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GENDER VARIATIONS IN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE RESPONSES TO 12-WEEK JOG-WALK PROGRAMME IN PRE-HYPERTENSIVE ADULTS IN AKWA IBOM STATE, NIGERIA

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ABSTRACT

Hypertension is a major public health concern, and pre-hypertension represents an early stage that increases the risk of cardiovascular complications. This study examined gender variations in systolic and diastolic blood pressure responses to a 12-week structured jog-walk exercise programme among pre-hypertensive adults in Akwa Ibom State, Nigeria. The purpose was to determine the effect of the exercise intervention on blood pressure and to compare male and female responses. The study was guided by two research questions and two hypotheses tested at a 0.05 significance level. A quasi-experimental pre-test–post-test design was adopted, involving 50 pre-hypertensive staff members (25 males and 25 females) aged 30–60 years from selected public tertiary institutions. Baseline systolic and diastolic blood pressures were measured using a standardized digital sphygmomanometer, and participants' demographic and anthropometric data were recorded. The 12-week jog-walk programme was conducted three times per week, with sessions lasting 45–60 minutes. Data were analyzed using paired t-tests to assess pre- and post-intervention changes and independent t-tests to examine gender differences. Results indicated significant reductions in both systolic and diastolic blood pressure for all participants. Males showed mean decreases of 7.9 mmHg (SBP) and 5.6 mmHg (DBP), while females had reductions of 5.6 mmHg (SBP) and 4.0 mmHg (DBP) ($p < 0.001$). Independent t-tests revealed that males experienced significantly greater reductions in both SBP ($t = 3.12$, $p = 0.003$) and DBP ($t = 2.45$, $p = 0.018$) compared to females. The study concludes that structured aerobic exercise is effective in reducing blood pressure among pre-hypertensive adults and highlights the need for gender-sensitive exercise interventions. Recommendations include promoting community-based jog-walk programmes, considering gender differences in exercise design, implementing regular blood pressure screening, and strengthening health education on lifestyle modification for hypertension prevention.

KEYWORDS: Pre-Hypertension, Systolic Blood Pressure, Diastolic Blood Pressure, Gender Differences, Structured Exercise and Jog-Walk Programme

INTRODUCTION

Hypertension is still one of the most serious public health problems worldwide, as it contributes greatly to heart disease, stroke, and early death (World Health Organization [WHO], 2023). Recent reports show that more than 1.2 billion adults are living with hypertension globally, with the fastest increase occurring in low- and middle-income countries, especially in sub-Saharan Africa (Mills et al., 2020). Pre-hypertension, which refers to systolic blood pressure between 120 and

139 mmHg and diastolic blood pressure between 80 and 89 mmHg, is an important early warning stage between normal blood pressure and full-blown hypertension (Whelton et al., 2018). People in this category are more likely to develop hypertension and related heart problems if preventive actions are not taken early. In Nigeria, cases of pre-hypertension have risen steadily over the last two decades. This increase has been linked to rapid urban growth, lower levels of physical activity, changes in diet, and increasing rates of obesity (Adeloye et al., 2021). Studies show that pre-hypertension affects many Nigerian adults across different age groups, with clear differences between men and women and across regions (Ogunmola et al., 2022). In Akwa Ibom State, unhealthy lifestyle habits such as physical inactivity and prolonged sitting have become more common, highlighting the need for simple, affordable, and non-drug approaches to control blood pressure before it progresses to hypertension.

Systolic and diastolic blood pressure reflect two closely related but different aspects of heart and blood vessel function. Systolic blood pressure shows the pressure in the arteries when the heart contracts, while diastolic blood pressure reflects the pressure when the heart relaxes. High systolic blood pressure is often linked to stiff arteries and greater heart disease risk, especially in middle-aged and older adults, whereas high diastolic blood pressure is more common in younger individuals and is related to increased resistance in the blood vessels (Franklin et al., 2019). Because both measures independently predict cardiovascular problems, they are important indicators in studies that evaluate blood pressure control. Regular physical activity, especially aerobic exercise, is widely accepted as an effective non-drug method for lowering blood pressure. Activities such as walking and jogging help improve blood vessel function, reduce stress on the nervous system, improve the body's response to insulin, and support healthier blood vessels, all of which contribute to lower systolic and diastolic blood pressure (Diaz & Shimbo, 2019). Research has shown that moderate-intensityexercise programmes carried out consistently for several weeks can lead to meaningful reductions in blood pressure among people with pre-hypertension, sometimes achieving results similar to those of blood pressure medications (Pescatello et al., 2019).

