the ECG machine was turned off while fixing the electrodes, this was to avoid any shocks from naked leads ends. It was also ensured that participants do not have any metal on their body to avoid interference or false reading. Hairs on the parts of participant's body where the electrodes were to be placed were as a matter of fact shaved, especially in the male participants, because most male subjects have body hairs. This is because hairs are poor conductors of electric currents, it would have reduced the heart current transmissions between the body and the ECG machine.

While carrying out the test, after placing the electrodes and clamps, the subjects were instructed not to move, laugh or try to stand up, move leg or arm as this would have interfere immediately recording thereby scattering the wave lines and may lead to false results. It was ensured that subjects were calm during the ECG examination. This experimental procedure was immediately repeated as soon as the subject has reached exhaustion on the ergo metric bicycle.

Trial Run

A trial run was carried out with a sample size of 5 students, prior to full scale experimentation. The purpose for the trial run was to determine the level of difficulties that may be encountered during the main work. Things like setting of the ECG leads (chest and limbs), getting conversant with responds of subjects and their readiness to participate in the study. The ergo metric bicycle has to be calibrated for speed and other modalities generally concerning the test conduct. The scores obtained from the trial run was equally treated as if it were the main work, which provided a micro inside of the main.

Area of Study

The area of the study was Rivers State of Nigeria. Rivers State is one of the 36 states of Nigeria. Located in the South, South geopolitical zone of Nigeria, and created out of the old Eastern Region by Decree No. 19 in 1967. Before then, it was referred to as the oil Rivers due to the large palm oil produce, which the colonial masters traded on. Coincidentally, the discovery of the hydrocarbon oil (petrol and gas) in the mid1950s reaffirmed the zone as a true oil region indeed. Today, Rivers State with headquarter in Port Harcourt is identified among the states of the federation as the Treasure Base of the Nation (Rivers State diary, 2006). Rivers State is made up of 23

Local Government Areas. There are four Universities in Rivers State. The selected Universities for the study are located within the Capital City of Port Harcourt. They are, Rivers State University (RSU), is the State own university. The University of Port Harcourt (UPH), the Federal Government own university and Madonna University (MADONNA), a privately own University.

Population of the Study

The population of this research comprised of all the third year undergraduate student males and females that are resident on campus, aged between 19 and 30 years in the three Universities, RSU, UPH and MADONNA who are registered for 2014/2015 academic season. These category of students were used for this study because by their third year in the university they would have formed a menu pattern. The University of Port Harcourt undergraduate full time population is put at 40,000 students and year three levels at 8,500 students in the 2014/2015 academic session (UPH Review, 2014). Rivers State University undergraduate student's population is put at 29,000 and the third level of 6,500 students (Rivers State University, 2015). While Madonna University, a relatively young institution started in 1999, compared to the university of Port Harcourt which was founded in 1975 and RSU founded in 1980, Its population is 16,800 undergraduate students, while the third year is about 3,200 (Madonna University, 2015).While Madonna University, a relatively young institution that started in 1999, compared to the university of Port Harcourt which was founded in 1975 and RUST funded in 1980, Its population is 16,800 undergraduate students, while the third year is about 3,200 (Madonna, 2015).

Sample and Sampling Technique

A total of 68 participants, comprising of 27 males and 41females obese students were selected out of the estimated 18,200 targeted year three (300 level) students from a total of 85,500 population of the three universities according to the stated sources above. The students who have satisfied the conditions of the study were purposively selected for the study**.** Thus purposive sampling technique was adopted in selecting the participantsfor the study. This technique was deemed fit for this study because the subjects were pre-determined. In purposive sampling technique, specific elements, which satisfy some pre-determined criteria, are selected and the criteria used, are usually based on the researcher's judgment (Nworgu, 1991). Usually, the researcher exercises his judgment in relation to what constitutes a representative sample with respect to the researcher's purpose. Therefore, purposive sampling technique was use in the sense that the subjects possess the required characteristics suitable for the sample of the study such as level, residency, age, BMI, and full time 2014/2015 academic session students running degree programs in their various universities. The inclusions criterion also included, previous history of heart disease; ingestion of digitalis in preceding six months; fixes-rate pace maker in subjects; uncontrolled metabolic disease especially diabetes mellitus; neuromuscular; musculoskeletal or rheumatoid disorder; hypertension and associated pulmonary disease previous history of chest surgery; pregnancy and medication.

