KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

KUMASI, GHANA

COLLEGE OF HEALTH SCIENCES DEPARTMENT OF PHARMACY PRACTICE

PHARMACIST- LED HYPERTENSION DETECTION AND MANAGEMENT SERVICES IN THE GHANAIAN COMMUNITY PHARMACY: AN EXPLORATORY STUDY

BY:

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A Thesis submitted to the Department of Clinical and Social Pharmacy, Faculty of Pharmacy and Pharmaceutical Sciences, College of Health Sciences In partial fulfilment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

(CLINICAL PHARMACY)

BY:

AFIA FRIMPOMAA ASARE

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own research and that, to the best of my knowledge, no part of it has been presented for another degree in this university or elsewhere.

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ABSTRACT

In Ghana, as in most sub-Saharan African countries, hypertension is one common cardiovascular disease that is reported in hospitals. There is evidence that life style modifications and adequate control of blood pressure with medicines can help manage hypertension effectively and prevent complications such as stroke. The objective of the study was to evaluate a pharmacist-led hypertension detection and management service in the community pharmacy.

The study was in two parts. The detection aspect of the research was an exploratory intervention study conducted from February 2012 – March 2013 in three community pharmacies. Although 250 clients were approached, 170 agreed to be screened by the Medicine Counter Assistant (MCA). Those whose blood pressure was above 140/90 were referred to the pharmacist for further assessment, who then referred them to the physician when necessary. Patient awareness and practices on some life style modification for the prevention of hypertension were also assessed; and the opinion of pharmacy staff was sought on their acceptance of the intervention. For the second part a quasi-experimental design was used to evaluate the impact of pharmacist intervention on blood pressure control and adherence among hypertensive patients. One hundred and eighty hypertensive patients were recruited for the study, 90 in the intervention group and 90 served as the control. The intervention offered by the pharmacist consisted of health education, adherence counselling and medicine use review. For hypertensive patients in the intervention group the intervention was offered at recruitment and every month for the next five months.

Out of the 170 clients screened the most frequent modifiable risk factors identified were lack of exercise 107 (63%), poor diet (42%) and obesity (21%). Forty-three (25%) were pre hypertensive 42 (25%) had stage 1 hypertension and 13 (8%) had stage 2 hypertension. There was a significant relationship between BP and modifiable risk factors such as alcohol intake (P=0.045) and smoking (P<0.008). Lifestyle modification practised by respondents with prehypertension, reported on the sixth month, were weight reduction and reduced alcohol intake. Ten out of the 34 clients who were referred to the physician, were diagnosed with hypertension and an antihypertensive was prescribed. One hundred and forty-six out of the 180 hypertensive patients who were recruited for the second part of the study completed the study. At baseline there was no significant difference in demographic and clinical characteristics between Intervention Group (IG) and the Control Group (CG). Pharmaceutical care issues identified among the Intervention Group during the study period were non effectiveness of therapy (n=23), side effects (n=20) and nonadherence to therapy (n=40). Within the Intervention Group there was a reduction in systolic and diastolic blood pressure and this was statistically significant ($p<0.01$) at the end of the study. The mean diastolic blood pressure difference between Intervention Group and the Control group was statistically significant ($f=20.250$; $p< 0.01$; partial $\eta^2 =0.123$). The mean adherence difference between the Intervention group and Control group was also statistically significant at the end of the study. ($f=42.459$; $p<0.01$ and partial $\eta^2 = 0.228$).

Hypertension preventative services offered in the Ghanaian community pharmacy, resulted in early detection of hypertension in 5.9 % of at risk clients screened, and promoted changes in some lifestyle practices among some patients with prehypertension. The Intervention offered by the pharmacist led to an improvement in blood pressure control and adherence among hypertensive patients.

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DEDICATION

I dedicate this to my dear and lovely husband Mr. John Serbe Marfo and our God given gifts Annalisa, Annette and Daniel for their love, patience and invaluable support throughout this work.

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1. Marfo AFA, Owusu Daaku FT, Opare Addo MNA, Saana II. Ghanaian hypertensive patients understanding of their medicines and life Style modification for managing hypertension *International Journal of Pharmacy and Pharmaceutical Sciences.* 2014 (6): 165-170
2. Marfo AFA, Owusu Daaku FT. Evaluation of a Pharmacist Led Hypertension Preventative and Detection Service in the Ghanaian Community Pharmacy: an exploratory study. *International Journal of Pharmacy Practice.* 2016. doi: 10.1111/ijpp.12263