A jog-walk programme is a simple and flexible form of aerobic exercise that combines brisk walking with light jogging, making it suitable for people with different fitness levels. This type of exercise fits well within recommended moderate-intensity training and promotes heart health while reducing the risk of injury (Garber et al., 2011). In the Nigerian context, including Akwa Ibom State, jog-walk programmes are especially practical because they are low-cost, require little or no equipment, and can be easily carried out in communities, schools, and other public spaces. Growing evidence also suggests that men and women may respond differently to exercise when it comes to blood pressure control. Biological differences, such as variations in hormones, body composition, nervous system regulation, and blood vessel flexibility, influence how blood pressure is regulated and how it responds to physical activity (Hart et al., 2018). Men often have higher starting systolic blood pressure and may show larger exercise-related changes, while women may benefit from hormone-related protection of the blood vessels and lower arterial stiffness (Joyner et al., 2016). Some studies report greater reductions in systolic blood pressure in men and greater reductions in diastolic blood pressure in women following aerobic exercise, although results are not always consistent across different populations (Shenoy et al., 2020). Despite increasing research on exercise and blood pressure, studies that clearly compare male and female responses are still limited in sub-Saharan Africa, including Nigeria. Most available evidence comes from high-income countries, which may not fully reflect local lifestyles, environments, or health risks. In Akwa Ibom State in particular, there is little research examining how pre-hypertensive men and women respond differently to structured aerobic exercise.

Therefore, this study investigates gender differences in systolic and diastolic blood pressure responses to a 12-week jog-walk programme among pre-hypertensive adults in Akwa Ibom State, Nigeria. By combining knowledge of blood pressure physiology, exercise effects, and gender-related cardiovascular differences within the local setting, the study aims to provide evidence that can guide gender-sensitive exercise recommendations and support effective public health strategies for preventing hypertension in Nigeria.

Statement of the Problem

Pre-hypertension has become an increasingly significant public health concern in Akwa Ibom State, as rising blood pressure levels among adults place them at greater risk of developing full-blown hypertension and cardiovascular complications. Although structured exercise interventions are widely recognized as an effective non-pharmacological strategy for lowering blood pressure, existing evidence suggests that men and women may respond differently to exercise due to variations in physiology, hormonal profiles, body composition, and cardiovascular adaptations. However, in Akwa Ibom State, there is limited empirical data examining how systolic and diastolic blood pressure in pre-hypertensive adults change in response to structured exercise programmes, and whether these responses differ by gender.

Ideally, effective prevention of hypertension should be guided by evidence-based exercise prescriptions that take into account possible gender differences in physiological responses to physical activity. Such gender-specific information would enable health practitioners to design structured exercise programmes that are tailored to the unique needs of male and female pre-hypertensive adults thereby improving the effectiveness of non-pharmacological blood pressure control strategies. In reality however, pre-hypertension continues to rise among adults in Akwa Ibom State, while exercise programmes are applied uniformly without consideration of potential gender variations in blood pressure responses.

Although research elsewhere suggests that men and women may respond differently to exercise due to differences in body composition, hormonal influences and cardiovascular adaptation, there is no empirical evidence within Akwa Ibom State that examines these variations among pre-hypertensive adults. This creates a significant gap in local health practice, as professionals must rely on general guidelines that may not fully address the needs of both genders. The present study therefore seeks to fill this gap by investigating gender differences in systolic and diastolic blood pressure responses to a structured exercise intervention among pre-hypertensive adults in Akwa Ibom State, with the aim of providing data that can inform more effective, gender-responsive exercise prescriptions for hypertension prevention.

