KNOWLEDGE ATTITUDE AND PRACTICE OF EXERCISE FOR BLOOD PRESSURE CONTROL AMONG ADULTS WITH HYPERTENSION IN UNIVERSITY OF BENIN TEACHING HOSPITAL

BY

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CERTIFICATION

This dissertation by **IYOHA DEBORAH OLUWASOLA** is accepted in its present form is satisfying dissertation requirement of the degree of the Bachelor of Physiotherapy of the school of Basic Medical Sciences, College of Medical Science of the University of Benin.

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DEDICATION

This work is dedicated to God Almighty, the source of all wisdom, who has graciously provided divine strength, guidance, and provision throughout this project. I extend my deepest gratitude to my loving and supportive mother, my loving father and my loving siblings, for their unwavering love, encouragement, and support that made this project a reality. Special thanks to my wonderful friends for their amazing support.

ABSTRACT

Background:
Hypertension is a leading non-communicable disease and a major risk factor for cardiovascular morbidity and mortality globally. Despite proven evidence that regular exercise reduces blood pressure, the level of knowledge, attitude, and practice (KAP) of exercise among hypertensive patients remains suboptimal, particularly in Nigeria. Understanding these dimensions is essential for promoting effective non-pharmacological management of hypertension.

Aim:
The study assessed the knowledge, attitude, and practice of exercise for blood pressure control among adults with hypertension attending the University of Benin Teaching Hospital (UBTH).

Methods:
A descriptive cross-sectional study design was employed involving 150 adults with high blood pressure recruited from the cardiology clinic of UBTH. Data were collected using a structured, self-administered questionnaire divided into sections on socio-demographic data, knowledge, attitude, and practice of exercise for blood pressure control. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were expressed as frequencies and percentages, while associations between variables were tested using the Chi-square test at a significance level of $p < 0.05$.

Results:
Findings revealed that 74% of participants had adequate knowledge of exercise for blood pressure control, 76% demonstrated a good attitude, and 60% had good exercise practice. There was a significant association between socio-economic status and knowledge of exercise ($p = 0.021$), while age, level of education, and socio-economic status showed no significant association with attitude and practice ($p > 0.05$). Most respondents (85.4%) reported improvement in blood pressure since initiating exercise.

Conclusion:
The study concluded that hypertensive adults at UBTH generally possess good knowledge and attitude toward exercise for blood pressure control; however, practical engagement in exercise remains moderate. Continuous patient education, physiotherapy involvement, and community-based exercise programs are recommended to enhance adherence and improve hypertension outcomes.

Keywords:
Hypertension, Exercise, Knowledge, Attitude, Practice, Blood Pressure Control.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Hypertension, commonly referred to as high blood pressure, is a chronic medical condition characterized by a sustained elevation in arterial pressure. According to the World Health Organization (WHO, 2002), it is defined as a systolic blood pressure (SBP) of ≥140 mmHg and/or a diastolic blood pressure (DBP) of ≥90 mmHg, measured on at least two different occasions. Hypertension remains a significant global public health issue, contributing substantially to the global burden of cardiovascular diseases (WHO 2002; Chobanian et al., 2003; Kearney et al., 2004). It is a major modifiable risk factor for life-threatening conditions such as stroke, myocardial infarction, heart failure, and chronic kidney disease (Joseph., 2016).

The prevalence of hypertension increases progressively with age and tends to be more common in certain demographics, notably among individuals of African descent and in males (Joseph., 2016). In Nigeria and across sub-Saharan Africa, the burden of hypertension has been rising, fueled by urbanization, sedentary lifestyles, unhealthy diets, and increased stress levels (Atakite et al., 2015). The University of Benin Teaching Hospital (UBTH), a tertiary health institution in Nigeria, attends to a growing population of patients diagnosed with hypertension, many of whom present with poorly controlled blood pressure due to various challenges including poor compliance, limited access to care, and inadequate lifestyle modifications (Ukoh., 2007).

Management of hypertension includes both pharmacological and non-pharmacological approaches. While antihypertensive medications are effective in lowering blood pressure, they are

often accompanied by side effects, financial burdens, and varying levels of adherence among patients. Non-pharmacological interventions, particularly regular physical exercise, have gained increasing recognition as a cost-effective, low-risk strategy for blood pressure control (Awotidebe et al., 2014). Physical activity contributes to cardiovascular health by improving endothelial function, reducing arterial stiffness, enhancing insulin sensitivity, and facilitating weight reduction.

Evidence from clinical study has demonstrated that aerobic exercise alone can result in clinically significant reductions in blood pressure—by as much as 12 mmHg systolic and 5 mmHg diastolic (Westhoff et al., 2002). As such, exercise is increasingly recommended as an integral component of hypertension management guidelines globally (Chobanian et al., 2003; Whelton et al., 2002; WHO, 2003; Pescatello et al., 2005). Despite its proven benefits, however, patient engagement in exercise remains suboptimal, often due to lack of awareness, misconceptions about exercise safety, inadequate physician counseling, and cultural attitudes toward physical activity. The integration of exercise into hypertension care requires more than general recommendations—it calls for targeted education, supportive attitudes, and sustained behavioral change. Maruf et al. noted that structured exercise programs can reduce the need for multiple antihypertensive medications and may prevent the progression of hypertension-related complications with minimal adverse effects. Nonetheless, effective implementation depends on patients' knowledge of the benefits of exercise, their attitudes toward physical activity, and the consistency of their exercise practices.

Knowledge, attitude, and practice (KAP) studies serve as essential tools in understanding how individuals perceive and engage with health interventions. A patient's knowledge about hypertension and the role of exercise in its control can significantly influence their willingness to adopt and maintain an active lifestyle. (Busari et al. 2010) emphasized that improving patients'

knowledge is directly linked to better compliance with treatment regimens and improved health outcomes.

However, there is a paucity of empirical data on the KAP of exercise for blood pressure control among hypertensive patients in Nigeria, particularly in tertiary health settings such as UBTH. While some reviews have discussed the interaction between antihypertensive medications and exercise, including effects on hemodynamic responses and thermoregulation (Arita et al.), few studies have explored the real-world challenges patients face in integrating exercise into their daily routine.

1.2 STATEMENT OF THE PROBLEM

Hypertension is a major public health challenge and a leading risk factor for cardiovascular diseases, stroke, and premature death. According to the World Health Organization (WHO, 2023), over 1.28 billion adults aged 30–79 years are living with hypertension worldwide, with nearly 46% unaware of their condition. Despite global efforts to promote lifestyle modifications, poor knowledge, attitude, and practice (KAP) related to non-pharmacological interventions such as regular physical activity persist.

The burden of hypertension is rising rapidly due to urbanization, sedentary lifestyles, and changes in dietary habits. The prevalence of hypertension in sub-Saharan Africa is estimated to be around 30–46% among adults, making it one of the regions with the highest rates globally (Ataklte et al., 2015). Unfortunately, awareness and control of hypertension remain poor, and engagement in preventive behaviors, especially regular exercise, is low due to cultural beliefs, lack of knowledge, and healthcare access issues.

Hypertension is the most common non-communicable disease, with prevalence rates ranging from 20% to over 40% depending on the population studied (Adeloye et al., 2015). Despite evidence that regular physical activity can significantly reduce blood pressure, many hypertensive individuals lack adequate knowledge and fail to adopt appropriate lifestyle changes. The attitude towards exercise is often influenced by myths, low perceived benefits, or socioeconomic constraints, while practices are undermined by urban stress, poor health education, and limited community-based interventions.

This issue is of particular concern at the University of Benin Teaching Hospital (UBTH), where a significant number of hypertensive patients present with poor blood pressure control. Clinical observation suggests that many of these patients may not understand the role of exercise in managing their condition, or they may not engage in regular physical activity due to negative attitudes or incorrect practices.

1.3 RESEARCH QUESTIONS

i What is the level of knowledge among hypertensive individuals regarding the benefits of exercise for blood pressure control?

ii What are the attitudes of hypertensive patients toward using exercise as a strategy for managing hypertension?

iii How frequently do hypertensive individuals engage in physical exercise as part of their hypertension management?

iv What types of physical exercise are most commonly practiced by hypertensive individuals?

1.4 AIM OF THE STUDY

The study was to assess the knowledge, attitude, and practice of exercise among hypertensive adults at UBTH.

1.5 SPECIFIC OBJECTIVES

I. To assess the level of awareness/knowledge regarding exercise benefits for blood pressure control.

ii. To determine patients' attitudes toward exercise as a management strategy for hypertension.

iii. To examine the frequency and types of exercise practiced by hypertensive individuals

1.6 HYPOTHESE

1.6.1 Main hypothese:

i There would be no significant association between socio-demographic characteristics and the practice of exercise for blood pressure control

ii There would be no significant association between socio-demographic characteristics and the knowledge of exercise for blood pressure control

iii There would be no significant association between sociodemographic characteristics and the attitude of exercise for blood pressure control.