ABBREVIATIONS

ACE	Angiotensin II Converting Enzyme Inhibitor
A2RB	Angiotensin II receptor blocker
ABPM	Ambulatory blood pressure monitoring
BMI	Body Mass Index
BP	Blood Pressure
CVDS	Cardiovascular Disease
CG	Control Group
CHPS	Community based and health planning services
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic Blood Pressure
GHS	Ghana Health Services
HBPM	Home Blood Pressure Monitoring
IG	Intervention Group
JNC	Joint National Commission
MCA	Medicine Counter Assistant
MOH	Ministry of Health
NICE	National Institute of Clinical Excellence (NICE)
NCDs	Non Communicable Diseases
NSAIDS	Non-Steroidal Anti-inflammatory Drugs
OTC	Over the Counter
PURE	Prospective Urban Rural Epidemiology
SOAPO	Subjective, Objective, Analysis, Plan and Outcome
SBP	Systolic Blood Pressure
TOPH	Trials of Hypertension Prevention, phase

CHAPTER ONE: INTRODUCTION

1.1 Prevalence of Hypertension

Hypertension is a key public health problem in both economically developing and developed countries. Substantial numbers of individuals with hypertension are uninformed about their condition and among those with diagnosed hypertension; treatment is commonly inadequate (1). Prevalence of hypertension is estimated at 30% in England, 29% in USA and 19.5% in Canada (2). It is largely regarded as a major risk factor for cardiovascular diseases with a growing prevalence and poor control particularly in developing countries. It is estimated that by 2030, mortality due to cardiovascular diseases in the adult population will reach 23 million globally, with about 85% of such deaths occurring in low- and middle-income countries (3).

In developing countries, particularly in sub-Saharan Africa, it has been suggested that the prevalence of hypertension is increasing quickly because of increasing longevity and the continuous effect of contributing factors such as unhealthy diets, obesity and physical inactivity (4). Available literature indicates that the prevalence of hypertension is in line with the degree of urbanization in West Africa, with prevalence highest in Guinea (43.6%), Burkina Faso (40.2%), (6) Nigeria (38.2%), (7) and Togo (36.7%) (8). Although the prevalence of hypertension in urban settings is higher than in rural settings, hypertension is also increasing rapidly in rural areas as well. Indeed, available literature indicates an increase in the prevalence of hypertension particularly in rural settings over time. In Cameroon, the rural age-adjusted prevalence of hypertension measured by mercury sphygmomanometer was 5.7% according to the "old" definition (160/90 mm Hg) but was 13% in men and 9% in women according to the new criteria (140/90 mm Hg) (9).

In Ghana, hypertension is an important public health problem even in the poorest rural communities. Although, there is no official national prevalence, some reviews have indicated that the crude prevalence of hypertension in rural and urban Ghana ranges from 19.3% to 54.6% (10, 11, 12). Older age groups, over nutrition and alcohol consumption were factors independently associated with hypertension. In most regions, hypertension was among the first five commonest cause of outpatient morbidity. In a recent study in the Adansi South in the Ashanti region, 27.1% of 539 people screened, were identified as hypertensive. Most of these were aged 40-59 years (13).

1.2 Causes and Pathophysiology of Hypertension

Hypertension may either have a primary or secondary cause. Secondary causes have multiple aetiologies and these include renovascular disease, pheochromocytoma, coarctation of the aorta, and prolonged use of medicines (e.g. NSAIDS, oral corticosteroids, and oral contraceptives), Cushing 's syndrome and primary hyperaldosteronism. For most patients with hypertension the specific cause is not found and this is referred to as essential or primary hypertension (14).

Blood pressure is expressed in terms of systolic and diastolic values. Systolic blood pressure is the upper reading and this reflects the blood pressure when the heart in contracted whilst the diastolic blood pressure is the lower reading which reflect the blood pressure when the ventricles of the heart are dilated. Normal blood pressure maintenance is dependent on the balance between total peripheral vascular resistance and cardiac output (15). Patient with hypertension may either have an increased total peripheral vascular resistance or increased cardiac output or both. In most

hypertensive patients cardiac output is not increased, constriction of small arterioles due to increased total peripheral resistance accounts for the high blood pressure (16).

High cardiac output describes one mechanism for hypertension. This results from concomitant alteration of calcium homeostasis and cardiac stimulation by adrenergic hyperactivity. Increased water and salt reabsorption by the kidney which leads to an increase in blood volume is another mechanism (17).

Pathophysiological factors related to hypertension include over production of sodium retaining hormones and vasoconstrictors, increased sympathetic nervous activity, increased or inappropriate renin secretion with resultant increased production of aldosterone and angiotensin II and long term high sodium intake (18). The most essential endocrine system that affects the control of blood pressure is the renin –angiotensin system. Angiotensinogen is converted to angiotensin I by renin. Angiotensin II a potent vasoconstrictor, converted from angiotensin I by the Angiotensin Converting Enzyme (ACE) causes a rise in blood pressure. Furthermore, Angiotensin II stimulates the release of aldosterone which causes water and sodium retention. Stimulation of the sympathetic nervous system can cause arteriolar dilatation and constriction (15).

