# Comparative Effects of Aerobic Moderate -Intensity and Vigorous - Intensity Exercise on Reduction of Mild-Hypertension in Adults of South-East, Nigeria.

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## ABSTRACT

A random control trial (RCT) was used to compare the effects of 12 week aerobic moderate-intensity brisk walking at 60% heart rate and aerobic vigorous-intensity jogging at 75% heart rate on non-physically active adults with mild-hypertension in Urban area of Anambra state, south east, Nigeria. 21 adults with mild-hypertension were assigned randomly into 3 groups consisting of brisk walking treatment group, jogging treatment group and control group to compare the mean difference at pre-test and post-test on their systolic and diastolic blood pressure. ANCOVA was used by the study to test for significant difference in hypothesis at 0.05% margin of error. In conclusion, the study revealed that aerobic moderate-intensity brisk walking proved to be more effective in treating systolic and diastolic pressure among mild-hypertensives compared to aerobic vigorous-intensity jogging. However, the study also reveled that there was no significant difference between these exercise protocols.

## INTRODUCTION

Hypertension or high blood pressure is a cardiovascular disease of a persistent condition where the force of blood against the artery walls is too high making the heart work harder and damaging vessels over time leading to serious risks like hypertension and stroke. Hypertension occurs when the systolic blood pressure (SBP) and diastolic blood pressure ( DBP) are consistently elevated above an optimum blood pressure of 120mmHg and 80mmHg respectively.

Hypertension is characterized by blood pressure of systolic and diastolic blood pressure and it can be measured while sitting or standing. It can be detected at rest or while standing (orthostatic hypertension) and in motion (ambulatory hypertension). Hypertension It can also be essential and non-essential. Essential hypertension is an indication that the disease is caused by non-traceable condition whilst non-essential hypertension can be traced to a condition or co-morbidity like heart failure, kidney disease , thyroid problems, stress etc.

American Heart Association (AHA 2024) released a guideline of 3 stages of hypertension - First stage was reported as elevated high blood pressure or mild-hypertension with values of systolic blood pressure of between 130mmHg-139mmHg , Second stage was reported as moderate hypertension with values of systolic blood pressure of between 140mmHg-159mmHg and finally stage 3 was reported as severe hypertension of systolic blood pressure higher than 160mmHg and diastolic blood pressure of higher than 100mmHg.

According to the World Health Organization (WHO 2025), the global prevalence of hypertension is such that an estimated 1.4 billion adults aged 30-79 years had hypertension in 2024; thus representing 33% of the population in this range. Olowoyo, Akinkumi and Osohon (2025) concluded that the burden of hypertension in Africa remains substantial especially among older adults and is among the highest in the world with limited progress in achieving meaningful reductions. In addition, Adeloye, Owolabi, Ojii and Auta (2021) revealed that between 1995 and 2020, hypertension cases in Nigeria increased by 540% from 4 million individuals to 28 million individuals. Adeloye et.al. (2021) estimated that the age-adjusted hypertension prevalence in Nigeria was 32.5% a substantially higher number than 28% prevalence compared to 2010. Similarly, Odili, Chori, Danladi and

Nwakile (2020) also found that 38% of adult Nigerians aged 18 years and above were hypertensive and out of this number 60% were aware of their status whilst one-third were receiving treatment and 12% had their blood pressure under control and the prevalence range of hypertension was 20.9% in the north-central and 52.8% in the south east of Nigeria. Agency report (2025) summed it up by revealing that 1 in 3 Nigerians are hypertensive and many are unaware.

Hypertension is caused by various risk factors among them includes modifiable risk factors such as unhealthy diets, physical inactivity, excess weight and obesity, tobacco use, stress and poor sleep. On the other hand, non-modifiable factors such as age, family, history, race/ethnicity, sex etc. According to Center for disease Control (CDC 2024) modifiable risk factors of hypertension are responsible for more than half of incidence of hypertension globally at about 65% on average, WHO (2025) described the situation as poor life style choices as a result of lack awareness by individuals leading to hypertension.