Instrument for Data Collection

Materials

1. ECG machine, model; G58301, Manufacturer; General meditech, Inc. 2014.Component parts are, the limb leads, chest lead and gel. This model is relatively faster and has a screen display of recording as well as printing automatically, compare to older models.
2. Ergometer (Platinum Megatop; H.M. Energy). Very easy to maintain and monitor while in use.
3. Portable Couch (Vono). It is portable, it can be folded at the end of used and move to other positions.
4. Standiometer (Made in Germany; SECA). This is a two in one scale(weight in

kilogram and height in meter).It is relatively less bulgy and is easily portable.

5. Sphygmomanometer and stethoscope (kris-Aloy). It is efficient and relatively cheaper compare to others.

Validation of the Instrument

The major instrument used for this study were standard scientific equipment known worldwide in the scientific cycle. They were calibrated at the onset of each test and the scores obtained were comparable with the standard scores already known. This is to say the equipment already have worldwide standardization.

Reliability of the Instrument

To ensure adequate reliability, the instrument was administered on pre-test groups. The scores were correlated using Pearson product Moment Correlation Coefficient using the formula for computing (r).

Training of Research Assistants

Five research assistants were trained for the study, but only three were actually available. They were people who already have competent knowledge of handling laboratory equipment. One assisted in Body mass index measurement, one assisted in the application of ECG gel and determination of blood pressure, while one assisted in supervising the ergo meter and Tachometer, the researcher personally placed the ECG leads and operated the machine for the recordings as described in the experimental procedure below.

Method of Data Collection

The subjects were approached on individual basis and the researcher explained the procedure of the test and that it was a non-invasive and painless procedure, the electrodes cannot generate enough electric current to cause shocks. Once they were convinced, they were requested to fill the consent form as stated above, their BMI were determined, the recording devices of the machine then put in place for recording. Adequate instructions as stated in the experimental procedure above were how the subjects should conduct themselves was given before the actual commencement of the test.

Method for Data Analysis

Mean scores and standard deviations were used for answering the research questions. The hypotheses were tested using the Analysis of covariance (ANCOVA) at 0.05 alpha levels. ANCOVA was suitable in testing the hypothesis since it serves as a procedure for determining the contingencies of multiple means which involves two independent estimation of the population variance. It was equally used in checking the homogeneity of variance between samples. HenceAgu (2009) stated that "In many experimental research designs…researchers often desire to compare groups that are not initially alike in either the variable under study or some other related variables. In such situations, subjects are placed into experimental and control groups and comparison is made concerning the two groups after the experiment on the variable of interest". Oyeka(1992)emphasized that ANCOVA is used for partitioning the total variation of a set of data into several components. Furthermore, Onyeka(1992) stated that ANCOVA is mainly used in testing hypotheses concerning population means and that it makes it possible to ascertain the proportion of the total variation attributable to each of variation in a set of data. In the same vain Owie(2001) added that ANCOVA is used in experimental studies where the samples are normally or distributed, independent of each other and the variance of the population are equal. This is done by giving pre-test and post-test to all the groups, the data from the pre-test and post-test to all the groups, are then used to evaluate variation in the post-test data. In order to determine the direction of significance across groups in which F ratio was used.

Presentation of Results

The main purpose of the study was to study the effects of aerobic exercise the ECG chest leads, pulse rate and blood pressure of obese

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undergraduate students in Rivers State of Nigeria. In this chapter the results of the analysis of data of the student are presented. The result attempted to answer the research questions and tested the hypothesis postulated for the study.

Research Question 1. What will be the effects of aerobic exercise on the ECG Chest Leads of obese male and female under graduate students in Rivers State?

Table 1a: Means and standard deviation of male chest leads at pre- and post-test.

Column 1	N5	male pre Mean	Std. Deviation6	post male Mean	Std. Deviation6
V1	27	66.4815	13.95424	15.4074	14.04734
V2	27	69.8889	11.21926	101.9630	11.24716
V3	27	47.9259	10.68761	46.2593	11.71322
V4	27	48.1852	6.63346	94.1852	19.50944
V5	27	54.0741	8.91380	48.7778	9.93182
V6	27	62.5556	8.67948	57.9630	11.81095

Table 1b: Means and standard deviation of female chest leads at pre- and post-test.

