**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI**

**COLLEGE OF HEALTH SCIENCES**

**FACULTY OF PHARMACY AND PHARMACEUTICAL SCIENCES**

# PATIENT-RELATED FACTORS THAT AFFECT ADHERENCE TO ANTI-HYPERTENSIVE THERAPY AT KOMFO ANOKYE TEACHING HOSPITAL

**A THESIS SUBMITTED TO THE DEPARTMENT OF CLINICAL AND SOCIAL PHARMACY**

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**BY**

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## DECLARATION

I hereby declare that except for references to other authors' work, for which reference has been duly cited, this work is my original research and has not been presented either in part or wholly in any presentation for an award anywhere.

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## DEDICATION

My utmost dedication is to Jehovah God for his unfailing grace and mercies.

I also dedicate this work to Michael Adu Donkor, Joshua N. O. Adu, Justin K. Ankomah, Michelle N. Adu, Adelyn E. Ankomah and Ivan k. Ankomah, whose existence has made life worthwhile.

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## ABSTRACT

Hypertension is still ranked as one of the top chronic medical conditions that affect individuals of all ages worldwide. Patients encounter difficulties during their therapy which leads to uncontrolled blood pressure .The complications that arise mainly due to uncontrolled blood pressure can be greatly reduced with a combination of on-schedule medication taking and the practice of positive lifestyle measures. This can be achieved when patients have positively formed conceptions about their medical condition and medications which invariably impacts on their medication-taking behaviour.

The objective was to measure the level of adherence and determine patient-related factors that affect adherence to antihypertensive therapy.

An institution-based cross-sectional study was conducted on 326 hypertensive patients who attended the Komfo Anokye Teaching Hospital's hypertensive clinic from 1st May, 2014 to 31st July, 2014. A well-structured questionnaire that incorporated the MMAS-8 was administered to participants to evaluate patients' level of adherence and also determine if the assessed variables had any influence on patients' medication-taking behaviour. Data were entered and analysed using SPSS version 16.

One hundred and thirty-three (41%) of the patients were males and 193(59%) were females. Two hundred and twelve (212, 65%) of participants were in the age range 55-79 years with a mean age of 60.59 years (SD=12.03).Two hundred and three (62%) had gone through basic education. Two hundred and five (205, 62.9 %) of the study participants were found to be highly adherent to their medication therapy, with 82 (25.2%) and 39 (11.9%) of the participants being categorised into the medium and low adherence groups respectively. Patients reported forgetfulness, a sense of well-being and side effects of their medications as major reasons for not being able to take their medications as prescribed**.** Patients were knowledgeable about the dose, dosing frequency and purpose but less knowledgeable about the names and side effects of their medication therapy.

Patients were aware of lifestyle measures adjunctive to medication therapy. The knowledge score on medication therapy was poor and the score on awareness of lifestyle measures was average.

No association was found between patients' gender (P-value=0.714), age, awareness of hypertensive state (p-value=0.149), awareness of lifestyle measures (0.149), number of years diagnosed hypertensive (P-value=0.175) and patients' adherence level. There was an association between patients' knowledge about their diet (P-value-0.05), awareness of systolic blood pressure (P-value=0.01) and patients' adherence level.

More than 50% of the study population highly adhered to their medication therapy and patients' adherence level was determined to be influenced by the type of diet likely to affect blood pressure negatively as well as knowledge of the doses and side effects of their antihypertensive medicines.

**KEYWORDS**: Hypertension, Medication therapy, Adherence, Lifestyle modification measures

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## LIST OF ABBREVIATIONS & DEFINITIONS

**BP-** Blood Pressure

**BMI-** Body Mass Index

**DASH-** Dietary Approaches to Stop Hypertension

**KATH**- Komfo Anokye Teaching Hospital

**WHO**- World Health Organisation

**NICE**- National Institute for Health and Clinical Excellence

**MMAS-8**- Morisky Medication Adherence Scale -8

**NSAIDS-** Non-Steroidal Anti-Inflammatory Drugs

**OPD-** Out Patients Department

**HDL**- High density lipoprotein

**LDL**- low density lipoprotein

**CVD**- Cardiovascular disease

**SBP**- Systolic blood pressure

**DBP**- diastolic blood pressure

**JNC**- Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure

**CV**- Cardiovascular Disease

**HPT**- Hypertension

**ACEI-** Angiotensin Converting Enzyme Inhibitor

**ARB-** Angiotensin Receptor Blocker

**SPSS-** Statistical Package for Social Sciences

**Clinic/GP surgery blood pressure readings:** These are readings taken by a doctor or nurse in a clinic or GP surgery using a standard blood pressure machine.

**Home blood pressure readings:**

These are readings taken by a person whilst seated and at rest at home using a standard blood pressure machine.

**Ambulatory blood pressure readings:**

These are readings taken at regular intervals whilst you go about your normal activities. A small machine that is attached to your arm takes and records the readings.

**ARTHEROMA-** small fatty lumps formed within the interior lining of blood vessels.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background

Patients with acute conditions have been reported to have a higher rate of adherence compared with those with chronic conditions such as hypertension, diabetes, HIV/AIDS, Asthma, etc. It has been estimated that an average of 50% of patients in the developed countries on long-term therapy are noted to better follow their prescribed medication during the first six (6) months of initiating therapy, meaning that adherence is better when the duration of therapy is short (Haynes, 2001). The adherence rate of medications actually taken by individuals over a specified period is lower in the developing countries due to non-availability of adequate resources with respect to the population (WHO, 2003).

Hypertension is a chronic medical condition and also one of the major public health problems that increases an individual's cardiovascular risk factor significantly. Though several agents and therapeutic regimens have been developed for the management of the condition, several studies done to assess the extent to which patients take their anti-hypertensive medication have revealed that, about 75% of hypertensive patients do not take their medications nor follow recommended treatment as prescribed. The failure of patients to follow the recommended therapy is known to be a reason why patients experience uncontrolled blood pressure (WHO, 2003). This sub-optimal outcome measure may be caused by demographic, organizational, disease, patient and medication-related factors (Gascon et al, 2004). These interdependent factors bring to the fore the essence of the responsibility of both the patient and the health care provider in planning, setting and implementing treatment goals.

The patient has a responsibility of following instructions regarding the prescribed medication regimen and is tagged the sole barrier to adherence when he fails to execute the expected recommendation. Once the patients are made aware of their ultimate responsibility in their care, they

will be well motivated and confident enough to better manage their condition and have improved quality of lives. Thus, involving patients in decisions concerning their treatment helps them to better understand the essence of controlling their blood pressure (Delmater, 2006 & Meichenbaum, 1987)

The treatment regimen (both medication and lifestyle modification regimens) for hypertensive patients must be individualized and the regimen followed consistently and indefinitely as closely as possible in order for the patients to achieve the maximum clinical benefit from well-controlled blood pressures (Burkhart et al, 2002).

Hypertensive patients who have their blood pressure poorly controlled experience cardiovascular complications such as stroke, myocardial infarction, coronary heart disease and early death (Osterberg & Blaschke, 2005).When a healthcare professional is able to detect non-adherence, it then becomes possible to develop interrelated interventions that can be used to tackle the problem. Health personnel can effectively tailor a patient's medication regimen to achieve optimum blood pressure to prevent treatment failures, reduce cardiovascular morbidity and mortality and achieve better outcomes for the patient (WHO, 2003). Also, being able to control the blood pressure of patients reduces the cost that patients incur in purchasing medications or paying for prescribed therapy. When patient outcomes are better controlled, clinic visits reduce and the health system spends less on medications, devices and overall cost of treatment used in managing the patients (Sokol et al, 2005). It is therefore imperative to evaluate patient adherence reliably to identify issues that affect a patient's ability to follow a treatment regimen.

## 1.2 Rationale of Study

Though hypertension in itself is asymptomatic, uncontrolled blood pressure places the individual at a risk of developing complications. Some studies have emphasized the importance of frequent blood pressure monitoring by hypertensive patients and incorporating lifestyle measures to augment the

prescribed medications to control their blood pressure. The combination of on-schedule medication taking and the practice of positive lifestyle measures appropriate in controlling an individual's blood pressure are known to reduce hypertensive-related complications (Tassell et al, 2007).

The provision of advice on lifestyle modification measures such as limiting salt intake, cessation of smoking, limiting alcoholic drinking and avoiding sedentary lifestyle to hypertensive patients, patients with borderline blood pressure or high normal blood pressure helps to decrease the age-associated rise in blood pressure (Whelton et al, 2002).

Factors directly related to the patient have been linked with the inability of patients to achieve set or targeted health outcomes (DiMatteo, 2004 & W.H.O 2003).Some patients have formed perceptions about their medical condition and medications which can affect their medication-taking behaviour (Leventhal et al, 1984). Adherence to treatment may be intentional or unintentional depending on patients' ability to make treatment decisions based on their beliefs about their condition and treatment (Hashmi et al, 2007).

Some of the indicators documented to affect adherence to antihypertensive medications include the complexity of the regimen, influence of the regimen on the patients' normal daily activities, side effects of the medication being taken by the patient as well as availability of resources to manage the hypertension. The confidence that patients have in their own ability to manage their condition and the motivation they have also influences their adherence behaviour. Some patients with relatively little knowledge about their disease condition or who have difficulties accepting their condition are known to be less motivated to adhere to their treatment options (WHO, 2003).

Well-resourced healthcare systems encourage patients to have positive conceptions about the ability of the system in the management of their condition. Such systems must have well-trained health professionals as well to address the concerns of their patients. Patients who are able to communicate effectively with their physicians and healthcare providers follow their therapies with much ease.

Good communication ensures that the patient understands his condition and how he is being managed to receive optimum care; he can understand the benefits of taking his medications and adhere to all aspects of his treatment (WHO, 2003).

The socio-economic status of the patient such as financial constraints, family and social support also affect adherence behaviour. Patients who are unable to make up-front payments for their prescription refills have a higher rate of adherence problems as compared with patients who are catered for by their insurance or supported by financially sound family members. Patients with families who show more support and are less critical in their care are known to be more adherent to their recommended regimen (WHO, 2003).

One study in India has suggested that a relationship exists between sex and adherence. In this study, men were known to have a three-fold increased risk of non-adherence rate comparative to women. Some reasons attributed to this finding were that men were more burdened with outdoor activities which make them busy and forgetful in taking their medications (Abere et al, 2012)

In order for such influences to be addressed, there is the need to understand the relationship which exists between such factors in the study population

In Ghana, hypertension is known to affect individuals of all ages and cause cardiovascular complications (Plange-Rhule et al, 1999). Statistics from the medicine directorate at the Komfo Anokye Teaching Hospital (KATH) and the Kwame Nkrumah University of Science and Technology (KNUST) indicate that 120 new cases of hypertension are seen every week. Again, 25% of deaths at KATH are attributed to the abnormally high blood pressure. The reasons cited for the high rate of uncontrolled blood pressure is the inability of patients to closely follow the recommended regimen due to a combined number of factors (KATH Journal, 2009).

A survey carried out at the Ghana Ports and Harbours Authority Hospital revealed a non-adherence rate to antihypertensive medicines of 31.4% (Jambedu, 2006).

Currently, limited study has been done in Ghana to explain adherence behavior in relation to antihypertensive medication therapy. It is thus important to identify patient-associated reasons related to uncontrolled blood pressure of patients at the KATH hypertensive clinic. This will help to improve upon individualized therapies, develop improved interventions, improve counselling sessions and reduce healthcare costs for the individual and health-system.

## 1.3 Aim

The primary aim was to evaluate factors related to hypertensive patients that influence their ability to follow recommended therapy.

## 1.4 Objectives

The specific objectives of the study were;

- To evaluate the relationship between selected demographic characteristics of the study population and adherence
- Determine the level of adherence to antihypertensive medication among the study population
- Assess the relationship between patient's knowledge about their hypertensive status and adherence
- Evaluate the relationship between patients' knowledge about their antihypertensive medications and adherence.
- To evaluate patients' knowledge about lifestyle modification and adherence

## 1.5 Hypertension

Hypertension affects mainly the arteries; the vessels that carry blood away from the heart to other parts of the heart; resulting in an increase in blood pressure. This increase in blood pressure generally causes no symptoms and warrants no intervention in an individual. Due to its asymptomatic nature, its detection and diagnosis is often missed but is often identified during a health screening programme as well as when other tests are conducted for a primary condition that the patient may have. However, the increased blood pressure raises an individual's chances of developing cardiovascular complications. An individual therefore benefits clinically from lowering the extent of elevation of the blood pressure (Walker & Edwards, 2003).

About 90-95% of recorded cases of hypertension is believed to be of unknown origin, whereas the remaining 5-10% of the cases is due to identifiable secondary causes. Clinically, hypertension may be referred to as essential/primary hypertension and secondary hypertension respectively (Chobanaian et al, 2003). Conditions that can lead to hypertension include

- Acute and chronic renal disease
- Thyroid and parathyroid disease
- Cushing's syndrome
- Phaechromocytoma
- Reno-parenchymal disease
- Coarctation of the aorta
- Drug-induced (NSAIDS/ COX-2 inhibitors, oral contraceptives, sympathomimetics, steroids, oral decongestants, etc)

### 1.5.1 Prevalence of Hypertension

High blood pressure caused 7.1 million premature yearly deaths worldwide. The worldwide adult population with hypertension is likely to increase from 972 million in the year 2000 to 1.5 billion in

2025 (Kearney et al, 2005). High blood pressure is also responsible for 13% of all deaths globally (Chobanian et al, 2003). Over 26% of the world's population was known to have hypertension (Haijer & Kotchen, 2000) and the percentage of the African population tagged with hypertension is 15% (Salako, 1993). An estimated 40% of hypertensive adults are unaware of their condition and 75% of those receiving treatment have uncontrolled blood pressure (McInnes, 2004). The increasing number of cases being recorded worldwide is attributed to under-diagnosis, under-treatment and poor rates of BP control (Primatesta et al, 2001).