Hypertension can be treated either by pharmacology or non-pharmacology approach. In some cases it can be treated using both approaches depending on the severity of the disease. Pharmacology approach of treating hypertension includes medications like diuretics, beta-blockers, calcium channel blockers and many others. On the other hand, non-pharmacology approach includes diets, nutrition and exercise.

Exercise is described as a planned structured repetitive activity. Exercise and physical activity are interchangeable however the former remains a planned action undertaking for skill performance and health related development whilst the latter is the casual and perhaps a lower intensity approach even though their movements and the purposes for undertaking them are similar. Exercise can be classified as aerobic, anaerobic and resistant exercise and it comes in various intensities such as moderate and vigorous exercise. Exercise intensity explains the rate at which exercise is executed which is reflective on parameters like the heart rate, maximum oxygen intake (Vo2 max) and others.

WHO (2020) recommends that adults between the age of 18-64 years should do at least 150 minutes of moderate-intensity exercise or physical activity throughout a week or do at least 75 minutes of vigorous -intensity of exercise of physical activity or an equivalent combination of both for health benefits. In addition, De Lannoy, Ross and Stotz (2017) recognizes that added benefit of exercising at a greater intensity improves cardio respiratory fitness. However, in contrast, Jamnick, Pettitt, Granata, Pyne and Bishop (2020) argues that intensity need to be individualized relative to specific boundaries reflecting precise metabolic conditions above which physiological homeostasis is challenged. This implies that although exercise proves to reduce parameters of metabolic conditions, however, exercise- intensity may not be a guarantee for effective treatment of health related issues rather the ability of individuals to adapt to exercise based on their unique physiological response to exercise.

Thus, on this basis, the study aims to compare the reducing effects of moderate and vigorous exercise- intensity exercise among mild- hypertensive adults in South-east region of Nigeria.

**Concept of Hypertension**

Hypertension is a cardiovascular disease that affects young, middle-aged and elderly people in our society. Nurbati and Ratna (2020) posited that hypertension occurs due to the change in pressure that can be caused by systemic changes in the peripheral blood flow system. According to WHO (2025) people with hypertension or high blood pressure may not feel symptoms and the risk factors are genetics, age, overweight or obesity, non-physical activity , high-salt diet and excess alcohol consumption. Stolting, Tran Vo, Haus and Scholl (2025) argued that hypertension has a strong genetic link, with studies showing it's 30%-50% heritable. It implies that genes significantly influence hypertension usually through a mix of many genes (polygenic). Hopkins and Hunt (2023) explained that rare single-gene disorders can cause severe early- onset hypertension and most common causes involve numerous common gene variant (SNP) and epigenetic factors interacting with factors like salt sensitivity, kidney function and renin-angiotensin system.

Hypertension significantly increases with age because blood vessels naturally stiffen and thicken over time hence lack of free flow of blood (Durso 2024). Physical inactivity is a major risk factor for hypertension. According to

Gamage and Seneviratne (2021) non-physical activity increases your chances of developing hypertension due to stiffness of the arteries, weight gain and increased cardiovascular strain. Hayes, Ferrara, Keating, McKnight and O'Regan (2022) stated that studies show that people have a 30%-50% greater risk of developing hypertension and that adults who don't exercise are 2.55 times more likely to be hypertensive. Apart from hypertension occurring from lack of physical activity, poor nutrition and poor eating habits contributes to cardiovascular diseases like hypertension ( Alagbu, Alagbu, Chike and Agwubuike 2017). Whilst hypertension can occur from known causes, it can also occur from unknown causes. Brettler (2025) described essential hypertension also known as primary hypertension as high blood pressure with no single identifiable cause, developing gradually over the years due to mix of genetic, environmental and lifestyle factors.