1.6.2 Sub hypothese:

I There would be no significant association between age and the practice of exercise for blood pressure control

ii There would be no significant association between level of education and the practice of exercise for blood pressure control

iii There would be no significant association between socioeconomic status and the practice of exercise for blood pressure control

iv There would be no significant association between age and the knowledge of exercise for blood pressure control

v There would be no significant association between level of education and the knowledge of exercise for blood pressure control

vi There would be no significant association between socioeconomic status and the knowledge of exercise for blood pressure control.

vii There would be no significant association between age and the attitude of exercise for blood pressure control.

viii There would be no significant association between level of education and the attitude of exercise for blood pressure control

ix There would be no significant association between socioeconomic status and the attitude of exercise for blood pressure control

1.7 SIGNIFICANT OF STUDY

This study is of significant importance in advancing the understanding of how exercise is perceived and practiced among hypertensive adults, specifically within the context of the University of Benin Teaching Hospital (UBTH). Hypertension continues to pose a serious burden on both individuals and the healthcare system, particularly in developing countries where access to medications may be limited and lifestyle-related diseases are on the rise. The findings from this study have multiple implications for clinical practice, public health interventions, and policy development:

1. Promotes Non-Pharmacological Interventions

Hypertension is a global public health challenge, and its management increasingly involves lifestyle modifications alongside pharmacological treatments. This study emphasizes the role of exercise—a proven non-pharmacological intervention—in the control of blood pressure. By assessing patients' knowledge, attitudes, and practices regarding exercise, this research highlights the importance of behavioral health education in delivering sustainable, low-cost, and effective strategies for hypertension control. The findings will help reinforce the value of exercise as a core component of hypertension management protocols at UBTH and beyond.

2. Improves Patient Outcomes

Identifying patients' current levels of awareness, beliefs, and exercise behaviors can reveal key barriers to adherence. For example, patients may lack accurate knowledge about the benefits of exercise or may harbor misconceptions about its safety or efficacy. By uncovering these gaps, the study will inform the development of more personalized, patient-centered approaches that encourage consistent physical activity. Tailored exercise programs and health education strategies

can enhance adherence, leading to improved blood pressure control and overall cardiovascular health among hypertensive patients.

3. Informs Clinical Practice

The findings will offer critical insights to healthcare providers—particularly physiotherapists, nurses, and physicians—regarding patients' readiness to adopt and maintain exercise regimens. These insights can guide the development of more effective educational materials, motivational strategies, and exercise prescriptions suited to the cultural, social, and economic realities of patients at UBTH. Understanding patient attitudes also allows clinicians to adopt more empathetic and supportive counseling techniques, ultimately leading to better engagement and therapeutic outcomes.

4. Contributes to Existing Literature

This study will add to the limited body of research on non-pharmacological management of hypertension in Nigeria, and particularly within institutional settings like UBTH. While numerous studies have documented the benefits of exercise in hypertension management, fewer have explored the knowledge, attitude, and practice dimensions among hospital-based adult populations. The study therefore fills a critical gap in literature and provides context-specific evidence that can be used for further academic research and program evaluation.

5. Guides Public Health Policy and Community Interventions

Beyond clinical practice, the study's results can be instrumental in shaping public health initiatives aimed at hypertension prevention and control. Policymakers and health administrators can use the

evidence generated to design and implement targeted community-based exercise programs, health education campaigns, and training workshops focused on behavioral change. It can also support the development of institutional protocols that promote routine physical activity as part of outpatient care, especially for patients at high risk of cardiovascular events.

6. Strengthens Health System Capacity

In the long term, integrating structured exercise interventions based on patient knowledge and attitudes can reduce the burden on the healthcare system. Better hypertension control through exercise can lead to fewer complications such as stroke, heart failure, and kidney disease, thereby reducing hospital admissions and associated healthcare costs. The findings can also help UBTH evaluate and enhance its current health promotion and physiotherapy services, contributing to improved institutional capacity for chronic disease management.

1.8 SCOPE OF THE STUDY

1 Adults aged 18 years and above.

2 Diagnosed with hypertension.

3 Receiving treatment or follow-up at University of Benin Teaching Hospital (UBTH).

4 The study did not include hypertensive individuals who were not attending UBTH or those with secondary hypertension due to other medical conditions unless specified.

1.9 DEFINITION OF TERMS

1 Hypertension: A medical condition characterized by persistently high blood pressure.

2 Exercise: Any physical activity aimed at improving health and fitness.

3 Knowledge: Awareness and understanding of the benefits of exercise for blood pressure control.

4 Attitude: The perception and willingness to engage in regular physical activity.

5 Practice: The actual behavior of engaging in exercise for blood pressure management.

1.9.1 LIST OF ABBREVIATIONS

Abbreviation	Meaning
BP	Blood Pressure
KAP	Knowledge, Attitude and Practice
HTN	Hypertension
UBTH	University of Benin Teaching Hospital
WHO	World Health Organization
CDC	Centers for Disease Control and Prevention
BMI	Body Mass Index
NCDs	Non-Communicable Diseases
SBP	Systolic Blood Pressure
DBP	Diastolic Blood Pressure
PA	Physical Activity
MOH	Ministry of Health
RCT	Randomized Controlled Trial

HR Heart Rate

mmHg Millimeters of Mercury (unit of BP)

DASH Dietary Approaches to Stop Hypertension

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Hypertension, commonly known as high blood pressure, is a major public health issue globally, particularly in developing countries. It is a significant risk factor for cardiovascular diseases, stroke, and renal failure. Effective blood pressure control often involves lifestyle modification, with regular physical activity being one of the most recommended non-pharmacological interventions. Understanding the knowledge, attitude, and practice (KAP) of hypertensive patients regarding exercise is crucial to implementing effective interventions. This review explores existing literature on KAP of exercise for blood pressure control, with a focus on adult populations and relevance to the Nigerian healthcare context, particularly the University of Benin Teaching Hospital (UBTH).

2.1.1 Knowledge of Exercise in Blood Pressure Control

Knowledge about the role of exercise in controlling hypertension is often variable among patients. Studies have shown that while many hypertensive patients are aware that exercise can help reduce blood pressure, detailed knowledge of the type, frequency, and duration of exercise required is often lacking (Ogunlana et al., 2019; I& Iyalomhe, 2015).

In a Nigerian study, only 40% of hypertensive patients had adequate knowledge of exercise as a lifestyle modification for hypertension management (Oladapo et al., 2013). This knowledge gap has been attributed to inadequate health education, low literacy levels, and lack of structured counseling in health facilities.

2.1.2 Attitude Towards Exercise

Attitude refers to a person's feelings and beliefs about engaging in exercise. Several studies indicate that even when patients are aware of the benefits of exercise, their attitude may not be supportive of behavioral change.

A study conducted by Akinlua et al. (2020) in southwestern Nigeria reported that although patients expressed positive attitudes toward exercise, they perceived several barriers such as lack of time, physical discomfort, and fear of worsening their condition. Cultural perceptions and lack of motivation also negatively influence attitudes, particularly among older adults.

At UBTH, anecdotal observations suggest a similar trend, with some patients expressing skepticism about non-drug approaches to blood pressure management.

2.1.3 Practice of Exercise Among Hypertensive Adults

Regular exercise among hypertensive patients remains suboptimal despite its known benefits. The World Health Organization recommends at least 150 minutes of moderate-intensity aerobic exercise per week for adults, but adherence among hypertensive populations in Nigeria remains low (WHO, 2020).

In a cross-sectional study in Lagos, only 30% of hypertensive patients reported engaging in regular physical activity (Adeloye et al., 2015). Barriers to practice include comorbid conditions, lack of access to safe environments for exercise, and limited guidance from healthcare professionals.

At UBTH, there is limited documented evidence of the exercise practices of hypertensive patients, although clinical experiences indicate that exercise counseling is often secondary to pharmacologic interventions.

2.1.4 Gaps in Literature and Need for Study in UBTH

There is limited data specific to UBTH or the South-South region of Nigeria regarding KAP of exercise for blood pressure control. Most existing studies are from Lagos, Ibadan, or northern regions. Furthermore, few studies integrate the three components—knowledge, attitude, and practice—simultaneously in the context of a tertiary health facility.

A study focused on UBTH will help assess current patient education strategies, identify barriers unique to this population, and offer data-driven recommendations for improving lifestyle counseling in hypertensive care.

2.2 EPIDEMIOLOGY OF HYPERTENSION

The prevalence of hypertension varies across regions and country income groups. The WHO African Region has the highest prevalence of hypertension (27%) while the WHO Region of the Americas has the lowest prevalence of hypertension (18%).

The number of adults with hypertension increased from 594 million in 1975 to 1.13 billion in 2015, with the increase seen largely in low- and middle-income countries. This increase is due mainly to a rise in hypertension risk factors in those populations.

2.3 ANATOMY OF HEART

The heart is a muscular organ that serves to collect deoxygenated blood from all parts of the body, carries it to the lungs to be oxygenated and release carbon dioxide. Then, it transports the oxygenated blood from the lungs and distributes it to all the body parts.

2.3.1 Heart Diagram :

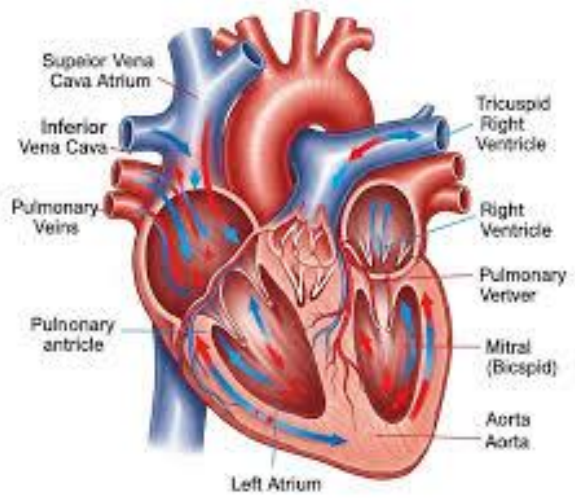

Figure 1 : Structure of the heart

Image source : https://share.google/images/q5PRkrpFVuCucfXFw

2.3.2 THE FOUR CHAMBERS: TWO ATRIA (RIGHT AND LEFT) AND TWO VENTRICLES (RIGHT AND LEFT)

a Left Atrium: The left atrium contributes the majority (about two-thirds) of the base of the heart. This chamber receives oxygenated blood from the lungs via the pulmonary veins.

b Right Atrium: The right atrium contributes the remaining one-third of the base. This chamber receives deoxygenated blood from the body through the superior and inferior vena cavae.

c Left ventricle: The left ventricle receive oxygenated blood from left atrium and distribute it to other part of the body

d Right ventricle: The right ventricle receive deoxygenated blood from right atrium and distribute it to the lung

The heart pumps around 7,200 litres of blood in a day throughout the body.