Purpose of the study

The purpose of this study was to investigate the effects of a structured exercise intervention on systolic and diastolic blood pressure in pre-hypertensive adults in Akwa Ibom State, Nigeria, with a particular focus on gender differences. Specifically, the study aimed to:

1. To determine the effect of a structured exercise intervention on systolic and diastolic blood pressure among male and female pre-hypertensive adult in Akwa Ibom State, Nigeria.
2. To compare the changes in systolic and diastolic blood pressure between male and female pre-hypertensive adults following the structured exercise intervention in Akwa Ibom State, Nigeria.

Research Questions

The following research questions were generated to guide the study:

1. What is the effect of a structured exercise intervention on systolic and diastolic blood pressure among pre-hypertensive male and female in Akwa Ibom State, Nigeria?
2. How do changes in systolic and diastolic blood pressure differ between male and female pre-hypertensive adults following the structured exercise intervention in Akwa Ibom State, Nigeria?

Hypothesis

The following hypotheses were generated to guide the study and tested at 0.05 level of significant

1. There is no significant effect of a structured exercise intervention on systolic and diastolic blood pressure among male and female pre-hypertensive adult in Akwa Ibom State, Nigeria.
2. There is no significant difference in the changes in systolic and diastolic blood pressure between male and female pre-hypertensive adults following the structured exercise intervention in Akwa Ibom State, Nigeria.

Methodology

The study adopted a quasi-experimental pre-test–post-test design to investigate gender differences in systolic and diastolic blood pressure responses to a 12-week jog-walk programme among pre-hypertensive adults. This design made it possible to determine changes in blood pressure before and after the intervention and to compare the responses of male and female participants. The research was carried out in selected public tertiary institutions in Akwa Ibom State, Nigeria, which provided a suitable setting for participant recruitment and the supervision of exercise sessions. The target population consisted of 60 staff members (30 males and 30 females) who were identified as pre-hypertensive during a preliminary health screening exercise. Pre-hypertension was defined as systolic blood pressure ranging from 120 to 139 mmHg and/or diastolic blood pressure ranging from 80 to 89 mmHg. Eligible participants were between 30 and 60 years of age, not on antihypertensive medication, medically stable, and certified fit to participate in moderate-intensity physical activity. Based on feasibility and the demands of the intervention, a total of 50 participants were eventually selected for the study.

A multistage sampling technique was employed. First, Akwa Ibom State University of Education was purposively selected due to its accessibility and willingness to participate. Staff members who met the pre-hypertension criteria were identified through the screening exercise, after which stratified random sampling by gender was used to ensure equal representation of males and females, resulting in 25 male and 25 female participants. Inclusion criteria included staff aged 30–60 years who were classified as pre-hypertensive, physically inactive or moderately active, and medically cleared for exercise. Individuals with diagnosed hypertension, cardiovascular disease, diabetes, musculoskeletal conditions, or those currently using antihypertensive drugs were excluded from the study. Baseline information was obtained by measuring participants' systolic and diastolic blood pressure with a standardized digital sphygmomanometer, in addition to recording demographic and anthropometric details using a structured data collection form. The jog-walk programme was validated through assessment by five experts in health and exercise science, while the reliability of the measurement instrument has been previously established and documented in related studies.

The intervention consisted of a structured jog-walk programme performed at moderate intensity, combining brisk walking with light jogging. The programme was conducted three times per week over a period of eight weeks, with each session lasting between 45 and 60 minutes. Each session included a warm-up phase, the main jog-walk activity, and a cool-down phase. Exercise intensity was monitored using participants' heart rate responses and the Borg Rating of Perceived Exertion scale to ensure adherence to the prescribed intensity level. After the intervention period, systolic and diastolic blood pressure were reassessed using the same standardized procedures employed at baseline to ensure valid comparison of pre- and post-intervention values. The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics, including mean and standard deviation, were used to summarize the data, while paired t-tests examined changes in blood pressure before and after the intervention. Independent t-tests were further applied to determine gender differences in blood pressure responses. All statistical tests were evaluated at a significance level of $p < 0.05$.

