

**ASSESSMENT OF KNOWLEDGE, ATTITUDES AND
BEHAVIOURS OF HYPERTENSION PATIENTS AT ST.
MICHAEL HOSPITAL, PRAMSO.**

By

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DECLARATION

I hereby declare that this submission is my own work towards the Master Degree and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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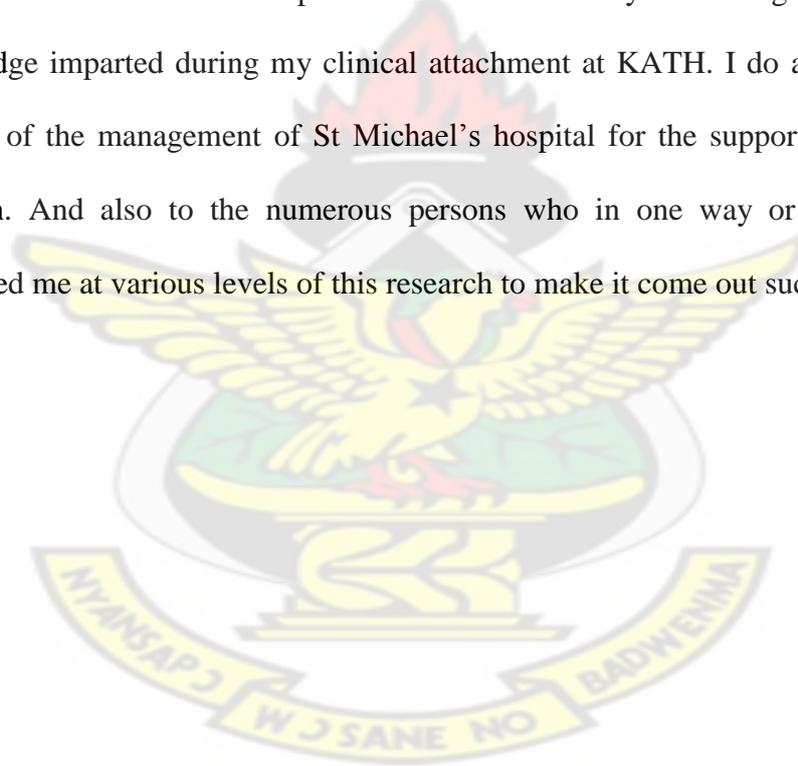
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DEDICATION

This thesis is dedicated to the blessed memory of my late mother Gloria Amma Awuah Okyere.

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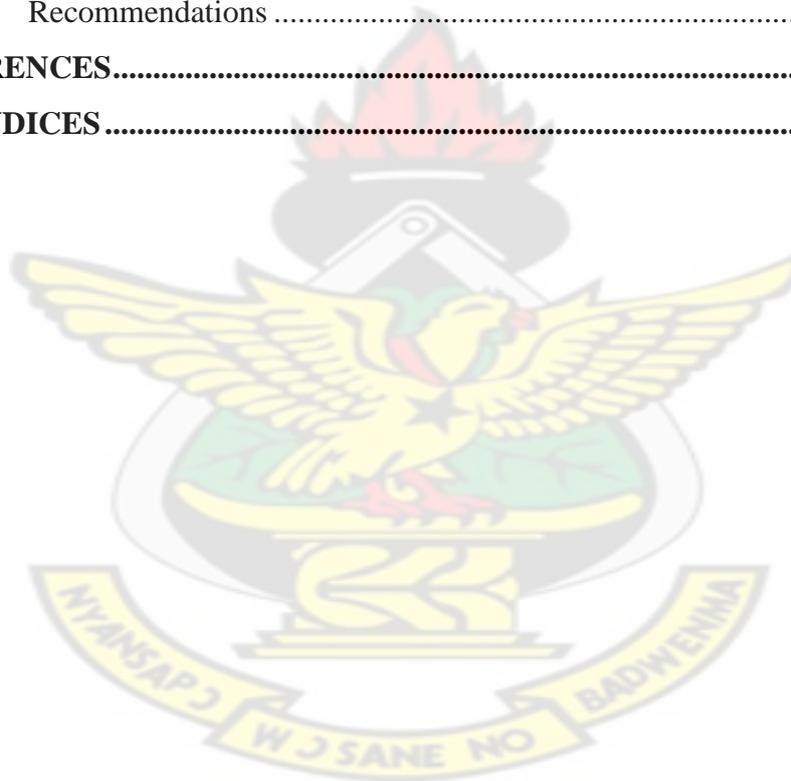


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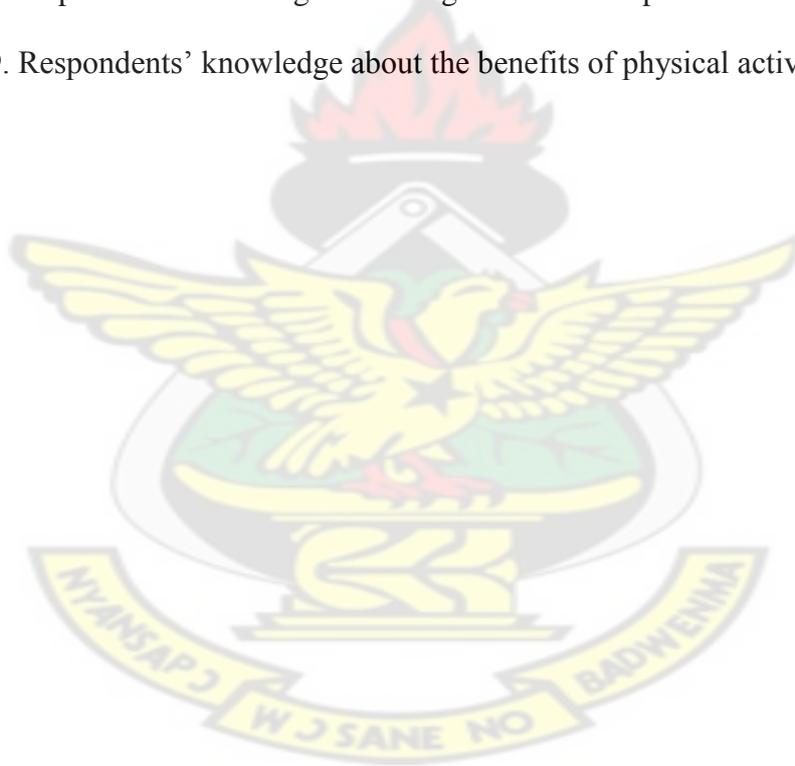
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ABSTRACT

Objectives of study

This research sought to explore the knowledge, attitudes and practices of hypertension patients about their condition, and that of non-pharmacological interventions (life style modifications) in the management of the condition. In addition, the appropriateness of storage conditions of patients' medication at home was also assessed.

Methods

Patients with hypertension who regularly sought for care at St Michael Hospital in Pramso, near Kumasi Ghana, were involved in the study. A total number of 200 patients were involved. This represents about 50% of hypertension patients who are regular attendants to the hospital. Respondents were recruited using a systematic random sampling technique. From these, data were obtained using a structured questionnaire to assess their level of knowledge about hypertension, their attitudes and behaviors regarding non pharmacological interventions to support drug therapy for improved outcomes. Also, assessment was made on the safety of conditions under which patients' medicines were stored at home.

Results

Ninety eight percent (n=196) of the respondents knew they had hypertension. Ninety five percent (n=190) did not know what the complications of hypertension were. Seventy one percent (n=142) had BMI > 25, and half of these had poorly controlled BP (p=0.04). Sixty three percent (n=126) knew about the negative health effects of alcohol in hypertension management and control. Eighty seven percent (n=174) had

adequate knowledge about the benefits of salt restriction, 27% (n=54) indicated that they added salt to already prepared food. 66% (n=35) of those who added salt to already prepared food had uncontrolled blood pressure (p=0.05). Sixty three percent (n=125) did not know about the effect of red meat on hypertension and 47% ate red meat. Seventy two percent (n=144) knew the benefits of physical activity in hypertension control, 35% (n=70) were living a sedentary life style and, 42% (n=84) performed exercises below the recommended regimen. Eighty percent of the patients (n=159) indicated they stored their medicines at cool and dry places, away from light and high temperatures.

Conclusion and Recommendation

Majority of the respondents knew they had hypertension but most did not know about the complications of the condition. Most of the respondents knew about the benefits of alcohol, salt and red meat restriction, as well as the role of physical activity in the management and control of blood pressure. Adoption of the appropriate non-pharmacological interventions to support drug therapy was rather poor. Majority of the respondents kept their medicines appropriately to retain its efficacy. Appropriate life style modification and attitudes should be promoted in patients with hypertension in order to achieve optimal treatment outcomes.

CHAPTER ONE

INTRODUCTION

1.1 Background

Hypertension is an important risk factor for cardiovascular complications accounting for 60% of heart failure deaths, 40% end stage renal, 75% of myocardial infarction deaths (Biritwum *et al*, 2005) and 41% of stroke deaths in an autopsy report. (Anim, 1990). High blood pressure is the blood pressure that is raised to such an extent that clinical benefit is imperative if it is lowered with medication or other therapeutic interventions. Blood pressure measurement consists of diastolic and systolic components which are both important in the determination of one's cardiovascular risk. (Edwards & Walker 2001). Clinically however, hypertension is defined as a systolic blood pressure > 140mmHg and / or a diastolic blood pressure > 90mmHg where drug therapy is associated with therapeutic benefits. (Jawad *et al.*, 2005).

1.2 The prevalence and burden of hypertension in Ghana.

It has been reported that 10% to 25% of the population is expected to benefit from drug treatment of hypertension. (Edwards & Walker 2001). In Ghana, hypertension is one of the leading Non Communicable Diseases. It accounted for 55.3% of Non – Communicable Diseases in 1975 and 63% in 1996. (Biritwum *et al*, 2005). The 2000 Report of the Ministry of Health of Ghana for all its health institutions list hypertension as the leading cause of deaths in over 45 year-olds. (Biritwum, *et. al.*, 2005). It is one of the leading causes of OPD attendance at hospitals and clinics across the country. The crude prevalence rate in The Greater Accra Region of Ghana is 28.3%. (Amoah 2003). Data available at the Bosomtwi health directorate in 2013 indicates that hypertension accounted for about 7% (total OPD attendance = 97155) of

the total OPD. At the St. Michael Hospital with an average monthly OPD attendance of 8000 and being the major health post serving the Bosomtwi District, hypertension accounts for about 12% of total OPD attendance. Community studies have revealed that, with a BP of 160/95mmHg or more, prevalent rates of hypertension are 10-15% in urban areas and 5-12% in rural Ghana in people over 15 years. (Britwum *et al*, 2005).

Before 1930, hypertension was thought to be common in Europe and in North America but rare in Africa. However, towards the end of 1950, post mortem reports suggested high blood pressure was beginning to be a problem in Sub-Saharan Africa and from 1961 hypertension became a public health concern in Sub-Saharan Africa.. (Britwum *et al*, 2005). In 1975, A BP survey carried out at Agona Kwansakrom, in Ghana, cardiovascular disorders were not rare, with estimated prevalence of 62.5 per 1000 using a diastolic BP of 100mmHg as the cut-off point. (Colbourne *et al*, 1950).

By 1970, from clinical and pathological studies, there was evidence of the growing relevance of cardiovascular diseases notably, hypertension. (Pobee, 2006). Hypertensive disease was the commonest cause of spontaneous deaths in adults in the late 1960s and early 1970s. (Laing, 1969).

Hypertension poses a great risk to the population because it is the leading circulatory disorder in people above 15 years, impacting heavily in the middle-aged and elderly. Degenerative cardiovascular disorders heavily impact and affect the economic and productive sections of our population. (Britwum *et al*, 2005). Management of hypertension remains imperative and crucial in reducing the overall cardiovascular risk in subjects. This calls for a comprehensive approach which includes

pharmacological and non - pharmacological interventions (life style modification) in attaining optimal BP control. (Biritwum *et al*, 2005)

In people older than 50, CVD risk doubles for each 20/10mmHg rise in BP. Those at age 55 and normotensive will have a 90% lifetime risk of developing hypertension. Pre-hypertensive individuals (systolic BP 120-139mmHg or diastolic of 80-89mmHg) require health promoting life style modifications to prevent the progressive rise in BP and CVD. (Aram *et al* 2003).