In Ghana, 35% of the adult population is known to have hypertension with an estimated 30-50% adhering precisely to their medication regimen (Jambedu, 2006).

### 1.5.2 Risk Factors for Developing Hypertension

Certain factors predispose an individual to developing diseases of the heart (heart muscle) and blood vessels (vasculature). These predisposing conditions known as risk factors (Table 1.1) cause the heart muscle and vasculature to narrow and cause resistance in blood flow, subsequently resulting in stroke, angina, heart attack, transient ischaemic attack, peripheral vascular disease and premature deaths (NICE 2011).

**Table 1.1: Classification of Risk Factors for Developing Hypertension (Kennedy, 2012)**

| LIFESTYLE /PREVENTABLE | TREATABLE/PARTIALLY TREATABLE RISK FACTORS | FIXED RISK FACTORS |
|---|---|---|
| Unhealthy diet | | Age ↑ SBP >50 yrs, DBP ↑<50 yrs |
| Inactivity /sedentary lifestyle | Diabetes | Sex |
| Obesity | Kidney diseases | Family history-single most important risk factor for causing essential hypertension. 45% risk for an individual if both parents hypertensive, 30% risk if one parent hypertensive |
| Excess alcohol intake | Dyslipidaemia<br>• Elevated low density lipoproteins or non high Lipid cholesterol<br>• Elevated triglicerides<br>• Low high lipid cholesterol | Early menarche/early menopause in women |
| Smoking | | Ethnicity |
| Excessive salt intake | | |

### 1.5.3 Diagnosis of Hypertension

An individual is not considered hypertensive from a one-off abnormally high BP reading; mainly because the changes in blood pressure is affected daily by several factors such as anxiety and an individual's health risk factors.

For one to be tagged as hypertensive, a sustained measured average of the systolic, diastolic or both, taken with a standard BP machine over several weeks must be evidently high. Several guidelines exist that classify BP based on an assessment of the overall cardiovascular risk of an individual to determine thresholds for initiating therapy and also set treatment goals. Health professionals use a risk factor calculator to predict the health risk of an individual. The presence of an individual's

cardiovascular risk factors, target organ damage and associated clinical conditions, factored in predicting the health risk affect the prognosis of hypertension (Merck manual, 2006).

**Table 1.2: JNC-7 Classification of Hypertension with Treatment Goals (Beers et al, 2006)**

| | BP(mm/Hg) | | |
|---|---|---|---|
| | SBP | DBP | TREATMENT GOAL |
| Normal | <120 and | <80 | Re-check BP in 2 years |
| Pre-hypertension (individuals at high risk of developing hypertension) | 120 – 139 OR | 80 – 89 | ✓ Re-check BP in 1 year if no risk factor exists<br>✓ Initiate lifestyle changes to lower BP to normal level and prevent progressive rise in BP<br>✓ Initiate Lifestyle modifiable measures in patients with co-morbid conditions<br>✓ Initiate drug therapy in patients with co-morbid conditions if Lifestyle modification measures fails to lower BP to ≤ 130/80 |
| Stage 1 | ≥140– 159 OR | ≥90 – 99 | ✓ Target BP <140/90<br>✓ Initiate Lifestyle modifiable measures and confirm BP within 2 months |
| Stage 2 | ≥160 OR | ≥100 | ✓ Target BP <140/90<br>✓ Evaluate or refer to source of care within 1 month<br>✓ For BP 180/110, evaluate and treat immediately or within 1 week based on clinical assessment and/or complications |

## 1.6 Management of Hypertension

Ultimately, the goal of blood pressure management is to decrease renal and cardiovascular morbidity and mortality (Cohen et al, 1995). Patients must be made aware of the relevance of small changes in BP levels when managing their hypertension. Decreasing SBP and DBP to <140/90 mmHg in patients with/without compelling indications and target levels of <130/80 in hypertensive patients with co-morbid diseases decreases cardiovascular complications. Due to implication of several factors in the development of hypertension and its related complications, an overall assessment of an individual's risk factors enable proper drug initiation levels and setting of treatment target goals for patients who may require non-pharmacological and/or pharmacological therapy.

### 1.6.1 Non-Pharmacological Management of Hypertension

Dietary and exercise interventions are known to reduce blood pressure by at least 10mmHg in about 1 in 4 people with high blood pressure. As stipulated by authors of JNC-7, all hypertensive patients, patients with borderline and all staged hypertensive patients with/ without co-morbidities benefit from moderate reductions in BP brought about by lifestyle interventions. The aim of such a management schedule is to reduce the large number of people with high normal BP who would otherwise eventually require drug therapy. Managing a patient without medications is known to be less expensive, non-harmful and gives patients an improved sense of well-being.

***Physical activity***- Physically active patients have low incidence of Type 2 diabetes (Walker et al, 2002 & Eriksson et al, 2001). There is also a known consistent protective effect of regular physical activity in both sexes on the risk of developing hypertension. This protective effect of engaging in physical activity is independent of the level of obesity in individuals with no history of antihypertensive use, independent of age, education, smoking habits, alcohol intake, history of diabetes and systolic blood pressure at baseline. This therefore emphasizes the point that there is a direct link between overweight and obese subjects and an increased risk of developing hypertension

(Tuomilehto et al, 2001). The act of engaging in aerobic exercises of varying frequency, type and intensity leads to a decrease in the mean systolic BP by 3.8mmHg and diastolic BP by 2.6mmHg in overweight individuals.

Patients with heart disease, family history of heart disease or any other health problem need to consult their physician before initiating moderate –level activity.

Forms of physical activity include;

- ✓ Light/physically very easy to perform –sitting, office work, reading, watching television
- ✓ Moderate/active –walking ( 1 mile in 15 minutes brisk walking, ≤ 15 minutes stair walking), standing, walking and lifting, <30 minutes cycling, 30-45 minutes raking leaves, 45-60 minutes washing car, 30-45 minutes light gardening, 30 minutes fast dancing, 20 minutes swimming laps, 45 minutes playing football.
- ✓ Moderately high- engaging in some form of physical activity ≥ 3-4 hours a week; fishing, hunting, heavy gardening, jogging, skiing, running

These forms of physical activity may be re-grouped into;

Occupational- office work, store assistant, industrial work, farm work

Commuting- <30 or ≥30 minutes walking or cycling

Leisure time physical activity- low ( almost completely inactive).

-moderate (>4 hours a week eg gardening)

-high (performing vigorous physical activity> 3 hours eg heavy gardening, competitive sport several times a week, ball games, running)

Patients are known to report light levels of occupational, <30 minutes commuting and leisure time physical activity (low), only 1 of the 3 types of moderate-high physical activity (moderate) or 2/3

types of moderate-high physical activity (high.) Individuals need not continuously engage in physical activity but these activities can be divided into 10 minutes each.

There is documented evidence on an association between consistent protective effect of regular activity in both sexes- regardless of age, educational background, smoking habits, alcohol intake, a history of Diabetes Mellitus, the level of obesity/body mass index, and systolic blood pressure (BP) at baseline - and a reduced risk of developing hypertension (Hu et al, 2003). Though such documented evidence is scanty, evidence available underscores the positive effect of all forms of aerobic exercises on BP. Regardless of the frequency, type or intensity of the exercise, a significant decrease is known in mean systolic BP by 3.8mmHg in hypertensive, normotensive, overweight and normal weight subjects (Peto et al, 1990).

***Weight***- maintaining a weight/BMI of 20-25kg/m² decreases the risk of developing hypertension. Hypertensive patients benefit from weight loss by losing as much as up to 2.5/1.5 mm Hg of blood pressure for each excess kilogram of weight lost.

***Smoking***- the chemical nicotine, found in cigarette and other tobacco products causes decreased oxygen levels in the heart, increased BP and heart rate, increased blood clotting and damage to cells that line the coronary arteries and other blood vessels. Smoking is known to cause coronary artery disease especially in younger people and there is a recorded 30% rate of smoking-associated heart disease currently in the USA. The risk of heart and blood vessel disease increases proportionally with the number of cigarette sticks and duration of smoking. In addition, smoking results in breathing problems and lung cancer (Beckerman, 2015)

The benefits of reducing smoking in an individual include a reduced risk of developing heart, lung disease and an improved quality of life.

***Dietary modification***- Most people are known to consume more salt than they need. This salt includes all sodium in food products and salt in the form of NaCl/ table salt. The table salt mostly consumed is used both in cooking and also added at the table while eating. The recommended daily sodium intake is 2.3g/2300mg ≈ 6g of salt ≈ 1 teaspoon and the recommendation is to consume less than the 6g of salt – less than 100mmol (all sodium and table salt consumed) (Kennedy, 2012). African Americans and the elderly are known to be more sensitive to the BP raising effects of sodium and salt. The practice of reducing salt intake to less than 2g daily results in the prevention of essential hypertension and its development as a major public health issue. Again, individuals consuming diets of 1.5g of sodium have been shown to have better control of their BP with added BP lowering effects. Individuals benefit from adding less salt in cooking and at the table while eating, limiting intake of soy sauce, seafood, processed beef, poultry or pork. Such food products contain most of the sodium consumed and also, checking food labels before purchasing helps to identify food products with the recommended daily dietary salt intake. Individuals who have consistently followed the DASH plan (Dietary Approaches to Stop Hypertension) at the lowest sodium level of 1.5g daily obtain the highest BP lowering effects. A diet low in sodium, sugars and fats, enriched with herbs, spices, fruits, nuts, vegetables and whole grains decreases BP (Kennedy, 2012). Patients are advised to consume starch-based foods mostly cereals, wholegrain bread, rice, pasta and include fresh fruits and vegetables in the diet. The consumption of foods fried with vegetable oil such as sunflower oil, olive oil and consumption of lean meat also helps in lowering blood cholesterol.

***Consumption of alcohol***- consumption of large amounts of alcoholic based fluids has been linked to an increase in BP via its vaso-constrictive effects, with a resultant negative effect on vital organs such as the liver, brain, heart.

A unit of alcohol≈10mls of pure alcohol≈8g of pure alcohol; and it is usually expressed in terms of ABV (alcohol by volume). Alcohol by volume ABV/vol. simply means the expression of an alcoholic content as a percentage of the whole drink; thus 13ABV wine is 13% pure alcohol.

1 unit alcohol=10mls/8g pure alcohol=25mls single measure of whisky (ABV 40%)

= One third of pint of beer (ABV 5-6%)

= half a standard (175mls) glass of wine (ABV 12%)

The number of units of alcohol consumed by an individual is calculated based on the formula;

$$\text{Number of Units} = \frac{\text{Strength (ABV)} * \text{Vol (ml)}}{1000}$$

Moderate drinking is; 12 ounces of beer=1 drink=355mls of beer

12 ounces of beer (regular or light contains 150 calories)

3 ounces of wine contains 100 calories=148 mls of wine

1.5 ounces of 80-proof whisky contains 100 calories=44 mls

The calories in alcoholic beverages contribute to unwanted weight gain as well. Alcohol interferes with the effectiveness of medications and increases the side effects of some BP medications

Men who consume more than 8 units of alcohol daily ($\leq$3-4 units) on a regular basis ie on a daily basis or most days of the week, are 4 times more likely to increase their risk of developing hypertension whereas the risk for women is tagged at consuming more than 6 units. Drinking too much at a sitting- binge drinking- (>3 drinks) increases BP temporarily but has long-term effects such as alcoholic liver disease and decreased quality of life. Cutting back on heavy drinking lowers SBP by 2-4mmHg and DBP by 1-2mmHg. The recommendation is for heavy drinkers to slowly reduce consumption over 1-2 weeks and for high BP patients to avoid or drink in moderation; ie.

2 drinks daily for men <65 years and

1 drink daily for men ≥ 65 years.

Women of all ages who take in alcoholic beverages are advised to consume 1 drink daily.

### 1.6.2 Pharmacological Management of Hypertension

The use of medicines in the management of hypertension is considered when patients respond poorly to lifestyle interventions in controlling BP. As much as a wide variety of medications exist for the management of hypertension, the condition may be sub-optimally managed due to

- ✓ Unavailability of national hypertension guidelines (61%)
- ✓ Inadequate training of health professionals which tends to make them use monotherapy in managing the condition (45%)
- ✓ Unaffordability of anti-hypertensives (25)
- ✓ Insufficient medications and equipment to manage the condition. (Alwan et al, 2001)

Most patients require at least two (2) antihypertensive medications to effectively control their BP. Monotherapy has been shown to predispose patients to sub-optimal attainment of BP targets and about 30% of patients are placed on three (3) drugs or more for optimal control of their BP (Rascati et al, 1997).

A patient is never treated on the basis of an isolated BP reading; Guidelines exist to guide initiation of therapy in diagnosed patients. The hypertensive patient must be carefully evaluated to determine his overall risk of developing a CVD. Treatment decisions are based on a

- ✓ Thorough patient history,
- ✓ Physical examination and
- ✓ Routine investigations.

And this careful evaluation process aids in determining

- ✓ the cause
- ✓ associated CV risk factors
- ✓ evidence of target organ damage and
- ✓ co-morbid conditions

Attaining and maintaining BP targets is difficult especially in situations where resources are limited.