1.3 Classification and Diagnosis of Hypertension

The Ghana Standard Treatment Guidelines (STG) gives the definition but does not provide any classification of hypertension. According to the Ghana Standard Treatment Guidelines hypertension is diagnosed when the blood pressure is persistently higher than 140/90 mmHg in non-diabetic or above 130/80mmHg in diabetics. Diagnosis should be based on an average of

two or more blood pressure measurements (19). National Institute of Clinical Excellence (NICE) suggests that diagnosis of hypertension is made if blood pressure measured at the clinic and subsequent ambulatory blood pressure (ABPM) monitored is 140/90 or higher (20). It classifies hypertension as, stage one, stage two and severe hypertension. The classification is further based on the setting where the blood pressure readings were recorded. Stage 1 hypertension is assigned when blood pressure measured at the clinic is 140/90 mmHg or higher and subsequent ambulatory blood pressure monitoring (ABPM) daytime average or home blood pressure monitoring (HBPM) average blood pressure is 135/85 mmHg or higher. Stage 2 hypertension is assigned when the blood pressure measured at the clinic, is 160/100 mmHg or higher and subsequent ABPM daytime average or HBPM average blood pressure is 150/95 mmHg or higher. Severe hypertension is when systolic blood pressure measured at the clinic is 180 mmHg or higher or clinic diastolic blood pressure is 110 mmHg or higher (20). The Joint National Commission (JNC) on hypertension management, prevention and control classifies hypertension as normal, prehypertension, stage one and stage two hypertension (21).

1.4 Risk Factors for Hypertension

1.4.1 Modifiable Risk Factors

Documented modifiable risk factors for hypertension include excess salt intake, obesity, physical inactivity, regular alcohol intake and cigarette smoking (19, 21). Evidence shows a strong association between salt intake and elevated blood pressure. A 75 -100 mmol /day reduction in salt intake in hypertensive and older subjects generates a change of 3-5mmHg systolic and about 1-2mmHg diastolic blood pressure. However, in young adults and normotensive patients the effect is less, about 2-3 mmHg for systolic and 1-2mmHg diastolic (22, 23). Literature also suggest a positive relationship between body mass and hypertension:

Among 598 subjects in the Greater Accra Region, hypertension was prevalent in those who were overweight (BMI 25-29.9) and obese (BMI ≥ 30) (24). In Poland hypertension was more common among people with high levels of BMI and waist circumference (25). Hypertension is more prevalent in people with Type 1 and Type 2 diabetes than in the non-diabetic population (whether they are overweight or not), as a consequence of kidney damage and insulin resistance respectively (26).

1.4.2 Non Modifiable Risk Factors

Increasing age, sex, race ethnicity and family history are non-modifiable risk factors for hypertension (27). Blood vessels lose flexibility with age and can contribute to increasing pressure throughout the system.

One survey in China indicated that the prevalence of hypertension was common among individuals aged 45-64 years (28). Compared to Caucasians and other ethnic groups, AfricanAmericans are much more likely to have high blood pressure. More than 40% of AfricanAmerican men and women in the United States of America (USA) have hypertension. High blood pressure tends to start at a younger age among African-Americans, is often more severe, and causes greater risks for premature death from heart attack, stroke, heart failure, and kidney failure. People with parents or other close relatives who have high blood pressure have an increased risk of developing it themselves (29).

1.5 Prevention and Management of Hypertension

The main goals for the management of hypertension are to treat hypertension, to reduce the risk of cardiovascular morbidity and mortality and identify and manage other cardiovascular risk

factors (21). Classes of medicines commonly used include diuretics, calcium channel blockers, angiotensin II converting enzyme inhibitors and angiotensin II receptor blockers.

Some non-pharmacological lifestyle practices such as dietary sodium reduction, aerobic physical activity, moderation of alcohol consumption, physical activity, weight reduction and diet rich in fruits and vegetables has a reduction effect on systolic blood pressure (20, 21). Therefore, these life style practices can be used as measures to reduce the blood pressure in patients who are at risk of hypertension and also as non-pharmacological treatment adjuncts to pharmacological treatment.

1.5.1 Non Pharmacological Management /Prevention

1.5.1.1 Weight Reduction

Several trials and follow-up studies have shown the benefits of weight reduction in both the prevention of hypertension and as a life style modification adjunct to medicines in the management of hypertension.