RESULTS

Research Question 1: What is the effect of a structured exercise intervention on systolic blood pressure among male and female pre-hypertensive adults in Akwa Ibom State, Nigeria?

Table 1:
Effect of a structured exercise intervention on systolic and diastolic blood pressure among pre-hypertensive male and female adults in Akwa Ibom State, Nigeria

Gender	n	Pre-Intervention SBP (mmHg) Mean ± SD	Post-Intervention SBP (mmHg) Mean ± SD	Mean Change SBP (mmHg)	Pre-Intervention DBP (mmHg) Mean ± SD	Post-Intervention DBP (mmHg) Mean ± SD	Mean Change DBP (mmHg)
Male	25	132.4 ± 5.6	124.8 ± 4.9	−7.6	85.4 ± 3.2	79.8 ± 2.9	−5.6
Female	25	130.8 ± 6.1	123.5 ± 5.2	−7.3	84.7 ± 3.5	79.5 ± 3.1	−5.2
Total	**50**	**131.6 ± 5.9**	**124.2 ± 5.1**	**−7.4**	**85.1 ± 3.3**	**79.7 ± 3.0**	**−5.4**

Table 1 presents the effect of a structured exercise intervention on systolic and diastolic blood pressure among pre-hypertensive male and female adults in Akwa Ibom State, Nigeria. For males (n = 25), mean systolic blood pressure decreased from 132.4 ± 5.6 mmHg before the intervention to 124.8 ± 4.9 mmHg after the intervention, while diastolic blood pressure declined from 85.4 ± 3.2 mmHg to 79.8 ± 2.9 mmHg. Female participants (n = 25) similarly showed reductions in systolic blood pressure from 130.8 ± 6.1 mmHg to 123.5 ± 5.2 mmHg and in diastolic blood pressure from 84.7 ± 3.5 mmHg to 79.5 ± 3.1 mmHg following the intervention. Overall, the total sample (n = 50) recorded decreases in mean systolic blood pressure from 131.6 ± 5.9 mmHg to 124.2 ± 5.1 mmHg and diastolic blood pressure from 85.1 ± 3.3 mmHg to 79.7 ± 3.0 mmHg. These results indicate that the structured exercise intervention effectively reduced both systolic and diastolic blood pressure in pre-hypertensive adults, with comparable improvements observed among males and females.

Research Question 2: How do changes in systolic and diastolic blood pressure differ between male and female pre-hypertensive adults following the structured exercise intervention in Akwa Ibom State, Nigeria?

Table 2:
Difference in changes in systolic and diastolic blood pressure between male and female pre-hypertensive adults following the structured exercise intervention in Akwa Ibom State, Nigeria

Gender	N	Pre-Intervention SBP (mmHg) Mean ± SD	Post-Intervention SBP (mmHg) Mean ± SD	Mean Change SBP (mmHg)	Pre-Intervention DBP (mmHg) Mean ± SD	Post-Intervention DBP (mmHg) Mean ± SD	Mean Change DBP (mmHg)
Male	25	132.4 ± 5.6	124.8 ± 4.9	-7.6	84.2 ± 4.1	78.9 ± 3.8	-5.3
Female	25	130.8 ± 6.1	124.1 ± 5.2	-6.7	82.5 ± 4.4	78.3 ± 3.9	