In such areas with limited resources, priority is given to patients with high and medium risk

**Table 1.3: Categories of patients at risk and management goals**

| Type of patient | Plan | Target | Benefit |
|---|---|---|---|
| Low risk | estimated CV Decide to treat OR monitor without treatment based on risk, patient's choice | Initiate therapy at <160/100mmHg | ✓ Decreases absolute risk of developing a CV event in elderly<br>✓ Decreased morbidity and mortality events |
| Medium risk (women and patients with uncomplicated hypertension | Decide to treat based on estimated CV risk OR monitor with patient on lifestyle modification measures | 139/83mmHg | Reduced major CV events |
| | | SBP <150<br>DBP <90 in non-diabetic patients | |
| Medium risk >55 years | | SBP <140 | |
| High risk | Establish effective BP control in patients with established CVD, DM, renal insufficiency | | |
| High risk DM patients | | ≤130/80mmHg | Decreased CV events or DM-related microvascular complications |

Medicines used in controlling BP include

- Diuretics
- β – Blockers
- Calcium channel blockers
- Angiotensin Converting Enzymes (ACE) inhibitors
- Angiotensin II receptor blockers
- Adrenergic inhibitors
- Alpha one (α-1) receptor blockers
- Vasodilators.

The major classes of antihypertensive medicines are largely equivalent in efficacy and safety and may be chosen for a patient based on its cost-effectiveness and the presence/absence of compelling indications in a particular individual. Some patients derive benefit from the least expensive medicines whereas for others, cost-effectiveness may result from use of more expensive medicines.

## 1.7 Adherence to Anti-Hypertensive Therapy

Individuals with chronic conditions take medications over a longer period of time, and it is therefore necessary that the patient follows a set of recommendations regarding his/her treatment as closely as possible in order to meet targeted health outcomes (Haynes, 2001). Earlier researchers explained the concept of adherence but failed to include the patient as an important participant in the medication therapy decision-making process. All responsibility of ensuring outcomes was thus shifted on the prescriber (WHO, 2003). In this era of patient- oriented care, the patient tends to benefit less from a range of interventions when he is not involved in the decisions regarding the management of his own condition.

There is the need to involve him in following instructions such as filling/renewing prescriptions, taking medications appropriately, attending follow-ups, engaging in lifestyle interventions, etc. toward the achievement of set health outcomes (Salter, 2010). This mutual relationship between the patient and the healthcare provider must be based on trust, understanding and privacy (Meichenbaum & Turk, 1987). In as much as the concept of adherence now places the patient in the center of the process, it is important to realize that certain habitual behavior patterns of patients predispose the patient to difficulties in achieving set health outcomes.

Not every patient is able to take his medication as prescribed at the desired time and it is clear that the full benefit of the many effective medications that are available will be achieved only if patients follow prescribed treatment regimen reasonably closely.

### 1.7.1 Prevalence of Adherence to Anti-Hypertensive Therapy

It is worthy of note that adherence problems is inherent in situations where self- administration of medications is involved. The worldwide problem of chronically ill patients (regardless of disease type, severity and/or accessibility to health resources) not adequately following recommended regimen in routine clinical practice carries with it an increased risk of morbidity and mortality. There is a recorded adherence rate of 50% for developed countries whereas developing countries have recorded a lower rate of adherence due to paucity of health resources available and inequities in access to health care (Haynes, 2001 & Sackett, 1978).

Patients with long-term care require good adherence behaviour and several studies have recorded varying adherence behaviours with respect to gender, age, condition being managed, socioeconomic status, data source, population under study and methods used to measure adherence. There is a reported adherence rate of 75-80% of patients with acute conditions and a reported adherence rate of 50% for patients on long-term care (Haynes, 2001). Out of the population of diagnosed hypertensive

patients, a known 75% are unable to achieve full control of their BP ie less than 25% of patients treated for hypertension in several countries achieve good control of their BP (Burt et al, 1995). 50-70% has also been quoted as the estimated number of patients who actually take their antihypertensive medications.

There have been adherence rates of 43%, 27%, 26%, 51% for China, Gambia, Seychelles and USA respectively. Again, 7% of patients in the UK and 4.5% of the Venezuelan populace were also known to follow recommended therapy to antihypertensive treatment (Sulbaran, 2000).There are studies that re-inforce the relation between non-adherence to prescribed efficacious cardio-protective medications and adverse cardiac events over time. With regards to prescription filling, almost one-fourth (≈24%) of patients with coronary artery disease failed to fill their cardiac prescription medication by day 7 of discharge. For some patients discharged on aspirin, statin and B-blocker after acute MI (≈ 34% of patients), at least 1 medication was stopped with 12% stopping all three medications within 1 month of hospital discharge. In another study, ≈40% of patients were found to be active in their statin medications 2 years after hospitalization for acute coronary syndrome (Jackevieus et al, 2008 & Spertus et al, 2006). Over half of hypertensive patients drop out of care entirely within a year of diagnosis (Vrigens et al, 2008)

Patients being managed on anti-hypertensives were noted to consistently have low adherence over 6-12 months. 71% reported persistent aspirin use, 46% had persistent B-blocker use, 44% used lipid lowering agents and 21% used all three medications after diagnosis of coronary artery disease by coronary angiography (Newby et al, 2006).

About 75% of patients on monotherapy for hypertension were found to be highly adherent in one study that defined adherence as medication possession ratio of 80% -100% (Bramley et al, 2006) whereas 79% of patients on ACE-I's, 65% on B-blockers, 56% on Spironolactone, 83% on statins were noted, 5 years after index heart failure hospitalization, to be persistently adherent (Gislason et al, 2007).

### 1.7.2 Measurement of Adherence to Anti-Hypertensive Therapy

Accurate measurement of adherence is necessary to ensure that changes in health outcomes can be attributable to the recommended regimen .Adherence is only an estimate of an individual's actual behaviour as no specific standard of measurement technique defines thresholds for "good" or "bad" adherence (Osterberg et al, 2005).

Subjective/indirect methods that exist for measuring adherence include use of standardized patient – administered questionnaires, analysis of patients' subjective reports, records of patients and health providers'ratings on adherence behaviour (assessment of patients' clinical response, patient diaries and measurement of physiological markers). The most commonly used subjective means include use of self-reports, pill counts and rates of prescription refills.

Objective/ direct means of assessing adherence behavior include measurement of non-toxic biological markers as well as medicine and metabolites in blood, directly observed therapy and use of electronic monitoring devices. Though the direct methods are considered robust compared to the indirect method, the indirect methods of measuring adherence behavior are practical for routine clinical use (Osterberg et al, 2005).

The method employed for measuring adherence must meet basic psychometric standards (Nunnally, & Bernstein, 1994) and must be

- ✓ Valid
- ✓ Reliable
- ✓ Cost-effective and
- ✓ Accepted by both healthcare providers and patients (Morisky, 2005)

In choosing a particular method, there is the need to consider factors such as;

- ✓ Goals of the researcher
- ✓ Accuracy requirements associated with the regimen
- ✓ Available resources
- ✓ Response burden of the patient
- ✓ Purpose of the results

Tools for measuring adherence in out-patient clinical settings are intended to provide insight into modifiable factors that affect adherence in different patient populations. Each developed measurement tool lays the groundwork for interventions to be developed to enhance adherence to therapies. Each of the measurement techniques employed has drawbacks as well as advantages (Timmreck & Randolf, 1993). The use of a multi-method that employs feasible self-reporting and reasonable objective measures currently remains the 'state-of-the art' in measuring adherence.

Rates of adherence can be measured as

- ✓ The percentage of prescribed medication taken over a period reported as 52-74% ( Bittar, 1995 & Okanno et al, 1997)
- ✓ Serum levels of medication
- ✓ Days of medication adherence (43-88%)
- ✓ Percentage of patients who failed to reach a clinically estimated adherence minimum (Bender et al, 1997)

There exists differing values of the estimates of adherence due to studies conducted with different study groups, variable methods of estimating adherence, extent of follow-up and differences in individual or population drug regimen.

Some studies use ≥80% as a cut-off point to define patient adherence. This percentage cut-off point is the value of antihypertensive medications not taken by the patient (Sackette, 1975) and 20-80% of patients are considered to be adherent to their medications (Costa, 1996).

The Morisky Medication Adherence Scale (MMAS-4) used to measure adherence levels is a validated, commonly used 4-item self-reported adherence measure that has been shown to be predictive of adherence to cardiovascular medications and blood pressure control. The MMAS-8 which is employed in this study, is an updated self-reported (8) eight-item structured questionnaire version of the MMAS-4 which has been shown to have greater sensitivity to the four-item scale published in 1986 and considered the most commonly used self-reporting method to assess patients' medication-taking behaviour.

## 1.8 Factors Related to Adherence to Antihypertensive Medication Therapy

A range of factors have been associated with the inability of patients to successfully follow their therapy as closely as possible to achieve the desired therapeutic goal. The WHO model of interdependent variables related to adherence to medications in patients on long-term therapy include the individual, the healthcare provider, aspects of the condition being managed, socio-economic status of the patient and the health system in which the patient is being managed (WHO, 2003).

### 1.8.1 Patient Factors

The majority of hypertensive out-patients self-administer their treatment prescribed by their physician and other health care providers. Patients are known to adhere better with a medication regimen that makes sense to them, seems effective, one they believe the benefits exceed the costs, when they feel they have the ability to succeed at the regimen, and when their environment supports regimen related behaviours. This self-care ability of patients has been identified as a key area for

modifying the behavior of patients with uncontrolled blood pressure. The effectiveness of interventions targeted at solving non-adherence can be affected by the attitudes and beliefs of patients with regards to the importance of achieving well-controlled blood pressure.

***Behavioral pattern and cognitive state of patients***-The habitual behavior patterns of patients predispose them to difficulties in following a set of instructions diligently. Many observational studies re-inforce the relation between non-adherence to medications and adverse effects but there is also a debate as to this 'healthy adherer effect' being a major factor in observed associations between adherence and patient outcomes (whether the incidence of low adverse effects is directly related to a high adherence rate). This is evidenced by a study that found no association between adherence to cardiovascular medications and hospitalization for lung, breast or prostate cancer. This debate has led to an emphasis being placed on the importance of adhering to cardiovascular medications than considering the 'healthy adherer effect as a surrogate marker for overall healthy behavior (Rasmussen et al, 2007). Some observational studies simply conclude that patients who take their medication regularly are also more likely to perform other healthy behaviors, such as eating properly and exercising regularly (Jensen et al, 2008 & Brookhart et al, 2007).

Social psychologists introduced the concept of 'health belief' in the 1950's to describe a range of health behaviors that seek to explain patients' cognition and social behavior in relation to their involvement in health programs such as immunization, health screening and adherence to therapies such as lifestyle change recommendations. The application of this model was widely restricted in the developed world in diseased conditions such as tuberculosis (Houchbaum, 1958); dental problems (Kegeles, 1963); contraceptive practices (Fisher, 1978); alcohol use and driving (Beck, 1981); dietary behavior (Becker et al, 1977); smoking (Weinberger et al, 1988); exercises and physical activities (O'Connel et al, 1985). With this model, patients are encouraged to avoid complications of their diseased condition by taking the recommended medications, assess the benefit/risk ratio of taking or not taking their medications and believe that the barriers that may hinder one from

successfully taking the recommended health action can be overcome (Stewart & Eales, 2002). Thus, hypertensive patients must assess the severity of their hypertensive state, realize the benefit of taking the recommended medications to control their blood pressure effectively to avoid complications and overcome most of the barriers that prevent positive outcomes. Patients with appropriate self-care behaviors can attain well controlled blood pressure and avoid health problems associated with hypertension.

***Socio-demographic variables related to the patient-*** Socio-demographic variables related to the patient like age, gender, marital status, educational and literacy levels are known to affect the patient more than organizational variables such as time spent with the physician, communication style of the physician and continuity of care (Abaz, 1997). Other factors that predisposes the patient to default his hypertensive therapy include the patient's understanding and acceptance of his condition, the overall cost related to his therapy and what he perceives to be risky health-wise if he defaults his therapy (Johnson et al, 1978)

***Age-*** Age is known to be significantly related with compliance. With regards to a specific disease condition, children and adolescents, by virtue of their dependence on parents and other carers have a known adherence rate range of 43-100% (Burkhart & Dumbar, 2002). The elderly form 64% of the world's population with an increased prevalence of chronic illnesses and require complex long-term treatment. They have a higher rate of cognitive and functional impairment and tend to consume multiple prescription medications and need close monitoring to ensure achievement of therapeutic outcomes. Good adherence behavior in the elderly prevents complications (medical, increased healthcare cost, disability and death) from arising (Jernigan, 1984).

***Sex-*** One study done in India has found men to have a threefold increased risk of non-adherence to their antihypertensive medications in relation to women. The reasons attributable to this percentage shift in favour of the women in the study population included burdensome activities carried out by

the men. These outdoor activities make the men busy and they forget to take their medications (Abere et al, 2012)

### 1.8.2 Non-patient-related factors

***Therapy-*** The ability and willingness of patients to take their medications may be compromised by how complex their individualized medication regimen pans out. Some of the issues related to drug complexity warrants questions that border on the number of medications being taken at a time (concurrent drugs), how frequent the medication needs to be taken (dosing schedule), any other symptoms experienced by the patient other than those expected from the intended drug (adverse events) and changes in medications that may occur due to any issues with the agreed regimen. Studies show improved rates of adherence with fewer daily doses of drugs and less drug turbulence (Wright et al, 2000). Patients who are unwilling to adhere to their therapy compromise effective outcome of treatment if they are unable to perceive the seriousness of their hypertensive state. This behavior on the part of patients is more apparent due to the asymptomatic and lifelong nature of hypertension.