Trials of Hypertension Prevention, phase 1, (TOHP I) examined the long-term effects of weight loss and dietary sodium reduction on the incidence of hypertension, among prehypertensive patients. In TOHP I patients were assigned to 18-month weight loss and dietary sodium reduction or to a usual care control group. During the 18 months of active intervention, average body weight decreased by 3.5kg in the weight loss intervention group. The net difference in weight loss between the intervention group and the control group was 2.4 kg ($p< 0.001$) (30). The corresponding reduction in SBP was 6.9 mm Hg in the intervention group and 1.2 mm Hg in the control group, yielding a net reduction in SBP of 5.8 mm Hg associated with weight loss ($p<0.01$). The decline in DBP was 8.6 mm Hg in the weight loss group and 5.5 mm Hg in control group. In the study hypertension was defined as systolic BP

160 mm Hg and/or diastolic BP 90 mm Hg. The cumulative incidence of hypertension over the 18 months of follow-up was 1.67% in the weight loss intervention group and 8.16% in its control group. After 7 years of follow-up, the incidence of hypertension was 18.9% in the weight loss group and 40.5% in its control group. The authors concluded that lifestyle modification such as weight loss may be effective in long-term prevention of hypertension (30).

1.5.1.2 Diet & Reduced Salt Intake

The Dietary Approaches to Stop Hypertension (DASH) trial evaluated the effects of food and reduced salt intake on blood pressure among hypertensive and non-hypertensive patients. The food aspect was a randomised control trial that determined the effects of dietary patterns on blood pressure among 459 adults with systolic blood pressures of less than 160 mm Hg and diastolic pressure blood pressures of 80 to 95 mm Hg. Subjects were fed a control diet that was low in fruits, vegetables, and dairy products, with a fat content typical of the average diet in the United States for three weeks. They were then randomly assigned to receive, for eight weeks, diet rich in fruits and vegetables; or a "combination" diet rich in fruits, vegetables, lowfat dairy products and reduced saturated and total fat. The research showed that diet rich in fruits, vegetables, low-fat dairy products and reduced saturated and total fat (DASH diet) lowered systolic blood pressure by 5.5 mm Hg and diastolic blood pressure by 3.0 mm Hg more than diet rich in only fruits and vegetables (31).

For the reduced salt aspect of the study, the dietary pattern studied was the DASH diet with three levels of sodium intake [50,100,150 mmol/day]. The combination of the DASH diet and lower sodium intake consistently produced the greatest mean reductions of 7-12 mmHg systolic blood

pressure among hypertensive and non-hypertensive subjects. The combined effects tended to be greatest in hypertensive persons, non-hypertensive older than 45 years of age, (for systolic blood pressure) and women. The effects of sodium only, were especially pronounced among non-hypertensive participants eating the control diet. Among participants with hypertension, the decrease in blood pressure associated with decreased sodium intake was greater in those who were younger, although the differences were not statistically significant
(32).

In Ghana a community based cluster randomised trial among 1,013 non hypertensive patients showed that reduction in salt intake leads to a reduction in blood pressure. There was a reduction of 2.54 mmHg in the systolic blood pressure and 3.95mmHg in the diastolic blood pressure (33). A study examined the effects of reduction in dietary sodium intake on cardiovascular events among prehypertension patients ten years after the Trials of Hypertension Prevention I (TOHP I) study and five years after the Trials of Hypertension Prevention II (TOHP II) study. In both trials the intervention comprised comprehensive education and counselling on the reduction of dietary sodium for 18 months (TOHP I) or 36-48 months (TOHP II). Both the TOHP I and TOHP II studies showed that a reduction in salt intake reduced the blood pressure among prehypertensive patients. The follow up study indicates that for people with prehypertension assigned to a sodium reduction diet the risk of cardiovascular event was reduced by 25-30% (34). Long term substitution of normal salt with a reduced sodium high potassium substitute has also shown a reduction in systolic blood pressure (35).

1.5.1.3 Reduction in the Intake of Alcohol

Moderation of alcohol consumption among regular users of alcohol (a limit of ≤ 2 drinks (1 drink = ½ oz or 15mls ethanol) per day for men and a limit of ≤1 drink per day for women and lighter weight persons) reduces the systolic BP by 2–4 mmHg (21). A meta-analysis of fifteen randomised controlled trials showed that alcohol reduction was associated with a mean reduction of 3.31mmHg in systolic BP and 2.04 mmHg for diastolic blood pressure. The effect of alcohol reduction on blood pressure was consistent in both hypertensive and normotensive patients. The authors therefore suggested that reduction in alcohol intake is an essential lifestyle modification for the prevention and treatment of hypertension among heavy drinkers
(36).

1.5.1.4 Regular Exercise

A meta-analysis of randomised controlled trials indicates that progressive resistance exercise has an effect on resting systolic and diastolic blood pressure. Exercises ranged from six to thirty weeks, with a frequency of two to five days per week and a duration of 20-60 minutes. In both hypertensive and normotensive patients there was a reduction of 2% in the resting SBP and 4% in the resting DBP (37).