The heart is situated at the centre of the chest and points slightly towards the left.

HEART LOCATION

The heart is a conical hollow muscular organ situated in the middle mediastinum and is enclosed within the pericardium. It is positioned posteriorly to the body of the sternum with one-third situated on the right and two-thirds on the left of the midline. The heart measures 12 x 8.5 x 6 cm and weighs ~310 g (males) and ~255 g (females). It pumps blood to various parts of the body to meet their nutritive requirements.

Relations

1. **Anteriorly:** the body of the sternum, and adjoining costal cartilages; left lung, and pleura (apex)

2. **Posteriorly:** oesophagus, descending thoracic aorta, azygos, hemiazygos veins, and thoracic duct
3. **Superficially:** bifurcation of the main pulmonary trunk
4. **Inferiorly:** diaphragm
5. **Laterally:** lungs, pleura

Apex

1. **Location and Structure**: The apex is formed by the left ventricle, and it points downward, forward, and to the left.
2. **Anatomical Position:** The apex is typically located at the level of the 5th left intercostal space, about 9 cm (3.5 inches) from the midline of the body. This position is just medial to the midclavicular line.
3. **Clinical Relevance:** The apex of the heart is clinically significant because it can be palpated during a physical examination. This palpation is commonly referred to as the point of maximal impulse (PMI), which can help assess the size and position of the heart, as well as its function.
4. **Anatomical Composition:** The base of the heart is primarily formed by the left atrium (about two-thirds), while the right atrium contributes about one-third. This part of the heart is located opposite to the apex, facing posteriorly.
5. **Orientation:** The base of the heart is directed backward and to the right, contrasting with the apex's downward, forward, and leftward direction.

Relation to Vertebral Column

In a recumbent (lying down) position, the base of the heart is positioned in front of the middle thoracic vertebrae (T5–T8).

When in an erect posture, the base descends by one vertebra, typically positioned in front of T6–T9.

1. **Separation from Vertebral Column:** The base is separated from the vertebral column by several structures
2. **Oblique pericardial sinus:** A recess in the pericardium that allows space for the heart's movement.
3. **Esophagus:** The muscular tube connecting the throat to the stomach, which lies behind the heart.
4. **Aorta:** The large artery that carries blood from the left ventricle to the rest of the body.

Clinical Relevance

Great Blood Vessels: The base of the heart is where the major blood vessels are attached, including the superior vena cava, ascending aorta, and pulmonary trunk. This makes the base significant in cardiovascular assessments.

1. Sternocostal (Anterior) Surface

Main contributors: The right atrium and right ventricle primarily form this surface. These two chambers are separated by the anterior atrioventricular groove.

Additional contributors: The left auricle and left ventricle also contribute to the sternocostal surface, but to a lesser extent.

Separation between ventricles: The right ventricle is separated from the left ventricle by the anterior interventricular groove.

Important notes:

The left atrium is not visible from the front because it is hidden by the ascending aorta and pulmonary trunk.

The cardiac notch of the left lung leaves an area of superficial cardiac dullness on the sternocostal surface.

2. Diaphragmatic (Inferior) Surface

Flat and rests on: This surface is flat and lies on the central tendon of the diaphragm, providing support.

Main contributors: It is formed by the left and right ventricles.

The left ventricle forms about two-thirds of the diaphragmatic surface.

The right ventricle forms the remaining one-third.

Separation between ventricles: The posterior interventricular groove separates the left and right ventricles on the diaphragmatic surface.

3. Left Surface

Main contributor: This surface is primarily formed by the left ventricle.

Additional contributors: It is also partially formed by the left atrium and left auricle.

Direction: The left surface is oriented upwards, backwards, and to the left, making it the most lateral surface of the heart.

- ❖ Right Border

Formation: The right border is primarily formed by the right atrium.

Extension: It extends from the right side of the opening of the superior vena cava (SVC) to the right side of the opening of the inferior vena cava (IVC).

Function: This border separates the base of the heart from the sternocostal surface.

- ❖ Left Border

Formation: The left border is formed mainly by the left ventricle and partly by the left auricle.

Curvature: It is curved and oblique, extending from the left auricle to the apex of the heart.

Function: The left border separates the sternocostal surface from the left surface of the heart.

- ❖ Inferior Border

Formation: The inferior border is mainly formed by the right ventricle, with a small contribution from the right atrium.

Extension: It extends from the opening of the IVC to the apex of the heart.

Function: This border separates the sternocostal surface from the diaphragmatic surface.

Notch: Near the apex, the inferior border features a notch called the incisura apicis cordis, which is a slight indentation.

- ❖ Upper Border

Formation: The upper border is formed by both the right and left atria, but it is mainly formed by the left atrium.

Obscured view: This border is obscured from view on the sternocostal surface because it is covered by the ascending aorta and the pulmonary trunk.

Surface marking: On the surface of the body, the upper border can be marked by a line:

From a point on the lower border of the 2nd left costal cartilage (1.5 inches from the median plane).

To a point on the upper border of the 3rd right costal cartilage (1 inch away from the median plane).

2.4 LAYERS OF THE HEART WALLS

1. **Heart layers**

The heart wall consists of three layers enclosed in the pericardium:

Epicardium - the outer layer of the wall of the heart and is formed by the visceral layer of the serous pericardium.

Myocardium - the muscular middle layer of the wall of the heart and has excitable tissue and the conducting system.

Endocardium.

A middle concentric layer

A subendocardial layer.

The rest of the heart is composed mainly of the subepicardial and subendocardial layers.

2.5 STRUCTURE AND FUNCTION

Human-heart-chambers

The heart is subdivided by septa into right and left halves, and a constriction subdivides each half of the organ into two cavities, the upper cavity being called the atrium, the lower the ventricle. The heart, therefore, consists of four chambers:

- ✓ Right Atrium
- ✓ Left Atrium
- ✓ Right Ventricle
- ✓ Left Ventricle

Venous blood returning from the body drains into the right atrium via the SVC, IVC and coronary sinus

The right atrium pumps blood through the tricuspid valve into the right ventricle

The right ventricle pumps blood through the pulmonary semilunar valve into the pulmonary trunk to be oxygenated in the lungs

Blood returning from the lungs drains into the left atrium via the four pulmonary veins

The left atrium pumps blood through the bicuspid (mitral) valve into the left ventricle

The left ventricle pumps blood through the aortic semilunar valve into the ascending aorta to supply the body.

Heart Valves

The valves of the heart maintain unidirectional flow of the blood and prevent its regurgitation in the opposite direction. There are two pairs of valves in the heart, a pair of atrioventricular valves and a pair of semilunar valves. Apart, it has four valves. All four valves of the heart have a singular purpose: allowing forward flow of blood but preventing backward flow. The outflow of each chamber is guarded by a heart valve:

Atrioventricular valves between the atria and ventricles

Tricuspid valve (right side of the heart)

Mitral valve/bicuspid valve (left side of the heart)

Semilunar valves which are located in the outflow tracts of the ventricles

Aortic valve (left side heart)

Pulmonary valve (right side heart)

Blood Supply

Overview of the coronary arteries and cardiac veins - anterior and posterior views

The heart is supplied by two coronary arteries:

Left main coronary artery carries 80% of the flow to the heart muscle. It is a short artery that divides into two branches

Left anterior descending artery that supplies anterior two-thirds of the inter-ventricular septum and adjoining part of the left ventricular anterior wall

Circumflex coronary artery that supplies blood to the lateral and posterior portions of the left ventricle.

Coronary arteries and veins course over the surface of the heart. Most coronary veins coalesce into the coronary sinus that runs in the left posterior atrioventricular groove and opens into the right atrium. Other small veins, called thebesian veins, open directly into all four chambers of the heart.

Venous drainage and Lymphatics

Venous drainage is via the variable coronary veins and the coronary sinus.

The lymphatic vessels drain mainly into:

Brachiocephalic nodes, in front of brachiocephalic veins

Tracheobronchial nodes, located at the distal end of the trachea.

Nerve Supply

Course and distribution of the glossopharyngeal, vagus, and accessory nerves.

The main control of the heart resides with the medulla oblongata. There is an area called the cardioacceleratory centre, or pressor centre, in the upper part of the medulla oblongata, and an area called the cardioinhibitory centre, or depressor centre, in the lower part. Together they are called the cardioregulatory centre, since they interact to control heart rate, etc.

The nervous supply to the heart is autonomic, consisting of both sympathetic and parasympathetic parts. The sympathetic fibres arise from the pressor centre, while the parasympathetic fibres arise in the depressor centre.

The sympathetic nervous system acts on the sinoatrial node, speeding up the depolarisation rate, and therefore increasing the heart rate.

The parasympathetic system works in reverse in order to slow the heart rate down.

The heart itself has a natural pacemaker, the sinoatrial node, which does not need a nervous supply to function. If you sever all the nerves to the heart, then it will continue to beat. In fact, it will beat faster than normal, since there is normally a parasympathetic supply slowing the heart down.