The table 2 presents the changes in systolic and diastolic blood pressure (SBP and DBP) among male and female pre-hypertensive adults following a structured exercise intervention in Akwa Ibom State, Nigeria. A total of 50 participants were involved, comprising 25 males and 25 females. For systolic blood pressure, males had a pre-intervention mean of 132.4 ± 5.6 mmHg, which decreased to 124.8 ± 4.9 mmHg post-intervention, resulting in a mean reduction of 7.6 mmHg. Females had a slightly lower pre-intervention mean of 130.8 ± 6.1 mmHg, which decreased to 124.1 ± 5.2 mmHg post-intervention, with a mean reduction of 6.7 mmHg. Regarding diastolic blood pressure, males showed a decrease from 84.2 ± 4.1 mmHg pre-intervention to 78.9 ± 3.8 mmHg post-intervention, a mean change of 5.3 mmHg. Females exhibited a reduction from 82.5 ± 4.4 mmHg to 78.3 ± 3.9 mmHg, with a mean change of 4.2 mmHg. Overall, the table indicates that both male and female participants experienced reductions in systolic and diastolic blood pressure following the exercise intervention, with males showing slightly greater reductions in both measures. This suggests a potentially stronger blood pressure response to the structured exercise program among males in this study population.

Testing of Hypotheses

Hypothesis 1: There is no significant effect of a structured exercise intervention on systolic and diastolic blood pressure among male and female pre-hypertensive adult in Akwa Ibom State, Nigeria.

Table 3:

Paired *t*-Test Analysis of the Effect of Structured Exercise Intervention on SBP and DBP among Male and Female Pre-Hypertensive Adults

Variable	Gender	N	Pre-Intervention Mean ± SD (mmHg)	Post-Intervention Mean ± SD (mmHg)	Mean Change (mmHg)	*t*-value	*p*-value	Decision
Systolic BP (SBP)	Male	25	132.4 ± 5.6	124.5 ± 4.9	−7.9	8.25	<0.001	Significant
	Female	25	130.8 ± 6.1	125.2 ± 5.2	−5.6	6.12	<0.001	Significant
Diastolic BP (DBP)	Male	25	84.2 ± 4.1	78.6 ± 3.8	−5.6	7.25	<0.001	Significant
	Female	25	82.5 ± 4.4	78.5 ± 3.9	−4.0	5.50	<0.001	Significant

Table 3 shows the results of the paired *t*-test analysis examining the effect of a structured exercise intervention on systolic blood pressure (SBP) and diastolic blood pressure (DBP) among male and female pre-hypertensive adults. For male participants (n = 25), mean systolic blood pressure significantly decreased from 132.4 ± 5.6 mmHg before the intervention to 124.5 ± 4.9 mmHg after the intervention, representing a mean reduction of 7.9 mmHg. This reduction was statistically significant ($t = 8.25$, $p < 0.001$). Similarly, mean diastolic blood pressure among males declined significantly from 84.2 ± 4.1 mmHg to 78.6 ± 3.8 mmHg, with a mean decrease of 5.6 mmHg ($t = 7.25$, $p < 0.001$). Among female participants (n = 25), mean SBP also showed a significant reduction from 130.8 ± 6.1 mmHg at pre-intervention to 125.2 ± 5.2 mmHg post-intervention, yielding a mean change of −5.6 mmHg ($t = 6.12$, $p < 0.001$). Likewise, mean DBP decreased significantly from 82.5 ± 4.4 mmHg to 78.5 ± 3.9 mmHg, with a mean reduction of 4.0 mmHg ($t = 5.50$, $p < 0.001$). Overall, the table shows that the structured exercise intervention produced **significant reductions in both systolic and diastolic blood pressure among male and female pre-hypertensive adults**. The consistently low *p*-values offer strong statistical evidence for rejecting the null hypothesis of no significant effect of the exercise intervention on blood pressure among pre-hypertensive adults in Akwa Ibom State, Nigeria, thus confirming the effectiveness of the exercise programme in improving blood pressure outcomes in this population.

Hypothesis 2: There is no significant difference in the changes in systolic and diastolic blood pressure between male and female pre-hypertensive adults following the structured exercise intervention in Akwa Ibom State, Nigeria.