Column1	N	female pre Mean	Std. Deviation	female post Mean	Std. Deviation
V1	41	50.8293	4.99951	13.9512	3.20118
v2	41	49.5610	5.75347	78.9024	8.34208
V3	41	48.7805	5.13572	46.0244	6.42840
V4	41	47.6098	2.65404	80.4878	6.45803
V5	41	60.6098	12.14265	60.2439	8.39577
V6	41	58.3415	8.84197	62.4390	7.11705

Where,

V…… represent the chest leads 1 to 6

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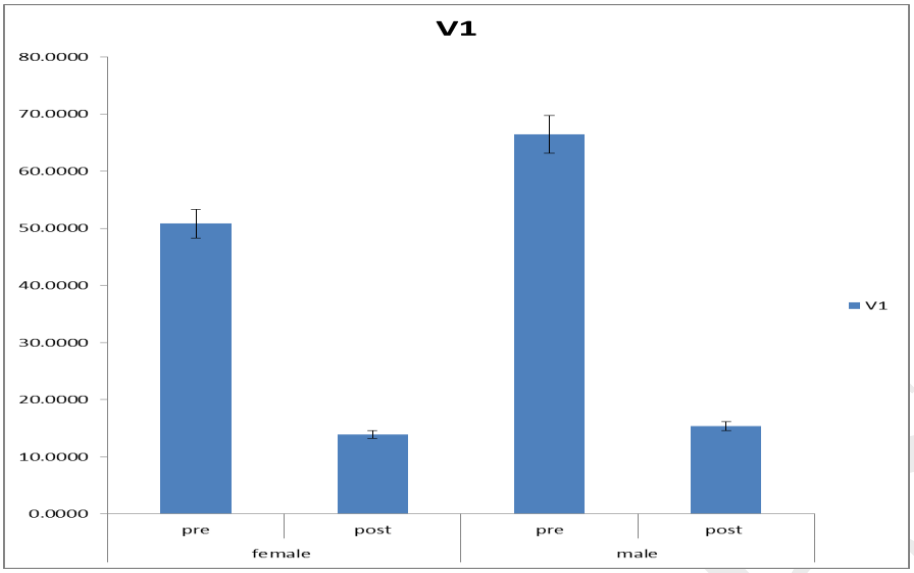


Figure 1a: Chest Lead Vector 1 Pre and Post-test Obese Male and Female Participants.

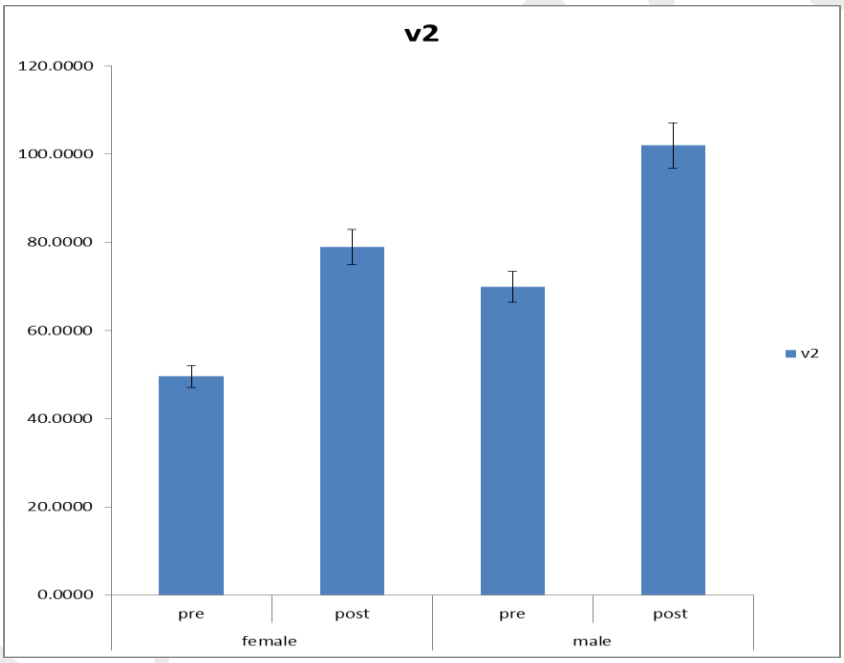


Figure 1b: Chest Lead Vector 2 Pre and Post-test Obese Male and Female Participants.

