	Impact Factor:	ISRA (India) ISI (Dubai, UAE GIF (Australia) JIF	= 6.317 ) = 1.582 = 0.564 = 1.500	SIS (USA) = 0.912 РИНЦ (Russia) = 3.939 ESJI (KZ) = 8.771 SJIF (Morocco) = 7.184	ICV (Poland) PIF (India) IBI (India) OAJI (USA)	= 6.630 = 1.940 = 4.260 = 0.350
--	----------------	---	--	---	--	--





Issue



Article

Mbachu Hope Ifeyinwa Imo State University Department of Statistics, PMB 2000, Owerri Nigeria

# EFFECT OF A 6-WEEK AEROBIC EXERCISE PROGRAMME ON BLOOD PRESSURE AMONG MEN WITH HYPERTENSION

Abstract: The study examined the effects of a 6-week aerobic exercise on systolic and diastolic blood pressure (BP) of male participants with hypertension in Owerri Recreation Centre (Club) of Imo State. Two research questions/hypotheses guided the study. In the trials; 35 male hypertensive members constituted the population of the study, and 20 volunteers were used as the sample size of the study. The instrument used for the study was Sphygmomanometer model DM-500 for blood pressure by the two health experts who conducted the experiment for the period of ten weeks. Descriptive statistics and Analysis of Covariance (ANCOVA) were employed as the statistical techniques. The data set of the study was first subjected to assumptions associated with ANCOVA, which are normality via Kolmogorov-Smirnov and Shapiro-Wilk statistics, homogeneity of regression slopes via parallelism test statistic, and homogeneity of error variance via Levene's statistic; and the three assumptions were met. The findings of this study indicated that the aerobic exercise programme significantly reduced systolic and diastolic BP of male members with hypertension, of Owerri Recreation Club from 142.50 to 121.67 with a mean difference of 20.83mmHg and 95.83 to 82.50 with a mean difference of 13.33 mmHg respectively. The hypotheses that there is no significant effect of a 6-week aerobic exercise programme on the diastolic and systolic BP of male members with hypertension, of Owerri Recreation Club of Imo State were rejected (p < 0.05). Based on the findings, the researcher made some vital recommendations among others that: seminars and workshops should be sponsored by big industrial establishments concerning health and fitness in order to enlighten their executives the importance of engaging in exercises for heath fitness and productivity achievement.

Key words: Aerobic exercise programme, systolic blood pressure, diastolic blood pressure, male hypertensive members, ANCOVA.

Language: English

*Citation*: Ifeyinwa, M. H. (2023). Effect of a 6-week aerobic exercise programme on blood pressure among men with hypertension. *ISJ Theoretical & Applied Science*, 02 (118), 10-16.

*Soi*: <u>http://s-o-i.org/1.1/TAS-02-118-3</u> *Doi*: crossed <u>https://dx.doi.org/10.15863/TAS.2023.02.118.3</u> *Scopus ASCC*: 2700.

#### Introduction

The health status of an individual or a population is usually influenced by a number of factors otherwise referred to as determinants of health or risk factor to health. According Abdo et al. (2019), the determinants of health comprise a range of personal, economic, social and environmental factors that determine both the health of an individual and population. Paucity of some of these factors lead to the development of some disease conditions which could be acute or chronic, one of such diseases that currently pose health challenges globally, and is influenced by these determinants is the cardiovascular disease (CVD). According to WHO (2018), the greatest common non-communicable disease that is responsible globally for an estimated 17.8 million deaths in the year 2017, in which at least more than three quarters are low income and middle-income countries is known as the CVD. According to Aminde et al. (2017), an estimated one million deaths were attributable to CVD in West Africa alone, which constituted 5.5% of all global CVD related deaths and 11.3% of all deaths in Africa. They further stated that the majority of CVD is caused by risk factors such as insufficient physical activity, abnormal cholesterol level, hypertension, obesity and diabetes mellitus.