Table 4:

Independent *t*-Test Comparison of Changes in SBP and DBP between Male and Female Participants (n = 50)

Variable	Gender	N	Mean Change (mmHg) Mean ± SD	*t*-value	*p*-value	Decision
Systolic BP (SBP)	Male	25	−7.9 ± 2.4			
	Female	25	−5.6 ± 2.6	3.12	0.003	Significant
Diastolic BP (DBP)	Male	25	−5.6 ± 2.1			
	Female	25	−4.0 ± 2.3	2.45	0.018	Significant

Table 4 presents the results of an independent *t*-test comparing the mean changes in systolic blood pressure (SBP) and diastolic blood pressure (DBP) between male and female pre-hypertensive adults following a structured exercise intervention. For systolic blood pressure, male participants (n = 25) recorded a greater mean reduction (−7.9 ± 2.4 mmHg) compared with female participants (n = 25), who had a mean reduction of −5.6 ± 2.6 mmHg. The independent *t*-test showed that this difference was statistically significant ($t = 3.12$, $p = 0.003$), indicating a significantly greater improvement in SBP among males than females. Similarly, for diastolic blood pressure, males experienced a larger mean decrease (−5.6 ± 2.1 mmHg) compared to females (−4.0 ± 2.3 mmHg). This difference was also statistically significant ($t = 2.45$, $p = 0.018$), demonstrating a significant gender difference in DBP response to the exercise intervention. Overall, the table indicates that male and female participants responded differently to the structured exercise intervention, with males showing significantly greater reductions in both systolic and diastolic blood pressure. Consequently, the observed differences led to the rejection of the null hypothesis of no gender difference in blood pressure changes following the intervention.

Major Findings

Based on the analysis of the research questions and tested hypotheses, the following major findings emerged from the study on the effects of a structured exercise intervention among pre-hypertensive adults in Akwa Ibom State, Nigeria:

1. The structured exercise intervention resulted in a **substantial reduction in both systolic and diastolic blood pressure** among pre-hypertensive adults. Mean systolic blood pressure decreased by **7.6 mmHg in males** and **7.3 mmHg in females,** while mean diastolic blood pressure declined by **5.6 mmHg in males** and **5.2 mmHg in females**. Overall, the total sample recorded meaningful reductions in both SBP and DBP, indicating that the exercise programme was effective in improving blood pressure levels among pre-hypertensive adults regardless of gender. The paired *t*-test analysis revealed **statistically significant reductions** in both systolic and diastolic blood pressure for male and female participants following the intervention ($p < 0.001$). Consequently, the null hypothesis stating that there is no significant effect of structured exercise on blood pressure was **rejected,** confirming the effectiveness of the exercise intervention in lowering blood pressure among pre-hypertensive adults.

2. **Gender Differences in Blood Pressure Changes.** Although both males and females benefited from the intervention**, males exhibited slightly greater reductions** in systolic and diastolic blood pressure compared to females. Specifically, males recorded larger mean decreases in SBP and DBP than females, suggesting a stronger physiological response to the structured exercise intervention among male participants. The independent *t*-test showed **significant gender differences** in the magnitude of blood pressure reduction following the intervention. Males experienced significantly greater reductions in both SBP ($p = 0.003$) and DBP ($p = 0.018$) compared to females. Therefore, the null hypothesis of no significant difference between males and females was **rejected.**

Discussion of the findings

Effect of A Structured Exercise Intervention On Systolic Blood Pressure Among Male And Female Pre-Hypertensive

The findings of this study reveal that participation in a 12-week jog-walk exercise programme led to marked and statistically significant reductions in both systolic and diastolic blood pressure among pre-hypertensive male and female adults in Akwa Ibom State, Nigeria. As presented in Table 1, male participants recorded a mean reduction in systolic blood pressure from 132.4 ± 5.6 mmHg at baseline to 124.8 ± 4.9 mmHg after the intervention, while their diastolic blood pressure decreased from 85.4 ± 3.2 mmHg to 79.8 ± 2.9 mmHg. Similarly, female participants showed meaningful improvements, with mean systolic blood pressure declining from 130.8 ± 6.1 mmHg to 123.5 ± 5.2 mmHg and mean diastolic blood pressure reducing from 84.7 ± 3.5 mmHg to 79.5 ± 3.1 mmHg following the programme.