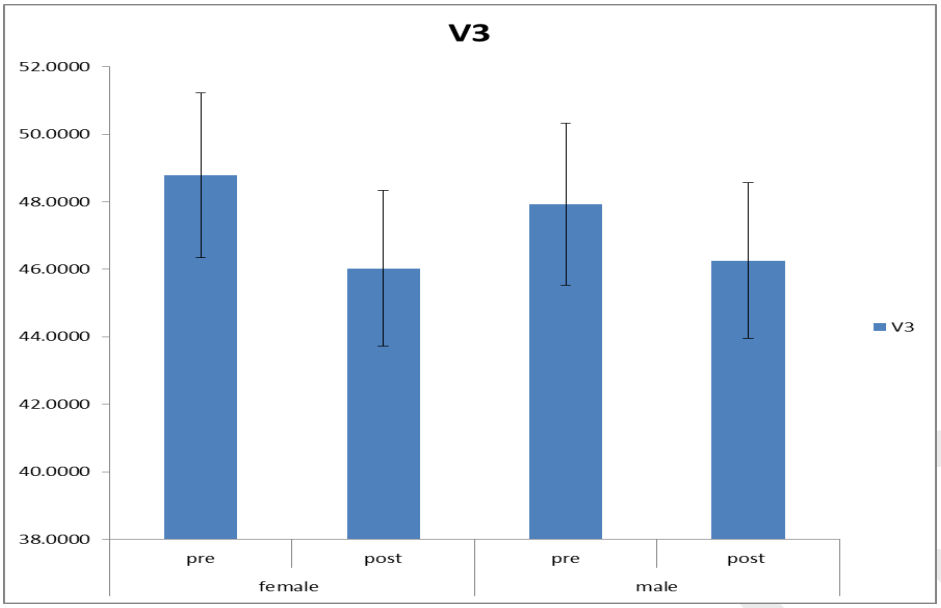


Figure 1c: Chest Lead Vector 3 Pre and Post-test Obese Male and Female Participants.

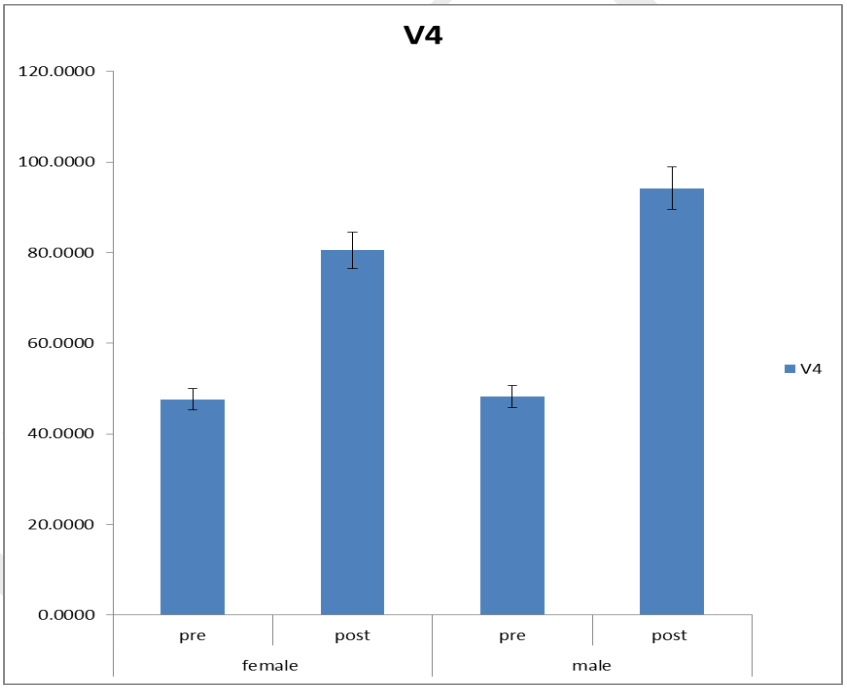


Figure 1d: Chest Lead Vector 4 Pre and Post-test Obese Male and Female Participants.

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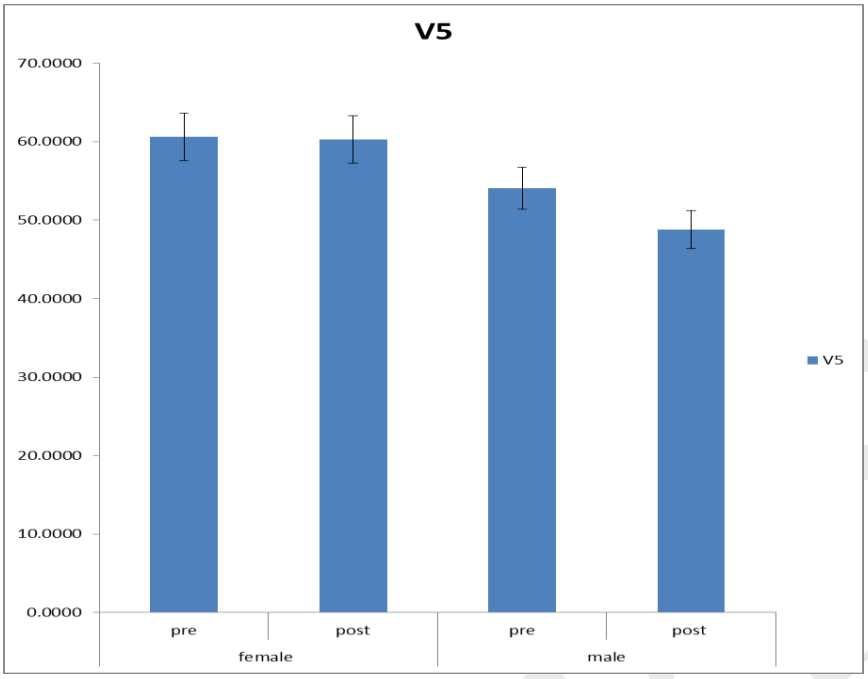


Figure 1e: Chest Lead Vector 5 Pre and Post-test Obese Male and Female Participants.