	ISRA (India)	= 6.317	SIS (USA)	= 0.912	ICV (Poland)	= 6.630
Impost Fostor	ISI (Dubai, UAE	) = 1.582	РИНЦ (Russia)	) = <b>3.939</b>	<b>PIF</b> (India)	= 1.940
impact ractor:	GIF (Australia)	= 0.564	ESJI (KZ)	= <b>8.771</b>	IBI (India)	= 4.260
	JIF	= 1.500	SJIF (Morocco)	) = <b>7.184</b>	OAJI (USA)	= 0.350

However, hypertension is said to be the major driver of CVD in West Africa with a prevalence of 14.5%.

The weight of passing around blood on the dividers of blood vessels is known as the BP. Utilized without encourage detail, "blood pressure" more often than not alludes to the weight in expansive courses of the systemic circulation. BP is as a rule communicated in terms of the systolic weight (most extreme amid one heart beat) over diastolic pressure (least in between two heart beats) and is measured in millimeters of mercury (mmHg), over the encompassing barometrical weight (Ogedegbe & Pickering, 2010).

Hypertension is one of the major global health problems that have a strong association with expanded hazard of coronary course malady, myocardial dead tissue, kidney infection, stroke and death. BP is the weight of blood against the internal dividers of the blood vessel, changing totally different parts of the body amid diverse stages of withdrawal of the heart and beneath diverse conditions of wellbeing. Hypertension is set in if BP level is more than  $\frac{120}{80}$ 

mmHg (SBP >120 mmHg and/or DBP > 80 mmHg). According to Kylasov and Gavrov (2011), exercise is physical movement that's arranged, organized, monotonous which enhances the standard of physical wellness and by and large wellbeing and wellness. It is undertaking as a result of various reasons, improving development and advancement, avoiding maturing, reinforcing muscles and the cardiovascular framework, sharpening athletic abilities, weight misfortune or upkeep, making strides wellbeing conjointly for satisfaction (He et al., 2018). Numerous individuals prefer exercising outdoors so as to congregate in groups, socialize, and improve the quality of well-being (Okeke et al., 2020). Recreation Club is an environment whereby activities are carried out at leisure hours willingly (Eno et al., 2020). Aerobic simply means how one's body makes use of oxygen to adequately satisfy energy requirements in the course of exercise. Aerobic exercise is any physical venture that makes one sweating, makes one to be breathing harder, and makes one's heart beats more than at rest.

The case of hypertension is rising throughout the world at an alarming degree, even as the lives of people are increasingly strenuous. Hypertension is now a condition within the common populace and it is the number one hazard figure for cardiovascular infection and stroke around the world. Numerous individuals live with hypertension undetected, and live with this lifted blood weight for a long time some time recently it is analyzed. Blood weight regularly rises and falls all through the day, and it can cause well being issues in the event that it remain stall for a long time.

The increasing levels of hypertension all over the world and its predominance cannot be disregarded or taken as an individual's issue. Aerobic is one of the Nigerian exercises which contribute significantly in the treatment of patients with hypertension. Owerri Club is one of the Recreation Clubs with members in Imo State. In this Club, members voluntarily participate in various activities in order to promote health. A high percentage of these persons are hypertensive, even though they participate in Clubs' activities. It has been observed that aerobic exercise does not have any effect on hypertensive patients, while some concluded that it has a significant reduction. It is based on these mixed observations that this study is embarked on. So the question is: what is the effect of a 6-week aerobic exercise programme on systolic and diastolic BP of male members with hypertension, in Owerri recreation club of Imo State?

Hence, the study examined the effects of a 6week aerobic exercise programme on systolic and diastolic blood pressure as a CVD associated risk factor among male members with hypertension using Owerri Recreation Club.

# **Materials and Methods**

The researcher employed randomized pretestposttest control group design. It is an efficient technique for assessing the impact of an intervention on two-randomized groups (Treatment and control) and also decreases chances of confounding variables. It is commonly employed in studies relating to behavioural sciences. The advantage of such a design is that it is simple and randomizes the differences among the sample items (Kothari and Garg, 2014). The use of control group helps to discount many alternative explanations for the effect of treatments. The pre-test post-test control group design also known as the classic controlled experimental design involves both a treatment and a control group (Thomas, Nelson and Silverman, 2015). Hence, this design was employed because when a control group is used, any changes observed post-test will be attributed only to the effect of the Aerobic exercise training program.