**Meaning, Benefits and types of Exercise**

Exercise is a planned and structured activity and has so many benefits involving movements that makes muscles work and burn calories offering significant physical and mental benefits (AHA 2024). According to Center for Disease Control (CDC 2024) physical benefits of exercise includes weight management, stronger muscles and bones, blood sugar management, better heart and lung health. On the other hand, regular exercise significantly boosts mental health by improving mood, stress, anxiety and depression through secretion of endorphins (WHO 2024). Exercise may be in the form of aerobic, anaerobic and resistance exercise.

Aerobic exercise is defined as any cardiovascular conditioning or 'cardio'. According to Hildreth (2024) by definition it means that aerobic exercise requires oxygen such that your breathing and heart rate will increase thereby supplying energy to the working muscles of the body. Anaerobic exercise involves short intense bursts of activity where the body uses stored energy like glucose without oxygen. On the other hand, resistance exercise or strength exercise makes muscles work against an external force like weights, bands or your own body weight.

Aerobic exercise can be performed in a range of intensities-moderately intense and vigorous intense. Moderately intense aerobic exercise are activities that increase your breathing and heart rate but should be able to carry out a conversation. It can lead to an increase in body temperature causing slight sweat examples are brisk walking and casual cycling. On the other hand vigorous intense aerobic exercise are activities that lead to heavy breathing where you cannot keep a conversation. It can also cause large increase in heart rate and body temperature examples are jogging and circuit training.

**Aerobic exercise response to Hypertension**

Aerobic exercise has been a vital source of exercise in treating hypertension. According to Pinkard, Baskin and Stanford (2019) aerobic exercise works by strengthening the heart, reducing strain on the vessels and helping to maintain a healthy weight. For instance, Ganjeh, Zeraatthalab-Motlagh and Shab-Bidar (2024) reveled that dose dependent aerobic exercise had a reducing effect on systolic, diastolic and hemodynamic factors in adults with hypertension. Leeyio, Katto Juma, Mkassy and Liwa (2025) found that adherence to anti-hypertensive medications in addition to aerobic activity effectively reduced blood pressure among hypertensive adults particularly at 8 weeks. According to Pascatello, Mc Donald and Johnson (2015) aerobic exercise is universally recommended as initial lifestyle therapy for individuals with hypertension because it lowers systolic and diastolic blood pressure by 7mmHg. In addition, Daimo, Mandai and Mahmud (2020) revealed that 16 weeks moderate-intensity exercise and supervised aerobic exercise training significantly reduce blood pressure levels in stage 1 hypertensive men.

Furthermore, aerobic training has the capacity to promote systolic and diastolic blood pressure levels in adults with hypertension regardless of whether there is progression of the training variables (Barcelos, Herberie, Conegilan, Vieira and

Delevatti 2022). Saco-Ledo, Valenzuela, Jimenez, Morales and Castillo- Garcia (2021) stated that a single bout of acute aerobic exercise, reduces ambulatory blood pressure over 24 hours in medicated and non-medicated hypertensives. Similarly, Zafar (2025) concluded that a structured aerobic exercise regimen effectively improved cardiovascular, metabolic and quality of life parameters among adult hypertensives.

According to Kobayashi (2025) the physiological mechanism through which different exercise reduce blood pressure are diverse but coverage on improving vascular health. In addition, the author stated that aerobic exercise enhances endothelial function by increasing nitric oxide bio-availability reducing oxidative stress and improving arterial compliance. Furthermore Umemura, Arima, Asayama and Hirooka (2019) stated that aerobic exercise induces structural adaptations in the vasculature, such as increased capillary density and enhanced arterial elasticity which collectively contribute to sustained blood pressure reduction.

**Objectives of the study**

The main objectives of the study were to-

1. determine comparative reduction of moderate- intensity brisk-walking and vigorous- intensity jogging exercise on systolic blood pressure of mild-hypertensive adults.