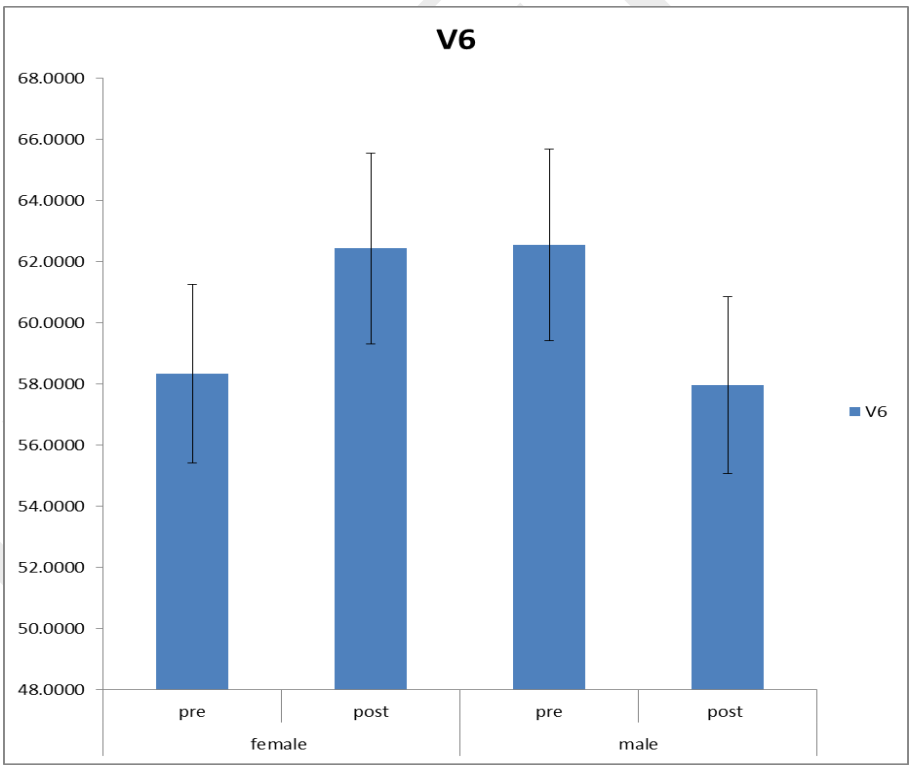


Figure 1f: Chest Lead Vector 6 Pre and Post-test Obese Male and Female Participants.

The overall results in table 1a and 1b indicated that remarkable changes were recorded in both male and female that means V1 in male at post-test was

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66.4815+13.95424 and 13.4074+14.04734 while the female recorded 50.8293+4.99951 pre-test and 13.9512+3.20118 at post-test, lead.

V2 indicated sharp increase in means in both male and female participants. This showed that 69.8889+11.21926 pre- test and 101.9630+11.24716 post-test male participants while 49.5610+5.75347 at post-test 78.9024+8.34208 at post- test V3 showed 47. 9259+ 10.68761 pre-test for male which is a dropped compared to 46.2593+11.71322 at post- test while 48.7805+513572 pre-test and 46.0244+6.4240 at post- test in the female participants. V4 indicated increases in mean were recorded in both male and female as 48.1482+6.64336 pre-test and 94.1852+19.50944 post- test 47.6098+ 2.65404 and 80.4878+ 6.45804 post- test and test respectively. V5 male 54.0741+8.91380 pre-test and 48.778+9.93182 post- test, while female mean of 60.6098+12.14265 pre-test and 60.2749+8.39377 post- test means are both increases at post- test. V6 showed that 65.5556+8.67948 pre-test and 57.9630+ 11.81095 post-test, while a dropped but 58.3415+ 8.84197 pre-test and 624390+7.11705 post- test shown an increase in the female participants.

Hypothesis1: There is no significant effect of aerobic exercise on the ECG Chest Leads of obese males and female undergraduate students in Rivers State. Analysis of the result using ANCOVA is showed in table 1c and 1d.