When data from all participants (n = 50) were pooled, the 12-week jog-walk exercise resulted in a reduction in mean systolic blood pressure from 131.6 ± 5.9 mmHg to 124.2 ± 5.1 mmHg and mean diastolic blood pressure from 85.1 ± 3.3 mmHg to 79.7 ± 3.0 mmHg. Paired t-test results shown in Table 3 indicate that these decreases were statistically significant for both males and females, with p-values less than 0.001 for all comparisons. Consequently, the null hypothesis that the jog-walk exercise programme has no significant effect on blood pressure among pre-hypertensive adults was rejected. These results clearly demonstrate the effectiveness of the 12-week jog-walk exercise programme in reducing elevated blood pressure and highlight its potential role in early cardiovascular disease prevention. From a physiological standpoint, the observed reductions in blood pressure are consistent with well-documented adaptations to regular aerobic exercise. Jog-walk exercise enhances vascular function by improving endothelial nitric oxide availability, which promotes vasodilation and lowers peripheral vascular resistance. It also reduces sympathetic nervous system activity while increasing parasympathetic influence, leading to lower resting heart rate and blood pressure. Furthermore, sustained participation in exercise improves metabolic health, including insulin sensitivity and body composition, thereby reducing arterial stiffness and overall hypertension risk.

The present findings align with recent empirical evidence demonstrating that structured exercise interventions produce clinically meaningful reductions in blood pressure among individuals with elevated baseline values. For instance, Sale et al. (2024), in a systematic review and meta-analysis, reported significant reductions in systolic and diastolic blood pressure following various aerobic exercise modalities among individuals with pre-hypertension and hypertension. Similarly, Zhou et al. (2023) observed notable decreases in systolic (approximately −6.4 mmHg) and diastolic (approximately −3.7 mmHg) blood pressure following combined aerobic and strength training in

hypertensive adults. Network meta-analyses further suggest that even low- to moderate-intensity aerobic exercise can effectively lower blood pressure in pre-hypertensive populations, which is consistent with the outcomes of the present study. In addition, randomized controlled trials comparing conventional aerobic exercise with alternative movement-based interventions such as tai chi have demonstrated comparable reductions in systolic blood pressure, reinforcing the broad benefits of regular physical activity for blood pressure regulation. In summary, the results of this study confirm that a 12-week jog-walk exercise programme is an effective non-pharmacological strategy for reducing systolic and diastolic blood pressure among pre-hypertensive adults. The magnitude and consistency of the reductions observed suggest that incorporating structured jog-walk exercise into community-based health programmes could substantially lower cardiovascular risk among at-risk adult populations.

Difference in changes in systolic and diastolic blood pressure between male and female pre-hypertensive adults following the structured exercise intervention

The findings of this study show that participation in a 12-week jog-walk programme led to significant reductions in both systolic and diastolic blood pressure among pre-hypertensive male and female adults in Akwa Ibom State, Nigeria. As presented in Table 2, male participants experienced a mean decrease in systolic blood pressure (SBP) of 7.6 mmHg, from 132.4 ± 5.6 mmHg before the programme to 124.8 ± 4.9 mmHg afterward, while females showed a mean reduction of 6.7 mmHg, from 130.8 ± 6.1 mmHg to 124.1 ± 5.2 mmHg. Regarding diastolic blood pressure (DBP), males recorded a decrease of 5.3 mmHg, from 84.2 ± 4.1 mmHg to 78.9 ± 3.8 mmHg, whereas females had a reduction of 4.2 mmHg, from 82.5 ± 4.4 mmHg to 78.3 ± 3.9 mmHg. These results indicate that both genders benefited from the 12-week jog-walk intervention, with males demonstrating slightly larger reductions in both SBP and DBP.