Heart Conduction System

An electrical conduction system regulates the pumping of the heart and timing of contraction of various chambers. Heart muscle contracts in response to the electrical stimulus received system generates electrical impulses and conducts them throughout the muscle of the heart, stimulating the heart to contract and pump blood. Among the major elements in the cardiac conduction system are the sinus node, atrioventricular node, and the autonomic nervous system.

The sinus node is the heart's natural pacemaker. The sinus node is a cluster of cells situated in the upper part of the wall of the right atrium. The electrical impulses are generated there. (The sinus node is also called the sinoatrial node.)

The electrical signal generated by the sinus node moves from cell to cell down through the heart until it reaches the atrioventricular node (the AV node), a cluster of cells situated in the center of the heart between the atria and ventricles.

The AV node serves as a gate that slows the electrical current before the signal is permitted to pass down through to the ventricles. This delay ensures that the atria have a chance to fully contract before the ventricles are stimulated. After passing the AV node, the electrical current travels to the ventricles along special fibers embedded in the walls of the lower part of the heart.

The autonomic nervous system (the same part of the nervous system as controls the blood pressure) controls the firing of the sinus node to trigger the start of the cardiac cycle. The autonomic nervous system can transmit a message quickly to the sinus node so it in turn can increase the heart rate to twice normal within only 3 to 5 seconds. This quick response is important during exercise when the heart has to increase its beating speed to keep up with the body's increased demand for oxygen.

2.6 CAUSES OF HYPERTENSION

1 Cardiac output and peripheral resistance

Maintenance of a normal blood pressure is dependent on the balance between the cardiac output and peripheral vascular resistance. Most patients with essential hypertension have a normal cardiac output but a raised peripheral resistance. Peripheral resistance is determined not by large arteries or the capillaries but by small arterioles, the walls of which contain smooth muscle cells. Contraction of smooth muscle cells is thought to be related to a rise in intracellular calcium

concentration, which may explain the vasodilatory effect of drugs that block the calcium channels. Prolonged smooth muscle constriction is thought to induce structural changes with thickening of the arteriolar vessel walls possibly mediated by angiotensin, leading to an irreversible rise in peripheral resistance.

It has been postulated that in very early hypertension the peripheral resistance is not raised and the elevation of the blood pressure is caused by a raised cardiac output, which is related to sympathetic overactivity. The subsequent rise in peripheral arteriolar resistance might therefore develop in a compensatory manner to prevent the raised pressure being transmitted to the capillary bed where it would substantially affect cell homeostasis.

2 Renin-angiotensin system

The renin-angiotensin system may be the most important of the endocrine systems that affect the control of blood pressure. Renin is secreted from the juxtaglomerular apparatus of the kidney in response to glomerular underperfusion or a reduced salt intake. It is also released in response to stimulation from the sympathetic nervous system.

Renin is responsible for converting renin substrate (angiotensinogen) to angiotensin I, a physiologically inactive substance which is rapidly converted to angiotensin II in the lungs by angiotensin converting enzyme (ACE). Angiotensin II is a potent vasoconstrictor and thus causes a rise in blood pressure. In addition, it stimulates the release of aldosterone from the zona glomerulosa of the adrenal gland, which results in a further rise in blood pressure related to sodium and water retention.

The circulating renin-angiotensin system is not thought to be directly responsible for the rise in blood pressure in essential hypertension. In particular, many hypertensive patients have low levels

of renin and angiotensin II (especially elderly and black people), and drugs that block the renin-angiotensin system are not particularly effective.

There is, however, increasing evidence that there are important non-circulating "local" renin-angiotensin epicrine or paracrine systems, which also control blood pressure. Local renin systems have been reported in the kidney, the heart, and the arterial tree. They may have important roles in regulating regional blood flow.

3 Autonomic nervous system

Sympathetic nervous system stimulation can cause both arteriolar constriction and arteriolar dilatation. Thus the autonomic nervous system has an important role in maintaining a normal blood pressure. It is also important in the mediation of short term changes in blood pressure in response to stress and physical exercise.

There is, however, little evidence to suggest that epinephrine (adrenaline) and norepinephrine (noradrenaline) have any clear role in the aetiology of hypertension. Nevertheless, their effects are important, not least because drugs that block the sympathetic nervous system do lower blood pressure and have a well established therapeutic role.

It is probable that hypertension is related to an interaction between the autonomic nervous system and the renin-angiotensin system, together with other factors, including sodium, circulating volume, and some of the more recently described hormones.

Cross transplantation experiments with kidneys of hypertensive rats transferred to normotensives, and vice versa, strongly suggest that hypertension has its origins in the kidneys. Similarly, human evidence from renal transplant recipients shows that they are more likely to develop hypertension

if the donors' relatives are hypertensive. This essential hypertension may be due to a genetically inherited abnormality of sodium handling

4 Endothelial dysfunction

Vascular endothelial cells play a key role in cardiovascular regulation by producing a number of potent local vasoactive agents, including the vasodilator molecule nitric oxide and the vasoconstrictor peptide endothelin. Dysfunction of the endothelium has been implicated in human essential hypertension.

Modulation of endothelial function is an attractive therapeutic option in attempting to minimize some of the important complications of hypertension. Clinically effective antihypertensive therapy appears to restore impaired production of nitric oxide, but does not seem to restore the impaired endothelium dependent vascular relaxation or vascular response to endothelial agonists. This indicates that such endothelial dysfunction is primary and becomes irreversible once the hypertensive process has become established.

5 Vasoactive substances

Many other vasoactive systems and mechanisms affecting sodium transport and vascular tone are involved in the maintenance of a normal blood pressure. Bradykinin is a potent vasodilator that is inactivated by angiotensin converting enzyme. Consequently, the ACE inhibitors may exert some of their effect by blocking bradykinin inactivation.

The thrombotic paradox of hypertension (the Birmingham paradox) Although the blood vessels are exposed to high pressures in hypertension, the main complications of hypertension (stroke and myocardial infarction) paradoxically are thrombotic rather than hemorrhagic.

Endothelin is a recently discovered, powerful, vascular, endothelial vasoconstrictor, which may produce a salt sensitive rise in blood pressure. It also activates local renin-angiotensin systems. Endothelial derived relaxant factor, now known to be nitric oxide, is produced by arterial and venous endothelium and diffuses through the vessel wall into the smooth muscle causing vasodilatation.

Atrial natriuretic peptide is a hormone secreted from the atria of the heart in response to increased blood volume. Its effect is to increase sodium and water excretion from the kidney as a sort of natural diuretic. A defect in this system may cause fluid retention and hypertension.

Sodium transport across vascular smooth muscle cell walls is also thought to influence blood pressure via its interrelation with calcium transport. Ouabain may be a naturally occurring steroid-like substance which is thought to interfere with cell sodium and calcium transport, giving rise to vasoconstriction.

6 Hypercoagulability

Patients with hypertension demonstrate abnormalities of vessel wall (endothelial dysfunction or damage), the blood constituents (abnormal levels of haemostatic factors, platelet activation, and fibrinolysis), and blood flow (rheology, viscosity, and flow reserve), suggesting that hypertension confers a prothrombotic or hypercoagulable state. These components appear to be related to target organ damage and long term prognosis, and some may be altered by antihypertensive treatment.

7 Insulin sensitivity

Epidemiologically there is a clustering of several risk factors, including obesity, glucose intolerance, diabetes mellitus, and hyperlipidaemia. This has led to the suggestion that these represent a single syndrome (metabolic syndrome X or Reaven's syndrome), with a final common

pathway to cause raised blood pressure and vascular damage. Indeed some hypertensive patients who are not obese display resistance to insulin. There are many objections to this hypothesis, but it may explain why the hazards of cardiovascular risk are synergistic or multiplicative rather than just additive.

8 Genetic factors

Although separate genes and genetic factors have been linked to the development of essential hypertension, multiple genes are most likely contribute to the development of the disorder in a particular individual. It is therefore extremely difficult to determine accurately the relative contributions of each of these genes. Nevertheless, hypertension is about twice as common in subjects who have one or two hypertensive parents, and many epidemiological studies suggest that genetic factors account for approximately 30% of the variation in blood pressure in various populations.

Examples of specific genetic mutations causing hypertension are Liddle's syndrome, a disorder associated with hypertension, low plasma renin and aldosterone levels, and hypokalaemia, all of which respond to amiloride, an inhibitor of the distal renal epithelial sodium channel• Glucocorticoid-remediable aldosteronism, a disorder mimicking Conn's syndrome, in which there is a chimeric gene formed from portions of the 11β-hydroxylase gene and the aldosterone synthase gene. This defect results in hyperaldosteronism, which is responsive to dexamethasone and has a high incidence of stroke.

Congenital adrenal hyperplasia due to 11β-hydroxylase deficiency, a disorder that has been associated with 10 different mutations of the CYP11B1 gene.

Syndrome of apparent mineralocorticoid excess, arising from mutations in the gene encoding the kidney enzyme 11α-hydroxysteroid dehydrogenase; the defective enzyme allows normal circulating concentrations of cortisol (which are much higher than those of aldosterone) to activate the mineralocorticoid receptors.

Congenital adrenal hyperplasia due to 17α-hydroxylase deficiency, a disorder with hyporeninaemia hypoaldosteronism, absent secondary sexual characteristics, and hypokalaemia• Gordon's syndrome (pseudo-hypoaldosteronism): familial hypertension with hyperkalaemia, possibly related to the long arm of chromosome 17.