2. examine the comparative reduction of moderate -intensity brisk-walking exercise and vigorous-intensity jogging exercise on diastolic blood pressure of mild-hypertensive adults

3. analyze the comparative reduction of moderate-intensity brisk-walking exercise and vigorous-intensity jogging exercise on systolic blood pressure of male and female mild-hypertensive adults

4. ascertain the comparative reduction of moderate-intensity brisk-walking exercise and vigorous-intensity jogging exercise on diastolic blood pressure of male and female mild-hypertensive adults

**Research questions**

The following questions were sought by the study-

1. What is the mean difference on systolic blood pressure among mild-hypertensive adults exposed to moderate-intensity brisk-walking exercise and vigorous-intensity jogging; and those in the control group?

2. What is the mean difference on diastolic blood pressure among mild-hypertensive adults exposed to moderate-intensity brisk-walking exercise and vigorous-intensity jogging exercise; and those in the control group?

3. What is the mean difference on systolic blood pressure among male and female mild-hypertensive adults exposed to moderate-intensity brisk-walking exercise and vigorous-intensity jogging exercise; and those in the control group?

4. What is the mean difference on diastolic blood pressure among male and female mild-hypertensive adults exposed to moderate-intensity brisk-walking exercise and vigorous intensity jogging exercise; and those in the control group?

**Hypothesis**

The hypothesis of the study were tested at 0.05 level of significance in the following null assumptions-

1. There is no significant difference in the mean systolic blood pressure among mild-hypertensive adults exposed to moderate-brisk walking exercise and vigorous jogging exercise; and those in the control group.

2. There is no significant difference in the mean diastolic blood pressure among mild-hypertensive adults exposed to moderate-intensity brisk-walking exercise and vigorous-intensity jogging; and those in the control group.

3. There is no significant difference in the mean systolic blood pressure among male and female adults exposed to moderate-intensity brisk-walking exercise and vigorous-intensity jogging exercise; and those in the control group.

4. There is no significant difference in the mean diastolic blood pressure among male and female mild-hypertensive adults exposed to moderate-intensity brisk-walking exercise and vigorous-intensity jogging; and those in the control group.

# METHODS

The methods of the study are presented in the following sub headings: Research design, population of the study, instrument for data collection, method of data collection and method of data analysis

**Research design**

The study applied random control trial (RCT) experimental design to assign participants of the study randomly into treatment and control groups.

**Population of the study**

A total of 73 non- physically active adults were tested for hypertension in an urban area in Anambra state of south east, Nigeria. 21 adults out of the number consisting of male and female between the ages of 30-60 years who showed consistent scores of mild hypertension i.e systolic blood pressure of of between 130mmHg-139mmHg and diastolic blood pressure of between 80mmHg-89mm were randomly recruited in the study.

**Sample and sampling technique**

A purposive sampling technique was applied to recruit participants based on the characteristics required by the study.

**Instrument of Data Collection**

An Omron automated spygmomanometer was used by the researcher to measure systolic blood pressure and diastolic blood pressure at pretest baseline and posttest.

**Method of data collection**

12- week of brisk walking moderate exercise at 60% maximum heart rate and vigorous jogging exercise at 75% heart rate were administered to participants of the study after they were evenly assigned into 3 groups of Brisk walking treatment group, jogging treatment group and control group. 7 participants of both male and female were assigned to each group making a total of 21 participants. An ethical consideration and consent forms were duly obtained for the study and as well as a physical activity readiness questionnaire (PAR-Q) was presented to participants of the study to ascertain their physical activity fitness level before commencement of exercise protocols.

**Inclusion criteria**

The inclusion criteria of the study consisted of non- physically active male and female mild-hypertensive adults (30-60 years).

**Data analysis**

The study was analyzed using mean and standard deviation to establish the mean reduction in the exercise protocols and ANCOVA was used to determine if there was any significant difference between the exercise protocols.