Research has shown a lower adherence rate when the antihypertensive regimen is complex **(**Kjellgren et al, 1995). Some issues related to a complex regimen which favours non-adherence include a regimen that comprises a higher number of daily doses for each medication, concurrent medications and the frequent changes in antihypertensive medications that may or may not be due to undesirable effects of the medications (Bloom, 1998).

With regards to the side effects of antihypertensives being taken by patients, it has been observed that some patients tolerate the initial treatment with the newer classes of antihypertensives such as angiotensin II antagonists, angiotensin converting enzyme inhibitors and calcium channel blockers better (Caro, 1999). A relatively higher number of patients are also noted to discontinue treatment

with alpha adrenergic blockers and beta blockers but few stopped treatment on the thiazide diuretics due to adverse effects of these medications (El et al, 2002).

***Condition-*** Patients faced with co-morbidities such as depression, HIV/AIDS, diabetes, alcohol abuse in addition to their hypertensive state are known to have issues with adherence. This is because multiple prescriptions place on the patient, the onus of prioritizing their medication needs according to which condition that in their judgement, affects their lifestyle the most if not handled well (Ciechanawski et al, 2000).

***Health-system -***Adhering to medication regimen based on an active and interactive patient-physician relationship ensures favourable clinical outcomes, as opposed to the more subservient, passive patient-physician relationship of compliance where the patient is "instructed by the physician on what needs to be done (Svensson et al, 2000). In approximately one third of hypertension-related visits in which blood pressure was not controlled, it is known that the care-provider paid very little attention to ensuring his patients understood medication-taking and further prevented meaningful discussions on medications and medication-taking behaviors by asking his patients close-ended questions (Bokhour et al, 2006).One study has also found a correlation between poor counselling sessions with hypertensive patients on their medications and poor adherence rates to antihypertensive medication therapy (Jackeviaus et al, 2008). Another study indicated that less than 50 % of patients were able to list all their medications and even fewer could recount the reason for being given their medications after discharge (Makaryus et al, 2005).

## 1.9 Interventions to Improve Medication Adherence

Although the problem of non-adherence to medication is serious, it is not insurmountable. Due to the multifactorial nature of the factors that influence patient adherence to therapy, a number of reviews have recommend that problems of adherence must be jointly tackled by both health professionals/

clinical team, patients and those who are responsible for administering medications to the patients throughout the treatment. Interventions to improve adherence need to be looked at from the educational, behavioural and training in self-regulatory skills of patients (Brownell & Cohen, 1995).

### 1.9.1 Educational Interventions

During such educative programs, there is the need to assess the cognitive or mental state of the patient. The health professional or health educator must ensure that;

- ✓ the language of communication is clear enough for the patient to understand the information being given
- ✓ the diseased condition is clearly explained to the patient
- ✓ the patient as well as his carers can perceive the side effects of the medication being given and be able to recognize symptoms early enough to report to a medical facility and avoid health complications from occurring
- ✓ the medical information regarding treatment is detailed and clear enough for the patient and his carers to be able to carry out the necessary actions, should the patient experience symptoms that require medical attention
- ✓ the clinical goals of treatment are realigned for both health carers and patients (Marteau et al, 1987). Some of these patients may adhere to their regimen with the aim of preventing symptoms that may interfere with their daily activities from developing, whereas clinicians may aim for their patients to adhere to their therapies to prevent long-term complications from arising.

  (Falvo & Tippy, 1988)
- ✓ patient information leaflets handed out to patients must be easy to understand and simple enough to aid retention

### 1.9.2 Behavioural Interventions

Due to the long-term nature of hypertension and its management, approaches that target the beliefs, attitudes and mental state/ cognitions of patients need to be addressed. The medication- taking behaviour of patients must be clearly studied and understood before behaviour-specific interventions can be developed and applied. There must be an established relationship based on trust and mutual understanding between healthcare providers and patients. Both the healthcare provider and his patient must agree on the best pharmacological and/or lifestyle regimen for each patient aimed at achieving optimum blood pressure.

Patients must be equipped with information on the importance of controlling their blood pressure with medications and adopting relevant and effective lifestyle measures. There is the need for patients to recognize the importance of consistently taking their medications and be able to deal with missed doses which is likely to affect their blood pressure negatively. Any adverse event likely to influence the patients' medication taking behaviour must be clearly explained to the patients to optimize treatment outcomes.

Even though patients are responsible for their own decisions and self-care behaviours, patient outcomes are also affected by the behaviour of health care personnel. Health care providers responsible for training patients on the importance of maintaining optimum blood pressure need to also firstly establish and maintain good rapport with their patients. In a busy clinical setting encounter, health providers must employ active listening techniques and ask open-ended questions to find out what the patients consider the most comfortable treatment option for them. Health providers must understand the adherence rate pertaining to the population being handled, be aware of any non-adherence factors among their hypertensive patients and learn to counsel hypertensive patients constructively and show empathy, devoid of judgement (Wright et al, 2000). Health care providers must select drugs which are readily available, affordable effective and safe for their patients (El et al, 2002). The dosing schedule for patients must be simple to encourage adherence and minimally

interfere with the daily activities of the patients. Patient information leaflets issued to patients to serve as reminders must be simple to read and understand. Patients must be made aware of the cost of care from the onset of treatment and be made to understand the relevance of possible follow-ups in their care. In an effort to help patients to adhere better, health professionals must resist the temptation to take control of patients' will.

The families of patients must also be counselled on the importance of family support in terms of help in attending clinics where necessary, provision of financial assistance in the purchase of drugs in the absence of insurance and giving words of encouragement in the event of distress in the course of patients' treatment. The hypertensive patient on long-term therapy must not be socially isolated and prevent family conflicts as much as possible in order to avoid unnecessary stress that is capable of affecting their medication-taking behavior.

### 1.9.3 Self-Regulatory Skills Training

This approach aims to equip patients to be able to manage their hypertension in the absence of health personnel (Leventhal, 1993). Patients are encouraged to purchase blood pressure monitoring devices, if possible, and adequately trained to effectively measure and monitor their blood pressure at home, be able to recognize alarming symptoms of uncontrolled blood pressure and sustain positive lifestyle measures where applicable. Symptoms likely to evoke complications must be readily recognizable by patients and patients must be well-equipped to be able to handle any alarming event before complications set in- the patient must know when to report to the nearest medical facility for an intervention to be started.

# CHAPTER 2

# METHODOLOGY

## 2.1 Study Design

The study was an institution-based cross-sectional study that covered the period from 1st May, 2014 to 31st July, 2014.

## 2.2 Study Area

The study was conducted at the Komfo Anokye Teaching Hospital's (KATH) Out-Patient Hypertensive Clinic of the Directorate of Medicine. KATH, with an average bed capacity of 1000, is a tertiary health institution located in the regional capital of Ashanti Region, Kumasi. The hospital serves the health needs of patients in the Northern regions (Northern, Upper East and Upper West Regions), Brong Ahafo, Central, Western, Eastern and parts of the Volta Regions of the country.

The Hypertensive clinic, under the directorate of medicine, runs outpatient clinics once a week, with an average out-patient attendance on a clinic day of 120.

## 2.3 Study Population

Individuals of both sexes aged 18 years and older, with confirmed diagnosis of hypertension who were on antihypertensives and were being treated at the KATH out-patient hypertensive clinic during the period of study were eligible for recruitment for the study.

## 2.4 Sampling and Sample Size Determination

The recruited patients were selected from a list of patients who attended the clinic on a once-weekly basis. These patients were contacted during attendance at their regularly scheduled appointments. All

patients who met the inclusion criteria and consented to participate were included in the study.

Sample size was estimated using the statistical formula

$$n = \frac{z^2 p (1 - p)}{d^2}$$

Where n = estimated number of participants

z = z statistic at 95% confidence (margin of error)

p = prevalence of non-adherence in a pilot study

d = delta of 0.05

Using a proportion of 31.4% non-adherence rate in a study carried out at the Ghana Ports and Harbour Hospital by Jambedu, 2006, an assumption of 95% confidence limit and an estimated delta of 0.05, a minimum of 326 patients were recruited for this study.

## 2.5 Inclusion Criteria

- ✓ Both male and female patients aged ≥ 18 years who presented with ≥ 6 months history of hypertension at the hypertensive OPD clinic during the period of study

- ✓ Diagnosed hypertensive patients with uncontrolled hypertension (sustained average BP readings of ≥140/90 mmHg at the time of data collection) and on medication for at least six (6) months,
- ✓ Hypertensive patients with co-existing medical conditions of more than three (3) months preceding the interview time

## 2.6 Exclusion Criteria

- ✓ Pregnancy induced hypertensive patients.
- ✓ Patients diagnosed hypertensive of < 6 months.
- ✓ Diagnosed hypertensive patients on medication for < 6months.
- ✓ Hypertensive patients on admission.
- ✓ Hypertensive patients who did not visit the clinic during the period of study
- ✓ Hypertensive patients with co-morbidities of less than three (3) months prior to the interview time

## 2.7 Data Collection Tool

Based on the objectives of this study, data was collected using a structured questionnaire that incorporated the Morisky 8-item self-reported medication adherence Scale (MMAS). The structured questionnaire used to capture data was designed by the researcher and supervisor based on information from literature on what patients are supposed to know with regard to administration of medicines and life style modification adjunct to medicines for the management of hypertension. The structured questionnaire captured patients' socio-demographic and clinical details, patients' awareness of their medical condition, patients' knowledge of the name, dosage, duration, side effects and purpose of their prescribed medications as well as patients' awareness of six lifestyle measures that influence their hypertensive state. Medical records of patients were used in addition to capture and re-enforce patients' clinical details. The structured data collection instrument permitted the researcher to ask the same questions to all participants and mark their responses using pre-determined response options. Patients' adherence level was determined with the MMAS-8 scale.

## 2.8 Ethical Consideration

Permission was sought and granted from the directorate of medicine where the research was to be carried out and registered with the "Research and Development Unit (RDU) of the Komfo Anokye Teaching Hospital". The final approval to carry out the research was granted by the Committee on Human Research, Publications and Ethics, KNUST.

Participation in this study was voluntary. Each participant had the freewill to withdraw from the research at any stage without incurring any consequences. The purpose, risks and procedures for the study were clearly explained to each prospective participant after which consent forms were issued out to prospective participants to sign.

All signed or thumb-printed written consent forms for both literates and illiterates were scanned and transferred unto a password protected computer.

## 2.9 Data Collection

Data was collected by administering the close-ended structured questionnaires through direct and personal exit interviews. This enabled participants to answer the same set of questions and choose answers from predetermined options. Each participant was issued with a questionnaire directly by the principal researcher or any of the 2 trained intern pharmacists. Data collected included socio-demographic details, risk factors for hypertension, respondents' knowledge on risk factors, causes and complications of hypertension as well as respondents' knowledge on lifestyle modification measures for reducing blood pressure. The time used to complete one form was approximately 10 minutes with an overall data collection period of three (3) months.

## 2.10 Pilot Study

According to Burn & Grove (2007), for the instrument to be reliable, it must yield the same measure when used on more than one occasion. The questionnaire was pilot tested on 20 patients who met the inclusion criteria and attended the clinic prior to the study period by the researcher alone to ascertain unclear or ambiguous questions. Ambiguous questions were re-phrased or removed. The pilot testing of the questionnaire helped to estimate the time that could be taken to respond to the questionnaire which was an average of 15 minutes. Patients involved in the pilot study were not included in the main study.

## 2.11 Assessed Variables

The main outcome variable was adherence to antihypertensive medication. Other variables investigated included

- ✓ patients' socio-demographic details
- ✓ systolic and diastolic blood pressure measurement ( controlled BP characterised by BP measurements of <140/90 mmHg respectively)
- ✓ patients' awareness of their hypertensive status
- ✓ patients' knowledge of their anti-hypertensive medications
- ✓ patients' knowledge of lifestyle measures likely to influence their decisions regarding their prescribed therapy.

Each patient was also interviewed to find out other reasons that they may have regarding their inability to take their prescribed therapy aimed at controlling their blood pressure effectively.

## 2.12 Measurement of Adherence and Assessment of Variables

The MMAS-8 was used to ascertain the level of adherence to antihypertensive therapy. It (MMAS-8) is an updated self-reported (8) eight-item structured questionnaire version of the MMAS-4 which has been shown to have greater sensitivity to the four-item scale published in 1986. It is considered the most commonly used self-reporting method to determine adherence. MMAS-8 is a tool used to assess patients' medication-taking behaviour and basically contains eight questions with closed dichotomous (yes / no) answers designed to prevent the bias of positive responses that patients may give when asked questions by health professionals, Thus, each item measures a specific adherence behavior, with seven questions that must be answered negatively and only one positively, with the last question being answered according to a scale of five options: never, almost never, sometimes, often, and always.

The degree of adherence was determined according to the score that resulted from the sum of all the correct answers: high adherence (0), medium adherence (1 or 2 points) and low adherence (≥3 points) (Morisky et al, 2008).

The reasons given by participants pertaining to their non-adherent behaviour was also evaluated to ascertain issues related to their medication therapy.

With the aid of the structured questionnaire, patients were asked questions on lifestyle measures that they were engaged in, their hypertensive status, anti-hypertensives and their responses recorded. A scoring system of 'yes' or 'no' was used to determine respondents' knowledge on anti-hypertensives prescribed and knowledge about life style modification measures known for managing hypertension. In addition, in determining individual patients' overall knowledge score on medicines, the score on each medicine was calculated and the calculated average score on two or more medicines prescribed for the patient was used. To determine respondents' knowledge score on the life style modification for managing hypertension, a scoring system was employed where patients were given a score on

each life style modification known, with a total of 6 marks being awarded for excellent knowledge; 6-excellent; 5 – very good ; 4- good ; 3 – average; 2- fair, 1 – poor knowledge.