1.3 Management of hypertension

Management of hypertension is basically categorized into pharmacological and non-pharmacological interventions. The non- pharmacological intervention which mainly consists of life style modifications including dietary modification, exercises etc. are usually the first line of managing an otherwise mild hypertension. However in severe hypertension, a combination of non- pharmacological and pharmacological intervention which involves the use of medicines are used to achieve B P control.

1.4 Pharmacological intervention

Pharmacological agents are introduced in the management plan when non pharmacological interventions have failed to produce the needed BP control or when initial measurements of BP are high such as require medication.

There are various classes of drugs used in the management of hypertension. In choosing a drug for a subject, efficacy, safety, cost and convenience to the patient must guide the practitioner. Agents with time tested evidence of safety from large scale clinical trials with long established safety records are preferred. (Edwards & Walker, 2001). The cost implication is as relevant as the efficacy and safety. This is because compliance is directly linked to cost. Subjects who are unable to afford their

BP medicines are unlikely to obtain them hence compliance to management compromised.

1.4.1 Classes of agents.

Classes of agents used for hypertension management and control.

1.4.2 Diuretics

This class of antihypertensive agents includes the thiazide and thiazide like diuretics. Thiazide diuretics inhibit reabsorption of sodium and chloride mostly in the distal tubules. Long-term use of these drugs may result in hyponatremia. (Leung *et al*, 2011). Thiazide diuretics were thought to reduce BP by reducing circulating blood volume and total peripheral resistance via its effect on vascular tone. Aside its low cost, adequate clinical trial evidence exists to suggest the usefulness of thiazide diuretics in hypertension management. Low doses of these agents adequately lower BP and therefore warrant no reason for increasing doses which only increases the risk of metabolic disturbances without any meaningful further blood pressure reduction. (Edwards & Walker, 2001).

1.4.3 B-Adrenoreceptor antagonists

Commonly known as b-blockers, also have copious evidence from clinical trials in the control of BP. Although their mode of action is uncertain, it is known that they reduce renin secretion by antagonism to b-receptors located within the juxtaglomerular apparatus within the kidneys as well as reducing cardiac output in the short term. (Edwards & Walker, 2001). They are generally classified either as water soluble or non- water soluble or as non- selective or cardio selective. Atenolol, example of water soluble b –blocker does not cross the blood brain barrier (BBB) and hence relatively

lower CNS effect. Other agents like sotalol cross the BBB and therefore has a marked CNS adverse reaction manifesting as horrible dreams, nightmare, hallucination etc. Cardio-selective agents relatively bind more to β_1 -receptors on the heart to β -receptors in other organs like the lungs which make them preferable for subjects with asthma. However, this cardio-selectivity is not absolute. Some β -blockers also have partial agonist activity called the intrinsic sympathomimetic activity. Pindolol, an example of agents with ISA is preferred in subjects who develop bradycardia and tiredness to β -blockers. (Edwards & Walker, 2001)

1.4.4 Calcium channel blockers.

With the two main sub groups, the dihydropyridines (Some examples of dihydropyridines include amlodipine, nifedipine, clevidipine, and felodipine) and the non dihydropyridines, (verapamil and diltiazem). (Madhure *et al* 2014). These agents block the slow calcium channels in the peripheral blood vessels reducing blood pressure as a result of reduction in total peripheral resistance or on the heart by reducing heart rate and cardiac output respectively. They are long acting and require once daily dosing. These agents may be more effective in black patients as well as elderly patients. (Cummings *et al*, 1999)

1.4.5 Alpha adrenoreceptor blockers

These agents block alpha adrenoreceptors in the blood vessel wall preventing adrenaline induced vasoconstriction. They produce a reduction in the total peripheral resistance. The disadvantage of being short acting and thus causing first dose hypotension as seen in prazosin earlier is overcome by newer shown in the ALLHAT study with doxazosin being more associated with heart failure and stroke than thiazide diuretics,

its use as add-in therapy for patients with adequately controlled BP is appropriate.(Edwards &Walker, 2001).

1.4.6 Centrally acting agents.

They inhibit the sympathetic outflow from the brain resulting in a reduction in total peripheral resistance. Methyldopa, an agent in this class is not widely used due to its pronounced central adverse effects including tiredness and depression but used safely in pregnancy. It works well in subjects with resistant hypertension. Moxonidine, a newer agent appears to have a fewer central adverse effects than methyldopa.

1.4.7 Angiotensin converting enzyme (ACE) inhibitors

Angiotensin converting enzyme (ACE) inhibitors are the preferred choice of antihypertensives in patients with hypertension, chronic kidney disease, and proteinuria. They reduce morbidity and mortality rates in patients with heart failure, those with recent myocardial infarctions, and patients with proteinuric renal disease. ACE inhibitors are believed to act primarily through suppression of the renin-angiotensin-aldosterone system. They act by preventing the conversion of angiotensin I to angiotensin II and block the major pathway of bradykinin degradation by inhibiting ACE. Accumulation of bradykinin has been proposed as an etiologic mechanism for the side effects of cough and angioedema. ACE inhibitors can cause injury or even death to a developing fetus and therefore not indicated in pregnancy. (Madhur *et al* 2014).

1.5 Non pharmacological Intervention

This approach of managing blood pressure does not require the use of medicines rather a life style modification aimed at controlling blood pressure. It is usually recommended that subjects with suspected BP or borderline readings are encouraged

to adopt such life style practices to prevent the blood pressure from deteriorating as a means of checking further BP rise. It is also recommended for those on pharmacological therapy as an add on therapy. Practices such as exercising, dietary modification including reduction in salt intake, high fruit and vegetable consumption, weight reduction etc consists of the non-pharmacological approach of managing BP.

Regular physical activity accumulating to 30-60minutes of moderate-intensity dynamic exercises, 4-7 days per week, low risk consumption of alcohol (2 standard drinks per day and 14 standard drinks per week for men and less than 9 standard drinks per week for women) are helpful in the management of blood pressure. Attaining and maintaining ideal body weight (BMI 18.5-24.9 kg/m²) and reduction in sodium intake to <100mmol/day all contribute to the effective management of BP. (He *et al* 1999).

1.6 Aims and Objectives of study

1.6.1 Primary Objectives.

This study seeks to describe the knowledge, attitudes and behaviors of hypertensive subjects at St Michaels Hospital, Pramso and to provide a scientific basis for the strengthening of non-pharmacological approaches to the management of hypertension at the hospital.

1.6.2 Research questions

- 1.0 Do hypertensives in the hospital know their condition?
- 2.0 Do hypertensives know the complications of their condition?
- 3.0 Do hypertensives know the role of diet and other non-drug strategies to improve the management and of their BP?

4.0 To what extent do they use these non-pharmacological approaches to support the management of their condition?

1.6.3 Specific Objectives

- i. To assess the level awareness of study subjects about hypertension as a health problem
- ii. To assess the level of knowledge of the subjects on non-pharmacological interventions that help in the management of their conditions
- iii. To assess how well the subjects have adapted the non-pharmacological intervention to support drug therapy for improved health.
- iv. To determine appropriateness of medicine handling and storage by respondents at home



CHAPTER TWO

LITERATURE REVIEW

2.0 Knowledge and Awareness about Hypertension

Knowledge about the complications of hypertension in the hypertensive is crucial in the management of the condition. It is believed that increase in the level of knowledge and awareness of hypertensive patients in changing their attitude and life style contribute to good treatment outcomes. The high illiteracy level in the district may affect the depth of knowledge about hypertension among members of the community. Again, the doctor to patient ratio which is about 1: 2000, which is not significantly different from the ratio of other healthcare professionals to patients may also affect the quality of education given to the patients about their condition. These factors may lead to poor knowledge of the patients about the disease and related complications, resulting in poor behavior and life style practices that affect efficient control of the disease.

This research sought to assess whether patients with hypertension know about their condition and its complications. In addition, whether they are aware of non-pharmacological strategies to control the condition like exercise, controlled diet etc, and how they are adapting to them to improve their condition and general well-being.

A substantial body of evidence supports the idea that multiple dietary factors affect blood pressure (BP). (Appel *et al*, 2006). Reduced salt intake weight loss, moderation of alcohol consumption (among those who drink), increased potassium intake and consumption of dietary patterns based on the DASH diet are critical dietary modifications that lower BP. Findings that blacks are especially sensitive to BP lowering of reduced salt intake, increased potassium intake and the DASH diet have

raised public health interest. (Appel *et al*, 2006). Dietary modification is the initial strategy of management before drug treatment in uncomplicated stage I hypertension. The current challenge to stakeholders (healthcare providers, researchers, government and the general public) is the development and implementation of effective clinical and public health strategies that lead to the sustained dietary changes among individuals. (Appel *et al*, 2006). Studies such as PREMIER have shown that salt restriction (<6g/d), alcohol moderation (<2units/day in men and <1Unit/day in women), weight loss (if BMI >25), exercise and (DASH, Dietary Approaches to Stop Hypertension), diet (supplying 20-30mmol/d of potassium) can achieve decreases in systolic blood pressure of approximately 10 to 15mmHg when applied together. Of the dietary changes, salt intake remains the most amenable to change. The message to patients must be that dietary changes made within a concerted alteration in life style can have a very significant impact on their blood pressure. (O'Shaughnessy, 2006).

A study conducted in a sub urban Nigerian community about hypertension-related knowledge, attitudes and life style practices among hypertensive patients revealed that, 98 (90.7 %) felt that the disease indicates serious morbidity, 36 (33.3 %) were adherent with treatment and fewer practiced life style modification. The study concluded that patients' knowledge of hypertension in the Auchu community is low and their attitudes to treatment negative. (Iyalomhe and Iyalomhe, 2010.) In a descriptive survey to understand the status of hypertension knowledge, awareness and attitudes in a group of hypertension patients in Carletonville, a semi rural town in South Africa, results showed that only 36% of respondents adopted life style modifications. Patients however are knowledgeable about hypertension in general but less knowledgeable about the specific factors relating to their condition. (Oliviera *et al*, 2000).

Results from a study conducted at the Cardiology Clinic of the Federal medical Centre, Ido-Ekiti in Nigeria showed that, out of 240 participants, 114 (47.5 %) were men and 126 (52.5 %) women. 43(17.9 %) had a co existing diabetes mellitus. 47 % had good knowledge of hypertension, 54.6 % and 37.9 % knew that high salt intake and obesity respectively were associated with high BP. (Olusegun *et al* 2010).

Another study conducted at Seychelles Islands (Indian Ocean) involving 1067 people, showed that, more than 96 % knew that salt and obesity were associated with CVD occurrence. 79 % of participants recognize the benefit of physical activity. Most people reported that smoking causes high BP. 50 % knew they had hypertension (Line *et al*, 1999).

A research conducted at the Henry Ford Medical Group which is part of the Henry Ford Health System in Michigan concluded that although general knowledge and awareness of Hypertension is adequate among the research group, a comprehensive understanding was lacking. Patients do not recognize the importance of elevated SBP levels or the current status of their BP control. (Oliviera *et al*, 2004).

In a study conducted in the Republic of Seychelles with 85% of inhabitants predominantly of black African descent or some degree of mixing with this phenotype with the aim of examining the Knowledge, Attitude and Awareness Prevalence (KAP) for hypertension and associated risks factors in adults with known or without hypertension, 50% of people with high BP was aware of their condition with about 10% of hypertensive persons having a controlled BP. (Line *et al*, 1999).

Comparatively, hypertension prevalence and awareness in similar settings were 17.5, 18.3 and 21.5% in Jamaica, St. Lucia and Barbados. (Freeman *et al* 1996.)

In African Americans between 1991 and 1993, 93% of a similar population based sampling and case definition, were aware of their condition, 83% treated and 68% with BP controlled. (Freeman *et al*, 1996). In Barbados in 1994, 82% of sampled hypertensives were aware on their condition, 60% treated and 52% controlled. (Freeman *et al*, 1996). However, in rural Zaire in 1986 and in the Eastern Mediterranean in 1990, rates of hypertension control was poorer with 31% being aware of their condition, 13% treated and 3% controlled in Zaire (Mbuyamba-Kabungu *et al* , 1986) and 30% being aware of their condition in the Eastern Mediterranean (Alwan, 1993).

2.1 Diet

Diet involves a number of approaches in achieving an overall effect which includes salt restriction, and the particular kinds of food that should be eaten or avoided.