**Results**

**Research Question 1**. What is the mean difference on systolic blood pressure among mild-hypertensive adults exposed to moderate-intensity brisk walking exercise and vigorous-intensity jogging exercise, and those in the control group?

**Table 1. Mean Difference in systolic blood pressure of brisk-walking and jogging among mild-hypertensive adults**

| | Pretest | | Post-test | | Mean |
|---|---|---|---|---|---|
| Group | Mean | SD | Mean | SD | Reduction/ gain |
| Brisk walking | 132.29 | 2.984 | 131.67 | 5.241 | - 0.62 |
| Jogging | 133.71 | 3.817 | 134.29 | 6.824 | 0.58 |
| Control | 134.29 | 3.638 | 136.57 | 15.704 | 2.29 |

Table 1 shows the mean reduction in systolic blood pressure scores from pretest and post-test mean scores of moderate-intensity brisk-walking and vigorous-intensity jogging among mild-hypertensive adults. The table reveal pretest mean ($M$ = 132.29) and post-test mean ($M$ = 131.67.32) with a mean reduction of 0.62 for moderate-intensity brisk-walking exercise among mild-hypertensive adults. The table also shows pretest mean ($M$ = 133.71) and post-test mean ($M$ = 134.29) with a mean gain of 0.58 for vigorous-intensity jogging mild-hypertensive adults. The table further shows pretest mean ($M$ = 134.29) and post-test mean ($M$ = 136.57) with a mean gain of 2.29 for no exercise (control group) mild-hypertensive adults.

**Hypothesis 1**. There is no significant difference in the mean systolic blood pressure among mild-hypertensive adults exposed to moderate-intensity brisk walking exercise and vigorous intensity jogging exercise; and those in the control group

**Table 2. The ANCOVA Result in the Mean difference between Brisk-walking and Jogging on Systolic Blood Pressure among Mild-hypertensive Adults**

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Corrected Model | 143.574[a] | 3 | 47.858 | .418 | .742 | .073 |
| Intercept | 43.379 | 1 | 43.379 | .379 | .547 | .023 |
| SBP pretest | 65.850 | 1 | 65.850 | .576 | .459 | .035 |
| Group | 49.986 | 2 | 24.993 | .218 | .806 | .027 |
| Error | 1830.626 | 16 | 114.414 | | | |
| Total | 362704.000 | 20 | | | | |
| Corrected Total | 1974.200 | 19 | | | | |

In Table 2, the results show that the mean difference between the moderate intensity brisk-walking and vigorous intensity jogging exercise on systolic blood pressure of mild-hypertensive adults is not statistically significant: $F(2, 16) = 0.218$, $p = .800$, $\eta^2_p = .027$). This implies that the null hypothesis is retained. Hence, there is no significant difference between moderate-intensity brisk-walking exercise and vigorous-intensity jogging exercise on systolic blood pressure of mild-hypertensive adults exposed to brisk walking and jogging; and those in the control group.

**Research Question 2**. What is the mean difference on diastolic blood pressure among mild-hypertensive adults exposed to moderate-intensity brisk walking exercise and vigorous-intensity jogging exercise; and those in the control group?

**Table 3. Mean Difference in Diastolic Blood Pressure of Brisk-walking and Jogging among Mild-hypertensive Adults**

| | Pretest | | Post-test | | Mean |
|---|---|---|---|---|---|
| Group | Mean | SD | Mean | SD | Gain/Reduction |
| Brisk walking | 86.86 | 1.345 | 76.67 | 6.955 | - 10.19 |
| Jogging | 86.43 | 0.976 | 81.14 | 6.388 | - 5.29 |
| Control | 86.14 | 1.215 | 85.86 | 10.040 | - 0.28 |