### 2.13 Data Entry and Analysis

Data was entered into the computer and cleaned before being subjected to analysis using SPSS software programme version16.0. Information was summarized using frequency tables and cross tabulations. The chi-square test was used to compare proportions; bivariate correlation (Pearson correlation) analysis was done. Multivariate analysis was done using linear multiple regression to obtain the strongest predictor variable. A p-value of equal or less than 0.05 was considered statistically significant.

# CHAPTER 3

# RESULTS

## 3.1 Demographic Characteristics

A total of 326 participants were involved in the study, making the response rate 100%.There were 133(40.80%) males and 193 (59.20.%) females. The mean age of participants was 60.59 (SD=12.03). The majority of participants 212 (65%) fell into the age group 55-80 years. Within the study population, 211(64.70%) of the participants were married and 115 (35.3%) participants were single – either; never married, separated, divorced or widowed. 203 (62.30%) of the study participants had basic education and 61 participants (18.7%) represented the participants who had no formal education. Only 62 (19%) patients had achieved higher education. The majority of the participants; 203 (71.50%) were employed and 301 (92.30%) participants in the majority were of Christian background.

**Table 3.1: Socio-demographic characteristics of respondents**

| **Variables** | **n** | **%** |
|---|---|---|
| **Age of respondents (years)** | | |
| <55 | 96 | 29.40 |
| 55 – 79 | 212 | 65.00 |
| 80 and above | 18 | 5.50 |
| **Sex of respondents** | | |
| Male | 133 | 40.80 |
| Females | 193 | 59.20 |
| **Marital Status of respondents** | | |
| Single | 115 | 35.30 |
| Married | 211 | 64.70 |
| **Religion of respondents** | | |
| Christian | 301 | 92.30 |

| | | |
|---|---|---|
| Muslim | 23 | 7.10 |
| Traditionalist | 1 | 0.30 |
| Others | 1 | 0.30 |
| **Educational background** | | |
| Basic | 203 | 62.30 |
| Tertiary | 62 | 19.00 |
| No Formal Education | 61 | 18.70 |
| **Occupation of respondents** | | |
| Unemployed | 93 | 28.50 |
| Employed | 233 | 71.47 |

*n = number of patients observed and N = Total number of the sample

### 3.2 Clinical characteristics

Diabetes mellitus ranked first; 45 (13.80%) as the most common isolated co-morbid disease among the participants. Hyperlipidemia, stroke and heart failure followed with a participant number of 27 (8.30%), 5 (1.50%) and 3 (0.90%) respectively. Diabetes and hyperlipidemia were found to be dual co-morbid disease in 1 (0.30%) participant whereas stroke and hyperlipidemia combined was also found in 1 (0.30%) participant. Asthma was the only indirectly associated cardiac co-morbid disease in 5 (1.5%) of the study population.

Regarding the number of years lived with hypertension, 167(51.20%) of participants had been living with hypertension for a maximum of five (5) years. The number of patients and the respective number of years the patients had lived with hypertension are as shown in Table 3.2.

**Table 3.2: Distribution of respondents' disease features, comorbidities and disease complications**

| Variables | n | % |
|---|---|---|
| **Respondents' co-morbid status** | | |
| Diabetes mellitus | 45 | 13.80 |
| Heart failure | 3 | 0.92 |
| Stroke | 5 | 1.53 |
| Hyperlipidemia | 27 | 8.28 |
| Asthma | 5 | 1.53 |
| Diabetes mellitus, Hyperlipidemia | 1 | 0.31 |
| Stroke, Hyperlipidemia | 1 | 0.31 |
| Not known | 239 | 73.31 |
| **Number of years lived with Hypertension** | | |
| 1-5 | 167 | 51.23 |
| 6-10 | 91 | 27.91 |
| 11-15 | 30 | 9.20 |
| 16-20 | 21 | 6.44 |
| 21-25 | 4 | 1.23 |
| 26-30 | 7 | 2.15 |
| 31-35 | 4 | 1.23 |
| 36-40 | 2 | 0.61 |
| Total | 326 | 100 |

The majority of patients were unable to give specific reasons regarding their inability to take their prescribed medication as scheduled (253, 77.6%). Out of the total number of participants, 34 (10.4%) attributed their non-adherence to forgetfulness. Some of the participants related their non-adherence to either feeling sick, feeling well or being busy. The majority of participants 231(71.2%)

were not aware of their hypertensive state before being initially informed by the healthcare provider of their status after reporting a feeling of un-wellness and having their blood pressure checked (Fig 3.2).

**Table 3.3: Distribution of respondents' reasons for non-compliance and Awareness of respondents' Hypertensive Status**

| | | |
|---|---|---|
| **Respondents' reasons for Non-compliance** | | |
| Forgetfulness | 34 | 10.40 |
| Feeling sick/side effects | 14 | 4.30 |
| Feeling well | 14 | 4.30 |
| Busy , forgetfulness | 3 | 0.90 |
| Other multiple reasons | 8 | 2.50 |
| No reasons | 253 | 77.60 |
| **Respondents' awareness of their Hypertensive status** | | |
| Yes | 95 | 29.10 |

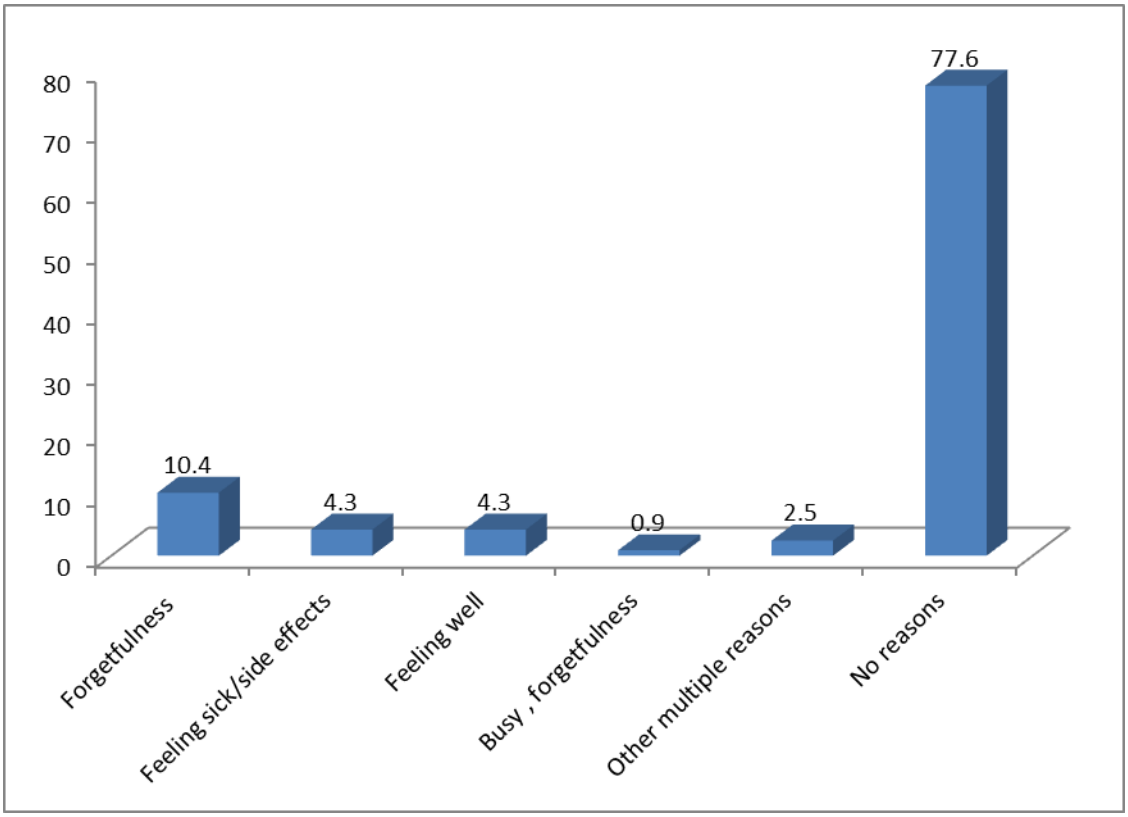


**Figure 3.1: Respondents' reasons for non-adherence to antihypertensive medications**

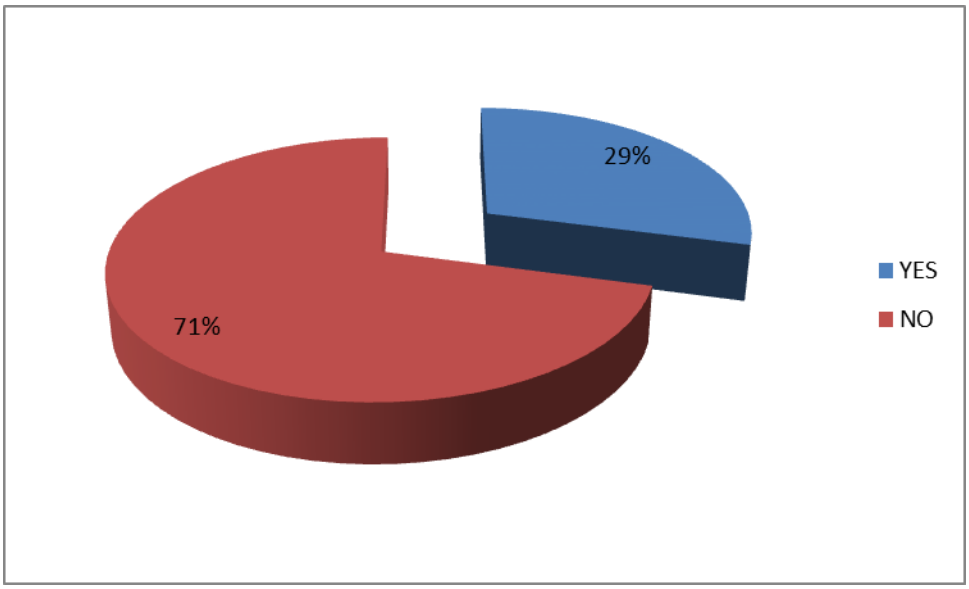


**Figure 3.2: Illustration of respondents' knowledge of hypertensive status**

**Table 3.4: Summary description of data of study patients (Summary of mean distribution of selected sociodemographic and clinic variables of 326 hypertensive patients).**

| Variable | n (%) | Mean (sd) | Median (IQR) |
|---|---|---|---|
| Age (years) | - | 60.59 (12.03) | - |
| BMI ($Kg/m^2$) | - | 29.66 (7.26) | - |
| Duration of hypertension (years) | - | | 6 (3, 10) |
| Number of Children | - | 4.73 (3.02) | |
| No. of Anti-hypertensives prescribed | - | 2.52 (0.95) | |
| Systolic BP | - | 138.46 (16.72) | |
| Diastolic BP | - | 88.84 (11.55) | |

### 3.3 Risk factors

One hundred and forty-seven participants- 147 (45.10%) -formed the majority of participants that had a familial history of hypertension. Six- 6 (1.80%) smoked, 35 (10.70%) drank alcohol and 204 (62.6%) were engaged in some form of minimal exercising. The consumption of fried or salty food was also identified as risk factors for developing hypertension in the study population (Table 3.3).

**Table 3.5: Distribution of risk factor characteristics of respondents**

| Variable | n | % |
|---|---|---|
| **Family history of Hypertension** | 147 | 45.10 |
| **Respondents' smoking status** | 6 | 1.80 |
| **Respondents' alcohol intake status** | 35 | 10.70 |
| **Respondents' intake of fried food** | 202 | 62.00 |
| **Respondents' intake of salty food** | 163 | 50.00 |
| **Respondents' knowledge of risk factors** | 166 | 50.90 |

### 3.4 Medicines prescribed

The majority of the patients; 133 (40.80%), were being managed on two (2) anti-hypertensives while 103 (31.60%), 45 (13.80%) and 40 (12.30%) were on three (3), four (4) and one (1) medication(s) respectively. A small fraction of the participants; 3 (0.90%) and 2 (0.60%) were placed on five or six drugs at a time (Table 3.5). Fourteen anti-hypertensive medicines from seven different classes were prescribed seven hundred and sixteen (716) times for 326 patients. The classes of anti-hypertensive prescribed included calcium channel blockers 195(27%), diuretics 152(21%), ACE Inhibitors/A2RB 219 (31%) and B-blockers 88(12%). The common calcium channel blockers prescribed were amlodipine and Nifedipine whiles furosemide was the commonest diuretic prescribed. Bisoprolol and Atenolol were the commonest B-blockers prescribed.

**Table 3.6 Classes of Anti-hypertensive Medicines Prescribed**

| **1.CALCIUM CHANNEL BLOCKER** | **FREQUENCY** |
|---|---|
| Nifedipine | 136 |
| Amlodipine | 59 |
| **DIURETICS** | |
| Furosemide | 71 |
| Bendroflumethiazide | 51 |
| Spironolactone | 23 |
| Hydrochlorothiazide (Esidrex) | 7 |
| **ACEI** | |
| Lisinopril | 102 |
| **ARB** | |
| Losartan | 117 |
| **B-blockers** | |
| Bisoprolol | 37 |
| Atenolol | 22 |
| Carvedilol | 17 |
| Metoprolol | 6 |
| Propranolol | 6 |
| **CENTRALLY ACTING** | |
| Methyldopa | 58 |
| **DIRECT VASODILATORS** | |
| Hydralazine | 20 |

### 3.5 Patient Awareness of the administration of Medicines

The majority of the patients under study were knowledgeable about the doses, dosing frequencies as well as the reason for which they were taking their medications but relatively few had little knowledge about the drug names and side effects of the medications they were taking for their hypertension (Table 3.7). The mean anti-hypertensive knowledge score obtained was 2.17 (SD:1.06) out of 5. The overall patient knowledge score on anti-hypertensives prescribed for respondents was average.