2.1.1 Salt

Numerous epidemiological, clinical and experimental have linked dietary sodium intake to blood pressure and a reduction in dietary sodium has been documented to lower BP. (Frisoliet *al*, 2012.) Elderly subjects, African Americans and obese patients are more sensitive to the blood pressure - lowering effect of reduced salt intake. Depending on baseline BP and the degree of salt intake reduction, systolic BP can be lowered by 4 to 8 mmHg. Dietary salt intake reduction can delay or prevent the incidence of antihypertensive therapy and facilitate BP reduction in hypertensive subjects on medication. (Frisoli *et al*, 2012.)

One treatment which is effective in the management of BP in some cases is the restriction of dietary sodium (NaCl) intake notably in "salt sensitive" BP patients. Due to their inability to excrete NaCl as much as in healthy individuals, they turn to retain

sodium which leads to water retention and subsequently the release of digitalis -like substance that increases the contractility of the heart and blood vessels. Sodium itself penetrates the vascular smooth muscle cell causing it to contract. The Elderly and black are the dominant in this group. They benefit greatly from increased calcium and potassium intake. (Haddy and Pamnani, 1995). Dietary Salt restriction is hence beneficial in the control of BP especially in blacks. (Haddy and Pamnani, 1995).

Some dietary sodium is required for nutritional purposes and therefore the attempt is not to prohibit the use of dietary sodium in hypertensive individuals. An Institute of Medicine Committee set the sodium intake at g/d (mmol/d) to ensure nutritional adequacy. (Institute of Medicine, 2004).

2.1.2 High Potassium Intake/ Fruit and Vegetable Consumption.

Epidemiological and clinical trials have suggested that high potassium (K) intake reduces blood pressure. This was validated by their study to evaluate the effect of low - dose potassium supplementation on blood pressure in apparently healthy volunteers. The research concluded that after a 6 week supplementation with 24mmol/day of potassium, the Mean Arterial Pressure (MAP) reduced by 7.01mmHg, Systolic BP was reduced by 7.60mmHg and Diastolic BP reduced by 6.46mmHg. The low daily dietary supplement of K is equivalent to the content of five portions of fresh fruits and vegetables. (Naismith and Braschi, 2003).

Another research conducted on the antihypertensive effect of oral potassium aspartate supplementation in mild to moderate arterial hypertension supported the earlier assertion that potassium supplementation reduces BP. A relatively low supplementation of 30mmol/day of potassium aspartate lowered office and ambulatory BP in subjects with mild to moderate essential hypertension. The results

showed changes in office (systolic BP 154.4 \pm 8.2 vs 142.2 \pm 7.6 mmHg; Diastolic BP 95.0 \pm 5.6 vs 87.2 \pm 4.3 mmHg. (Franzoni *et al.* 2005).

According to the American Heart Association, a diet that includes natural sources of potassium is crucial in controlling BP due to the ability of potassium in lessening the effect of sodium. It however recommends that potassium be considered only as part of the total dietary plan. DASH (Dietary Approaches to Stop Hypertension) found that a diet rich in fruits, vegetables, fat-free or low-fat (1%) milk products, whole grain foods, fish, poultry, beans, seeds and unsalted nuts reduced systolic and diastolic BP by 5.5/3.0 mmHg.

Achieving high potassium intake through diet rather than the pill is recommended due to the other variety of nutrients that accompany dietary sources. Sweet potatoes, potatoes, greens, spinach, mushrooms, lima beans, peas, bananas, tomatoes, oranges, grapefruit, apricot, tuna and molasses are rich sources of potassium that should be heavily patronized for healthy living. American Heart Association: prevention and Treatment, Aug 27, 2012.

In a study to determine the effects of alcohol reduction and caloric restriction on blood pressure and mmHg; serum lipids in overweight men, caloric \pm reduction and alcohol restriction caused weight loss of 7.5 (p < 0.001) and 2.1 (p < 0.01) kg, respectively. Caloric reduction and alcohol restriction were associated with decreases in systolic blood pressure of 5.4 (p < 0.001) and 4.8 (p < 0.01) mmHg respectively and in diastolic blood pressure of 4.2 (p < 0.001) and 3.3 (p < 0.01) mmHg respectively. In the study 86 men with mean age 44.3, a mean regular alcohol intake of 440 ml/week (5 or 6 standard drinks per day), a mean BP of 137.4/84.8 mmHg and a mean body mass of 92.5 kg were used in a controlled two-way factorial study. Subjects were

randomly assigned four groups for a period of 18 weeks during which members of two groups drank only low-alcohol beer, thereby reducing their alcohol intake by 374ml/week, while in the other two groups, normal alcohol intake continued. Within the low and normal intake alcohol groups, subjects either continued their usual diet or reduced their caloric intake by 4200-6300kj/day (1000-1,500kcal/day) (protein, fat and carbohydrate in the ratio 15%, 30% and 55% of total calorie respectively). (Puddey *et al.*, 1992).

2.2 Physical Activity

About 15 studies have been published in the English Literature with results indicating exercise training decreases blood pressure BP in approximately 75% of individuals with hypertension of which systolic reduction is about 11mmHg and diastolic reduction of about 8mmHg. Women may reduce BP more with exercises than men and middle-aged people with high BP may obtain greater benefits than young or older people. It is again noted that low to moderate intensity exercise appears to produce same if not more beneficial BP control as higher intensity training. Minimal data indicate that African American reduce BP with exercise training. Some evidence also points regression of pathological left ventricular hypertrophy with exercise training as well as improvement in plasma lipoprotein-lipid profile. These findings continue to support the recommendation that exercise training plays an important role in the initial or adjunctive step in the treatment of mild to moderate hypertension. (Haqberg *et al* 2000). Regular dynamic exercises, at a level appropriate to the individual subject, performed at least three times weekly reduce blood pressure and increase body fitness. (Edwards & Walker, 2001).

The prevalence of hypertension and its cardiovascular complications is higher in African Americans than in whites. Regular exercise lowers blood pressure in patients

with mild to moderate hypertension but its effect in patients with severe hypertension has not been studied. The study examined the effects of moderately intense exercise on blood pressure and left ventricular hypertrophy in African - American men with severe hypertension.

Randomly assigned 46 men, between 35 to 76 years of age were to exercise plus antihypertensive medication (23 men) or antihypertensive medication alone (23 men). A total of 18 men in the exercise group completed 16 weeks of exercise and 14 completed 32 weeks of exercise which was performed three times per week at 60 to 80 percent of the maximal heart rate. +- to after 16 weeks , mean (+- SD) diastolic pressure had decreased from 88+-7 to 83+-8mmHg in the patients who exercised where as it had increased slightly from 88+-6 to 90+-7 in those who did not exercise. In conclusion, regular exercise reduced blood pressure in African -American men with severe hypertension. (Kokkinos *et al*, 1995)

2.3 Alcohol

Some observational studies and clinical trials have documented a direct, dose-dependent relationship between alcohol intake and BP. Available evidence again supports the moderation of alcohol intake especially among those who drink as an effective independent factor (age, obesity, salt intake) in lowering BP. It concludes that alcohol intake should be limited to less than or equal to two alcoholic drinks per day in most men and less than or equal to one alcoholic drink per day in women. (1 drink =12oz of regular beer, 5oz of wine (12%alcohol) and 1.5oz of 80-proof distilled spirits. (Appel *et al*, 2006). A study, Alcohol consumption and blood pressure Kaiser- Permanente Multiphase Health Examination data concluded that, the associations of blood pressure and drinking were independent of age, sex, race, smoking, coffee use, former "heavy" drinking, educational attainment and adiposity

and further suggested strongly that the regular use of three or more drinks of alcohol per day is a risk factor for hypertension. (Klatsky *et al*, 1997).

The association between alcohol reduction and blood pressure control was again emphasized by XueXin, L *et al*, 2001 in a Meta-Analysis of Randomized Controlled Trials in the Effects of Alcohol Reduction on Blood Pressure. It establishes an association between increased blood pressure in its analysis of 15 randomized control trials published before 1999 in which alcohol reduction was the only intervention difference between active and controlled groups. Overall alcohol reduction was associated with a significant reduction in mean (95% confidence interval) systolic and diastolic blood pressure of -3.31mmHg (-2.52 to -4.10mmHg) and -2.04mmHg (-1.49 to -2.58mmHg), respectively. Their study suggests strongly that alcohol reduction should be recommended as an important component of lifestyle modification for the prevention and treatment of hypertension especially among heavy drinkers.

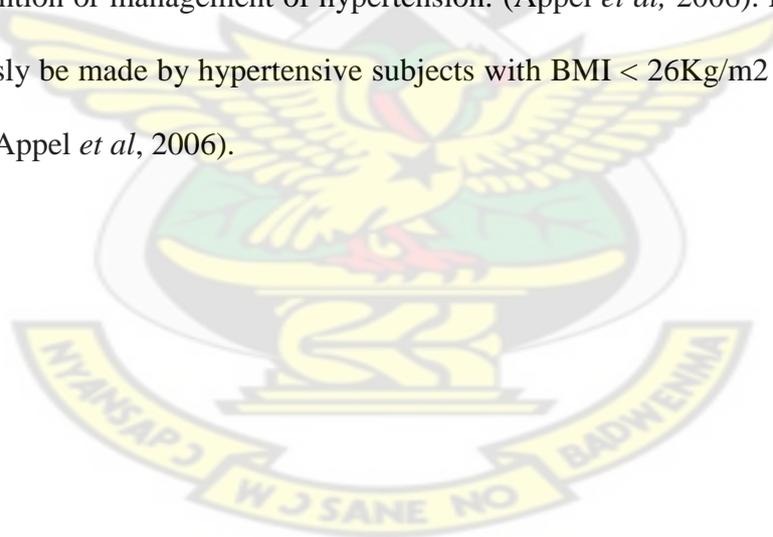
A limit of 2 to 3 unit per day alcohol consumption should not be exceeded. (Edwards & Walker, 2001).

2.4 Weight Reduction/Loss

A vast body of evidence from observational studies and clinical trials document that weight is directly associated with BP and its importance is underscored in the increasing prevalence of obesity throughout the world. Clinical trials have also documented that weight loss lowers BP. (Lawrence *et al*, 2006). Increased body weight is a strong risk factor for hypertension. This was confirmed in A Meta - Analysis of randomized Controlled Trials performed to estimate the effect of weight reduction on blood pressure. A net weight reduction of -5.1kg by means of energy restriction, physical activity, or both reduced systolic BP by -4.44mmHg(95%CI,-5.93

to -2.95) and diastolic BP by -3.57mmHg (95%CI,-4.88 to -2.25). Significantly larger blood pressure reductions were recorded in populations with an average weight loss > 5kg than in populations with less weight loss in both systolic and diastolic recordings. The effect on diastolic BP was significantly larger in populations taking anti - hypertensive than in the untreated populations. (Neter *et al*, 2003). Life style modification including maintenance of a high level of physical activity by way of exercises and reduced caloric intake are means to reduce and sustain body weight loss. Weight loss results in a reduction of BP of about 2.5/1.5mmHg /kg.

With a direct proportional effect between body weight and Body Mass Index (BMI), a healthy weight is critical in maintaining optimal BMI. Available evidence supports weight reduction, ideally attainment of a BMI <25 kg/m² as an effective approach in the prevention or management of hypertension. (Appel *et al*, 2006). Efforts should be consciously be made by hypertensive subjects with BMI < 26Kg/m² to maintain their weight. (Appel *et al*, 2006).



CHAPTER THREE

METHODS

3.1 Study Design

The design of the study was cross sectional, in which hypertensive patients attending the clinic were interviewed using a structured questionnaire to elicit response about their knowledge and attitudes towards non pharmacological approaches in BP management.

3.2 Study site

This study was conducted at St. Michaels Hospital, located within the Bosomtwi district in the Ashanti region of Ghana. St Michael hospital is a ninety nine (99) bed capacity hospital under the auspices of the Christian Health Association of Ghana (CHAG). It is a mission hospital established by the Catholic Church in Ghana, over 60years ago. It serves as a main referral center for other health facilities in the Bosomtwi district including the Bosomtwi District hospital at Kuntense.

The hospital has male and female medical wards, a pediatric ward and a maternity ward. Patrons of the hospital are mainly inhabitants of the Bosomtwi district, which accounts for about 40% of the hospital's clientele. The remaining 60% are often drawn from the peripheral villages around Kumasi Metropolis and the Amansie District, which share borders with the Bosomtwi District. As of June 2014, about 98 % of attendants to the hospital were registered with the National Health Insurance Scheme. By this, medical bills of most patients are paid for by the National Health Insurance Authority.