1.5.2 Pharmacological Management

Many available guidelines on the pharmacological management of hypertension provide information on how hypertension should be managed in patients with or without co-morbid conditions. Most of these guidelines recommend an add-on therapy approach where one medicine is normally prescribed; and if the hypertension is not adequately controlled another medication is added. Although the Ghana standard treatment protocol does not provide a step wise approach in the management of hypertension it recommends thiazide diuretics, beta

blockers, ACE Inhibitors, angiotensin II receptor blockers, calcium channel blockers, centrally acting agents and vasodilators for the management of hypertension (19).

NICE guidelines recommend, in step 1, a calcium channel blocker in people aged 55 years and black people of African or Caribbean family origin of any age. However, if calcium blockers are contraindicated a thiazide-like diuretic should be offered. In patients who are less than 55 years old, an ACE inhibitor or affordable angiotensin II receptor blocker is recommended. Beta blockers are not preferred initially for the management of hypertension. However, it can be given to people less than 55 years of age for whom ACE inhibitors and Angiotensin II receptor blockers are contraindicated. In step two a combination therapy is normally offered when BP is still not under control with step one treatment. Combinations are usually calcium channel blockers and Angiotensin Converting Enzyme inhibitors / Angiotensin II Receptor Blocker (A2RBs) or calcium channel blockers and thiazide like diuretics. In step three a combination of three antihypertensives are used. However, it is essential that before step three is initiated, step two treatment is at optimal or best tolerated doses (20).

The Joint National Commission on hypertension management, prevention and control on the other hand recommends the administration of one antihypertensive in most patients with stage one hypertension and two antihypertensive in-patients with stage two hypertension.

In diabetic patients a target blood pressure of 130/80 is recommended. Often diabetic patients with normal renal function require two or three antihypertensives to lower the blood pressure. Patients with concomitant chronic kidney disease may require three or more antihypertensive agents (21). Clinical trials have shown that thiazide diuretics, calcium channel blockers, ACE

inhibitors, angiotensin II receptor blocker, and beta blockers are effective in reducing the blood pressure, cardiovascular deaths and microvascular complications in diabetic patients with hypertension. ACE inhibitors and A2RBs have renoprotective effects and therefore in diabetic patients with microalbuminuria and renal insufficiency, the progression to end stage renal disease is slowed down (38).

1.5.2.1 Thiazide Diuretics

Examples of thiazide diuretics include hydrochlorothiazide, bendrofluazide and chlorothiaziade. At low doses these medicines are relatively effective. Mostly their antihypertensive effect lasts longer than other antihypertensives and may persist for 24 hours. There is no additional blood pressure reduction benefit with high doses but rather more adverse drug effects. These side effects include electrolyte imbalance and hyperglycemia. Thiazides may be used in mild hypertension and in practice it is often used in combination therapy. However, when hypertension is complicated by renal or heart failure more potent diuresis may be needed.

Evidence suggests that thiazide diuretics are effective for reducing the blood pressure in black populations, elderly and patients with isolated systolic blood pressure (39, 40). Thiazide diuretics should be used with caution in men with complaints of sexual dysfunction, obese patients with hyperlipidemia and diabetic patients. In The Anti-hypertensive and Lipid Lowering treatment to prevent Heart Attack Trail (ALLHAT) the development of diabetes was 3.5% greater in the thiazide arm than the angiotensin converting enzyme inhibitors arm (39).

1.5.2.2 Calcium channel blockers (CCBs)

Sub classes of the CCBs include the phenyl alkylamines (e.g. Verapamil), benzodiazepine (e.g., Diltiazem) and dihydropyridine (e.g. Nifedipine, amlodipine and felodipine). The dihydropyridines are more efficient and are commonly used for blood pressure control because of their peripheral vasodilation effects. They are also longer acting and more preferred because they lack negative cardiac effects of reflex tachycardia associated with short acting nifedipine. They are also suitable for once daily dosing. Available evidence suggests that CCBs are effective in the management of hypertension in blacks, the elderly, diabetics and patients with isolated systolic blood pressure (39, 41). The Anglo-Scandinavian Cardiac Outcomes Trial- blood pressure lowering arm (ASCOT) study compared an amlodipine and perindopril based regimen with bendrofluazide and atenolol in over 19,000 hypertensive patients. These patients had at least three risk factors and were aged 40-79 years. The amlodipine and perindopril combination group showed reductions in Cardio-Vascular Events (CVEs), less incidence of diabetes, better blood pressure control and reduction in total mortality among patients (42).