Table 1c: ANCOVA Summary of the effects of aerobic exercise on the ECG chest leads of obese female undergraduate students

Column1	N	female pre	female post	mean difference	P-value	Decision
V1	41	50.8293	13.9512	-36.8780	<0.01	S
V2	41	49.5610	78.9024	29.3415	<0.01	S
V3	41	48.7805	46.0244	-2.7561	0.035	NS
V4	41	47.6098	80.4878	32.8780	<0.01	S
V5	41	60.6098	60.2439	-0.3659	0.874	NS
V6	41	58.3415	62.4390	4.0976	0.023	S

Where……. S… indicate significant and NS … indicate not significant

The analysed result for female showed that only V3 and V5 are not significant at post exercise.

Table 1d: ANCOVA Summary ofthe effects of exercise the chest leads of obese male undergraduate students

Column1	N	male pre	male post	mean difference	P-value	Decision
V1	27	1.66.48	15.40	-51.08	<0.01	S
V2	27	2.69.88	101.96	32.08	0.01	S

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V3	27	3.47.92	46.2	-1.72	0.954	NS
V4	27	4.48.18	94.18	46	0.040	S
V5	27	5.54.07	48.77	-5.3	0.045	S
V6	27	6.62.55	57.96	-4.59	0.030	S

Where……. S… indicate significant and NS … indicate not significant.

Summary: The effects of aerobic exercise on the ECG chest lead of obese male and female undergraduate students in Rivers State. The result revealed a decreased in V1, V3, V4, V5, and V6, in male except V2, which increases at post exercise. The decreases in V1 and V4 were significant while the decrease in V3 and V6 were not significant. While the increased in V2 was significant in the females these decreases in V1, V3, and V6, which indicated that V1, was significant while V3 and V3, and V5, were not significant V2, V4, and V5, were not significant. V2, V4, and V6, were increased significantly. It also increases in the male V2, female V4, and v6 significantly this increased collaborate with the work of Fletcher et al, (2001)where their findings revealed the same change in clinical patients. Thus these results are serious indication of abnormalities.

Research Question 2. What will be the effects of aerobic exercise on Heart Rate of obese male and female undergraduate students in Rivers State?

Table 2a: Means and standard deviation of male pre-test and post-test heart rate.

Column1					
	N5	**male pre Mean**	**Std. Deviation6**	**post male Mean**	**Std. Deviation6**
HR	27	71.7407	7.79345	100.2593	6.72877

Table 2b: Means and standard deviation of female pre-test and post-test heart rate.

Column1	**N**	**female pre Mean**	**Std. Deviation**	**female post Mean**	**Std. Deviation**
HR	41	73.8049	10.29373	91.8293	10.07448

Where,
HR- is the heart rate.

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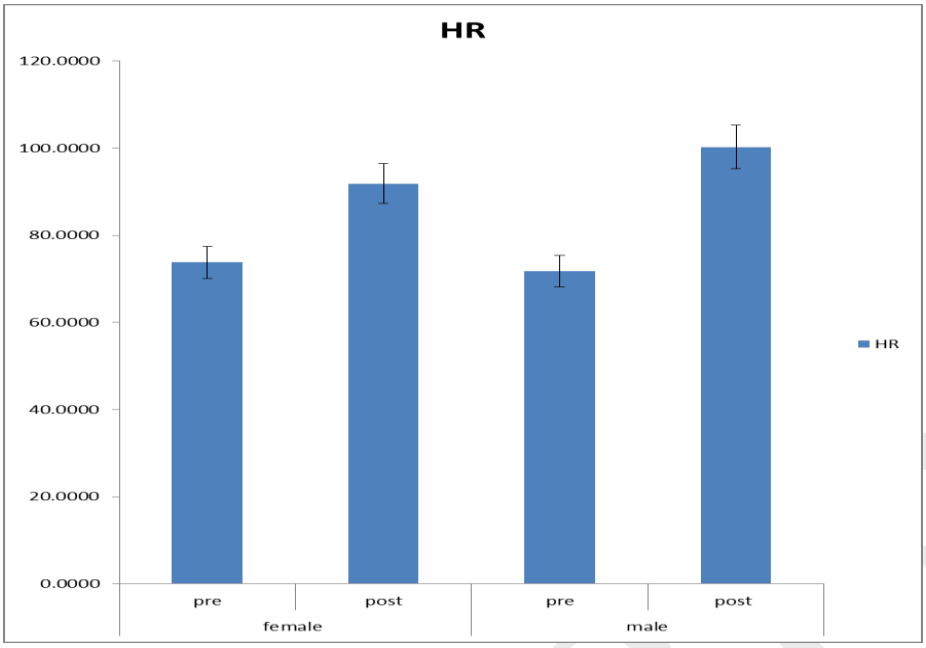


Figure 2a: Heart Rate of Obese Male and Female Participants at Pre and Post-test.