Average monthly OPD attendance is about 8000, and about 12% of the patrons that use the facility for OPD services are believed to have hypertension. Hypertension patients are required to attend clinic at least once every month for review and for refill of their medications. All hypertensive patients who are regular attendants at the hospital are covered by the National Health Insurance Scheme. All patients are assigned a medical folder in which the attending Physician documents information including relevant histories, laboratory investigations and medication history. A drug analysis book is also kept at the Pharmacy in which all medicines dispensed to the patients are recorded.

3.3 Study population.

Patients with hypertension who visit the facility for care were targeted for inclusion into the study. Hypertension patients with diabetes were also included.

Criteria for inclusion in the study among others were patients who have had the hypertension for more than six months, and are regularly using the facility for care.

Exclusion criteria

Hypertensive patients who are not regular attendants at the hospital and those on admission.

3.4 Sampling

The average monthly OPD attendance at the hospital is 8000, and of these 12% (n=960) had hypertension. 405 of them attend the clinic regularly for care. Half of this number was therefore targeted for inclusion in this survey. Ten patients were selected randomly to be interviewed on each day of the study, using a systematic random sampling technique, where every other hypertensive patient presenting at the

pharmacy was selected for informed consent and for participation in the study. This was to allow every hypertension patient to have a chance of being selected. Data collection spanned over a one month period. Interviews were conducted on week days thus Monday to Friday because most hypertensive patients attend their regular reviews on week days. A total of 200 patients were interviewed in the study.

3.5 Data Collection

A structured questionnaire was designed to solicit information on the level of knowledge of hypertension, as well as attitudes and behaviors of the subjects. Respondents were taken through the questionnaire in turns in a face to face interactive interview at the pharmacy. The needed responses were obtained from answers provided to each question posed. To minimize non responses, falsification of information and ensure confidentiality, respondents were assured that information obtained would be confidential and would be used to improve the management of their condition as well as for academic purposes. Two Pharmacy interns were trained in data collection techniques and skills in administration of questionnaire. Detailed information about the study was explained to respondents. The questionnaire was translated to respondents who could not understand English language. An interview with each respondent was conducted separately and independently so that responses were less likely to be affected or influenced by the presence of others. Questions were asked in simple language and an average of 40 minutes was spent per patient in the interview.

3.6 Data Sources

Blood pressure readings and Fasting Blood Sugar recordings were gathered from the patient medical folder. Responses to the questions were gathered from the patients through a face to face interview.

Determination of Body Mass Index.

The weights of patients were taken using a weighing scale calibrated in kilograms.

Their respective heights were measured using a calibrated wall in meters.

The BMI was calculated as Weight in kg/ square of the height in meters.

3.7 Statistical analysis

The data obtained were coded, stored and analyzed using SPSS version 17. Variables were determined based on the questionnaire and entries of the various individual responses were made into the software application. Analysis were made from the entered responses and presented in various forms such as tables, pie charts and bar charts. Percentages were calculated for the various responses.

3.8 Ethical Considerations.

Institutional Consent.

Upon formal request which detailed the objectives and relevance of the study, institutional consent was granted by the Hospital Management Committee as well as the District Health Directorate.

Patient consent

The consent of participating patients was sought after explanation of the study to respondents. Confidentiality of patient data was ensured throughout the study.

3.9 Limitations to Study

Responses obtained from study subjects were to a large extent subjective. Again, as there was no subsequent follow up on the study subjects, their attitudes and behaviours could not be linked to the long term treatment outcomes.

CHAPTER FOUR

RESULTS

Two hundred patients were involved in the study. Seventy percent were females and 30% percent males.

4.1 Distribution of respondents.

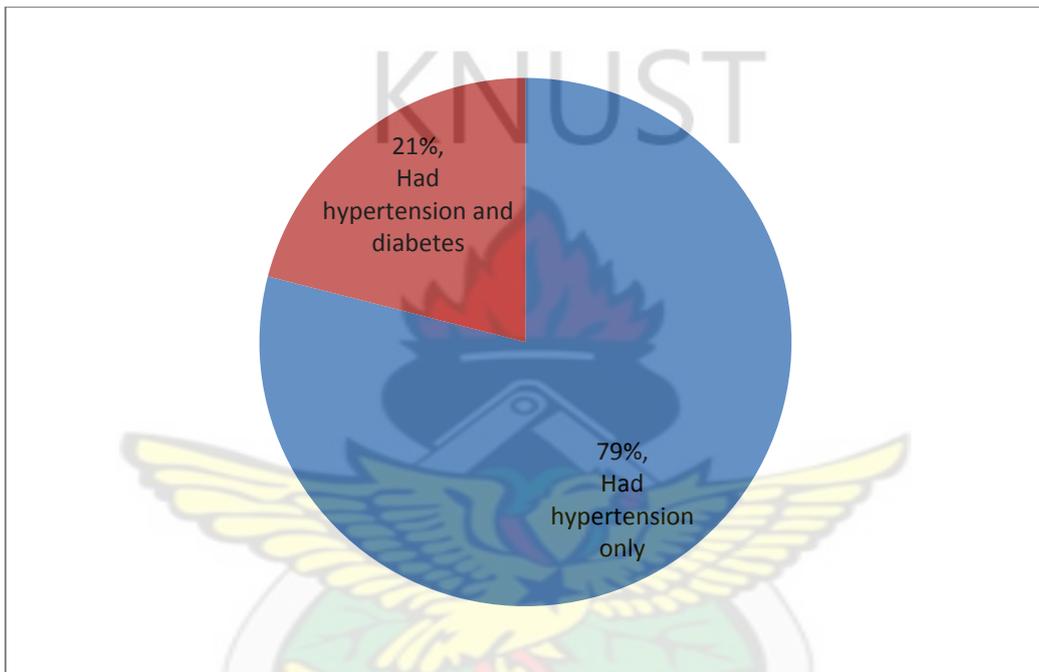


Figure 1 Respondents who had Diabetes

Sixty percent of the study subjects had hypertension only, 40% had both hypertension and diabetes.

4.2 Classification of blood pressure.

Table.1 Blood pressure of study subjects.

Blood pressure (mmHg)	n (%)
120/80-130/90	96 (48)
140/90-160/100	55 (27.5)
161/100 and above	49 (24.5)
Total	200 (100)

Forty eight percent of respondents had their blood pressure between 120/80mmHg and 130/90mmHg and 52% had their blood pressure above the target for control (140/90mmHg).

4.3 Classification of Fasting Blood Sugar

FBS of participants who had hypertension and diabetes (n=79)

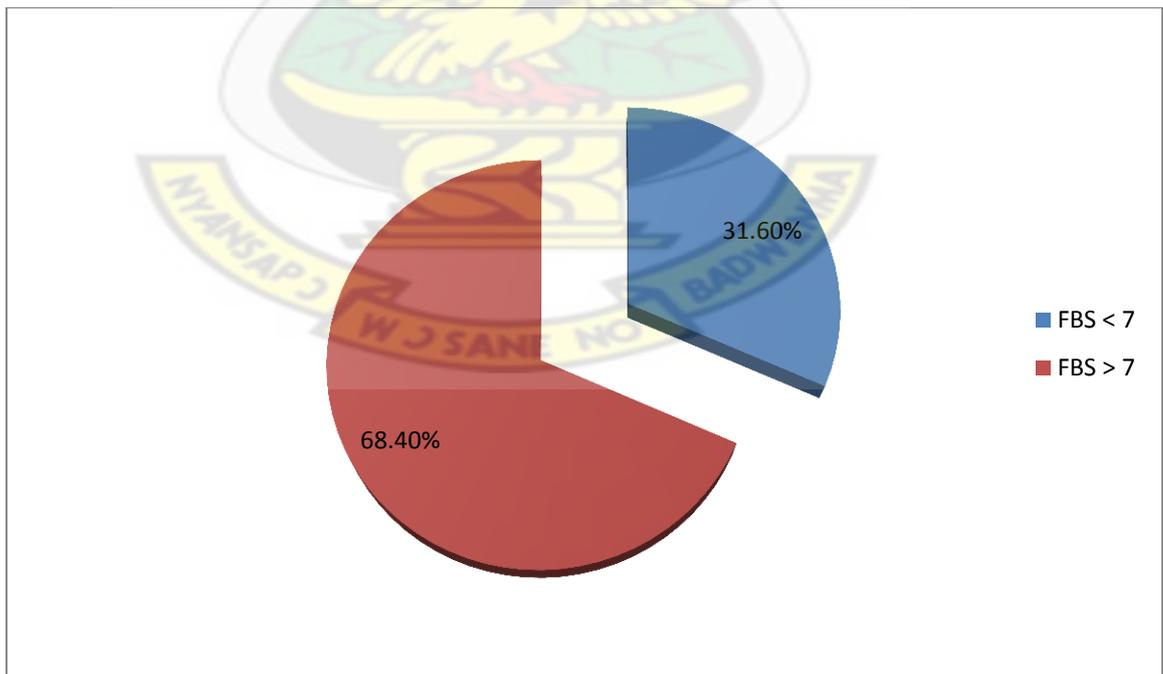


Figure 2 Classification of Fasting Blood Sugar

The FBs of 65% (n=52) of the subjects with Diabetes was > 7mmol/L and 31% werewithin range.

4.4 Weight and Body Mass Index

Table 2 Body Mass Index of respondents

BMI (kg/m ²)	n (%)
LESS THAN 18	8 (4)
18.5 – 24.9	48 (24)
(25-29.9)	122 (61)
(30.0+)	22(11)
TOTAL	200 (100)

Seventy percent of subjects were either overweight or obese.

Respondents' knowledge of their weight or BMI. (n =200)

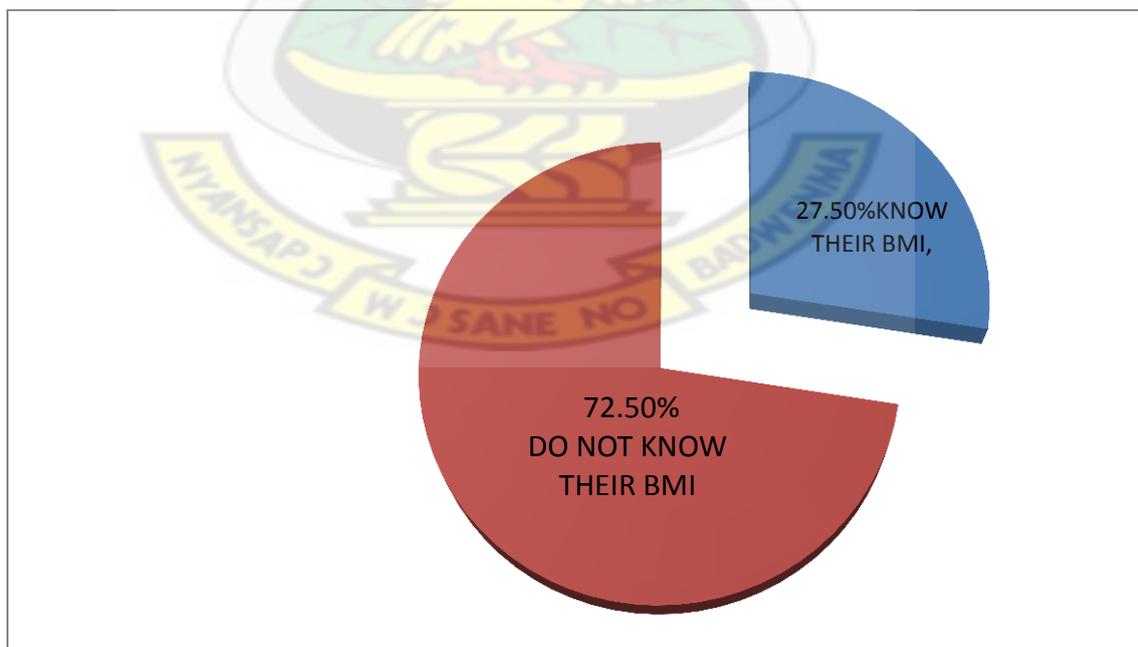


Figure 3 Respondents' knowledge of their weight or BMI. (n =200)

About seventy three percent of subjects did not know their weight or BMI. (fig 3)

Table 3 Body mass index of respondents versus BP

Blood pressure mm/Hg	BMI Kg/m ²			TOTAL
	<25	25-29.9	>30	
120/90-130/90	24	60	10	94
140/90-160/100	19	29	5	53
>160/100	10	29	9	48
TOTAL	53	118	24	195

Of the 142 respondents with a BMI of more than 25 Kg/m², 50% (n=72) had their blood pressure above target. P=0.04

4.5 Subjects Knowledge about their condition.

Ninety eight percent (n=196) of respondents knew they had blood pressure. Only, 2 % (n=4) did not know they have the condition. All respondents were on medication for the management of their conditions.