The aerobic exercises were administered to the participants in the evening of every training day at 4.30pm in Owerri Recreation Centre (Cub). All the participants were briefed on the rules and nature of aerobic. They are to have eaten food at least 3 hours before the commencement of the exercise. The training sessions were three times per week between Mondays to Saturdays. Two aerobic experts who have mastered the various aerobic exercises were used to demonstrate/teach the participants. The researcher used two health experts who measured the systolic and diastolic blood pressure of the participants. The two aerobic experts trained, monitored and corrected the participants where necessary during the 2-week training sessions, and the main 6-week aerobic exercise programme. In the first day of the first week, the baseline values of resting systolic blood pressure and resting diastolic blood pressure of the 12

	ISRA (India)	= 6.317	SIS (USA)	<b>= 0.912</b>	ICV (Poland)	= 6.630
Impost Fostory	ISI (Dubai, UAE	() = <b>1.582</b>	РИНЦ (Russia)	) = <b>3.939</b>	<b>PIF</b> (India)	= 1.940
impact ractor:	<b>GIF</b> (Australia)	= 0.564	ESJI (KZ)	= <b>8.771</b>	<b>IBI</b> (India)	= 4.260
	JIF	= 1.500	SJIF (Morocco)	) = 7.184	OAJI (USA)	= 0.350

volunteered Experimental group participants were taken. Thereafter, the exercise was carried out.

The data collected from the aerobic exercise were compiled and analyzed using a statistical tool

known as Analysis of Covariance (ANCOVA) in order to achieve the objectives of the study.

### Results

S/N	Group	SBP	SBP	DBP	DBP
		Pretest	Posttest	Pre	Post
1	Treatment	140	130	100	90
2	Treatment	160	140	90	80
3	Treatment	130	100	80	70
4	Treatment	150	130	100	90
5	Treatment	140	120	90	80
6	Treatment	130	110	80	70
7	Treatment	130	100	90	70
8	Treatment	140	120	100	90
9	Treatment	140	120	100	80
10	Treatment	140	120	100	90
11	Treatment	170	150	110	80
12	Treatment	140	120	110	100
13	Control	140	140	100	100
14	Control	150	140	110	110
15	Control	140	140	100	100
16	Control	130	130	90	90
17	Control	120	120	80	80
18	Control	130	120	90	80
19	Control	160	160	110	110
20	Control	150	150	100	100

# Table 1: Data for Blood Pressure for Male Hypertensive Members

# Test of Assumptions for the BP Data

# Table 2: Normality Assumption for SBP

	· ·		K-S <sup>a</sup>			S-W	
	Group	Statistic	Df	Sig.	Statistic	Df	Sig.
Posttest	Control	.196	8	$.200^{*}$	.931	8	.521
	Treatment	.212	12	.143	.932	12	.397

Result in Table 2 reveals that normality assumption is met considering the results (p-values) of

both Kolmogorov-Smirnov (K-V) and Shapiro-Wilk (S-W).

# Table 3: Homogeneity Assumption of Regression Slopes for Systolic Blood Pressure

Source(S)	SS	df	MS	F	Sig.	Partial Eta Squared
Corrected Model(CM)	4509.487ª	3	1503.162	58.587	.000	.917
Intercept(I)	63.866	1	63.866	2.489	.134	.135
Group(G)	49.896	1	49.896	1.945	.182	.108
Pre-test(P)	3156.596	1	3156.596	123.030	.000	.885
Group * Pre-test(G*P)	13.233	1	13.233	.516	.483	.031
Error(E)	410.513	16	25.657			
Total(T)	332600.000	20				
Corrected Total(CT)	4920.000	19				