Sporadic case reports of familial inheritance of phaeochromocytoma (multiple endocrine neoplasia, MEN-II syndrome), Cushing's syndrome, Conn's syndrome, renal artery stenosis due to fibromuscular dysplasiaOther associations•

Hypertension is rarely found in rural or “tribal” areas of Africa, but it is very common in African cities and in black populations in Britain and the United States. Whereas the rural/urban differences in Africa are clearly due to lifestyle and dietary factors, the finding that hypertension is commoner in black people compared with white people may have some genetic basis. There is some evidence from salt loading studies in medical students that black Americans are more susceptible to a given salt load than white Americans, and may be more sensitive to the beneficial effects of salt restriction.

9 Intrauterine influences

There is increasing evidence that fetal influences, particularly birth weight, may be a determinant of blood pressure in adult life. For example, babies who are small at birth are more likely to have higher blood pressure during adolescence and to be hypertensive as adults. Babies who are small

for their age are also more likely to have metabolic abnormalities that have been associated with the later development of hypertension and cardiovascular disease, such as insulin resistance, diabetes mellitus, hyperlipidaemia, and abdominal obesity (the “Barker hypothesis”). Insulin resistance contributes to the increased prevalence of coronary disease seen in adults of low birth weight.

It is possible, however, that genetic factors influence the Barker hypothesis. Mothers with above average blood pressure in pregnancy give birth to smaller babies who subsequently develop above average blood pressure themselves and eventually hypertension. It is entirely likely that the similarity of blood pressures in mother and child are genetic and, in a modern “healthy” society, unrelated to intrauterine undernutrition.

10 Diastolic dysfunction

In hypertensive left ventricular hypertrophy, the ventricle cannot relax normally in diastole. Thus, to produce the necessary increase in ventricular input, especially during exercise, there is an increase in left atrial pressure rather than the normal reduction in ventricular pressure, which produces a suction effect as described above. This can lead to an increase in pulmonary capillary pressure that is sufficient to induce pulmonary congestion. The rise in atrial pressure can also lead to atrial fibrillation, and in hypertrophied ventricles dependent on atrial systole the loss of atrial transport can result in a significant reduction in stroke volume and pulmonary oedema. Exercise induced subendocardial ischaemia can also produce an “exaggerated” impairment of diastolic relaxation of the hypertrophied myocardium.

2.7 SYMPTOMS OF HYPERTENSION

Most people with high blood pressure have no symptoms, even if blood pressure readings reach high levels.

A few people with high blood pressure may have:

Headaches

Shortness of breath

Nosebleeds

2.8 RISK FACTORS

1. **Elevated blood pressure**

Elevated blood pressure is blood pressure that is slightly higher than normal. High blood pressure usually develops over time. Having blood pressure that is slightly higher than normal increases your risk for developing chronic high blood pressure.

2. **Diabetes**

About 6 out of 10 of people who have diabetes also have high blood pressure. Diabetes causes sugars to build up in the blood and also increases the risk for heart disease.

3. Obesity

Having obesity is having excess body fat. Having obesity or overweight also means your heart must work harder to pump blood and oxygen around your body. Over time, this can add stress to your heart and blood vessels.

Obesity is linked to higher "bad" cholesterol and triglyceride levels and to lower "good" cholesterol levels.

In addition to high blood pressure, having obesity can also lead to heart disease and diabetes.

4. **Pregnancy**

Some women develop high blood pressure during pregnancy called gestational hypertension which resolve after delivery.

5. **Unhealthy diet**

A diet that is too high in sodium and too low in potassium puts is a risk for high blood pressure. Eating too much sodium, an element in table salt increases blood pressure. Not eating enough potassium—a mineral that your body needs to work properly—also can increase blood pressure. Potassium is found in many foods; bananas, potatoes, beans, and yogurt have high levels of potassium.

6. **Physical inactivity**

Getting regular physical activity helps your heart and blood vessels stay strong and healthy, which may help lower your blood pressure. Regular physical activity can also help you keep a healthy weight, which may also help lower your blood pressure.

7. **Too much alcohol**

Excessive consumption of alcohol increase the risk of having hypertension.

8. **Tobacco use**

Tobacco use increases your risk for high blood pressure. Smoking can damage the heart and blood vessels. Nicotine raises blood pressure, and breathing in carbon monoxide which is produced from smoking tobacco reduces the amount of oxygen that red blood cells can carry.

9. **Genetics and family history**

When members of a family pass traits from one generation to another through genes, that process is called heredity.

Genes likely play some role in high blood pressure, heart disease, and other related conditions. However, it is also likely that people with a family history of high blood pressure share common environments and other potential factors that increase their risk.

The risk for high blood pressure can increase even more when heredity combines with unhealthy lifestyle choices, such as smoking and eating an unhealthy diet.

2.9 CHARACTERISTICS THAT CAN AFFECT HYPERRTENSION

Characteristics that are inevitable such as your age, race, or ethnicity can affect risk for high blood pressure.

1 Age. Blood pressure tends to rise with increases in age.

2 Sex. Women are about as likely as men to develop high blood pressure at some point during their lives.

3 Race or ethnicity. Black people develop high blood pressure more often than white people, Hispanics, Asians, Pacific Islanders, American Indians, or Alaska Natives do. Compared with White people, Black people also develop high blood pressure earlier in life.

2.10 DIAGNOSIS

A blood pressure test is done to diagnose elevated blood pressure. A blood pressure test may be done as a part of a routine health checkup or as a screening for high blood pressure (hypertension).

Blood pressure is measured in millimeters of mercury (mm Hg). A blood pressure measurement has two numbers:

The top number (systolic) is the pressure of the blood flow when the heart muscle squeezes (contracts), pumping blood.

The bottom number (diastolic) is the pressure in the arteries measured between heartbeats.

Elevated blood pressure is systolic measurement of 130 mm-Hg and above and diastolic of 90 mm-Hg and above.

A diagnosis of elevated blood pressure is based on the average of two or more blood pressure readings. The measurements should be taken on separate occasions in the same way. The first time blood pressure is checked, it should be measured in both arms to determine if there's a difference. After that, the arm with the higher reading should be used.

A longer blood pressure monitoring test can be done to check blood pressure at regular times over six or 24 hours. This is called ambulatory blood pressure monitoring.

Tests

Investigations conducted in cases of elevated blood pressure include:

Complete blood count

Cholesterol test (lipid profile)/Fasting serum lipid profile test

Blood sugar (glucose) test

Kidney function tests

Thyroid function tests

Chest x-ray

Electrocardiogram

Echocardiogram

Urinalysis

2.11 PREVENTION OF HYPERTENSION

1 Weight loss: 5-20mmHg drop for each10kg weight loss

2 Aerobic exercise:

The Physical Activity Guidelines for Americans recommends that adults get at least 2 hours and 30 minutes of moderate-intensity exercise, such as brisk walking or bicycling, every week. That's

about 30 minutes a day, 5 days a week. Aerobic exercise at least 30minutes/day for most days will cause 4-9mmHg reduction in blood pressure.

3 Stop smoking

4 Limit how much alcohol you drink

Not more than 30mls of ethanol per day for men while women should have no more than 15mls per day. (https://www.cdc.gov)

5 Eating a healthy diet

Consumption of fresh fruits and vegetable, eating a variety of foods rich in potassium, fiber, and protein and lower in salt (sodium) and saturated fat can help keep blood pressure low and protect against heart disease and stroke.

6 Enough sleep

Getting enough sleep is important in overall health. It also helps keep heart and blood vessels healthy. Not getting enough sleep on a regular basis is linked to an increased risk of heart disease, high blood pressure, and stroke. (https://www.cdc.gov)

7 Manage stress

People who have depression, anxiety, stress, or post-traumatic stress disorder over a long period of time may develop other health problems, including an increased heart rate and high blood pressure.

CHAPTER THREE

METHODOLOGY

3.1 PARTICIPANTS

3.1.1 INCLUSION CRITERIA

- Adults aged 18 years and above.
- Individuals diagnosed with hypertension.
- Patients receiving regular care at UBTH.
- Hypertensive adults receiving treatment at UBTH who willingly gave consent to participate.

3.1.2 EXCLUSION CRITERIA

- Patients with physical disabilities preventing exercise participation.
- Individuals with severe cardiovascular conditions contraindicating exercise.

3.2 MATERIALS

The Structured questionnaire used in the study was descriptive cross sectional survey which was administered to 150 patients with hypertension receiving treatment at the Cardiology Clinics of University of Benin Teaching Hospitals in Edo State, Nigeria.

It has two sections:

SECTION A: contain information on demographics such as age, marital status, sex, education, occupation and income.

SECTION B: contain information on knowledge, attitude and practice of exercise for blood pressure control among adults with hypertension.

3.3 METHOD

3.3.1 RESEARCH DESIGN

A descriptive cross-sectional study design was employed to assess participants' knowledge, attitudes, and exercise practices.

3.3.2 SAMPLE SIZE

Sample size was determine using the Cochran's formular:

Sample Size Formula (Cochran's Formula):

Where:

n = required sample size

Confidence level = 95% (Z = 1.96)

p= estimated proportion of the population with the characteristic (if unknown,use 0.5 (50%) for maximum variability)

Margin of error (d) = 0.08 (8%)

n= ($\mathbf{Z^2}$× p × (1-p)) ÷ $\mathbf{d^2}$

n= ($(\mathbf{1.96})^{\mathbf{2}}$× 0.5 × (1-0.5)) ÷ $(\mathbf{0.08})^{\mathbf{2}}$

n= (1.9208 × (1-0.5)) ÷ 0.0064

n= (1.9208 × 0.5) ÷ 0.0064

n= 0.9604 ÷ 0.0064

n= 150.1

n= 150

A total of 150 hypertensive patients will be recruited for the study.