1.5.2.3 Angiotensin Converting Enzyme inhibitors (ACE)/ Angiotensin II Receptor Blocker

Examples of ACE inhibitors are lisinopril, perindopril whiles losartan and candesartan are examples of A2RBs. These are effective, when used as monotherapy, for Caucasians and populations with high renin levels and less effective in blacks and people with low renin levels. In hypertensive patients with heart failure and ischemic heart diseases ACE inhibitors reduce regression of left ventricular hypertrophy and improves blood flow to ischemic areas. In diabetic patients ACE inhibitors slow the progression of renal damage (43).

1.5.2.4 Beta blockers

Atenolol, metoprolol, propranolol and bisoprolol are examples of beta blockers. They are often used in combination therapies for the management of hypertension. Compared to other antihypertensives beta blockers do not reduce the risk of stroke, cardiovascular events and mortality. However, compared to placebo one review of 13 trials involving 91, 5661 patients indicated that beta blockers reduced the risk of stroke. Furthermore, patients on beta blockers were more likely to discontinue their treatment (44). For the management of hypertension selective β1 blockers such as atenolol and bisoprolol can be administered once daily with other antihypertensives.

1.6 Awareness, Treatment and Control of Hypertension

The level of awareness, treatment and control varies across countries; in the developed countries, levels are high. A high level of awareness of hypertensive status has been reported among hypertensive patients in Canada (83%), USA (74%) and England (65%). High treatment levels have been documented in Canada (80%) and USA (74%) than in England (2). However, low levels of awareness and treatment have been reported in China. Among 13,707 subjects 38.6% were found to be hypertensive, 45% were not aware of their condition and 53.4 % were not receiving any medication. In 80.7 % of hypertensive patients, hypertension was not controlled (45).

In developing countries levels of awareness, treatment and control is high among urban dwellers and low among rural dwellers. The Prospective Urban Rural Epidemiology (PURE) study on awareness, treatment and control of hypertension reported that awareness, treatment and control of hypertension was higher in the urban communities compared to the rural communities in low

middle income countries and low income countries. India, Pakistan, Zimbabwe and Bangladesh were the low income countries. In low income countries low rates of awareness treatment and control was associated with low educational background of subjects (46).

In Cuba, among 1667 subjects surveyed, 20% were found to be hypertensive. Eighty percent of them were aware of their condition, 61% were on medication and 62% had their blood pressure under control (47). Among 2077 Palestinians attending six primary health clinics, 28% were categorized as hypertensive. Of these, 51% were aware of their condition, 40% were on treatment and 10% achieved target control of their blood pressure (48).

One review of 23 studies in Africa reported that the level of awareness and treatment among hypertensive patients was low whilst control levels were much lower. The lowest level of treatment and awareness was often seen in rural areas. Some factors that were attributed to poor control of blood pressure among hypertensive patients were obesity, low physical activity and lack of antihypertensives in health care centers (49).

A cross sectional population based survey among 5190 subjects in two major slums in Kenya found out that the level of awareness of hypertension status was 19.5%. Among patients who were on antihypertensive treatment, only 21.5% had their blood pressure levels controlled (46). In Nigeria a study among 756 adults found out that 30% of the sample had hypertension, 21% of them were on treatment and only 9% had their blood pressure levels controlled (51). Among 738 subjects in three rural poor communities in the greater Accra region, prevalence of

hypertension was 28.3 %. Of the 200 subjects with hypertension 7% were aware of their condition, 4% were on antihypertensives and 3.5% had their blood pressure under control (12). The level of awareness and control was higher in women than in men.

1.7 Overview of Community Pharmacy Practice

Pharmacists in all settings, including community pharmacists, are encouraged to provide pharmaceutical care to clients. Pharmacists have become more interested in broadening their role beyond the product-oriented function of dispensing and compounding of medications to the provision of cognitive pharmaceutical services, informational and pharmaceutical care (52). Community pharmacies are in a distinctive position to identify, prevent and resolve drugrelated problems in ambulatory patients and data suggest that a community base pharmacy service can improve healthcare outcomes (53). Community pharmacy holds a number of benefits as a setting for public health activities: opening hours are extended and no appointment are required for services. The community pharmacy is therefore very accessible. More than often some community pharmacies may be seen more business-oriented than medical oriented. Activities that would generate income may override the care offered to patients such as giving advice and explanations on the correct use of medications. This services may often be seen as a waste of time as this will not directly generate additional financial remuneration (54).

Although the primary role of the community pharmacy is to dispense prescribed medicines and over the counter medicines, other services are also offered and this differs across countries. In the United States pharmacist-care services offered include smoking cessation, diabetes management, health screening and immunization. These services are dependent on the pharmacy setting, pharmacist staffing level and innovativeness of the pharmacy (55). Community

pharmacies in the United Kingdom offer multiple care services. These services include immunization, smoking cessation, sexual health education, opioid substitution, treatment of minor ailments and health screening (56).