**Table 3.7: Distribution of respondents' knowledge of anti-hypertensive medications and number of anti-hypertensive medicines prescribed**

| Variables | N | % |
|---|---|---|
| **Respondents' knowledge of drug name** | | |
| Yes | 118 | 36.20 |
| **Respondents' knowledge of drug dose** | | |
| Yes | 314 | 96.30 |
| **Respondents' knowledge of dosing frequency** | | |
| Yes | 264 | 81.00 |
| **Respondents' knowledge of side effects** | | |
| Yes | 15 | 4.60 |
| **Respondents' knowledge of purpose of medicines** | | |
| Yes | 211 | 64.70 |
| **Number of anti-hypertensive medicines prescribed** | | |
| 1 | 40 | 12.30 |
| 2 | 133 | 40.80 |
| 3 | 103 | 31.60 |
| 4 | 45 | 13.80 |
| 5 | 3 | 0.90 |
| 6 | 2 | 0.60 |

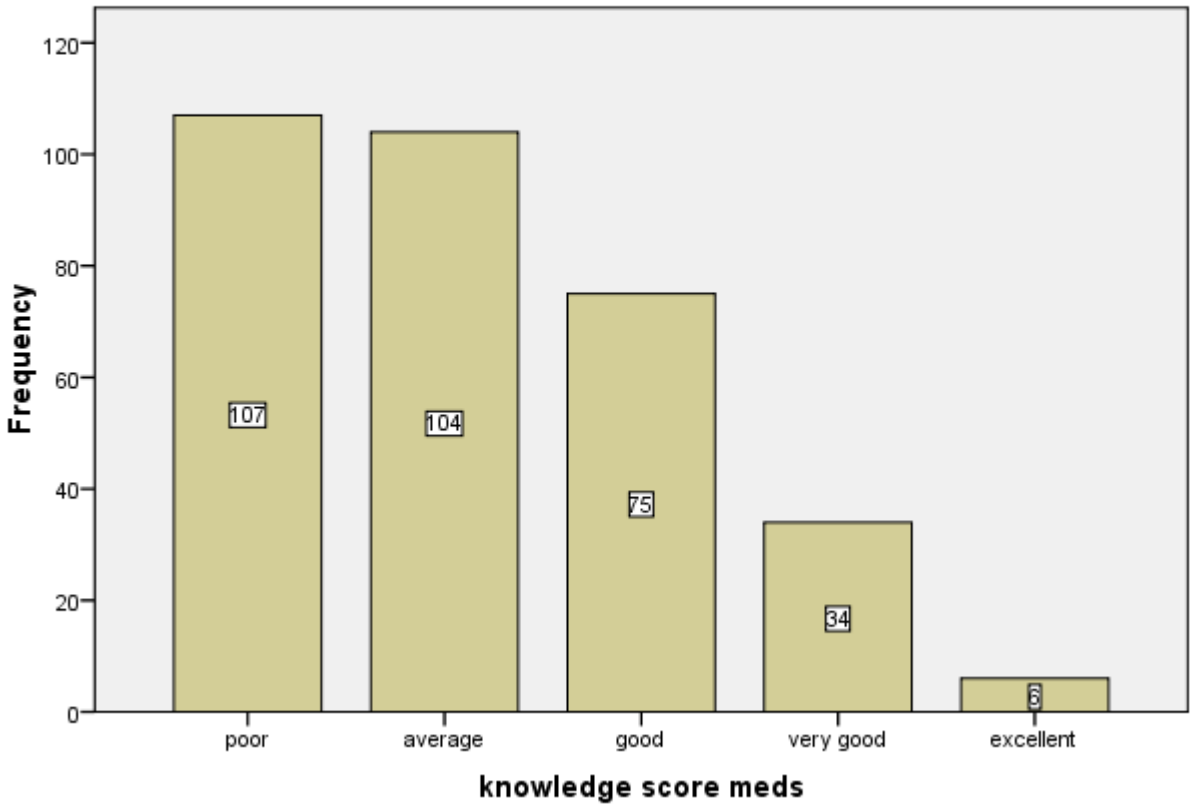


**Figure 3.3: Respondents' knowledge score on anti-hypertensive medications**

### 3.6 Adherence Level of Respondents

Two hundred and five- 205 (62.90%) - of the participants were found to be highly adherent to their medications. This was followed by medium adherence and low adherence with proportions of (82, 25.2%) and (39, 11.9%) respectively.

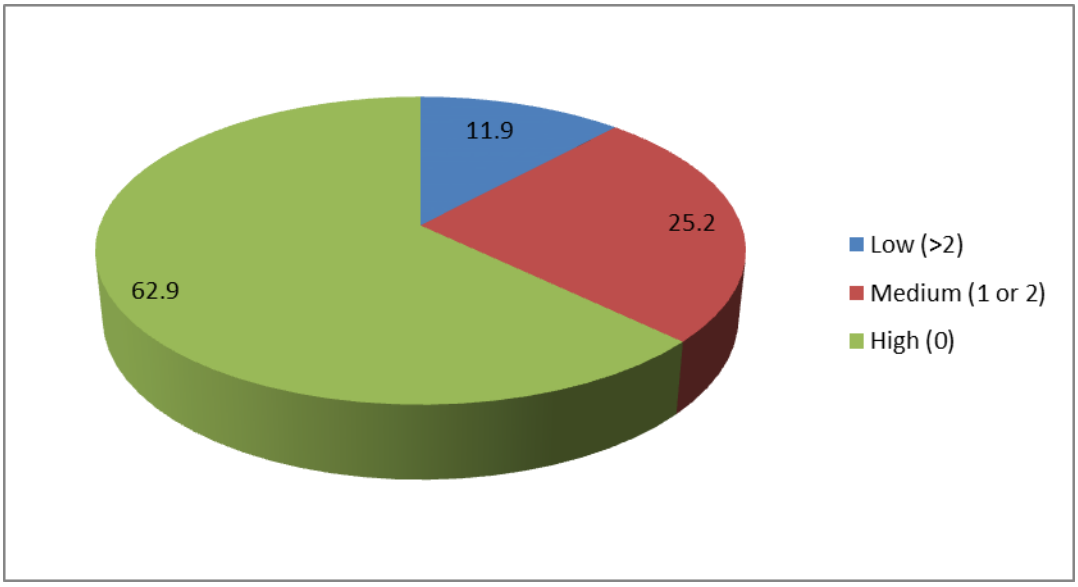


**Figure 3.4: level of adherence to antihypertensive agents**

## 3.7 Patient-related factors affecting adherence

### 3.7.1 Sex

From the results of cross tabulation, 62.4%, 27.8% and 9.8% of the male patients had high, medium and low level of adherence respectively. Also 63.2%, 23.3% and 13.5% of the female patients also showed high, medium and low level of adherence respectively. Among the high adherence group, 40.5% were males as compared to 59.5% of females. Also, 45.1% of the medium adherence level group were males as compared to 54.9% of females. 33.3% with low level of adherence were males as compared to 66.7% of females.

Also from the Chi-squared test result p=0.714, we fail to reject the null hypothesis. Therefore there is no evidence of association between patients' gender and adherence level. Hence in the wider population it could be that there are differences in adherence level among male and female hypertensive patients, but the differences are not statistically significant.

**Table 3.8: Summary Description of Cross Tabulation between Patients' Sex and Adherence level.**

| | | | Level of Adherence | | | |
|---|---|---|---|---|---|---|
| | | | LOW (>2) | MEDIUM (1 0R 2) | HIGH (0) | Total |
| Sex | Male | Count | 13 | 37 | 83 | 133 |
| | | % within Sex | 9.8% | 27.8% | 62.4% | 100.0% |
| | | % within Level of Adherence | 33.3% | 45.1% | 40.5% | 40.8% |
| | Female | Count | 26 | 45 | 122 | 193 |
| | | % within Sex | 13.5% | 23.3% | 63.2% | 100.0% |
| | | % within Level of Adherence | 66.7% | 54.9% | 59.5% | 59.2% |
| Total | | Count | 39 | 82 | 205 | 326 |
| | | % within Sex | 12.0% | 25.2% | 62.9% | 100.0% |
| | | % within Level of Adherence | 100.0% | 100.0% | 100.0% | 100.0% |

### 3.7.2 Age

The results show that the mean age of hypertensive patients among the three groups of high, medium and low adherence levels were 61.66, 59.84 and 56.51 respectively, with standard deviations of ±12.410, ±11.124 and ±11.090 respectively. The p-value determined for the mean age within the various adherence levels was 0.040. The null hypothesis of no difference in mean age is rejected.

Therefore there is evidence of statistically significant difference in the mean age between the three adherence level groups. The p-value determined for variance equality or non-equality within the adherence levels was 0.430, indicating variance equality within the groups.

**Table 3.9: Summary Description of Cross Tabulation between Patients' Age and Adherence Level.**

( Summary statistics of ANOVA Test- evaluation of differences in mean ages among the adherence levels)

| **Variable** | **Mean age (years)** | **Standard deviation** | **95% CI for the mean Lower, Upper** | **Levene's Test p-value (**determined for evaluating equality of variance within the adherence levels**)** | **p-value (**determined for differences in mean age within the adherence levels**)** |
|---|---|---|---|---|---|
| Adherence level | | | | 0.430 | 0.040 |
| **High** | 61.66 | 12.410 | 59.95, 63.37 | | |
| **Medium** | 59.84 | 11.124 | 57.40, 62.29 | | |
| **Low** | 56.51 | 11.090 | 52.92, 60.11 | | |

The results show that the mean difference is statistically significant between low and high adherence level. The actual mean difference between the high and low adherence level is 5.146 years with 95% CI (10.28, 0.01) and p=0.049. However the mean difference in age between the high and medium adherence level as well as between medium and low adherence level were not statistically significant as shown in table 3.10.

Therefore in the population, the statistically significant difference observed was between the low and high adherence groups and that patients with low adherence are on the average 5.146 years younger than the high adherence group.

**Table 3.10: Post hoc multiple comparison of Scheffe's Test- to evaluate which adherence level shows statistical significance**

| (I) Level of Adherence | (J) Level of Adherence | Mean Difference (I-J) | Std. Error | P-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| LOW (>2) | MEDIUM (1 0R 2) | -3.329 | 2.324 | .360 | -9.04 | 2.39 |
| | HIGH (0) | -5.146* | 2.087 | .049 | -10.28 | -.01 |
| MEDIUM (1 0R 2) | LOW (>2) | 3.329 | 2.324 | .360 | -2.39 | 9.04 |
| | HIGH (0) | -1.817 | 1.561 | .509 | -5.66 | 2.02 |
| HIGH (0) | LOW (>2) | 5.146* | 2.087 | .049 | .01 | 10.28 |
| | MEDIUM (1 0R 2) | 1.817 | 1.561 | .509 | -2.02 | 5.66 |

### 3.7.3 Awareness of hypertensive state

From the results of the cross tabulation (Table 3.11), among the patients with high level adherence, 31.4% of the patients indicated that, they were informed as being hypertensive when they visited the clinic for symptoms that they were not aware were related to hypertension. The percentage of patients who had no knowledge of their hypertensive state was 68.6%. Also, among the patients with low level of adherence, 20.5% had knowledge of their hypertensive state whilst 79.5% had no knowledge of their hypertensive state prior to being diagnosed at the clinic. Again among patients who had knowledge of their hypertensive state, 68.1%, 23.4% and 8.5% showed high, medium and low level of adherence respectively. Also, 60.6% of patients with no prior knowledge of their hypertensive state showed a high level of adherence compared with 26.0% and 13.4% who showed medium and low level of adherence respectively.

Also from the Chi-squared test result $p=0.149$, we fail to reject the null hypothesis. Therefore there is no evidence of association between patients' knowledge of their hypertensive state and adherence level. Hence in the wider population it could be that there are differences in adherence level among hypertensive patients with or without knowledge of their hypertensive state, but the differences are not statistically significant.

**Table 3.11: Summary description of Cross tabulation between Patients' awareness of their Hypertensive state and Adherence level.**

| Level of Adherence | | Patient Knowledge of HPT state | | Total |
|---|---|---|---|---|
| | | YES | NO | |
| LOW (>2) | Count | 8 | 31 | 39 |
| | % within Level of Adherence | 20.5% | 79.5% | 100.0% |
| | % within Patient Knowledge of HPT state | 8.5% | 13.4% | 12.0% |
| MEDIUM (1 0R 2) | Count | 22 | 60 | 82 |
| | % within Level of Adherence | 26.8% | 73.2% | 100.0% |
| | % within Patient Knowledge of HPT state | 23.4% | 26.0% | 25.2% |
| HIGH (0) | Count | 64 | 140 | 204 |
| | % within Level of Adherence | 31.4% | 68.6% | 100.0% |
| | % within Patient Knowledge of HPT state | 68.1% | 60.6% | 62.8% |
| Total | Count | 95 | 231 | 326 |
| | % within Level of Adherence | 28.9% | 71.1% | 100.0% |
| | % within Patient Knowledge of HPT state | 100.0% | 100.0% | 100.0% |

### 3.7.4 Awareness about medicines

The results (Table 3.7) indicate that patients were generally less knowledgeable about the names, side effects and purpose of their medicines and had more knowledge with regards to the dose and dosing frequency. However, patients within the medium adherence group (100, 44.6%) formed the majority that knew less of the names of their medicines compared with patients in the low and high adherent groups.