3.3.3 PROCEDURE FOR DATA COLLECTION

1. Participant Recruitment: Eligible individuals were identified at UBTH clinics.

2. Data Collection: Questionnaires was administered to assess knowledge, attitudes, and exercise behaviors.

The Structured questionnaire used in the study was descriptive cross sectional survey

which has two sections:

SECTION A: sought information on demographics such as age, marital status, sex, education, occupation and income.

SECTION B: sought information on knowledge, attitude and practice of exercise for blood pressure control. Items on knowledge consists of four sub- sections which included previous advice on exercise by health-care professionals, type of exercise for hypertension control, combination of exercise with medication, the importance of exercise in high BP control, adverse effects of exercise on, place of exercise (indoors or outdoors) and forms of exercise (multiple options). Items on attitude were of three sub-sections which included confidence of individuals to participate in exercise programme. Questions on practice also consisted of four sub-sections which included current state of exercise involvement, frequency of exercise practice, and patient duration of exercise and challenges involved in participating in exercise for BP control. The answering options were —Yes, —No or —I don‘t know.

3.3.4 Ethical Consideration

Ethical approval for this study was obtained from the Ethics and Research Committee of the University of Benin Teaching Hospital, Benin City.

Informed consent was gotten from the patients using a consent form. Before seeking informed consent, prospective participants was adequately informed of aims, methods, any possible conflicts of interests, institutional affiliations of the researcher, the anticipated belief and potential risks of the study and the discomfort it may entail. Having been fully informed of the aim, methods,

benefits and the potential risk, prospective participants was reserved with the right to refuse to participate without reprisal.

3.3.5 DATA ANALYSIS

All data were analyzed using descriptive statistics of frequency and percentage, inferential statistics of Chi-square test was used to test significant association between knowledge, attitude and practice of exercise for blood pressure control among hypertensive patients. Data was analyzed using statistical package for the social sciences (IBS SPSS) version 25. The level of significant was set at $p<0.05$.

CHAPTER 4

RESULTS

4.1 Results

4.1.1 Preamble

This study assessed the level of knowledge, attitude and practice of exercise for blood pressure control among adults with hypertension in UBTH. The study consisted of 150 participants.

4.1.2 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

Shown in Table 1 is the socio-demographic profile of the participants. 118(78.7%) of respondents were females indicating that women were more represented in this study and 82(54.7%) of the participants are greater than 45yrs in age which also support that hypertension increase with age. 118(78.7%) were Christian, 87(58.0%) were Married. 103(68.7%) have Tertiary school education while 12(8%) have no formal education. Participants who were diagnosed of hypertension in less than one year had higher percentage of 41.3% compare to those diagnosed within 1-3yrs with 30% and those diagnosed over 3yrs with 28.7% .

Table1: Sociodemographic Characteristics of Respondents (N=150)

Variables		Frequency	Percent
Age	18-24	15	10.0
	25-34	22	14.7
	35-44	31	20.7
	>45	82	54.7
Gender	Male	64	42.7
	Female	86	57.3
Religion	Christian	118	78.7
	Islam	17	11.3
	Others	15	10.0
Marital Status	Single	44	29.3
	Married	87	58.0
	Divorced	10	6.7
	Widowed	9	6.0
Education Level	Primary	10	6.7
	Secondary	25	16.7
	Tertiary	103	68.7
	No Formal Edu	12	8.0
Economic Status	Low	54	36.0
	Middle	75	50.0
	High	21	14.0
Duration since diagnosed of hypertension	<1year	62	41.3
	1-3years	45	30.0
	>3years	43	28.7

4.1.3 Frequency Distribution of Participants' Knowledge of Exercise for Blood Pressure Control

The table 2 below show that 125 (83.3%) were educated on exercise for blood pressure control,122 (81.3%) followed the advice to exercise for blood pressure control, 110 (33.3%) believed exercise was important for blood pressure control, 86 (42.7%) did not agree exercise has adverse effect on blood pressure control. In summary 111 (74.0%) have adequate knowledge of exercise for blood pressure control while 39 (26%) have inadequate knowledge about it.

Table 2: Frequency Distribution of Participants' Knowledge of Exercise for Blood Pressure Control (N=150)

Variables		Frequency	Percent
Received education on Exercise for BP Control	Yes	125	83.3
	No	25	16.7
Follow the advice to Exercise for BP Control	Yes	122	81.3
	No	28	18.7
Believes Exercise is Important for BP Control	Important	110	33.3
	Not sure	40	26.7
Exercise has adverse effect on BP Control	Yes	64	37.3
	No	86	42.7
Overall, Knowledge			
Adequate Knowledge	**111(74.0%)**		
Inadequate Knowledge	**39(26%)**		

4.1.4 Frequency Distribution of Participants' Attitude Towards Exercise for Blood Pressure Control

The table 3 below show that 62 (41.3%) agreed that they try hard enough to always overcome barriers with regards to exercise,82 (54.7) agreed that it is for them to accomplish their activity and exercise goals,18 (12%) agreed that they could exercise even when they tired,58 (38.7%) agreed that they believed with the adherence to exercise can replace medication in controlling hypertension. In summary 115 (76%) have good attitude while 35 (23%) have poor attitude.

Table 3: Frequency Distribution of Participants' Attitude Towards Exercise for Blood Pressure Control (N=150)

Variables	Strongly agree	Agree	Strongly Disagree	Disagree
I try hard enough to always overcome barriers with regard to exercise	43(28.7)	62(41.3)	23(15.3)	22(14.7)
I always find ways to exercise and be physically active	65(43.3)	61(40.7)	0(0.0)	24(16.0)
It is easy for me to accomplish my activity and exercise goals	24(16.0)	82(54.7)	18(12.0)	26(17.3)
When confronted with a barrier to exercise I could find several solutions to overcome this barrier	24(16.0)	106(70.7)	0(0.0)	20(13.3)
I could exercise even when I am tired	15(10.0)	18(12.0)	53(35.3)	64(42.7)
I don't exercise because Exercise interference with personal responsibilities	21(14.0)	42(28.0)	30(20.0)	57(38.0)
I believe with adherence exercise can replace medication in controlling hypertension	35(23.3)	58(38.7)	36(24.0)	21(14.0)
Overall Attitude				
Good Attitude 115 (76%)				
Poor Attitude 35 (23%)				

4.1.5 Frequency Distribution of Participants' Level of Practice of Exercise for Blood Pressure Control

The table 4 below show that 132 (88%) of the respondents engage in an exercise presently, 18 (12%) of the participants participate in exercise daily, 34 (22.7%) of the participants were doing jogging exercise, 43 (28.6%) used 10-20mins to exercise,128 (85.4%) have improvement in their blood pressure since they start exercise. In summary 90 (60%) have good practice of exercises while 60 (40%) have poor practice of exercise.

Table 4: Frequency Distribution of Participants' Level of Practice of Exercise for Blood Pressure Control (N=150)

Variables		Frequency	Percent
Do you engage in an exercise presently	Yes	132	88.0
	No	18	12.0
If yes how often do you participate in exercise?	Once a week	37	24.7
	Twice a week	32	21.9
	Thrice a week	32	21.9
	Four times a week	20	13.3
	Daily	18	12.0
	No Exercise	11	7.3
What Forms of exercise	Brisk walking	29	19.3
	Running	10	6.7
	Swimming	6	4.0
	Jogging	34	22.7
	Strength training	9	6.0
	Stretching	3	2.0
	Football	6	4.0
	No response/ Missing value	53	35.5
Duration of exercise	0-10min	24	16.0
	10-20mis	43	28.6
	20-30mins	35	23.3
	30-60mins	37	24.6
	No Exercise	11	7.3
Any improvement in your blood pressure since the start of exercise	Yes	128	85.4
	No	11	7.3
	No Exercise	11	7.3

Likely reasons for not exercising regularly	No time	28	18.6
	Am afraid, my blood pressure would shoot up	19	12.7
	Being on exercise before and unable to stick with it due to health problem	6	4.0
	I have difficulty in participating in exercise	6	4.0
	Others	3	2.0
	No response /Missing value	88	58.6
Overall Level of Practice			
Good Practice	**90(60.0%)**		
Poor Practice	**60(40.0%)**		

4.1.6 Chi Square Test of Association Between Age and Knowledge of Exercise for Blood Pressure Control (N=150)

A chi-square test was conducted to examine the association between age and knowledge of exercise for blood pressure control. The findings revealed that there was no significant association between the age and knowledge of exercise (X^2 =4.228, P-value= 0.238) (Table 5a).

Table 5a: Chi Square Test of Association Between Age and Knowledge of Exercise for Blood Pressure Control (N=150).

			Knowledge			
			Adequate	Inadequate	X^2	P-value
Age	18-24	% Within Knowledge	13(11.7)	2(5.1)		
	25-34	% Within Knowledge	16(14.4)	6(15.4)		
					4.228	0.238
	34-44	% Within Knowledge	26(23.4)	5(12.8)		
	>45	% Within Knowledge	56(50.5)	26(66.7)		
		Total	111(100.0)	39(100.0)		

P>0.05= No Significant difference between Age and Knowledge

4.1.7 Chi Square Test of Association Between Age and Attitude Towards Exercise for Blood Pressure Control (N=150)

A chi-square test presented in table 5b is the result of test of the associations between age and attitude towards exercise for blood pressure control. The findings revealed that there was no significant association between the ages and attitude towards exercise for blood pressure control. (X^2 =5.396, P-value =0.145) (Table 5b).