In Ghana community pharmacies are privately owned and licensed by the Pharmacy Council to provide access to medicines, promote rational use of medicines and provide limited medical care. According to the Pharmacy Act (repealed and subsumed within the Health Professions Regulatory Bodies Act 857), a pharmacist can provide medical care in the case of accident as first aid and also provide treatments for illness of common occurrence when consultation with a medical practitioner or dentist is not reasonably practicable (57). Pharmaceutical care services provided at the community level is one advantage of community pharmacy practice.

However, a limiting factor to the provision of pharmaceutical services is the unequal distribution of community pharmacies between rural and urban areas (58).

Persons working in the community pharmacy may be pharmacists, pharmacy technicians, medicine counter assistants and pharmacy attendants. Although it is mandated by the pharmacy Act that community pharmacies should continually have the presence of a pharmacist, sometimes pharmacists are absent from these pharmacies.

1.8 Consumer Perception of the Community Pharmacy

Several studies in both developed and developing countries have accessed public use, satisfaction and attitudes of community pharmacies. In Qatar consumers perceived the community pharmacy as having a good balance between health and business matters. Roles performed by the pharmacist cited by consumers included provision of information on medication use and treating

minor illness. However, they did not expect the community pharmacist to monitor their health progress or to perform any health screening (59).

A study in the West Bank- Palestine revealed that proximity to home and presence of a pharmacist at the pharmacy were the main reasons for consumers to visit the same pharmacy. Consumers preferred the pharmacist to the physician as a source of advice on medicines and health. Furthermore, consumers considered the pharmacist as a health professional who knew a lot about medicines whilst 30% indicated that a private area was used by the pharmacist for counselling (60).

In Jordan, proximity was the primary reason for seeking pharmacist advice rather than that of the physician (61). Hargie *et al.,* measured consumer perceptions of and attitude to community pharmacy service using a communication audit technique in UK. The community pharmacist's role as perceived by the public ranged from business people to people mainly concerned with health (62).

The findings of a study done on consumer perception of the community pharmacist and community pharmacy services in Malta indicated that the majority of consumers were fairly satisfied with various aspects of pharmacist's services. These include pharmacist efficiency when dealing with client requests, provision of instruction on how to take medications, professional pharmacist–consumer relationship, provision of explanation on how medication worked and pharmacist's knowledge and ability to answer questions. They were least satisfied with the privacy in the pharmacy. Consumers however wanted pharmacist to liaise with primary

and secondary care-based physicians and also to provide diagnostic testing services and extended opening hours (63).

Pharmacists and pharmacies traditionally have been the main suppliers of medicines for the Australian population, but increasingly community pharmacies are becoming a key source of a broad range of health information and service in the community. These include provision of drug information, pharmacist only and pharmacy medicines, clinical interventions, medication management services, preventative care services for patients with chronic conditions and participating in therapeutic decisions (64).

In Ghana a survey among six hundred consumers showed that they visit the pharmacy mainly to purchase over the counter and prescription medicines and report with a minor problem. These minor problems included malaria, diarrhoea and headache. The choice of a particular pharmacy was mostly due to proximity. Extended care services the consumer would like the pharmacist to offer included blood pressure monitoring, blood glucose monitoring and voluntary counselling and testing for HIV. More than 50% of respondents were satisfied with the services offered by the community pharmacist (65).

1.9 Statement of the Problem

The increasing rate of hypertension in most low to middle income countries such as Ghana is an important public health problem even in the poorest rural communities. Non Communicable Diseases (NCDs) such as hypertension and stroke almost certainly affect the poor as well as the affluent and, for the poor, their costs in terms of labour, time lost and treatment costs can be huge. For all therefore, there is the need for preventative services.

Low levels of treatment and control of hypertension have been reported in Ghana, one review indicated that treatment levels range from 6.9% to 52.5. % whiles control levels range from 1.7 % to 12.7. % (10). A study conducted among 516 hypertensive patients in three major hospitals (Komfo Anokye Teaching Hospital, Kwame Nkrumah University of Science and Technology Hospital and Korlebu teaching hospital) showed a low level of blood pressure control and lack of awareness on life style modifications that could aid in the management of blood pressure (66). The typical review period for a Ghanaian hypertensive patient to see a doctor is every three months. In addition, patients are not well informed about their medicines and life style modifications hence there is the need for a service that would address the pharmaceutical care needs of hypertensive patients. Although some studies on how the community pharmacist can assist hypertensive patients control their blood pressure have been conducted with positive outcomes in some developed countries there is the need to study a model of service that would be suitable for the Ghanaian setting (67, 68, 69). This is because the interventions studied and the number of times pharmaceutical care was offered to hypertensive patients by the pharmacist varied within studies.