4.6 Knowledge about complications of hypertension.

Respondents' knowledge about the complications of hypertension.

Ninety five percent (n=190) of subjects did not know what the complications of hypertension were.

4.7 Smoking

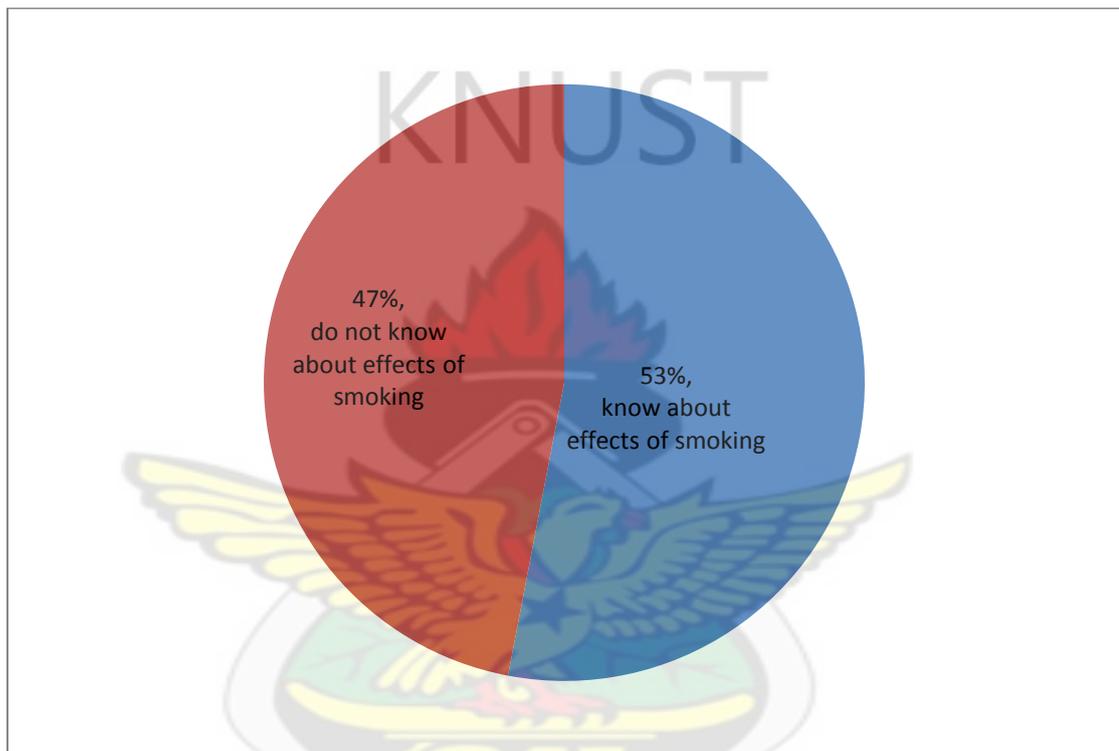


Figure 4 Respondents knowledge about the effects of smoking in hypertension

Fifty three percent of study subjects have not been educated about the effect of smoking on hypertension.

Respondents who Smoke

Three respondents smoke. Two smoked an average of 6 sticks per week whilst one uses 8 sticks per week.

4.7 Respondents knowledge about effects of Alcohol on hypertension.

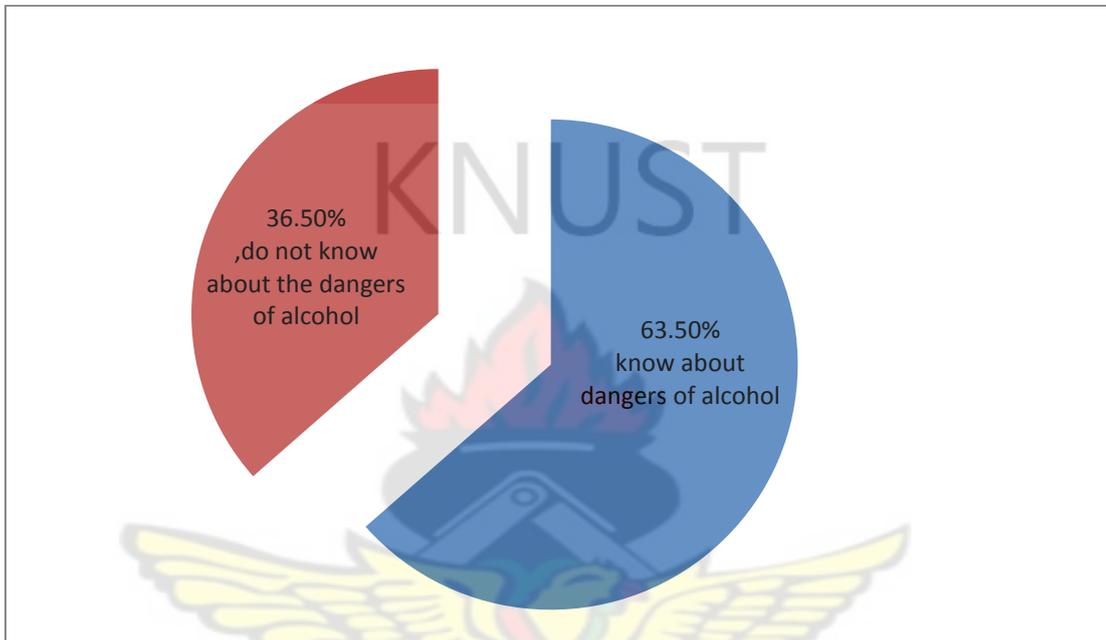


Figure 5. Respondents knowledge about effects of Alcohol on hypertension.

Sixty three percent (n=126) of subjects knew about the dangers of alcohol in hypertension.

4.8 Alcohol consumption among respondents

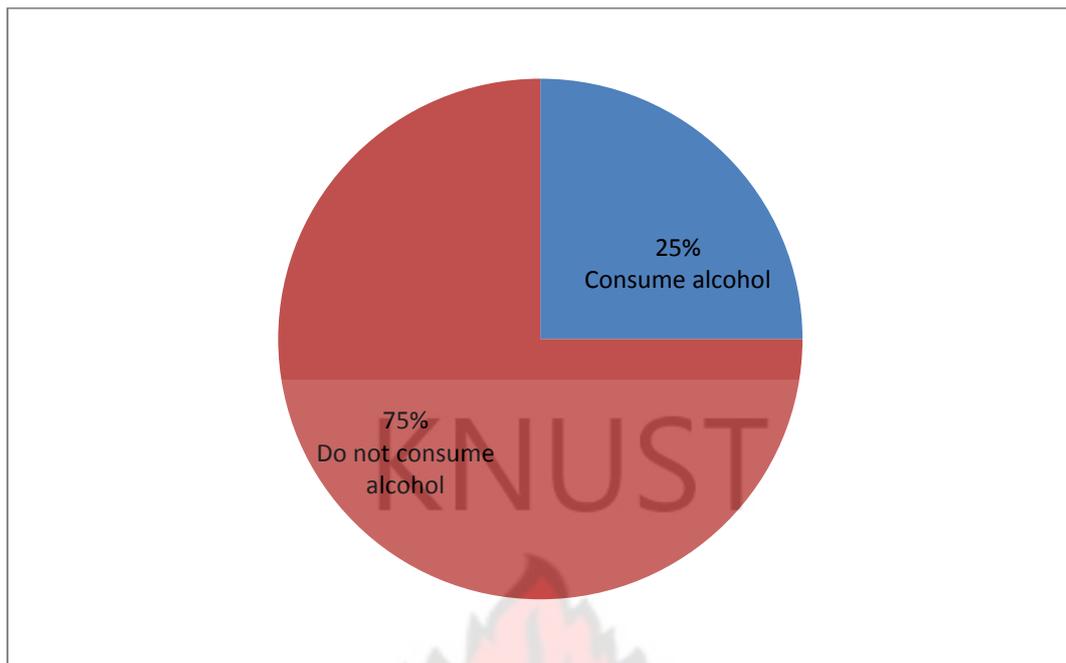


Figure 6. Alcohol consumption among respondents

Twelve percent (n=25) consumed some alcohol.

Table 4 Alcohol consumption

FREQUENCY	n (%)
Daily	5 (20)
5-6 days per week	4 (16)
4 days per week	4 (16)
1 - 3 days per week	8(32)
less than once a month	4 (16)
Total	25(100)

Fifty two percent of subjects, who consume alcohol, drink more than 4 days in a week

Units of alcohol

The respondents who drank alcohol claim they consume an average of 1 bottle of Beer or Guinness per sitting. Others drink the local gin popularly known as local wine or palm wine

Table 5. Alcohol Consumption vs. Blood Pressure of Respondent

Respondents	blood pressure of respondents(mm/Hg)			Total
	120/80 -140/80	141/90 - 160/100	161/100 <	
Consume alcohol	6	9	10	25
Don't consume Alcohol	86	43	35	164
Total	92	52	45	189

Of the 25 who consume alcohol, 76% (n=19) had their blood pressure >140/90mmHg.

P=0.03/95% CI

4.8 Diet

4.8.1 Red Meat

Knowledge of subjects about red meat

Sixty three percent (n= 125) of subjects were not aware of the effect of red meat on hypertension.

Forty seven (n=94) of study subjects eat red meat and 53% (n=106) do not eat red meat.

4.8.2 Fruits

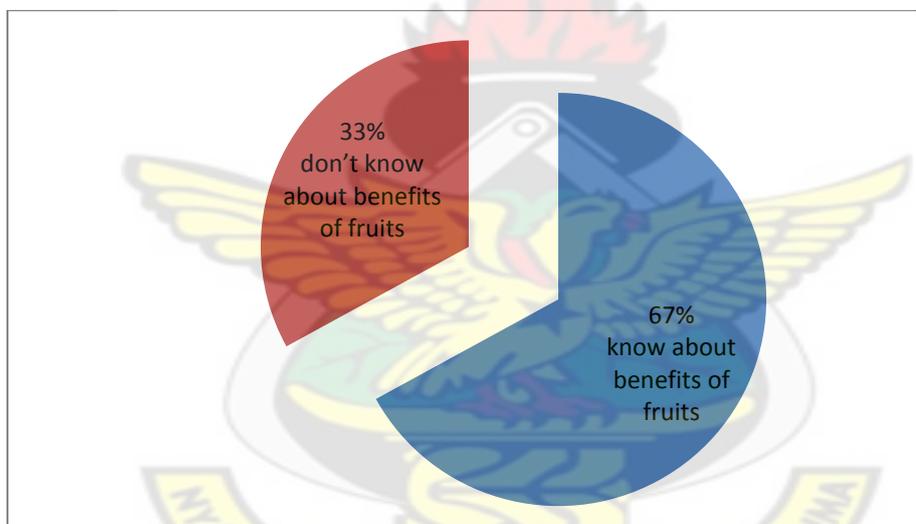


Figure 7. Respondents knowledge about the benefits of fruits in hypertension.

Sixty seven percent of respondents (n= 134) knew about the benefits of fruits for hypertension patients.

Table 6. Frequency of fruit consumption by subjects.