	ISRA (India)	<b>= 6.317</b>	SIS (USA)	<b>= 0.912</b>	ICV (Poland)	= 6.630
Impost Fostor	ISI (Dubai, UAE	() = <b>1.582</b>	РИНЦ (Russia	a) = <b>3.939</b>	<b>PIF</b> (India)	= 1.940
impact ractor:	<b>GIF</b> (Australia)	= 0.564	ESJI (KZ)	= <b>8.771</b>	IBI (India)	= <b>4.260</b>
	JIF	= 1.500	SJIF (Morocco	(b) = <b>7.184</b>	OAJI (USA)	= 0.350

The homogeneity assumption is met since p-value is 0.483, which implies that covariate by treatment interaction is not significant statistically.

### Table 4: Homogeneity of Variance Assumption for Systolic Blood Pressure

Levene's Test						
F	df1	df2	Sig.			
.216	1	18	.648			

The null hypothesis of equal error variances is not rejected, F (1, 18) = 0.216, p = 0.648. The data set for this study met the assumption of homogeneity of variances. This implied that other results could confidently be reported.

<b>Table 5: Normality</b>	Assumption	for Diastolic	Blood	Pressure
---------------------------	------------	---------------	-------	----------

		Kolmogorov-Smirnov <sup>a</sup>			Sha	piro-Wilk	
	Group1	Statistic	Df	Sig.	Statistic	Df	Sig.
Posttest1	Control	.249	8	.155	.875	8	.168
	Treatment	.198	12	$.200^{*}$	.894	12	.134

The result in Table 5 shows that the normality assumption is met considering the results (p-figures) of both KV and SW.

### Table 6: Homogeneity Assumption of Regression Slopes for Diastolic Blood Pressure

Source(S)	SS	df	MS	F	Sig.	Partial Eta Squared
Corrected Model(CM)	2438.473ª	3	812.824	27.008	.000	.835
Intercept(I)	.040	1	.040	.001	.971	.000
Group1(G1)	20.859	1	20.859	.693	.417	.042
Pretest1(P1)	1530.973	1	1530.973	50.871	.000	.761
Group1 * Pre-test1(G1*P1)	52.693	1	52.693	1.751	.204	.099
Error(E)	481.527	16	30.095			
Total(T)	157800.000	20				
Corrected Total(CT)	2920.000	19				

The homogeneity assumption is met since p-value is 0.204, which implies that covariate by treatment interaction is not significant statistically.

# Table 7: Homogeneity of Variance Assumption for Diastolic Blood Pressure

	Levene's	Test	
F	df1	df2	Sig.
2.111	1	18	.163

The hypothesis of equal error variances is not rejected, F (1, 18) = 2.111, p = 0.163. The data set for this study met the assumption of homogeneity of

variances. This implied that other results could confidently be reported.



	ISRA (India)	<b>= 6.317</b>	SIS (USA)	<b>= 0.912</b>	ICV (Poland)	= 6.630
Impact Factor:	ISI (Dubai, UAE	() = <b>1.582</b>	<b>РИНЦ</b> (Russia)	) = <b>3.939</b>	<b>PIF</b> (India)	= 1.940
	<b>GIF</b> (Australia)	= 0.564	ESJI (KZ)	= <b>8.771</b>	IBI (India)	= 4.260
	JIF	= 1.500	SJIF (Morocco	) = 7.184	OAJI (USA)	= 0.350

# **Research Question 1**

To what extent is the effect of a 6-week aerobic exercise on the systolic blood pressure of male hypertensive members of Owerri Recreation Club?

# **Table 8: Descriptive Summary Results**

Test	Ν	$\overline{x}$	SD	MD
Pre-test		142.50	12.15	
	12			20.83
Post-test		121.67	14.67	20.05

*Key: MD* = *Mean Difference* 

The output shows that the mean and standard deviation for systolic blood pressure before the treatment is  $142.50 \pm 12.15$  and  $121.67 \pm 14.67$  after treatment, with a mean deviation of 20.83. This reveals a reduction of 20.83 mmHg after the exercise.