The result showed that increases in mean heart rate in both male and female of post-test as follow 71.7407+79345 pre–test and 100.2593+6.72877 post-test and 73.8049+ 10.29373 and 91.829+ 10.107448 post-test in male and female respectively.

Hypothesis 2. There is no significant effects of aerobic exercise the Heart Rate of obese male and female undergraduate students in Rivers State. The hypothesis was analyzed with ANCOVA and tested at 0.05 level of significant.

Table 2c: Analysed male data.

Column1	N5	male pre Mean	male post Mean	mean difference	P-value	decision
HR	27	71.7407	100.2593	28.5185	<0.01	S

Table 2d: Analysed female data.

Column1	N	female pre Mean	female post Mean	mean difference	P-value	decision
HR	41	73.8049	91.8293	18.0244	<0.01	S

The result showed significant difference in mean at post-test in both male and female participants.
The findings revealed significant increase at post-test in both male and female participants. This is in agreement with Fletcher et al, 2014 as well as Kligfield et al, (2014).

Research Question 3. What will be the effects of aerobic exercise on the blood pressure of obese male and female undergraduate students in Rivers State?

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Table 3a: Computed means and standard deviation in male at both pre-test and post-test

Column1	N5	male pre Mean	Std. Deviation6	post male Mean	Std. Deviation6
SY	27	123.7037	10.43225	137.5926	8.81109
D	27	77.7037	9.40873	87.4074	8.13000

Table 3b:Computed means and standard deviation in female at both pre-test and post-test

Column1	N	female pre Mean	Std. Deviation	female post Mean	Std. Deviation
SY	41	110.0244	18.08658	126.3415	8.87584
D	41	78.6098	9.52596	77.5610	7.34183

Where,

Sy = systolic pressure

D – Diastolic pressure

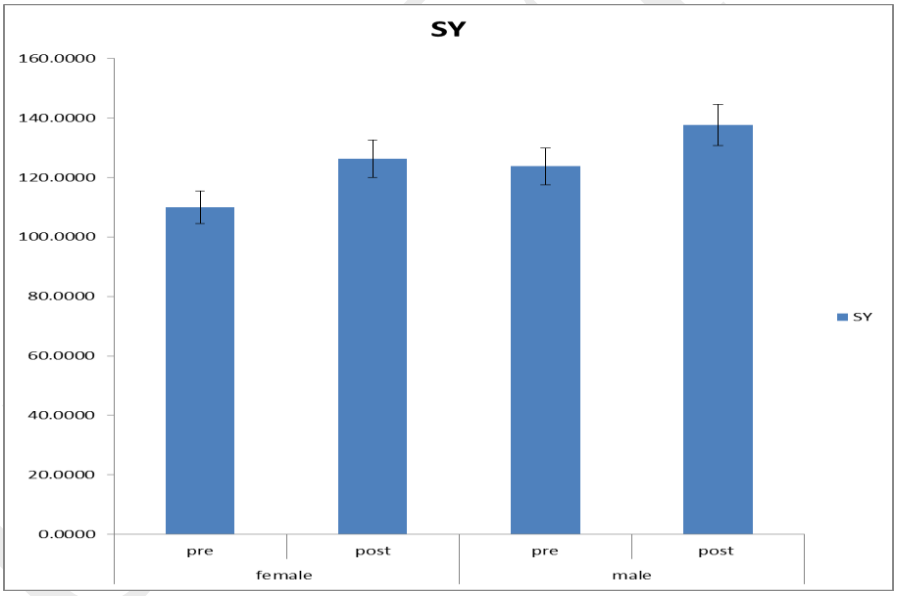


Figure 3a: Systolic Pressure of Obese Male and Female Participants at Pre and Post-test.