The Chi-squared test (linear by linear) result shows P-values of 0.796, 0.119, 0.103, 0.759 and 0.414 for patients' knowledge on the name, dose, dosing frequency, side effects and purpose of anti-hypertensive prescribed, thus making the null hypothesis of 'no association between patients knowledge of their anti-hypertensive medicines and adherence' to be accepted.

**Table 3.12: Summary description of Cross tabulation between Patients' knowledge of their anti-hypertensive medications and Adherence**

| | Adherence level | | | |
|---|---|---|---|---|
| **Factors** | **Low** | **Medium** | **High** | **p value** |
| **Knowledge of drug name** | | | | |
| Yes | 17(13.3) | 28(21.9) | 83(64.8) | 0.796 |
| No | 64(28.6) | 100(44.6) | 60(26.8) | |
| **Knowledge drug dose** | | | | |
| Yes | 38(12.9) | 76(25.9) | 180(61.2) | 0.119 |
| No | 2(6.2) | 6(18.8) | 24(75.0) | |
| **Knowledge of dosing frequency** | | | | |
| Yes | 26(13.1) | 57(28.6) | 116(58.3) | 0.103 |
| No | 14(11.0) | 25(19.7) | 88(69.3) | |
| **Knowledge of side effects** | | | | |
| Yes | 1(5.0) | 7(35.0) | 12(60.0) | 0.759 |
| No | 39(12.7) | 75(24.5) | 192(62.7) | |
| **Knowledge of purpose of medicine** | | | | |
| Yes | 12(11.9) | 31(30.7) | 58(57.4) | 0.414 |
| No | 28(12.4) | 51(22.7) | 146(64.9) | |

### 3.7.5 Awareness of lifestyle measures

Patients were relatively aware of lifestyle measures of exercising, reducing salt intake, limiting alcohol intake, smoke cessation, eating diet rich in fruits and vegetables and reducing weight to augment medication therapy (Table 3.13). The Chi-squared test (linear by linear) result gives P-values that suggests no association between patients' awareness of these lifestyle measures and their adherence levels. However, the P-value of 0.05 for patients' awareness of diets (diet rich in fruits, vegetables, less fatty food and wholegrain cereals) on adherence indicates a significant association

between patients' awareness of the effect that diet has on how patients take their medications. The mean knowledge score obtained on lifestyle measures was 4.27 (SD: 1.85) indicating patients 'good'.

**Table 3.13: Summary description of Cross tabulation between Patients' awareness of lifestyle measures and Adherence level.**

| | Adherence level | | | |
|---|---|---|---|---|
| **Factors** | **Low** | **Medium** | **High** | **p value** |
| **Awareness on exercising** | | | | |
| Yes | 25(10.2) | 65(26.6) | 154(63.1) | 0.258 |
| No | 15(18.3) | 17(20.7) | 50(61.0) | |
| **Awareness on salt reduction** | | | | |
| Yes | 30(11.2) | 67(24.9) | 172(63.9) | 0.167 |
| No | 10(17.5) | 15(26.3) | 32(56.1) | |
| **Awareness on alcohol intake** | | | | |
| Yes | 20(11.1) | 44(24.4) | 116(64.4) | 0.389 |
| No | 20(13.7) | 38(26.0) | 88(60.3) | |
| **Awareness on smoking** | | | | |
| Yes | 20(10.9) | 48(26.1) | 116(63.0) | 0.586 |
| No | 20(14.1) | 34(23.9) | 88(62.0) | |
| **Awareness on diet** | | | | |
| Yes | 29(11.1) | 62(23.8) | 170(65.1) | 0.050 |
| No | 11(16.9) | 20(30.8) | 34(52.3) | |
| **Awareness on weight reduction** | | | | |
| Yes | 28(11.5) | 62(25.4) | 154(63.1) | 0.556 |
| No | 12(1469) | 20(24.4) | 50(61.0) | |

### 3.7.6 Awareness of Systolic blood pressure and adherence

The results (Table 3.14) show that the mean difference in systolic BP for low and high adherence groups is 7.384 with 95% CI (1.803, 12.966) and p= 0.01. Therefore there is a statistically significant

difference in the mean systolic BP between the two groups. Patients with low adherence had higher systolic BP (mean systolic BP=143.46) than those with high adherence (mean systolic BP=136.08). On the average the systolic BP of patients with high adherence is 7.384mm Hg lower than patients with low adherence and in the population, the difference in systolic BP between the high and low adherence groups is between 1.803 and 12.966mm Hg.

**Table 3.14: Summary description of Cross tabulation between Patients' awareness of systolic blood pressure and Adherence level.**

| Variable | Mean difference | 95% CI of the difference Lower/Upper | Levene's Test (p-value) | p-value |
|---|---|---|---|---|
| Systolic BP (Low and High) | 7.384 | 1.803, 12.966 | 0.820 | 0.010 |

### 3.7.7 Number of years that patients have lived with hypertension

The P-value determined for the number of years that patients have lived with hypertension and the level of adherence was 0.175 (Table 3.15). There is thus no thus no association between the number of years lived with hypertension and adherence among the study population.

**Table 3.15: Summary description of Cross tabulation between the number of years patients have lived with hypertension and adherence**

| | Duration of HPT(years) | Level of Adherence | | | Total |
|---|---|---|---|---|---|
| | | LOW (>2) | MEDIUM (10R 2) | HIGH (0) | |
| | 1-5 | 15 | 37 | 115 | 167 |
| | 6-10 | 18 | 26 | 47 | 91 |
| | 11-15 | 3 | 8 | 19 | 30 |
| | 16-20 | 0 | 6 | 15 | 21 |
| | 21-25 | 1 | 2 | 1 | 4 |
| | 26-30 | 2 | 1 | 4 | 7 |
| | 31-35 | 1 | 1 | 2 | 4 |
| | 36-40 | 0 | 1 | 1 | 2 |
| Total | | 40 | 82 | 204 | 326 |

# CHAPTER FOUR

# DISCUSSION

## 4.1 Evaluation of Level of Adherence

The respondents in this study had a level of adherence of 62.9%. This rate is lower than that reported in studies conducted from hospitals in Egypt (74%), Pakistan (77%) and Scotland (91%)- (Abere et al, 2012 & Hashmi et al, 2007, Sullivan et al, 2006), but higher than studies done at the Ghana Ports and Harbour Authority Hospital Ghana (19.3%), Gambia (27%), Malaysia (44.2%) and Northwest Ethiopia (4.6%), (Jambedu, 2006, & Van de Sande et al, 2000). Hospitals that report high levels of adherence have attributed the high rate possibly to better access and care of patients whereas lower rated values, to cost of medications and relatively inadequate access to resource materials for the management of hypertension. In this study, 100% of the respondents were covered by health insurance and thus did not have to pay for their hypertensive medicines directly. The participants indicated forgetfulness (n=34, 10.4%) as a reason for non-adherence to their medications. This rate is lower than the study conducted at the GPHA hospital in Takoradi, Ghana (n=83, 45.4%). Some patients in the GPHA study claimed that they were employed at companies and were busy at work and mostly missed their doses due to forgetfulness or inability to access their medications if they forgot to take it to work.

Patients in this study were mostly self-employed as compared to the earlier study done and could access their medicines, and this may have accounted for the lower number of patients who actually forgot to take their medicines. Participants also cited a sense of well-being from taking their medications, a feeling of sickness from taking their medications (14, 4.3%), or being busy (3, 0.9%) as other reasons their inability to take their medicines. A large number of participants could not ascertain why they could not adhere to their treatment.

The study found no association between the number of years patients have lived with their condition and their level of adherence (P-value=0.175). However, patients who adhered better were those who had been diagnosed with hypertension within the first five years, supporting documentary evidence of better treatment adherence when duration of therapy is short (Whelton et al, 2002). The number of patients decreased as the duration of illness increased (Table 3.15). Patients who have lived longer with hypertension probably have resorted to other means of treatment (traditional or herbal medications), become complacent with taking their medicines or become over-burdened with the number and complexity of medicines associated with the possible development of co-morbid conditions over time. Patients cited forgetfulness as the reason for not taking their medicines and since cognitive function decreases with age, older patients may adhere less and require the support of family and friends in following their therapy.

## 4.2 Patients' Socio-demographics and Adherence

Numerous studies have investigated the association between hypertensive patients' socio-demographic factors and their adherence to treatment regimens. The study indicates that the females adhered better to their medications compared to their male counterparts but found no statistically significant association between gender and adherence level (P-value=0.714 from Chi-squared test). Some studies have suggested that females are more likely to adhere to their medications than males (Abere et al, 2012) whereas other studies have revealed males to be more adherent than females (Klootwyk & Sanoski, 2011). Hence in the wider population it could be that there are differences in adherence level among male and female hypertensive patients, but the differences are not statistically significant.

This study also revealed that on the average, older respondents were more adherent to their antihypertensive medication than patients with younger age. The results show that the mean age of hypertensive patients among the three groups of high, medium and low adherence levels were 61.66,

59.84 and 56.51years respectively. The mean difference in age between the high and low adherence level is 5.15 years with 95% CI (0.01, 10.28) and p=0.049. This indicates that there is evidence of statistically significant difference in mean age between the high and low adherence groups and that patients with high adherence are on the average 5.15 years older than the low adherence group. This finding may be attributed to the fact that relatively, older patients may be more concerned about development of complications since they may have had the disease for a longer duration than younger ones, hence their high adherence level. This finding could be linked to the fact that most of the elderly patient have a greater number of comorbidities and might perceive themselves as more vulnerable and hence adhere better to antihypertensive prescriptions. This finding is in line with a study conducted among Chinese hypertensive patients by Lee1 et al, 2013 which found that younger age, shorter duration of antihypertensive agents used, job status being employed, and poor or very poor self-perceived health status were negatively associated with drug adherence.

Conversely other studies have reported poor adherence to antihypertensive with increasing age (Yap et al 2015). Individual's cognitive level, physical mobility and self-care abilities are some factors that may affect the relationship between age and adherence level.

### 4.3 Risk factors

Modifiable risk factors identified in the study population were smoking, drinking alcohol, excessive weight (BMI of 29.66) unhealthy diet and lack of exercising. The participants could not clearly define the number of sticks of cigarette smoked or the number of units of alcohol taken in daily.

Most of the participants were found to be above 50 years (212, 65%), with an identified mean age of 61.66. This means that the study population may have or develop systolic hypertension more than diastolic hypertension and necessitates careful monitoring of their blood pressure over time. Some of the participants (n=147, 45.10%) admitted to a family history of hypertension. A family history of

hypertension has been documented as the single most common cause of primary hypertension in individuals (Kennedy, 2012)

### 4.4 Medicines prescribed for the management of hypertension

Most of the participants were placed on two or more medicines; in line with studies that have shown that hypertensive patients cannot be controlled on one drug only (NICE, 2011). Calcium channel blockers and diuretics were the commonest medicines prescribed is also in line with guidelines for managing primary hypertension in individuals aged 50 years and more and in blacks (NICE, 2011, STG, 2010).

### 4.5 Awareness of the administration of anti-hypertensive Medications

Patients' awareness of the names of their medicines vary across researches. Some studies have documented 'name of medicine' recall rates of 92%, 64%, 77% (Marfo et al, 2014). Some respondents (n=208, 63.8%) did not know the name and side effects of the medicines that they were using to control their blood pressure. This may be attributed to the fact that, the respondents may be having difficulties retaining the complex names of their medicines. It could also be inferred that most of the patients were not interested in the name of the drug since they had other means of identifying the drugs such as the size or colour of their pills. It is evident that patients are being educated on the right dose and right time at which the anti-hypertensives are to be taken since most of the respondents had knowledge of the dosing and dosing frequency of their medications. Respondents knew the goal of the therapy of their medicines and this may have accounted for the high level of adherence since adherence to treatment often improves when patients understand the goal of the therapy and also have positive beliefs about the efficacy of the treatment they take and trust that their treatment is working well to control their illness (Klootwyk & Sanoski, 2011).

The study also found that 311 representing 92.60% of the respondents were ignorant about the side effects of the drug. Similar studies have reported lower rates (Jolles et al, 2013). Medication side effects has been reported to be one of the determining factors of medication non-adherence, hence it will be prudent for pharmacists to educate hypertensive patients who visit the health facility on the side effects of drugs to make them aware of expected effects during their treatment.

The knowledge score on medicines was determined to be 'average' thus indicating the need for enhanced patient counselling on their medication for better adherence and improved control of patients' blood pressure (Ramlil et al, 2012).

### 4.6 Knowledge of lifestyle measures

One of the main barriers to good adherence is known to be lack of knowledge of lifestyle measures adjunctive to pharmacologic management for the optimum control of blood pressure. A number of studies that have measured determinants in successful drug therapy support such an association in which a positive relationship has been found between knowledge of such measures and adherence (Cohen, 1978). In contrast, there are also studies that found no association (Haynes et al, 1976). This study found patients to be aware of lifestyle measures for managing hypertension but found no association between patients' awareness of lifestyle measures and their level of adherence. An association was however found between patients' knowledge of dietary modification and controlled blood pressure (p-value=0.05). It is possible that most patients associated their medication-taking with their diet and took in their medicines after meals. Since most Ghanaians have formed habits of not missing their supper diet, indirectly, this could serve as a reminder to take their medicines, leading to improved adherence; however, this study did not seek respondents' reasons for associating their medicines with diet.