Table 5b: Chi Square Test of Association Between Age and Attitude Towards Exercise for Blood Pressure Control (N=150).

			Attitude			
			Good Attitude	Poor Attitude	X^2	P-value
Age	18-24	% Within Attitude	13(11.3)	2(5.7)		
	25-34	% Within Attitude	18(15.7)	4(11.4)	5.396	0.145
	34-44	% Within Attitude	27(23.5)	4(11.4)		
	>45	% Within Attitude	57(49.6)	25(71.4)		
		Total	115(100.0)	35(100.0)		

P>0.05= No Significant difference between Age and Attitude

4.1.8 Chi Square Test of Association Between Age and Practice of Exercise for Blood Pressure Control (N=150)

Presented in table 5c is the result of test of association between age and practice of exercise for blood pressure control. The findings revealed that there was no significant association between the age and practice of exercise for blood pressure control (X^2=0.666, P-value= 0.881).

Table 5c: Chi Square Test of Association Between Age and Practice of Exercise for Blood Pressure Control (N=150).

		Practice			
		Good Practice	Poor Practice	X^2	P-value
Age	18-24	10(11.1)	5(8.3)		
	25-34	14(15.6)	8(13.3)	0.666	0.881
	34-44	19(21.1)	12(20.0)		
	>45	47(52.2)	35(58.3)		
	Total	90(100.0)	60(100.0)		

P>0.05= No Significant difference between Age and Practice

4.1.9 Chi Square Test of Association Between Level of Education and Knowledge of Exercise for Blood Pressure Control (N=150)

Table 6a below shows,there was no association between level of education and knowledge of exercise for blood pressure control. The findings revealed that there was no significant association between the level of education and knowledge ($X^2 = 2.071$, P-value= 0.558) .

Table 6a: Chi Square Test of Association Between Level of Education and Knowledge of Exercise for Blood Pressure Control (N=150).

		Knowledge			
		Adequate	Inadequate	X^2	P-value
Education	Primary	8(7.2)	2(5.1)		
	Secondary	21(18.9)	4(10.3)		
				2.071	0.558
	Tertiary	74(66.7)	29(74.4)		
	No Formal Education	8(7.2)	4(10.3)		
	Total	111(100.0)	39(100.0)		

.

P>0.05= No Significant difference between Level of Education and Knowledge

4.1.10 Chi Square Test of Association Between Level of Education and Attitude Towards Exercise for Blood Pressure Control (N=150)

Table 6b below shows that, there was no significant between level of education and attitude towards exercise for blood pressure control. The findings revealed that there was no significant association between the level of education and attitude towards exercise for blood pressure control (X^2 =2.738, P-value=0.434).

Table 6b: Chi Square Test of Association Between Level of Education and Attitude Towards Exercise for Blood Pressure Control (N=150).

			Attitude			
			Good Attitude	Poor Attitude	X^2	P-value
Education	Primary	% Within Attitude	8(7.0)	2(5.7)		
	Secondary		22(19.1)	3(8.6)	2.738	0.434
	Tertiary		77(67.0)	26(74.3)		
	No Formal Education		8(7.0)	4(11.4)		
		Total	115(100.0)	35(100.0)		

P>0.05= No Significant difference between Level of Education and Attitude

4.1.11 Chi Square Test of Association Between Level of Education and Practice of Exercise for Blood Pressure Control (N=150)

A chi-square test was conducted to examine the association between level of education and practice of exercise for blood pressure control. The findings revealed that there was no significant association between the level of education and practice of exercise (X^2 = 1.414, P-value= 0.702) (Table 6c).

Table 6c: Chi Square Test of Association Between Level of Education and Practice of Exercise for Blood Pressure Control (N=150)

			Practice			
			Good Practice	Poor Practice	X^2	P-value
Education	Primary	% Within Practice	7(7.8)	3(5.0)		
	Secondary	% Within Practice	17(18.9)	8(13.3)		
					1.414	0.702
	Tertiary	% Within Practice	59(65.6)	44(73.3)		
	No Formal Education	% Within Practice	7(7.8)	5(8.3)		
		Total	90(100.0)	60(100.0)		

P>0.05= No Significant difference between Level of Education and Practice

4.1.12 Chi Square Test of Association Between Socio-Economic Status and Knowledge of Exercise for Blood Pressure Control (N=150)

A chi-square test was conducted to examine the association between socio-economic status and knowledge of exercise for blood pressure control. The findings revealed that there was significant association between the socio-economic and knowledge of exercise for blood pressure control (X^2 = 7.770, P-value=0.021) (Table 7a).

Table7a: Chi Square Test of Association Between Socio-Economic Status and Knowledge of Exercise for Blood Pressure Control (N=150).

		Knowledge			
		Adequate	Inadequate	X^2	P-value
Socioeconomic Status	Low	47(42.3)	7(17.9)		
	Middle	49(44.1)	26(66.7)	7.770	0.021
	Low	15(13.5)	6(15.4)		
	Total	111(100.0)	39(100.0)		

P<0.05= There is a significant difference between Socio-economic status and Knowledge

4.1.13 Chi Square Test of Association Between Socio-Economic Status and Attitude Towards Exercise for Blood Pressure Control (N=150)

A chi-square test was conducted to examine the association between socio-economic status and attitude towards exercise for blood pressure control. The findings revealed that there was no significant association between the socio-economic and attitude (X^2 =5.078, P-value=0.079) (Table 7b).

Table 7b: Chi Square Test of Association Between Socio-Economic Status and Attitude Towards Exercise for Blood Pressure Control (N=150)

		Attitude			
		Good Attitude	Poor Attitude	X^2	P-value
Socioeconomic Status	Low	47(40.9)	7(20.0)		
	Middle	53(46.1)	22(62.9)	5.078	0.079
	Low	15(13.0)	6(17.1)		
	Total	115(100.0)	35(100.0)		

P>0.05= No Significant difference between Socio-economic status and Attitude

4.1.14 Chi Square Test of Association Between Socio-Economic Status and Practice of Exercise for Blood Pressure Control (N=150)

Presented in table 7c is the result of test of the association between socio-economic status and practice of exercise for blood pressure control. The findings revealed that there was no significant association between the socio-economic and practice (X^2=3.880, P-value= 0.144).

Table 7c: Chi Square Test of Association Between Socio-Economic Status and Practice of Exercise for Blood Pressure Control (N=150)

		Practice			
		Good Practice	Poor Practice	X^2	P-value
Socioeconomic Status	Low	38(42.2)	16(26.7)		
	Middle	40(44.4)	35(58.3)		
				3.880	0.144
	Low	12(13.3)	9(15.0)		
	Total	90(100.0)	60(100.0)		

P>0.05= No Significant difference between Socio-economic status and Practice.

4.2 Hypothesis testing

1. There would be no significant association between age and the practice of exercise for blood pressure control

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.881

Judgement: since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED

2. There would be no significant association between level of education and the practice of exercise for blood pressure control

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.702

Judgement: since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED

3. There would be no significant association between socioeconomic status and the practice of exercise for blood pressure control

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.144

Judgement: since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED

4. There would be no significant association between age and the knowledge of exercise for blood pressure control

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.238

Judgement: since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED

5. There would be no significant association between level of education and the knowledge exercise for blood pressure control

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.558

Judgement: since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED

6. There would be no significant association between socioeconomic status and the knowledge of exercise for blood pressure control.

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.021

Judgement: since the observed p value is less than 0.05, the null hypothesis is therefore REJECTED

7. There would be significant association between age and the attitude of exercise for blood pressure control.

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.145

Judgement: since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED.

8. There would be no significant association between level of education and the attitude of exercise for blood pressure control

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.434

Judgement: since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED.

9. There would be no significant association between socioeconomic status and the attitude of exercise for blood pressure control

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.079

Judgement: since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED.

CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

The findings of this study provide valuable insights into the knowledge, attitude and practice of exercise among adults with hypertension. The study's objectives were to assess the knowledge of exercise in blood pressure control, attitude towards exercise and practice of exercise among hypertensive adults.

Knowledge of Exercise in Blood Pressure Control

This study showed that 74% of adult hypertensive patients at University of Benin Teaching Hospital had a good knowledge of benefits of exercise in the management of hypertension. The finding recorded an improvement to what was reported by a study conducted in Southwestern Nigeria with a poor knowledge of 67.3% by Awotidebe et al, (2014). There was no significant association between age, level of education, socio-economic status and knowledge of exercises for blood pressure control among adults with hypertension in UBTH as against significant association between socio-economic status and knowledge in the study by Adeyemo et al. (2020). The different proportion gotten from previous studies may be due to cultural, local or regional issues existing between the different communities studied and level of awareness of exercise as complementary or start up therapy in early mild hypertension other than medication. There is evidence that knowledge transferred from medical staff induces patients‘ability to comply with lifestyle modification (Thorogood et al, 2003; Hroscikoski et al, 2006). Findings of this study also shows expertise in exercise prescription among the care professional which supported a study done by Huang et al, (2004) that low counselling rates and lack of expertise in exercise prescription among health care professionals could contribute to poor BP control among patients with

hypertension. Furthermore, referral to exercise experts such as physical therapists in the cardiopulmonary rehabilitation constitutes a significant improvement by Pescatello et al, (2015).

Attitude Towards Exercise

Presence study revealed that the participants had good attitude(76%) towards exercise which contradict a study by Bello et al, (2023) that attitude toward physical activity in the management of hypertension was poor (45.1%). The finding also contradict study conducted by Awotidebe et al, (2014) that reported positive attitudes of only 26.0% to physical activity in the management of hypertension. This is likely due level of awareness, knowledge and level of education. Many individuals with hypertension are known to engage in sedentary behavior and consequent poor confident in taking up specific tasks such as exercise behavior. Hence the need for more public enlightenment about benefits of exercise in blood pressure control.