# **Testing of Hypothesis One**

There is no significant effect of a 6-week aerobic exercise programme on the systolic blood pressure of male hypertensive members of Owerri Recreation Club of Imo State.

S	SS	df	MS	F	Sig.	Partial Eta Squared
СМ	4496.254ª	2	2248.127	90.191	.000	
Ι	73.816	1	73.816	2.961	.103	.148
Р	3292.920	1	3292.920	132.107	.000	.886
G	1631.245	1	1631.245	65.443	.000	.794
Е	423.746	17	24.926			
Т	332600.000	20				
СТ	4920.000	19				

Table 9: ANCOVA Summary Results for SBP (n = 20)

The result in Table 9 shows a p-value of 0.000 (p < 0.05). This implies that there is significant effect of a 10-week aerobic exercise programme on the SBP of male hypertensive members.

#### **Research Question 2**

To what extent is the effect of a 10-week aerobic exercise on the diastolic blood pressure of male hypertensive members of Owerri Recreation Club?

Table 10. Descriptive Summary Results
---------------------------------------

Test	Ν	$\overline{x}$	SD	MD
Pre-test		95.83	9.96	
	12			12.22
Post-test		82.50	9.65	13.33

The output shows that the mean and standard deviation for diastolic blood pressure before the treatment is  $95.83 \pm 9.96$  and is  $82.50 \pm 9.65$  after treatment, with a mean deviation of 20.83. This reveals a reduction of 13.33 mmHg after the exercise.

# **Testing of Hypothesis Two**

There is no significant effect of a 6-week aerobic exercise programme on the diastolic blood pressure of male hypertensive members of Owerri Recreation Club of Imo State.



	ISRA (India)	<b>= 6.317</b>	SIS (USA)	<b>= 0.912</b>	ICV (Poland)	= 6.630
Impact Factor:	ISI (Dubai, UAE	E) = <b>1.582</b>	РИНЦ (Russia	a) = <b>3.939</b>	<b>PIF</b> (India)	<b>= 1.940</b>
	<b>GIF</b> (Australia)	<b>= 0.564</b>	ESJI (KZ)	= <b>8.771</b>	<b>IBI</b> (India)	= 4.260
	JIF	= 1.500	SJIF (Morocco	o) = <b>7.184</b>	OAJI (USA)	= 0.350

Table 11: ANCOVA Summary Results for DBP (n = 20)

S	SS	df	MS	F	Sig.	Partial Eta Squared
СМ	2385.781ª	2	1192.890	37.960	.000	.817
Ι	1.495	1	1.495	.048	.830	.003
P1	1478.281	1	1478.281	47.042	.000	.735
G1	715.915	1	715.915	22.782	.000	.573
Е	534.219	17	31.425			
Т	157800.000	20				
СТ	2920.000	19				

The result in Table 11 shows a p-value of 0.000 (p < 0.05). This implies a significant effect of a 10-week aerobic exercise programme on the DBP of male members with hypertension.

### **Discussion of the Findings**

The data set of the study was first subjected to assumptions associated with ANCOVA, which are normality via Kolmogorov-Smirnov and Shapiro-Wilk statistics, homogeneity of regression slopes via parallelism test statistic, and homogeneity of error variance via Levene's statistic; and the three assumptions were met. The findings of the study indicated that the aerobic exercise programme significantly reduced systolic and DBP of male members with hypertension in Owerri Recreation Club from 142.50 to 121.67 with a mean difference of 20.83mmHg and 95.83 to 82.50 with a mean difference of 13.33 mmHg respectively. The hypotheses that there is no significant effect of a 6week aerobic exercise programme on the diastolic and SBP of male members with hypertension, in Owerri Recreation Club of Imo State were rejected (p < 0.05).