Frequency of consumption(days)	n (%)
0	66 (33)
1	26 (13)
2	26 (13)
3	36 (18)
4	5 (2.5)
5	11 (5.5)
6	4 (2)
7	25 (12.5)
Total	200 (100)

Thirty three percent of subjects (n=66) did not eat fruits at all, 44% eat fruits less than 4 days per week and 23% more than 3 days in a week. (Table 4)

4.8.3 Respondents knowledge about vegetable consumption.

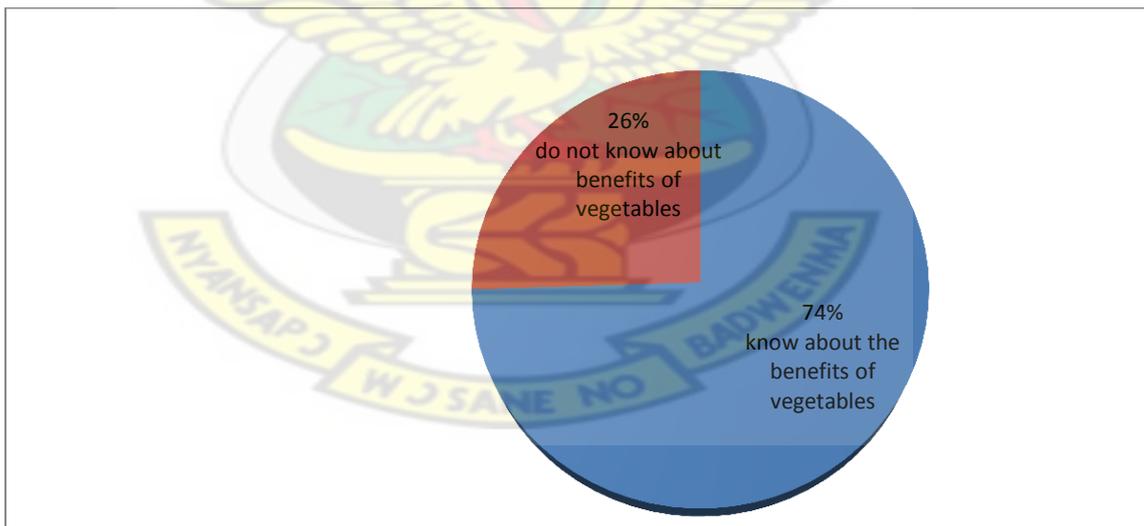


Figure 8 Respondents knowledge about vegetable consumption

Seventy four percent of respondents (n=149) knew about the benefits of vegetable consumption

Table 7 Frequency of vegetable consumption among subjects.

Number of days	n (%)
0	51 (25.5)
1	30 (15)
2	28 (14)
3	27 (13.5)
4	18 (8.3)
5	11 (5.5)
6	5 (2.5)
7	30 (15)
Total	200 (100)

Twenty five percent of respondents did not eat vegetables, 42% ate vegetables less than 4 days in a week, 33% more than 3 days in a week. Table 5

Salt restriction.

Eighty seven percent (n=174) of respondents had adequate knowledge about the effect of salt on hypertension.

Table 8. Frequency of salt addition to already prepared food.

Response	n (%)
NEVER	146 (73)
1 -5 per week	23 (11.5)
1-3 per month	31 (15.5)
Total	200 (100)

Seventy three percent of respondents did not add salt to already prepared food, 11.5% regularly added salt to already prepared food, and 15.5% occasionally added salt to already prepared food.

Table 9 Salt Addition vs. Blood Pressure of Respondent

Respondents	Blood Pressure of Respondent (mm/Hg)			Total
	120/80 -130/80	140/90 - 160/100	161/100 and above	
Never	78	43	25	146
Occasionally	8	10	13	31
Often	10	5	7	22
Total	96	58	45	199

Of the 53 who added salt to already prepared food, 66% (n= 35) have their BP above target. P=0.05

4.9 Physical Activity

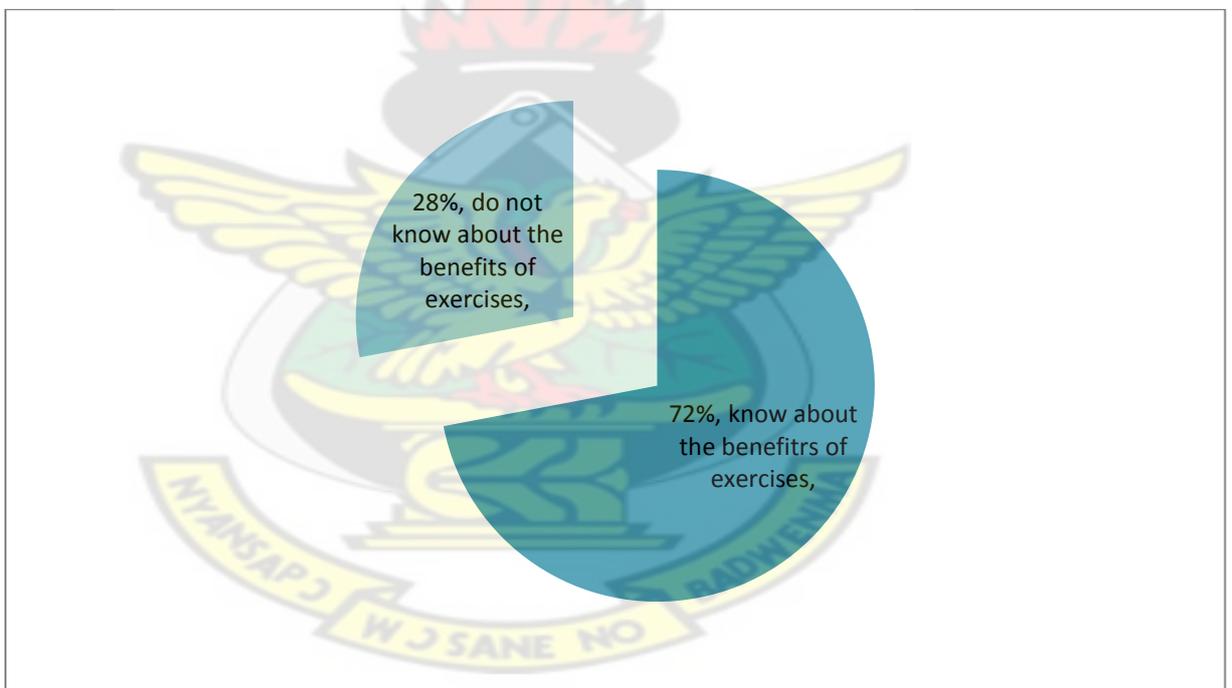


Figure 9. Respondents' knowledge about the benefits of physical activity

Seventy two percent (n= 144) of subjects knew the benefits of physical activity in the management of hypertension.

Table 10. Average time spent in exercising among study subjects

Duration of exercises	n (%)
> 60 minutes	12 (6)
31 - 60 minutes	35 (17.5)
10 -30 minutes	78 (39)
>10 minutes	6(3)
no exercises	69 (34.5)
Total	200 (100)

Thirty five percent of respondents (n=69) did not perform regular exercises, 42% (n=84) spend less than 30 minutes exercising and 23.5% spend more than 30 minutes exercising. .

Frequency of exercises

Sixty percent (n= 42) of respondents exercised less than four days in the week, 40% (n=27) exercise more than 4 days in the week

4.10 Knowledge about Medicines.

Table 11. Knowledge of respondents about their medicines.

Response	n (%)
Know their medicines	159 (79.5)
Do not know their medicines	41 (20.5)
Total	200 (100)

Eighty percent of respondents claimed they know their medicines. However, only 15% know their medicines by name.

Storage of medicines at home

Eighty percent of the respondents (n=160) claimed they keep their medicines at cool and dry places, away from light.

Respondents' knowledge about side effects of medication

Seventy three (n=146) percent of respondents claimed to have not been informed about side effects of their medicines. 20 % (n=40) experienced some side effects of their current medication which deters them from taking their medicines sometimes.

Respondents' knowledge about complications of hypertension.

Ninety five percent did not know about the complications of hypertension.

Table 12 Area OF Residence

Category	n (%)
Urban	95 (47.5)
Rural	105 (52.5)
Total	200 (100)

Fifty three percent of respondents were from urban areas where as 47.5 % are from rural communities.

CHAPTER FOUR

5.0 DISCUSSION

Two hundred patients were involved in this study. Females accounted for 67% compared to results from a study conducted at the Cardiology Clinic of the Federal medical Centre, Ido-Ekiti in Nigeria which showed that, out of 240 participants, 52.5% were women. This trend could be attributed to females having better health seeking habits than men. (Busari *et al.*, 2010). Two thirds of the patients had both hypertension and diabetes. Either of the conditions is a predisposing factor for the development of the other condition thus, hypertension is a risk factor for developing diabetes and vice-versa and therefore ineffective control of any could lead to the development of the other in an individual.

5.1 Target for Blood Pressure Control

Blood pressures of half of the respondents were above the recommended target of effective control. Majority of diabetic patients with hypertension had their FBS > 7mmol/L. The control of both blood pressure and FBS in patients with both conditions is challenging. Management of hypertension in patients with diabetes mellitus should be more vigorous in order to bring both conditions under control.

5.2 Weight and Body Mass Index

Two thirds of respondents did not know their weight or Body Mass Index and the impact it could have on their condition. About 60 percent of respondents were overweight and more than a tenth of the study subjects were obese. Out of the 142 respondents with a BMI above the recommended target, more than 50% had uncontrolled blood pressure. Obesity is regarded as worldwide epidemic as a result of the high caloric intake coupled with less physical activity. High BMI is an indication

of increased weight and possibly sedentary life style which are both risk factors for both diabetes and hypertension. Ignorance about the health implications of high BMI could be a contributory factor for the lack of attention to efforts at weight control revealed in the study. It is known that every kilogram of weight loss results in blood pressure reduction of about 2.5/1.5mmHg and weight gain to any degree even if not defined as overweight is associated with an increased incidence of high blood pressure. (Redon *et al.*, 2008).

5.3 Knowledge of Respondents about Hypertension.

Only three study subjects had not been told that they have hypertension. The remainder which knew were all on treatment. This is relevant because it begins the entire process of education to empower the patient with adequate knowledge about his /her condition. Further education about the complication of hypertension instills in the patient some urgency, personal interest and involvement in the management of the condition. Patients who do not have adequate knowledge about their condition especially the complications are unlikely to take their management seriously and may end up being noncompliant. This study reveals that the majority of respondents (95%) did not know the complications of hypertension as also indicated in the Busari *et al.*, 2010 findings where knowledge about the complications of hypertension among the subjects were poor. Development of complications further increases the overall cardiovascular risk of hypertensive patients.

5.4 Smoking

More than half of respondents had not received any education about the dangers of smoking tobacco products on hypertension. Only 3 percent of the respondents admitted to smoking some kind of tobacco. Even though the impact of smoke

cessation does not reduce blood pressure drastically, smoke cessation helps in the management of blood pressure. (Mellen *et al.*, 2004).

5.5 Alcohol

Close to two thirds of the respondents had received education about the negative impact of alcohol consumption on the management of their blood pressure. Fifty two percent of subjects who consume alcohol drank an average of two bottles four days in a week. Even though the volumes of alcohol consumed by the respondents do not exceed the recommended daily intake, over three quarters of those who consume alcohol had their blood pressure poorly controlled. Frequent alcohol consumption even in small volumes could make blood pressure control difficult. The usual amount of alcohol in 12 oz of beer, 4 oz of wine or 1.5 oz of whiskey contains between 10 to 12 mls of alcohol. Consuming more than three of these proportions per day raises BP. Drinking one or two portions a day is however not associated with a rise in BP. (He J, O *et al.*, 1999).

Women who drink more than two portions a day (Thadhani *et al.*, 2002) and men drinking more than three portions a day (Fuchs *et al.*, 2001) have high incidence of hypertension.

5.6 Diet

5.6.1 Proteins (Red Meat)

Over a tenth of the respondents took red meat and about 78% of those taking red meat took it three days in a week and the rest eat red meat more than three days in a week. The high protein content in the red meat may be detrimental with an additional load on the kidney (Friedman, 2004) and association with higher SBP with red meat intake is been established. (Tzoulaki *et al.*, 2008)

However, diet rich in high vegetable protein lowers BP (Stamler *et al.*, 1996) and intermap. (Elliot *et al.*, 2006).

5.6.2 Fruits and Vegetables.

More than two thirds and also 75% knew about the importance of fruits and vegetable consumption respectively. In addition, over two thirds of the participants claim they eat fruits and vegetables regularly. This lifestyle and must be encouraged because a diet rich in fruits and vegetables, legumes improve cardiovascular risks and again serve as antioxidants and have been (John *et al.*, 2002). Increasing dietary magnesium intake in the form of fresh fruits and vegetables other than using magnesium supplements is a better way of improving BP. Respondents however complained about the high cost of fruits and vegetables which they said sometimes deters them from eating it.