Some studies have reported low to average levels of patients' awareness of such measures on adherence (Iyalomhe & Iyalomhe, 2010). The mean knowledge patient score on lifestyle measures

was determined to be good (4.27; Sd: 1.85). Patients who attend the hypertensive clinic are counselled on such measures weekly before clinic commences and this may be the reason that patients are knowledgeable about such measures. However, counselling targeted at these patients excludes all individuals at risk in the wider population and there is therefore the need to increase education on such measures through various media to curtail the emergence of negative practices that places individuals at risk of developing hypertension (Whelton et al, 2002). Counselling before clinic commences also excludes patients who are unable to reach the clinic during counselling sessions; counselling must thus be taken up by pharmacists who are in direct contact with patients and their medicines to improve patient awareness of such measures.

Sometimes, the effect of other factors cannot be discounted too. It is worthy of note that due to the multi-factored nature of variables implicated in adherence, the association of other factors not directly linked to the patient needs to be investigated further.

# CHAPTER FIVE

# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Conclusions

The female participants adhered better than their male counterparts but no association was found between sex and adherence level. An association was also not found between age and participants' adherence level. The number of participants who were aware of their status was 94 (28.8%) but no association was determined. The majority of participants were placed on more than two(2) medicines at a time with calcium channel blockers and diuretics being the major classes from which patients' medicines had been selected.; in line with NICE 2011 and Standard treatment Guidelines.

The study population were knowledgeable about the dose, frequency of their medicines and purpose of their medications but were relatively not knowledgeable about the names and side effects regarding their medicines. No association was determined for patients' knowledge of their medication therapy and adherence. With respect to patients' awareness of lifestyle measures adjunctive to medication therapy, only the diet was found to be associated with adherence among the study population.

No significant association was found between gender, age, awareness of their hypertensive status and adherence. Patients with well controlled blood pressures were noted to have relatively lower systolic blood pressure. No significant association was found between patients' knowledge of their medications nor awareness of lifestyle measures on their level of adherence. The study patients were also found to have poor knowledge score on their medications with regards to the names and side effects of their medications.

## 5.2 Limitations of study

The study was limited to KATH hypertensive clinic. Even though it is a referral facility and receives a wide number of patients across the country, only patients who attend the clinic were assessed and results may not be reflective of patients on admission, patients who failed to attend the clinic during the period of study or attend other facilities for their medicines.

The Morisky medication adherence scale is self-reporting and the possibility of patients overestimating their responses is likely.

## 5.3 Recommendations

Patients found to be adherent to their medication therapy was found to be 62.9% (n=205). There still remain a number of patients with adherence issues which need to be strategically tackled to ensure better control of blood pressure to prevent hypertensive-related complications from developing.

- ✓ There is the need to adequately train pharmacist and/or dispensing technologists who are directly in contact with patients who attend the clinic on the relevance of good adherence to enable them understand the challenges patients go through and be well informed to develop improved interventions. The training can of these personnel in direct contact with hypertensive patients who visit the clinic can be done by pharmacists and any other well-trained health personnel with the requisite knowledge and skills on good adherence.

- ✓ KATH pharmacists must undergo re-orientation to spearhead counselling of all hypertensive patients who attend the clinic and on the wards instead of relegating this primary responsibility to other staff. This re-orientation process can be done through organized in-service training on' adherence counselling' for pharmacists by pharmacists and the public health unit of KATH.

- ✓ In-service training on effective communication and discharge counselling on anti-hypertensive medication must be organized to equip all pharmacists and pharmacy staff.

- ✓ Counselling at the hypertensive clinic and also by dispensing pharmacists during prescription re-fill is verbally done and in haste due to the large patient numbers at the clinic which is organized weekly. The facility can employ more staff adequately trained in the capacity of adherence counselling to offer counselling can on a one-on-one basis to address problems patients' may have regarding their therapy if staffing is an issue at the directorate level. Clear and written instructions on antihypertensive medications can be administered to patients to serve as reminders (Hill et al, 2001). Flyers can also be developed on expected side effects of the various anti-hypertensive medicines and administered to patients to improve adherence.

- ✓ The directorate under which the hypertensive clinic is organized can secure separate rooms for counselling to be done to ensure patient confidentiality instead of the current pin-hole windows in use at the out-patient outlets.

- ✓ Counselling sessions must be geared towards improving education for patients on the names and side effects of their medication to enable patients to be well informed and report relevant information for expert changes to be made on their regimen. Educative flyers on the relevance of lifestyle modification can be developed in animated form; with English and different dialects to inform patients from diverse ethnic groups who attend the clinic.

- ✓ Institutional policies can also be drawn and strengthened on adequate patient follow-up to ensure patients follow the recommended lifestyle measures adjunctive to their medications to control their blood pressures.

- ✓ KATH can collaborate with any of the mobile networks to set up a toll-free line for patients- with trained professionals at the other end of the line- to call in and have their 'out of clinic' concerns to be met since some patients travel long distances to attend the once-weekly clinic.

- ✓ There should be total collaboration between all KATH pharmacists, physicians and nurses to ensure proper patient education and patient counselling.

- ✓ Further studies can be done to evaluate the effect of other variables on patients' adherence to their anti-hypertensive therapy.

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## APPENDIX I

## PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

**PATIENT FACTORS THAT AFFECT ADHERENCE TO ANTI-HYPERTENSIVE MEDICATION THERAPY AT KOMFO ANOKYE TEACHING HOSPITAL**

**Name and affiliation of researcher**

This study is being conducted by (Pharm) Miss Abena Gyamfuaa Atakora of the Komfo Anokye Teaching Hospital, Directorate of Surgery-Department of Pharmacy.

**Background**

You are being invited to partake in this study. It is important for you to understand the reason for the research and what it involves before you decide to take part. Please take some time to read the following information carefully. You may discuss it with relatives and friends if you wish and take your time to decide whether you will participate in the study or not. You are allowed to ask the researcher for clarity concerning the research or for more information.

**Purpose of the research**

The purpose of this research is to find out the extent to which diagnosed hypertensive patients who have been on medication for at least six (6) months and who attend the hypertensive clinic at KATH take their anti-hypertensive medications. The research would also determine some of the reasons why patients are motivated to take their medications as prescribed and why they may sometimes fail to take their medications. Patients would also be interviewed to ascertain their knowledge about their medication regimen. The results of the study would be used to improve on in-use interventions, develop other interventions to further improve on the quality of life of hypertensive patients both at KATH and possibly on a national level.

**Procedure of the research**

You would be given a set of questions to answer. You may answer them verbally and your answers would be filled in your presence by the interviewer or you may fill in the answers yourself. While you are waiting to be reviewed by your physician, your blood pressure, height and weight will be measured by a staff member at the clinic. Your medical records would also be used to collect relevant data pertaining to the study. In totality, 250 participants will be recruited for the study at the hypertensive out-patient clinic.

**Risk(s)**

There will be very minimal risk to you. There will be no taking of blood samples, examination of wounds nor exposure of your body.

**Benefit(s)**

The results of this study will be used to improve upon the treatment regimen and overall quality of life of hypertensive patients in general.

**Confidentiality**

All information collected in this study will be transferred and kept in a password protected file on a computer. The hard-copy will be kept under strict confidentiality for further reference. Data sheets will be coded and your name will not be mentioned in the data analysis. No name or identifier will be used in any publication or reports from this study. However, as part of responsibility to conduct this research properly, physicians, pharmacists may be allowed access to your data to aid in improving the individualised anti-hypertensive medication for you.

**Voluntariness**

Taking part in this study should be out of your own free will. You are not under obligation to participate. If you decide to participate, a consent form would be given to you to sign.

**Alternatives to participation**

If you choose not to participate, this will not affect your treatment in this hospital/institution in any way.

**Withdrawal from the research**

You may choose to withdraw from the research at any time without having to explain yourself. You may also choose not to answer any question you find uncomfortable or private.

**Consequence of Withdrawal**

There will be no consequence, loss of benefit or care to you if you choose to withdraw from the study.

**Costs/Compensation**

There will be no form of compensation for your participation in this study. However, your time spent in filling the questionnaire will be deeply appreciated.

**Contacts**

If you have any question concerning this study, please do not hesitate to contact (Pharm) Miss ABENA GYAMFUAA ATAKORA (Principal researcher/Investigator) on 0262-116-830/0244116830.

Further, if you have any concern about the conduct of this study, your welfare or your rights as a research participant, you may contact:

The Office of the Chairman

Committee on Human Research and Publication Ethics

KNUST, Kumasi

Tel: 03220-63248 / 0205453785

**CONSENT FORM**

**Statement of person obtaining informed consent**

I have fully explained this research to participant_____ and have given sufficient information, including that about risks and benefits, to enable the prospective participant make an informed decision to or not to participate.

DATE: _____ NAME: _____

**Statement of person giving consent:**

I have read the information on this study/research or have had it translated into a language I understand. I have also talked it over with the interviewer to my satisfaction.

I understand that my participation is voluntary (not compulsory).

I know enough about the purpose, methods, risks and benefits of the research study to decide that I want to take part in it.

I understand that I may freely stop being part of this study at any time without having to explain myself.

I have received a copy of this information leaflet and consent form to keep for myself.

Patient's Name_____

DATE: _____ SIGNATURE/THUMB PRINT: _____

WITNESS' SIGNATURE (if participant is non-literate): _____

WITNESS' NAME: _____

**APPENDIX II**

**PATIENT DATA COLLECTION SHEET**

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF CLINICAL AND SOCIAL PHARMACY
FACULTY OF PHARMACY AND PHARMACEUTICAL SCIENCES

**PATIENT DATA COLLECTION SHEET**

**PATIENT FACTORS AFFECTING ADHERENCE TO ANTI-HYPERTENSIVE THERAPY AMONG HYPERTENSIVE PATIENTS AT KATH OUT-PATIENT CLINIC.**

**SECTION A- SOCIO-DEMOGRAPHIC DETAIL**

Patient no: …….….

Folder no: ……....

Telephone number: ……

Height…….

Please tick the appropriate answer or write your response in the space provided.

1. Title: Mr.. / Mrs./ Prof/ Dr. / Pharm / Sir / Madam / Other (please specify)…….
2. Patient's Name …….
3. Sex: Male/ Female 4. Age (yrs)……..
5. Marital Status : Single / Married/ Separated/ Divorced/ Widowed

6. Educational level: Primary / Secondary / Tertiary / Other (please specify) …….

7. Religion: Christian/ Muslim/ Traditionalist / Other (please specify)…….

8. Occupation…… 8b. Number of children (if any)……..

**SECTION B: RISK FACTORS (INITIAL ASSESSMENT)**

9. Weight/ kg …… 10. Smokes Yes/No

11. Diabetes Yes /No/ Don't Know 12. Family History of hypertension Yes/ No/ Don't Know

13.Do you enjoy salty foods Yes/ No

14. Intake of alcohol: yes/ no 14b. If yes: Amount …..... 14c. Frequency…….

15. Intake of fried foods: yes/ no 15b. If yes: Amount……. 15c. Frequency……..

16. Exercise: Yes/No 16b. If yes: Amount…… 16c.Frequency……..

17. Clinic BP/mmHg ……

18. B M I……

19. For how long has patient had hypertension? …….

20. Relevant coexisting conditions Not known / none / other relevant problem…….

**SECTION C- DRUG THERAPY**

**21. CURRENT MEDICINES FOR THE MANAGEMENT OF HYPERTENSION**

| Name of Medicine | Dosage | Did the patient know | | | | |
|---|---|---|---|---|---|---|
| | | Name | Dosage | Duration | Side effects | Purpose |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**SECTION D**

**22. PATIENT'S KNOWLEDGE ON LIFESTYLE MODIFICATION FOR REDUCING BLOOD PRESSURE**

| Did the patients know the following life style modification can help reduce their blood pressure? | YES | NO |
|---|---|---|
| Aerobic exercise at least 30 minutes per day ,four days per week | | |
| Reducing your dietary salt to less than 2.4g per day | | |
| Limiting alcohol intake to less than 21 units per week for men and less than 14 units per week for women | | |
| Avoiding cigarette smoking | | |
| Eating a diet high in fruits ,nuts and vegetable and low in fat | | |
| Losing weight | | |

23**.PATIENT'S KNOWLEDGE ON CAUSES, RISK FACTORS AND COMPLICATIONS OF HYPERTENSION**

23a.Risk factors

Alcohol [ ] Salt intake [ ] Smoking [ ] Overweight/Obesity [ ] Stress [ ] family history [ ]

23b.Hypertension is ?

High blood pressure [ ] Excessive thinking, worries, stress [ ]

Hereditary [ ] Caused by witches and wizards [ ] Caused by food poisoning [ ]

Caused by juju/ remote enemy attacks [ ] has dangerous complications e.g. stroke [ ]

Can affect my lifestyle [ ] Can lead to death [ ]

24.

| **Assessing compliance** | **No=0** | **Yes=1** |
|---|---|---|
| 1. Do you sometimes forget to take your hypertension medication? | | |
| 2. People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past three days, were there any days when you did not take your hypertension medicine? | | |
| 3.Do you ever cut back or stopped taking your hypertension medication without telling your Doctor or healthcare provider, because you felt worse when you took it? | | |
| 4. When you leave home, do you sometimes forget to bring along your hypertension medication? | | |
| 5. Did you take your hypertensive medicine yesterday? | | |
| 6. When you feel like your hypertension symptoms are under control, do you sometimes Stop taking your medicine? | | |
| 7. Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your hypertension treatment plan? | | |

24 Q8. Did you have any difficulty remembering to take all your hypertensive medication? Please circle the correct number

**A.**Never/Rarely **B**. Once in a while **C**. Sometimes **D**. Usually **E.** All the time

KEY:

**Scores:** >2 = low adherence 1 or 2 = medium adherence 0 = high adherence

A = 0 B-E = 1

25. What are your reasons for not being able to take your medications?

a. Forgetfulness b. financial c. feeling sick; side effects d. feeling well e. busy, forgets f. Don't believe in treatment g. other……..