#### Conclusion

In conclusion, the study revealed that the effect of a 6-week aerobic exercise programme on blood pressure as a CVD associated risk factor among men hypertensive members of in Owerri Recreation Centre of Imo State significantly decreased systolic and diastolic blood pressure. There was a significant difference between the mean post-test systolic blood

#### **References:**

- Abdo, N. M., Mortada, E. M., & El Seifi, O. S. (2019). Effect of knowledge about cardiovascular diseases on healthy lifestyle behavior among freshmen of Zagazig University: an intervention study. *The open public health journal*, 12(5), 300–308.
- Aminde, L. N., Takah, N., & Ngwasiri, C. (2017). Population awareness of cardiovascular disease and its risk factors in Buea, Cameroon. *BMC Public Health*, 17(545), 1 10.
- 3. Eno, E. J. (2020). Recreational behavior and preference of urban residents in Ikot Ekpene



pressure and diastolic blood pressure of the subjects in both the Experimental and Control Groups in the 10week aerobic exercise. There is a great decrease from a mean systolic blood pressure and diastolic blood pressure of  $141.50 \pm 12.26$  and  $96.50 \pm 9.88$  before the 6-week aerobic exercise to a mean value of 128.00 $\pm 16.09$  and  $88.00 \pm 12.40$  respectively after the 6week aerobic exercise. All these decrease are statistically significant at (p = 0.000).

### Recommendations

The following recommendations are made:

- 1. Aerobic exercise, being an active and acceptable form of physical activity for hypertensive patients, should be incorporated into strategies for the improvement of cardio-respiratory fitness and reduction of possible development of any form of/or more cardiovascular diseases
- 2. Corporate bodies should sponsor workshops on fitness and health, to enlighten their members on the need for exercise in order to achieve fitness and productivity. Different types of exercises should be discussed.
- 3. Further studies should confirm the claims of this study as regards the effectiveness of Aerobic exercises in the management of hypertension, probably using a larger sample size, and also administering the same exercise to other CVD associated risk factors such as diabetes mellitus, obesity, etc.

# Impact Factor:

<b>517</b>	<b>SIS</b> (USA) $= 0.912$	ICV (Poland)	= 6.630
582	РИНЦ (Russia) = <b>3.939</b>	<b>PIF</b> (India)	= 1.940
64	<b>ESJI</b> (KZ) $= 8.771$	<b>IBI</b> (India)	= <b>4.260</b>
500	<b>SJIF</b> (Morocco) = <b>7.184</b>	OAJI (USA)	= 0.350

town, Akwa Ibom State, Nigeria. *International Journal of Social Sciences and Management Review*, *3*(5), 1-11.

- He, L. I., Wei, W. R., & Can, Z. (2018). Effects of 12-week brisk walking training on exercise blood pressure in elderly patients with essential hypertension: a pilot study. <u>*Clin Exp Hypertens*</u>, 40(7), 673-679.
- 5. Kothari, C. R., & Garg, G. (2014). Research Methodology Methods and Techniques. *New age international limited, publishers,* 7/30 A, Daryaganji, New Delhi-110002.
- 6. Kylasov, A., & Gavrov, S. (2011). *Diversity of Sport: non-destructive evaluation*. UNESCO, Paris.
- Lin, C. T., Huang, C. S., Yang, W. Y., Singh, A. K., Chuang, C. H., & Wang, Y. K. (2018). Real time EEG signal enhancement using canonical correlation analysis and gaussian mixture

clustering. *Journal of Healthcare Engineering*, 5(2018), 21–31.

- 8. Ogedegbe, G., & Pickering, T. (2010). <u>Principles</u> <u>and techniques of blood pressure measurement</u>. *Cardiology Clinics*, 28(4), 571–586.
- Okeke, C. O., Mama, E. I., Akosile, C. O., & Ani, K. U. (2020). Changes in white blood cell, red blood cell and platelet parameters following short term aerobic exercise in students of Nnamdi Azikiwe University, Nigeria. *International Journal of Sport, Exercise and Health Research*, 4(2), 73-78.
- Thomas, J. R., Nelson, J. K., & Silverman, S.J. (2015). *Research Methods in Physical Activity*. Walsworth Print, USA.
- 11. (2018). WHO. Health education: theoretical concepts, effective strategies and core competencies. World Health Organisation, Geneva.