Practice of Exercise Among Hypertensive Adults

In the present study, practice of exercise is good (60%) supported by study conducted by Bello et al, (2023) that 64.5% patients' adherence to physical activity in the management of hypertension was reported to be good and level of education was found to be the only independent predictor. On the contrary, a study conducted in Eastern Nigeria reported lower figures on adherence to physical activity (16.4%). The disparity reported could be because the study population differs between the two studies. The study was done at primary and tertiary health facilities, but the present study was done at a tertiary health facility; therefore, the background of the patients may differ considering the facts that level of education as part predictors of adherence.

5.2 Conclusion

Practice of exercise for blood pressure control was adequate among patients with hypertension which was significantly influenced by knowledge of and positive attitude towards exercise practice for blood pressure control. This study also shows that education significantly influenced knowledge, attitude and practice of exercise for BP control.

Many factors have contributed good level of exercise practice among patients which includes perceived benefit of exercise, level of education, access to recreational facilities and increasing efforts of health staff in educating hypertensive patient about benefits of exercise in BP management. Amongst these, educational level has been reported to play significant role to influence good practice.

From finding of this study, the relationship between knowledge and practice shows the need for more effective behavioral interventions, patient education, and institutional support to promote regular physical activity as a cornerstone of hypertension management.

Efforts are to be put in place to ensure improving knowledge of exercise in order to maximize its benefits for prevention and management of hypertension.

5.3 Recommendations

Based on the finding of this study, the following strategies are recommended to improve knowledge, attitude and practice of exercise for blood pressure control:

1. Educational interventions: Tailored patient education programs (e.g. in clinics) that clarify recommended exercise types, durations, frequency. Use culturally relevant examples and address misbeliefs.

2. Healthcare provider role: Regular counselling by physicians, nurses, physiotherapists to reinforce and guide exercise prescription.

3. Community support: Creating group exercise programs, walking clubs, maybe hospital-community collaboration to facilitate safe spaces.

4. Policy actions: Integrate exercise promotion into hypertension management protocols and public health guidelines in Nigeria; allocate resources for patient education materials.

5.4 Implications for Future Studies

This study lays the groundwork for future research into factors affecting knowledge, attitude and practice of exercises for blood pressure control among adults with hypertension in UBTH. However, several areas could be explored further:

Knowledge gaps: The future studies could examine the poor knowledge—even when attitude is somewhat positive—suggests that many hypertensive adults may not understand what types, durations or intensities of exercise are useful for BP control. Misperceptions may exist, such as believing exercise alone cures hypertension or overestimating harms.

Attitudinal barriers: Negative or ambivalent attitudes can arise from fear of injury, perceived effort, lack of time, cultural beliefs, or insufficient social support. Even where knowledge is fair, attitude may weaken behavioral adoption.

Practice deficit: Low levels of exercise behavior despite some knowledge and occasional positive attitudes indicate structural or psychosocial barriers: lack of safe spaces, competing responsibilities, comorbidities, lack of guidance from health professionals.

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APPENDIX A

SURVEY PROFORMA QUESTIONNAIRE

Title of Study: Knowledge attitude and practice of exercise for blood pressure control among adults with hypertension in University of Benin Teaching Hospital.

Section A: Socio-demographics/ Socio-economics characteristics

(Please tick ✓ the appropriate option)

1. Age (years): ☐ 18–24 ☐ 25–34 ☐ 35–44 ☐ ≥ 45
2. Sex: ☐ Male ☐ Female
3. Religion: ☐ Christianity ☐ Islam ☐ Others _____
4. Marital status: ☐ Single ☐ Married ☐ Divorced ☐ Widowed
5. Level of Education: ☐ Primary school ☐ Secondary school ☐ Tertiary institution
   ☐ No formal education
6. What is your total household monthly income?

   ▢ Below ₦100,000 (Low SES)

   ▢ ₦100,000–₦1,000,000 (Middle SES)

   ▢ Above ₦1,000,000 (High SES)

7. Duration since diagnosed of hypertension
   a) Less than 1 year
   b) 1-3 years
   c) More than 3 years

Knowledge

8. Have you ever been advice on exercise by your health-care provider? Yes ☐ No ☐
9. What kind of Exercise was Advise by Health Providers?
    a) Brisk walking
    b) Running
    c) Cycling
    d) Strength training
    e) Swimming
    f) Stretching
    g) Jogging
    h) Others (Kindly specify)……
10. Place of exercise
    a) Indoors
    b) Outdoors
11. Did you follow the advice given by your health care professional on exercise?
    a) Yes
    b) No
12. Exercise is important in controlling high BP
    a) Important
    b) Very Important
    c) Not Sure
13. Exercise has adverse effects on patient high BP
    a) Yes
    b) No
    c) Not sure

Attitude

1: The following statement is about your confident on exercise for BP control

	Strongly agree	Agree	Strongly Disagree	Disagree
14. I try hard enough to always overcome barriers with regard to exercise				
15. I always find ways to exercise and be physically active				
16. It is easy for me to accomplish my activity and exercise goals				
17. When confronted with a barrier to exercise I could find several solutions to overcome this barrier				
18. I could exercise even when I am tired				
19. I don't exercise because Exercise interference with personal responsibilities				
20. I believe with adherence exercise can replace medication in controlling hypertension				

Practice

21. Do you engage in an exercise presently? Yes ☐ No ☐

22. If yes how often do you participate in exercise?

a) Once a week

b) Twice a week

c) Thrice a week

d) For times a week

e) Daily

f) No Exercise

23. What Forms of exercise? (Multiple options)

g) Brisk walking

h) Running

i) Cycling
j) Strength training
k) Swimming
l) Stretching
m) Jogging
n) Others (kindly specify)…….

24. Duration of exercise
a) 0 -10min
b) 10-20 min
c) 20-30 min
d) 30-60 min

25. Have you observed any improvement in your blood pressure since you started exercising? Yes ☐ No ☐ I don't Exercise ☐

26. If you have not been exercising, what are your likely reasons?
a) No time
b) Am afraid, my blood pressure would shoot up
c) Being on exercise before and unable to stick with it due to health problem
d) I have difficulty in participating in exercise
e) Provide any other reasons……
…….
……
……..

Thank You.

APPENDIX B

INFORMED CONSENT FORM

Title of study: Knowledge, attitude and practice of exercise among adults with hypertension in University of Benin Teaching Hospital

Investigator: Iyoha Deborah Oluwasola

Supervisors: Dr S.O Bolarinde

Financial Sponsorship: This research project is self-sponsored

Purpose of the research: The purpose of the research is to examine knowledge, attitude and practice of exercise among adults with hypertension in University of Benin Teaching Hospital.

Procedures and protocol involved in the study

You are politely approached to respond to an descriptive cross sectional survey questionnaire.

This questionnaire would be only used for research purpose and would knowledge, attitude and practice of exercise for blood pressure control among adults with hypertension in University of Benin Teaching Hospital.

Compensation

There will be no financial compensation for participating in this study.

Voluntary Participation

Please note that your participation in this research is entirely voluntary. No form of discrimination will be meted to you, should you decide not to participate in this study; You are entirely free to change your mind and stop participating even if you agreed earlier.

Side Effects

There is no anticipated adverse effect associated with participating in this study.

Benefits

The purpose of the research is to assess the knowledge, attitude and practice of exercise for blood pressure control among adults with hypertension in University of Benin Teaching Hospital

Confidentiality

All information and data obtained in the course of this study will be treated confidentially. The names of the participants will not be written on the questionnaire, and all information collected will be encoded in a file in my personal computer and passworded. Thereafter the questionnaires will be shelved and locked in my personal document cabinet.

CONTACT INFORMATION

IYOHA DEBORAH OLUWASOLA

PROJECT STUDENT

Email: iyohadebor554@gmail.com

Ethics and Research Committee

University of Benin Teaching Hospital

Benin City.

Phone Number: 09074531712

CERTIFICATE OF CONSENT

have read the above information (or it has been read to me). I had the opportunity to ask questions about it and the questions were answered to my satisfaction.

I consent voluntarily to take part as a participant in this study

I do not consent to participate in this study.

Signature of participant: _____

Date:_____

HEALTH RESEARCH
ETHICS COMMITTEE (HREC)

UNIVERSITY OF BENIN TEACHING HOSPITAL
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Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL.VII/2025/118

PROPOSAL TITLE: "KNOWLEDGE ATTITUDE AND PRACTICE OF EXERCISE FOR BLOOD PRESSURE CONTROL AMONG ADULTS WITH HYPERTENSION IN UNIVERSITY OF BENIN TEACHING HOSPITAL."

PRINCIPAL INVESTIGATOR(S): IYOHA DEBORAH OLUWASOLA

DEPARTMENT/INSTITUTION: DEPARTMENT OF PHYSIOTHERAPY, SCHOOL OF BASIC MEDICAL SCIENCES UNIVERSITY OF BENIN, BENIN CITY, EDO STATE

DATE CONSIDERED: JULY 14TH, 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 14/7/2025 TO 13/7/2026. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI **SIGNATURE & DATE**..... 14/7/2025

BENIN CITY P.M.B. 1111 * UNIVERSITY OF BENIN TEACHING HOSPITAL * ETHICS & RESEARCH COMMITTEE

SUPERVISOR (S): DR. S.O BOLARINDE

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification

Signature & Date.....