Data presented in Table 3 shows the mean gain/reduction in diastolic blood pressure scores from pretest and post-test mean scores of moderate-intensity brisk-walking and vigorous-intensity jogging exercise among mild-hypertensive adults. The table reveal pretest mean ($M$ = 86.86) and post-test mean ($M$ = 76.67) with a mean reduction of 10.19 for moderate-intensity brisk-walking among mild-hypertensive adults. The table also shows pretest mean ($M$ = 86.43) and post-test mean ($M$ = 81.14) with a mean reduction of 5.29 for vigorous-intensity jogging among mild-hypertensive adults. The table further shows pretest mean ($M$ = 86.14) and post-test mean ($M$ = 86.86) with a mean reduction of 0.28 for no exercise (control group) mild-hypertensive adults.

**Hypothesis *2***. There is no significant difference in the mean diastolic blood pressure among mild-hypertensive adults exposed to moderate-intensity brisk walking exercise and vigorous -intensity jogging exercise; and those in the control group..

**Table 4. The ANCOVA Result in the Mean difference between Brisk-walking and Jogging on Diastolic Blood Pressure of Mild-hypertensive Adults**

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Corrected Model | 308.968[a] | 3 | 102.989 | 1.651 | .217 | .236 |
| Intercept | 110.594 | 1 | 110.594 | 1.773 | .202 | .100 |
| DBP pretest | 35.066 | 1 | 35.066 | .562 | .464 | .034 |
| Group | 228.760 | 2 | 114.380 | 1.834 | .192 | .186 |
| Error | 997.982 | 16 | 62.374 | | | |
| Total | 133989.000 | 20 | | | | |
| Corrected Total | 1306.950 | 19 | | | | |

Table 4 shows that the mean difference between the moderate-intensity brisk-walking and vigorous-intensity jogging exercise- on diastolic blood pressure of mild-hypertensive adults is not statistically significant: $F(2, 16) = 1.834$, $p = .192$, $\eta^2_p = .186$). This implies that the null hypothesis is retained. Hence, there is no significant difference between moderate-intensity brisk-walking and vigorous-intensity jogging exercise on diastolic blood pressure of mild-hypertensive adults exposed to brisk walking and jogging; and those in the control group.

**Research Question 3**. What is the mean difference on systolic blood pressure among male and female mild-hypertensive adults exposed to moderate-intensity brisk walking exercise and vigorous-intensity jogging exercise; and those in the control group?

**Table 5 . Mean Interaction of Brisk-walking and Jogging on Systolic Blood Pressure based on gender**

| Group | Sex | N | Mean | Std. Deviation |
|---|---|---|---|---|
| Brisk-walking | Male | 4 | 133.00 | 5.292 |
| | Female | 2 | 129.00 | 5.657 |
| | Total | 6 | 131.67 | 5.241 |
| Jogging | Male | 4 | 138.00 | 6.272 |
| | Female | 3 | 129.33 | 4.041 |
| | Total | 7 | 134.29 | 6.824 |
| No exercise | Male | 3 | 140.33 | 6.807 |
| | Female | 4 | 133.75 | 20.918 |
| | Total | 7 | 136.57 | 15.704 |
| Total | Male | 11 | 136.82 | 6.290 |
| | Female | 9 | 131.22 | 13.340 |
| | Total | 20 | 134.30 | 10.193 |

Table 5 presents the mean scores for the interaction in systolic blood pressure of moderate-intensity brisk-walking and vigorous-intensity jogging exercise among male and female mild-hypertensive adults. The table

reveals a total interaction mean score (*M* = 131.67) for brisk walking based of male (*M* = 133.00) and female (129.00). Similarly, the table also reveals a total interaction mean score (M = 134.29) for jogging exercise of male (*M* = 138.00) and female (129.33). Finally, the table reveals a total interaction mean scores (*M* = 136.57) for no exercise (control group) of male (*M* = 140.33) and female (133.75).

**Hypothesis 3**. There is no significant difference in the mean systolic blood pressure among male and female mild-hypertensive adults exposed to moderate-intensity brisk walking exercise and vigorous-intensity jogging exercise; and those in the control group.