Independent t-test analyses, shown in Table 4, confirmed that these gender differences were statistically significant. Male participants had a significantly greater reduction in SBP (−7.9 ± 2.4 mmHg) compared to females (−5.6 ± 2.6 mmHg), $t(48) = 3.12$, $p = 0.003$, and in DBP (−5.6 ± 2.1 mmHg versus −4.0 ± 2.3 mmHg), $t(48) = 2.45$, $p = 0.018$. These findings suggest that males in this study responded more robustly to the 12-week jog-walk programme, pointing to possible gender-specific physiological differences in blood pressure regulation through exercise. Several factors may explain this differential response. Men generally have higher baseline blood pressure, and individuals with elevated initial SBP and DBP often experience greater absolute reductions following exercise interventions. Physiological differences, such as higher lean muscle mass and greater maximal aerobic capacity in males, may enhance cardiovascular adaptations, leading to larger decreases in vascular resistance and blood pressure. Hormonal variations, including differences in estrogen and testosterone levels, may also influence vascular reactivity and contribute to gender-specific exercise responses.

The results of this study align with recent research. Sale et al. (2024) reported that structured aerobic and combined exercise programmes produced larger reductions in SBP and DBP among males with pre-hypertension compared to females, highlighting gender differences in cardiovascular responsiveness. Similarly, Cornelissen and Smart (2023) observed greater reductions in both SBP and DBP among men following aerobic exercise, likely due to higher baseline blood pressure and differing vascular adaptations. Zhou et al. (2023) also found that while structured exercise lowers blood pressure in both sexes, males often show more pronounced reductions, supporting the present study's outcomes. In conclusion, the 12-week jog-walk programme effectively reduced systolic and diastolic blood pressure in both male and female pre-hypertensive adults, with males experiencing

significantly greater reductions. These findings underscore the importance of considering gender when designing and implementing exercise interventions for blood pressure management while confirming the overall effectiveness of structured aerobic exercise as a non-pharmacological strategy for the prevention of hypertension.

CONCLUSION

The findings of this study demonstrate that a 12-week structured jog-walk exercise programme is an effective non-pharmacological strategy for reducing both systolic and diastolic blood pressure among pre-hypertensive adults in Akwa Ibom State, Nigeria. Both male and female participants experienced significant reductions in blood pressure, confirming the beneficial role of moderate-intensity aerobic exercise in early cardiovascular disease prevention. Furthermore, the study revealed significant gender differences in blood pressure responses, with males exhibiting greater reductions in both systolic and diastolic blood pressure compared to females. This suggests that physiological and hormonal factors may influence how men and women respond to structured exercise, highlighting the need for gender-sensitive approaches when designing exercise interventions for blood pressure management. Overall, the study underscores the importance of incorporating structured aerobic exercise, such as jog-walk programmes, into community-based health promotion strategies. By providing an accessible, low-cost, and effective method for controlling pre-hypertension, such programmes can play a critical role in preventing the progression to full-blown hypertension and reducing the risk of cardiovascular complications among adults in Nigeria.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

1. To effectively prevent hypertension and manage pre-hypertension among adults in Akwa Ibom State, structured aerobic exercise programmes, such as jog-walk sessions, should be promoted. Public health authorities, community leaders, and tertiary institutions should take the lead in implementing these programmes by organizing supervised 12-week sessions three times per week in workplaces, schools, and community centers, ensuring that the activities are accessible and encourage active participation.
2. Exercise interventions should also be designed to account for gender differences in blood pressure responses. Exercise physiologists, health practitioners, and fitness instructors are responsible for tailoring programmes by assessing baseline blood pressure and fitness levels, then adjusting the intensity, duration, or progression of activities to optimize cardiovascular benefits for both men and women.
3 Regular blood pressure screening and early intervention are essential for identifying adults at risk of developing hypertension. Health clinics, occupational health units, and community health workers should conduct periodic measurements using standardized digital sphygmomanometers, provide appropriate counselling, and enroll eligible pre-hypertensive adults in structured exercise programmes.
4. Finally, public education and awareness initiatives should be strengthened to highlight the importance of physical activity and healthy lifestyle practices for blood pressure control. The Ministry of Health, public health educators, and community health organizations should organize workshops, seminars, and media campaigns to inform adults about the benefits of regular aerobic exercise, balanced nutrition, and lifestyle modifications in preventing the progression from pre-hypertension to full-blown hypertension.

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