Majority of respondents eat the vegetables cooked and thus the exposure to heat might have cause useful nutrients to be lost. The education on vegetables therefore should be concerned more with vegetable consumption in their natural or raw state.

5.6.3 Salt (Sodium)

Majority of respondents (87%) have been educated about dangers of high consumption of salts in the blood pressure patient. This was better than the 54.6% who knew that high salt intake is associated with high BP in the study by Busari1 *et al* (2010) but similar to the study by Aurbert Line *et al* (1999) where 96% knew that salt is associated with increased CVD occurrence. Further interaction with respondents revealed their fear for salt consumption. Seventy three percent of the study subjects never add salt to already prepared food. However, more than a quarter still added salt to an already prepared food. Out of the 53 who add salt to already prepared food, 66%

(n=35) had uncontrolled BP. Salt increases the sodium in the body leading to an increased in Total Peripheral Resistance as well as retention of water which lead to increases in the blood volume and subsequently increase in blood pressure. Reduction in sodium intake again increases the efficacy of all classes of antihypertensive agents excluding calcium channel blockers (Chrysant *et al.*, 2000; Morgan et al 1986). Analysis show that, the fall in BP is significant in hypertensive than in normotensive with the degree of sodium reduction. (He & Macgregor, 2003). Additionally, patients are more vulnerable to major side effects of diuretic therapy when on high levels of dietary sodium. (He *et al*, 1999).

5.7 Physical Activity

About three quarters of the respondents claim they were involved in some form of physical activity ranging from jogging, skipping to brisk walking and others. This is similar to the study by Aubert Line *et al* (1999) in which 79% of the respondents knew about the benefits of exercises. However, only 23.5% of the respondents indulge in the required duration and frequency of exercises which should be accumulating to 30-60minutes of moderate-intensity dynamic exercises, 4-7 days per week. This improves physical fitness and reduces blood pressure. Endurance training reduces blood pressure through a reduction in systemic vascular resistance with the likely involvement of the rennin angiotensin system and the sympathetic nervous system. The meta analysis of nine randomized controlled trials on the Effect of exercise on blood pressure control in hypertensive patients, (12 study groups), showed that physical activity reduces blood pressure and therefore plays an important role in the prevention, treatment and control of hypertension. Exercise helps in the control of blood lipid abnormalities, diabetes, and obesity. Aerobic exercise adds

An independent, modest blood pressure-lowering effect occurs in certain hypertensive groups who engage in physical activity. However, it takes a regularity to maintain these positive effects. (Fletcher *et al*, 1992). Increased physical activity and higher levels of exercise capacity reduces the risk of coronary disease (Weinstein *et al*. 2008). Increased levels of physical activity with structured exercises may lower BP (HU *et al.*, 2003). 30 minutes of walking or its equivalent per day provides improved cardiovascular fitness. (LaMonte & Blair, 2005). However, just few physicians counsel patients about the benefits of physical activity in BP management although the benefits are obvious. Exercise helps in the control of blood lipid abnormalities, diabetes, and obesity. (Blair *et al*, 1992).

5.8 Knowledge about Medicines

Majority of respondents can identify their medicines but only 15% know their medicines by names. Those who could identify their medicines could only do so by the packaging (brand) and not by their names. Knowing the names of the medicines is an indication of the extent of knowledge of the patient about his/her condition. Efforts should be made to get patients to know their medicines by name as much as possible. This helps in continuity of the management upon relocation or for refill when the need arises.

5.9 Storage of medicines at home

Majority of the respondents' claimed they kept their medicines at places that can be described as cool and dry away from light and excessive temperatures. Most of the patients kept medicines on their tables in their bedrooms or sitting rooms. However, about two-fourth of the respondents kept their medicines at other places likely to be

exposed to high temperatures. For example, some kept them at their kitchens and others on their verandas and others in their wardrobes.

Education about the right place to keep their medicines at home should be elaborate to make patients appreciate the essence and to encourage compliance as such. This is to ensure the medicines are kept wholesome throughout the period of stay with the patient.

KNUST



CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Majority of the respondents knew they had hypertension but most did not know about the complications of the disease. Most of the respondents also knew about the benefits of alcohol, salt and red meat restriction and the role of physical activity as non-pharmacological measures in the management of hypertension. The attitudes and behaviors of respondents towards the adoption of these non-pharmacological interventions were rather poor. However majority of the respondents indicated that they kept their medicines appropriately, (i.e. in cool, dry place) to retain its efficacy.

5.2 Recommendations

Further research should be carried out to determine the impact of non-pharmacological interventions on long term treatment outcomes of hypertensive patients in Ghana.

Insufficient attention to health education by health care practitioners and lack of motivation for health education services should be addressed. Places to engage in physical activity should be made readily available. Education on healthy diet should be efficiently promoted.

Efforts should be made to help patients to know their medicines by name as much as possible.

Focused group discussions and practices of these interventions must also be encouraged.

REFERENCES

- Amoah AG .Hypertension in Ghana: a cross-sectional community prevalence study in greater Accra, 2003, *Ethn Dis. Summer*; 13(3):310-5
- Biritwum RB, Amoah AGB, Pobee JOM, Cardiovascular Diseases in Sub-Saharan Africa., *The Ghana Paradigm*; 2005, Ascom publishers, Kotobabi, Accra, Ghana, 1: 1-120
- BlessC, Higson-Smith C *Fundamentals of social research methods: An African perspective* 2000Juta education, (pty) Ltd. 66
- Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, Jones DW, Materson BJ, Oparil S, Wright JT Jr, Roccella EJ, for the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, National Heart, Lung, and Blood Institute, National High Blood Pressure Education Program Coordinating Committee. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003; 42: 1206–1252.
- Colbourne MJ, EdingtonGM and Hughes MH.A medical survey in a Gold Coast village. *Trans Roy Soc Trop Med. Hyg* 1950. 44:221-227.
- Cummings DM, Amadio P Jr, Nelson L, Fitzgerald JM. The role of calcium channel blockers in the treatment of essential hypertension. *Arch Intern Med*. Feb 1991;151(2):250-9
- Elliott P1, Stamler J, Dyer AR, Appel L, Dennis B, Kesteloot H, Ueshima H, Okayama A, Chan Q, Garside DB, Zhou B. Association between protein intake and blood pressure: the INTERMAP Study. *Arch Intern Med*. 2006 (1):79-87. *European Journal of Preventive Cardiology* April 1, 2012 19: 151-

160. **Aerobic** interval training reduces blood pressure and improves myocardial function in hypertensive patients

Fletcher G. F, Blair, S. N, Blumenthal, J Caspersen, C,Chaitman B, Epstein S, Piña, I. L. (1992). Statement on exercise: Benefits and recommendations for physical activity programs for all Americans - A statement for health professionals by the Committee on Exercise and Cardiac Rehabilitation of the Council on Clinical Cardiology, American Heart Association. *Circulation*, 86(1), 340-344.

Franzoni F, Santoro G, Carpi A, Da Prato F, Bartolomucci F, Femia FR, Prattichizzo F, Galetta F. Antihypertensive effect of oral potassium supplementation in mild to moderate arterial hypertension. *Biomed Pharmacother*. 2005 jan-Feb;59(1-2): 25-9. Epub 2005 Jan 2.

Freeman V, Fraser H, Forrester T, Wilks R, Cruickshank J, Rotimi C, Cooper R. A comparative study of hypertension prevalence, awareness, treatment and control rates in St Lucia, Jamaica and Barbados. *J Hypertens*. 1996;14:495–501

Frisoli TM, Schiemedder RE, Grodzicki T, Messerli FH. Salt and hypertension: is salt dietary reduction worth the effort? *Am J Med*. 2012 Oct;125 (5): 433-9

Haddy FJ, Pamnani MB.Role of dietary salt in hypertension. *J Am CollNutr*. 1995 Oct;14(5):428-38

Hajjar I, Kotchen TA. Trends in prevalence, awareness, treatment, and control of hypertensionin the United States, 1988-2000. *JAMA* 2003;290:199-206

Haqberg JM, Parrk JJ, Brown MD, The role of exercise training in the treatment of hypertension: an update. *Sports Med*. 2000 Sep;30(3): 193-206.

- He J, Ogden LG, Vupputuri S, et al. Dietary sodium intake and subsequent risk of cardiovascular disease in overweight adults. *JAMA* 1999;282:2027-34
- I B Puddey, M parker, L J Beilin, R Vandongen and J R Masarei, Effects of alcohol and caloric restrictions on blood pressure and serum lipids in overweight men. *Hypertension*. 1992;20:533-541.
- Godfrey B.S. Iyalomhe and Sarah I. Iyalomhe. Hypertension-related knowledge, attitudes and life-style practices among hypertensive patients in a sub-urban Nigerian community. *Journal of Public Health and Epidemiology* Vol. 2(4), pp. 71-77, July 2010.
- Institute of Medicine. *Dietary Reference Intakes: Water, Potassium, Sodium Chloride, and Sulfate*. 1st ed. Washington, DC: National Academy Press; 2004
- Jawad M. Khan, D Gareth Beevers (2005). University Department of Medicine, City Hospital, Birmingham B18 7QH, UK. jawad.khan@swbh.nhs.uk *Journal Article Heart (British Cardiac Society)* 91(8) 1105-9(2005)
- Joseph OM Pobe, the heart of the matter. Community profile of cardiovascular diseases of a Sub- Saharan African Country, The Ghanaian paradigm: The Mamprobi cardiovascular health project, 1975-1983.
- Judith E. Neter, Bianca E. Stam, Frans J. Kok, Dierderick E. Grobbee, Johanna M. Geleijnse. Influence of Weight Reduction on Blood Pressure, A Meta - Analysis of randomized Controlled Trials. 2003;42:878-884
- Klatsky AL, Friedman GD, Siegelau AB, Gerard MJ. Alcohol consumption and blood pressure Kaiser-Permanente Multiphasic Health Examination data. *N Engl J Med*. 1977; 296: 1194–1200
- Laing WN. The patterns of cardiovascular disease and renal causes of obscure deaths in Accra. *Ghana Med. J* 1969;8:254-258

- LaMonteMJ¹, BlairSN, ChurchTS. Physical activity and diabetes prevention .J Appel
Physiol (1985). 2005 Sep;99(3):1205-13.
- Lawrence J Appel, MD, MPH, Michael W . Brands, PhD, Stephen R . Daniels, MD,
PhD, NjeryKaranja, PhD, Patricia J . Elmer, PhD, Frank M . Sacks, MD
.Dietary Approaches to Prevent and Treat Hypertension, A Scientific
Statement from the American Heart Association. *Hypertension* 2006; 47 : 296-
308
- Leung AA, Wright A, Pazo V, Karson A, Bates DW. Risk of thiazide-induced
hyponatremia in patients with hypertension.*Am J Med*. Nov
2011;124(11):1064-72.
- Lin Aubert, pascal Bovet, Jean-Pierre Gervasconi, anneRwebogora, BenardWaeber,
Fred Paccaud, Knowledge, Attitudes, and practices on Hypertension in a
country in Epidemiological Transition. 1998;31:1136-1145
- Mellen PB, Palla SL, Goff DC, et al. prevalence of nutrition and exercise counselling
for patients with hypertension:UniteStaes 1999 to 2000. *J Gen Intern Med*
2004; 19:917-924
- Mbuyamba-Kabangu JR, Fagard R, Lijnen P, Staessen J, Ditu MS, Tshiani KA,
Amery A. Epidemiological study of blood pressure and hypertension in a
sample of urban Bantu of Zaire. *J Hypertens*. 1986;4:485–491
- Naismith DJ, Braschi A. The effect of low-dose potassium supplementation on blood
pressure in apparaently healthy volunteers.*Br J Nutr*. 2001 Ju;90(1):53-60.
- OlusegunAdesola Busari¹, Timothy Olusegun, Olanrewaju², OlufemiOlumuyiwa et
al. Impact of Patients' Knowledge, Attitude and Practices on
Hypertension on Compliance with Antihypertensive Drugs in a Resource-poor
Setting. *TAF Preventive Medicine Bulletin*, 2010: 9(2)

O'Shaughnessy KM, 2006 August, Role of Diet in Hypertension). *Curr Hypertens Rep*:2006 Aug;8(4) 292-7

Peter F. Kokkinos, Ph.D., Puneet Narayan, M.D., John A. Collieran, D.O., Andreas Pittaras, M.D., Aldo Notargiacomo, B.S., Domenic Reda, M.S., and Vasilios Papademetriou, M.D. Effects of Regular Exercise on Blood Pressure and Left Ventricular Hypertrophy in African-American Men with Severe Hypertension *N Engl J Med* 1995; 333:1462-1467 November 30, 1995 DOI: 10.1056/NEJM199511303332204

Roger Walker BP harm PhD FR Pharm SHonFFPH, Clive Edwards BPharm PhD MRPharmSHonsFICR. *Clinical Pharmacy and Therapeutics*. Third Edition. Churchill Livingstone, Toronto 2003. 265 -278.