**Table 6. ANCOVA on Interaction of Brisk-walking and Jogging on Systolic Blood Pressure based on gender**

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Corrected Model | 302.353[a] | 6 | 50.392 | .392 | .871 | .153 |
| Intercept | 152.912 | 1 | 152.912 | 1.189 | .295 | .084 |
| SBP pretest | .236 | 1 | .236 | .002 | .966 | .000 |
| Group | 105.065 | 2 | 52.532 | .408 | .673 | .059 |
| Sex | 146.328 | 1 | 146.328 | 1.138 | .306 | .080 |
| Group * Sex | 16.063 | 2 | 8.031 | .062 | .940 | .010 |
| Error | 1671.847 | 13 | 128.604 | | | |
| Total | 362704.000 | 20 | | | | |
| Corrected Total | 1974.200 | 19 | | | | |

Table 6 reveals the interactive effects of difference between moderate-intensity brisk-walking and vigorous-intensity jogging exercise on systolic blood pressure of male and female mild-hypertensive adults. The table reveals no significant interaction effect among the group ($F = 0.408$, $p = 0.673$, $\eta^2_p = .059$), sex ($F = 1.138$, $p = 0.306$, $\eta^2_p = .080$), and group and sex ($F = 0.062$, $p = 0.940$, $\eta^2_p = .010$). The null hypothesis is therefore retained.

**Research Question 4**. What is the mean difference in diastolic blood pressure among male and female mild-hypertensive adults exposed to moderate-intensity brisk walking exercise and vigorous-intensity jogging exercise; and those in the control group ?

**Table 7. Mean Interaction of Brisk-walking and Jogging on Diastolic Blood Pressure based on gender**

| Group | Sex | N | Mean | Std. Deviation |
|---|---|---|---|---|
| Brisk-walking | Male | 4 | 76.25 | 7.500 |
| | Female | 2 | 77.50 | 3.536 |
| | Total | 6 | 76.67 | 6.055 |
| Jogging | Male | 4 | 83.25 | 5.377 |
| | Female | 3 | 78.33 | 7.638 |
| | Total | 7 | 81.14 | 6.388 |
| No exercise | Male | 3 | 89.67 | 2.517 |
| | Female | 4 | 83.00 | 13.115 |
| | Total | 7 | 85.86 | 10.040 |
| Total | Male | 11 | 82.45 | 7.621 |
| | Female | 9 | 80.22 | 9.365 |
| | Total | 20 | 81.45 | 8.294 |

Table 7 presents the mean scores for the interaction in diastolic blood pressure of moderate-intensity brisk-walking and vigorous-intensity jogging among male and female mild-hypertensive adults. The table reveals a total interaction mean score (*M* = 76.67) for brisk walking based of male (*M* = 76.25) and female (77.50). Similarly, the table also reveals a total interaction mean score (M = 81.14) for vigorous-intensity jogging exercise

of male ($M$ = 83.25) and female ($M$ = 78.33). Finally, the table reveals a total interaction mean scores ($M$ = 85.86) for no exercise (control group) of male ($M$ = 89.67) and female ($M$ = 83.00).

**Hypothesis 4**. There is no significant difference in the mean diastolic blood pressure among male and female mild-hypertensive adults exposed to moderate-intensity brisk walking and vigorous-intensity jogging exercise; and those in the control group.