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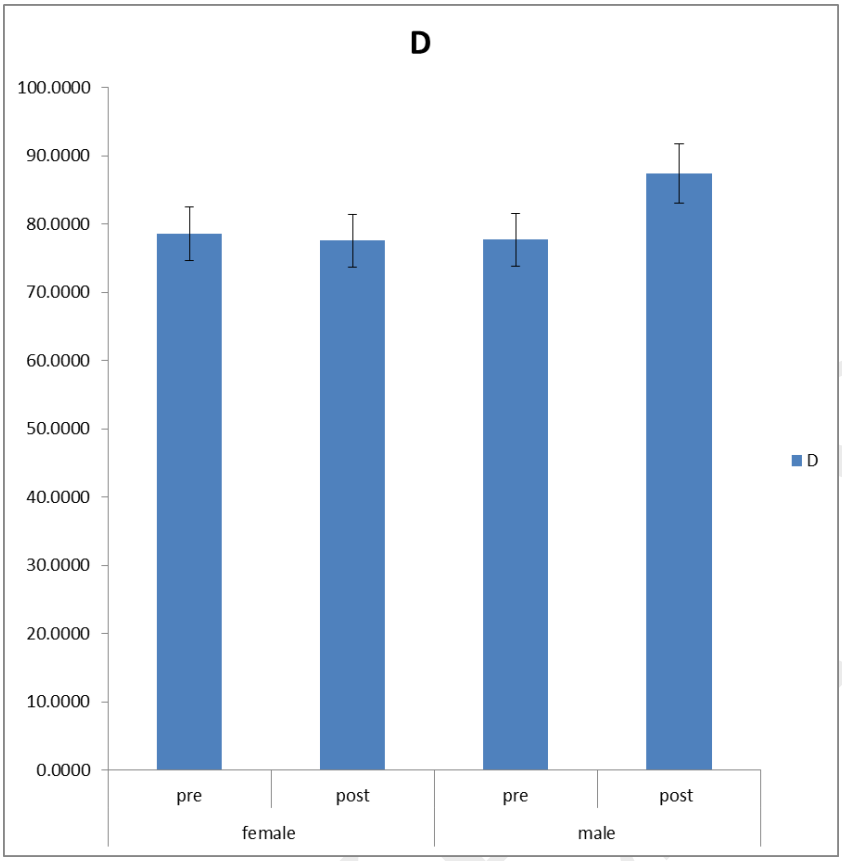


Figure 3b: Diastolic Pressure of Obese Male and Female Participants at Pre and Post-test.

The results computed indicated that systolic means increases in both male and female participants as follows, 123.7037+ 10.43225 pre-test and 137.5926+8.81109 post-test, while 110.0244+18.08658 pre-test and 77.5610+7.3418 post-test respectively, while the diastolic means in the male was 77.7037+9.40873 pre- test increased to 87.4074 +8.13000 at post-test. The female indicated an opposite response as the diastolic at post-test dropped from 78.6098+9.52596 to 77.5610+7.34183.

Hypothesis 3. There is no significant effects of aerobic exercise on Blood Pressure of obese male and female undergraduate students in Rivers State. This hypothesis was analyzed with ANCOVA at 0.05 level of significant as presented in table 3a and 3b.

Table 3c:Analysed male data

Column1	N5	male pre	post male	mean difference	P-value	Decision
SY	27	123.7037	137.5926	13.8889	<0.01	S
D	27	77.7037	87.4074	9.7037	<0.01	S

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Table 3d:Analysed female data.

Column1	N	female pre	female post	mean difference	P-value	Decision
SY	41	110.0244	126.3415	16.3171	<0.01	S
D	41	78.6098	77.5610	-1.0488	0.578	NS

The results indicated that only female diastolic mean was not significant all the remaining data analysed were significant. Summary: The effects of aerobic exercise on blood pressure of obese male and female undergraduate students in Rivers State.

The result showed that in the male both systolic and diastolic pressures increase significantly while in the female only the systolic pressure significantly increased at post-test. The diastolic pressure in female decreased at post-test but was not significant. The outcome of this finding is in agreement with the work of Fletcher et al, 2001 and Sarkir et al, (2008).

Conclusion

Based on the findings of this study the following conclusions were drawn.

1. The study revealed that V3, V2 male and V3, V5, in female were not significant at post aerobic exercise and all the remaining chest leads were found to be significant among the undergraduate students in Rivers State.

2. The heart rates of obese undergraduate male and female students were significantly increased by aerobic exercise.

3. There is significant response to aerobic exercise in the systolic and diastolic blood pressure of male undergraduate students and the systolic pressure of the female was also significant. However, the diastolic blood pressure of the female undergraduate student was decreased at post exercise but the decreased was not significant.

Recommendations

Squeal to the result of this finding the researcher deemed it necessary to recommend as following.

Undergraduate students should as a matter of fact check their body mass index regularly with a view to embarking on aerobic exercise at least twice a week or find time to take a walk every day in the morning especially those who are already obese.

The heart rate and blood pressure of obese participants are at risk due to lack of aerobic exercise, the general public who will come across this study should make effort to check these vital parameter of their cardiovascular system.

The study is recommended as a vital document for cardiac rehabilitation practitioners in handling their patient diagnoses.

The researcher strongly recommended the out -come of this finding to physiotherapist working with their obese patients.

It is strongly recommended to exercise physiologist and trainers as well as coaches to routinely consider checking cardiovascular parameters of their clients before any other consideration.

It is recommended to the ever fast growing gymnasia/ fitness centres across Nigeria.

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