Steven N. Blair and Jon C. Connelly. How Much Physical Activity Should we Do? The Case for Moderate Amounts and Intensities of Physical Activity. 1996. American alliance for Health, physical Education, Recreation and Dance Vol 67, No 2, pp 183-205

Susan A Oliviera ScD, Roland S Chen, MD, Bruce D McCarthy, MD, Catherine C Davis, PharmD and Martha N Hill, PhD, Hypertension Knowledge, Awareness, and Attitudes in a Hypertensive Population. *J Gen Intern Med*. 2005 March; 20(3): 219-225

Véronique A. Cornelissen, Robert H. Fagard, Ellen Coeckelberghs, Luc Vanhees. Impact of Resistance Training on Blood Pressure and Other Cardiovascular Risk Factors A Meta-Analysis of Randomized, Controlled Trials

Whelton PK, Appel LJ, Espeland MA, et al. Efficacy of sodium reduction and weight loss in the treatment of hypertension in older persons: Main results of the

randomised, controlled trial of non pharmacologic interventions in the elderly. (TONE). JAMA 1998;279:839-46

Whelton PK, Appel LJ, Sacco RL, Anderson CA, Antman EM, Campbell N, et al. Sodium, Blood Pressure, and Cardiovascular Disease: Further Evidence Supporting the American Heart Association Sodium Reduction Recommendations. Circulation. 2012;

XueXin, Jiang He, Maria G. Frontini, Lorraine G. Ogden, Oaitse I. Motsamai, Paul K. Whelton, Effects of Alcohol Reduction on Blood Pressure, a Meta-Analysis of Randomized Controlled Trials. 2001;38:1112-1117.



APPENDICES

ASSESSMENT OF KNOWLEDGE, ATTITUDES AND BEHAVIOURS OF HYPERTENSIVE SUBJECTS AT ST. MICHAEL HOSPITAL, PRAMSO.

A. ENROLLMENT QUESTIONNAIRE

This survey seeks to assess the knowledge, attitudes and behaviours of persons living with hypertension and diabetes. This will help inform authorities about other ways of helping manage your condition and on your ability to pay for certain medications for your disease and influences treatment.

All information gathered for this questionnaire will be kept CONFIDENTIAL.

Thank you for your participation.

Consent, Interview Language and Name	Response	Code
Consent has been read and obtained	Yes 1 No 2 If NO, END	A1
Interview Language [<i>Insert Language</i>]	English 1 [<i>Add others</i>] 2 [<i>Add others</i>] 3 [<i>Add others</i>] 4	A2
Interview start time: Interview End time: Time of interview (24 hour clock)	Hrs. minutes	A3

CATEGORY		
	Response	Code
Hypertension only	1	B 0
Diabetes only	2	
Hypertension and diabetes	3	

1. History of Raised Blood Pressure			
Question	Response		Code
Have you ever been told that you have raised blood pressure or hypertension or diabetes?	Yes	1	B1
	No	2	
Who told you about it?	Doctor	1	B2
	Pharmacist	2	
	Nurse	3	
	other	4	
If so, how many months/ years ago?	Less than 1 year	1	B3
	1 to 2 years	2	
	2 to 5 years	3	
	5 to 10 years	4	
	More than 10 years	5	
Are you currently taking any medication for your raised blood pressure?	Yes	1	B4
	No	2	
Do you know hypertension can cause some complications such as kidney, heart etc diseases?	Yes	1	
	No	2	

2. History of Diabetes			
Question	Response		Code
Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?	Yes	1	C1
	No	2 <i>If No, go to H12</i>	
If so, how many months/years ago?			C2
Are you currently taking medication for diabetes prescribed by a doctor or other health worker?	Yes	1	C3
	No	2	
What type of Diabetes have you been told that you have ?	Insulin-dependent diabetes	1	C4
	Non insulin dependent diabetes	2	

3. Smoking			
Now I am going to ask you some questions about tobacco use.			
Question	Response		Code
Have you been told about the effect of smoking on your condition?	Yes	1	D 1
	No	2	
Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes?	Yes	1	D2
	No	2	
	Yes	1	
	No	2	
On average, how many cigarette sticks do you smoke each day ?	DAILY↓		D3
	Cigarettes, cigars, other	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

4. Alcohol Consumption			
The next questions ask about the consumption of alcohol.			
Question	Response		Code
Have you been told about the effect of alcohol consumption on your condition?	Yes	1	A 1
	No	2	
Do you currently consume alcohol such as beer, wine, spirits, palm wine, or akpeteshie?	Yes	1	A2
	No	2	
How many bottles of the alcohol do you take per day?	1		
	2		
	>2		
During the past month, how frequently have you had at least one alcoholic drink ?	Daily	1	A3
	5-6 days per week	2	
	3-4 days per week	3	
	1-2 days per week	4	
	1-3 days per month	5	
	Less than once a	6	

5. Diet			
The next questions ask about the fruits and vegetables that you usually eat.			
Question	Response		Code
How often do you add sugar to your food/drink each day?	Never	0	D 1
	Rarely	1	
	Occasionally	2	
	Very often	3	
	Refused	4	
How often do you drink soda or carbonated beverages?	Never	0	D 2
	Rarely	1	
	Occasionally	2	
	Very often	3	
	Refused	4	
Do you eat red meat?	Yes	1	D 3
	No	2	
	Fish	3	
On how many days in the past week have you had meat?	0	0	D 4
	1	1	
	2	2	
	3	3	
	4	4	
	5	5	
	6	6	
	7	7	
Do you know the effect of the meat you eat on your condition?	Yes	1	D 5
	No	2	
Do you know the role fruits play in the management of your condition?	Yes	1	D 6
	No	2	
On how many days in the past week have you had fruits?	0	0	+6
	1	1	
	2	2	
	3	3	
	4	4	
	5	5	
	6	6	
	7	7	
On how many days in the past week have you had vegetables?	0	0	D 9
	1	1	
	2	2	
	3	3	
	4	4	
	5	5	
	6	6	
	7	7	
Do you know anything about salt restriction in relation to your condition?	Yes	1	D 10
	No	2	
How often do you add salt to food that has	Never	0	D 11

already been prepared?	Rarely	1
	Occasionally	2
	Very often	3
	Refused	4
	Don't know	5

6. Physical Activity

Question	Response		Code
Do you know the role of exercise in the management of your condition?	Yes	1	G1
	No	2	
Do you perform any exercises?	Yes	1	G2
	No	2	
Which forms of exercises to you do?	Brisk walking	1	G3
	Jogging	2	
	Skipping	3	
	bicycling	4	
	Other forms	5	
How much time do you spend exercising?	Less than 10 minutes	1	G4
	10 to 30 minutes	2	
	30 to 60 minutes	3	
	More than 60 minutes	4	



7.0 WEIGHT MANAGEMENT			
Question	Response		Code
Do you know the impact of weight on your condition?	Yes	1	H1
	No	2	
Do you know your weight or BMI?	Yes	1	H2
	No	2	
Do you know reduction in your weight can improve your BP/ DM control?	Yes	1	H3
	No	2	
Are you making any effort at controlling your weight?	Yes	1	H4
	No	2	
8. Medication Compliance			
Question	Response		Code
Do you know the medicines being used in managing your condition?	Yes	1	I 1
	No	2	
Do you know their names?	Yes	1	I 2
	No	2	
Where do you keep your medicines at home?			I 3
How many medicines are you taking for your hypertension?	1	1	I 4
	2	2	
	3 or more	3	
When do you take your once daily hypertension medicines in the day?	Morning	1	I 5
	Afternoon	2	
	evening	3	
Do you take them exactly the same times each day?	Yes	1	I 6
	No	2	
When do you take your twice daily medicines?	Morning and evening	1	I 7
	Morning and afternoon	2	
	Anytimes	3	
How many medicines are you taking for your DM	1	1	I 8
	2	2	
	3 or more	3	
When do you take your diabetes medicines?	Before meals	1	I 9
	After meals	2	
	Any time	3	
Do you know any side effects of the medicines you are taking for your condition?	Yes	1	I 10
	No	2	

In the past month, did you forget or miss (not take) your medicines for one or more days?	Yes	1	I 11
	No	2	
What are the reasons for which you did not take your medicine?	Too expensive	1	I 12
	I forgot	2	
	Side effects	3	
	Too many pills	4	
	Other	_____	
Do you experience any side effects from your medication?	Yes	1	I 13
	No	2	
How often do you attend clinic for your condition?	Monthly	1	I 14
	Bi monthly	2	
	Once in a while	3	

Question	Response		Code
Do you think your adherence to compliance of medication is having any impact on your condition?	Yes	1	J1
	No	2	
Do you think your BP and or DM is well controlled?	Yes	1	J2
	No	2	
Do you think or feel that your modified life style is helping manage your condition?	Yes	1	J3
	No	2	

Blood Pressure		
Blood Pressure Reading (sitting for 5 minutes)	Systolic (mmHg)	Ka
	Diastolic (mmHg)	Kb
Height and Weight		
Height <i>Record participant's height in cm with one decimal point without shoes or jacket</i>	in Centimetres (cm)	L11
Weight <i>If too large for scale 666.6</i> <i>Record participant's weight in kg with one decimal point.</i>	in Kilograms (kg)	L12
Waist		

Blood Glucose(Only for those that are there to have their blood glucose checked)			
Question	Response		Code
During the past 12 hours have you had anything to eat or drink, other than water? <i>It is essential that the participant has fasted.</i>	Yes	1	M1
	No	2	
Time of day blood specimen taken (24 hour clock) <i>Enter time measurement started.</i>	Hours : minutes hrsmins		M4
Fasting blood glucose	mmol/l		M5
	mg/dl L		
Today, have you taken insulin or other drugs (medication) that have been prescribed by a doctor or other health worker for raised blood glucose?	Yes	1	M6
	No	2	
Blood Lipids			
Total cholesterol <i>[CHOOSE ACCORDINGLY: MMOL/L OR</i>	mmol/l		N8
	mg/dl		
During the past two weeks, have you been treated for raised cholesterol with drugs (medication) prescribed by a doctor or other health worker?	Yes	1	
	No	2	

Triglycerides and HDL Cholesterol		
Triglycerides [CHOOSE ACCORDINGLY: MMOL/L OR	mmol/l	O 1
	mg/dl	
HDL Cholesterol [CHOOSE ACCORDINGLY: MMOL/L OR	mmol/l	O 2
	mg/dl	

. Demographic Information		
Question	Response	Code
Sex (<i>Record Male / Female as observed</i>)	Male Female	1 1 P1
How old are you? <i>If the age is unknown, help participant estimate their age by interviewing them about their recollection of widely known major events.</i>	Years _____	
What is your area of residence?	Urban Rural Periurban	1 2 3
What is your residential address? If not known, please indicate answer the next question		
Can you please provide your cell phone number (this will be kept CONFIDENTIAL)		
Physical Landmark		

EXPANDED: Demographic Information				
What is the highest level of education you have completed?	No formal		1	Q 1
	Nonformal		2	
	Less than primary school		3	
	Primary school completed		4	
	Secondary school completed		5	
	High school completed		6	
	College/University completed		7	
	Post graduate degree		8	
	Refused		88	
What is your marital status ?	Never married		1	Q 2
	Currently married		2	
	Separated		3	
	Divorced		4	
	Widowed		5	
	Cohabiting		6	
	Refused		88	
Which of the following best describes your work status over the past 12 months?	Government		1	Q 3
	Non-government		2	
	Self-employed		3	
	Non-paid		4	
	Student		5	
	Homemaker		6	
	Retired		7	
	Unemployed (able		8	
	Unemployed		9	
Refused		88		
Do you have a valid National Health Insurance Agency card?	Yes		1	
	No		2	