**Table 8. ANCOVA on Interaction of Brisk-walking and Jogging on Diastolic Blood Pressure based on gender**

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Corrected Model | 486.312[a] | 6 | 81.052 | 1.284 | .330 | .372 |
| Intercept | 189.591 | 1 | 189.591 | 3.003 | .107 | .188 |
| DBP pretest | 92.695 | 1 | 92.695 | 1.468 | .247 | .101 |
| Group | 232.667 | 2 | 116.333 | 1.843 | .197 | .221 |
| Sex | 114.488 | 1 | 114.488 | 1.814 | .201 | .122 |
| Group * Sex | 42.938 | 2 | 21.469 | .340 | .718 | .050 |
| Error | 820.638 | 13 | 63.126 | | | |
| Total | 133989.000 | 20 | | | | |
| Corrected Total | 1306.950 | 19 | | | | |

Table 8 reveals the interactive effects of difference between moderate-intensity brisk-walking and vigorous-intensity jogging exercise on diastolic blood pressure of male and female mild-hypertensive adults. The table reveals no significant interaction effect among the group ($F$ = 1.843, $p$ = 0.197, $\eta^2_p$ = .122), sex ($F$ = 1.814, $p$ = 0.201, $\eta^2_p$ = .122), and group and sex ($F$ = 0.304, $p$ = 0.718, $\eta^2_p$ = .0150). The null hypothesis is therefore retained.

## FINDINGS

The study revealed in table 1 that moderate-intensity brisk-walking showed a reducing effect on systolic blood pressure compared to those who were exposed to vigorous-intensity jogging and the control group who were not exposed to any exercise at pre-test and post-test. Indicating that moderate-brisk walking was more effective in treating systolic blood pressure among mild-hypertensive adults in south east, Nigeria. Furthermore, the result showed that there was no significant difference in systolic blood pressure between those who were exposed to moderate-intensity brisk walking and vigorous-intensity jogging and as well as the control group; and therefore hypothesis was retained.

Furthermore, the study revealed in table 3 that moderate -intensity brisk walking showed a better reducing effect on diastolic blood pressure compared to those who were exposed to vigorous-intensity jogging and control group who were not exposed to any exercise at pre-test and post-test. Indicating that moderate-brisk walking was more effective in treating diastolic blood pressure among mild-hypertensive adults in south-east, Nigeria. Furthermore, the result also showed that there was no significant significant difference in diastolic blood pressure between those who were exposed to moderate-intensity brisk-walking and vigorous-intensity jogging and as well as those in the control group; and therefore hypothesis was retained.

The study also indicated in table 5 that moderate-intensity brisk walking showed a lower interaction on systolic blood pressure among male and female compared to their counterparts who were exposed to vigorous-intensity jogging and control group who were not exposed to any exercise at pre test and post-test. Indicating that moderate-intensity brisk walking was more effective in treating systolic blood pressure among gender compared to those who were exposed to vigorous -intensity jogging and the control group who were not exposed to any exercise at pre-test and post-test. Furthermore, the result indicated that there was no significant difference in systolic blood pressure between those who were exposed to moderate-intensity brisk-walking and vigorous-intensity jogging and as well as those in the control group; and therefore hypothesis was retained.

Similarly, the study revealed in table 7 that moderate-intensity brisk walking showed a lower interaction on diastolic blood pressure among male and female compared to their counterparts who were exposed to vigorous-intensity jogging and control group who were not exposed to any exercise at pre-test and post-test. Indicating that moderate -intensity brisk-walking was more effective in treating diastolic blood pressure among gender compared to those who were exposed to vigorous-intensity jogging and the control group who were not exposed to any exercise at pre-test and post-test. Hence, the result of the study strengthens the argument that increased exercise intensity does not guarantee effective results but depends on how the body is able to adapt to the exercise regimen. Furthermore, the result indicated that there was no significant difference in diastolic blood pressure between those who were exposed to moderate-intensity brisk walking and vigorous-intensity jogging and as well as those in the control group; and therefore hypothesis was retained.

## CONCLUSION

In conclusion aerobic moderate-intensity brisk walking at 6o% heart rate proved to be more effective in treating systolic blood pressure and diastolic blood pressure compared to aerobic vigorous-intensity jogging at 75% heart rate among adults with mild-hypertension in south -east, Nigeria, However,the result also revealed that there was no significant difference between these exercise protocols.

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