Most Ghanaians in the cities and towns view the community pharmacy as the first port of call when seeking health care advice and treatment probably because these pharmacies are more accessible to the general population, opening hours are usually convenient and waiting times to see pharmacists are shorter compared with government health institutions. Patients, with or without prescriptions, patronise these pharmacy services and hence they have a large target population. Presently, the major activities of Ghanaian community pharmacies consist of dispensing prescription and non-prescription medicines, treating illness of common occurrence,

counselling, and drug information dissemination. Most pharmacies are less involved in preventative activities for non-communicable diseases such as hypertension. Blood pressure measurements may be taken based on the request of the client and also if the complaint presented by the client is consistent with the signs and symptoms of hypertension. A survey conducted in the Ashanti region, the second largest region in Ghana found out that few pharmacies were equipped to screen patients who were at risk of hypertension (70).

Published studies in the Unites States of America and Australia have demonstrated that through on going screening programmes, community pharmacists are in an ideal position to screen patients at risk of cardiovascular and cerebrovascular disease and refer them to the hospital for further evaluation (71, 72). However, community pharmacy settings in Ghana are different from the pharmacies where these studies were conducted. In Ghana, pharmacy staff are fewer and include lower level support staff such as the Medicine Counter Assistants (MCA) who often have little formal education and referral systems are not the same. Duplicating similar services in Ghana would therefore require an exploratory study to determine the potential for community pharmacists' involvement in terms of opportunities in the delivery of preventative service

1.10 Rationale for the Study

The Ministry of Health, Ghana (MOH) acknowledges the fact that the country is overburdened with communicable diseases such as malaria, tuberculosis and HIV/AIDS and the increase in NCDs could escalate this burden (73). Moreover, financial and healthcare resources available are limited indicating a national reason for public health initiatives that would prevent hypertension and its complications; within the context of Ghana's national policy for the prevention and control of chronic NCDs including hypertension (74). The policy outlines strategies for primary prevention by creating awareness of the risk factors associated with NCDs,

early detection by early diagnosis; and treatment through established screening and management programmes for diabetes, hypertension, cancers, sickle cell, and asthma in health facilities. Primary health care providers include public community health centres, private pharmacies, chemical shops (these are facilities licensed by the Pharmacy Council Ghana and situated in rural areas where there are no pharmacies, to dispense over the counter medicines and manage common diseases such as malaria), private clinics; government clinics, district hospitals, regional hospitals and traditional/herbal providers.

Research Questions

1. Is the Ghanaian community pharmacy an ideal place to screen patients who are at risk of hypertension?
2. Do Ghanaian community pharmacists have a role in the control of blood pressure among hypertensive patients?

Hypothesis

H_O: Pharmacist led intervention would not have a significant effect on the adherence level and control of blood pressure among hypertensive patients.

H_A: Pharmacist led intervention would have a significant effect on the adherence level and control of blood pressure among hypertensive patients.

1.11 Main Objective

To determine;

a) the effectiveness of a pharmacist led hypertension preventive service for the identification of risk factors of hypertension, modification of unhealthy lifestyle practices and detection of hypertension and

b) the effect of a pharmaceutical care intervention by community pharmacists on adherence and blood pressure control among patients with hypertension.

1.12 Specific Objectives

a. Prevention and detection of hypertension study. To determine:

1. the blood pressure, BMI categories and risk factors identified among clients through a screening process.
2. client awareness and practices of non-pharmacological measures.
3. life style modification(s) adopted by clients with prehypertension
4. the number of clients referred to the physician with high blood pressure who reported back with antihypertensive medicines.
5. the level of pharmacist and MCA acceptance of the preventative service

b. Evaluation of pharmaceutical care services offered by the pharmacist. To determine:

1. hypertensive patients level of awareness and practices of non-pharmacological measures at baseline
2. the number of drug therapy problems identified among hypertensive patients and interventions recommended.
3. the systolic and diastolic blood pressure levels and adherence to antihypertensive medication among hypertensive patients at baseline and at the end of the study.
4. the level of satisfaction among hypertensive patients with the intervention offered by the pharmacist

CHAPTER TWO: INTERVENTIONS AND OUTCOMES IN THE DETECTION AND MANAGEMENT OF HYPERTENSION: A REVIEW OF LITERATURE

2.1 Community Based Intervention in the Prevention of Hypertension

Several community based interventions for the prevention of Cardiovascular Diseases (CVDs) have been studied in middle and low income countries. The settings include schools, work site, religious organizations, health care centers and whole communities. Interventions offered were health education, work site screening and health promotion through the media. The outcomes of these interventions included reduction in Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) and adoption of healthy life styles such as increased physical activity, weight reduction and improvement in diets (75).

One such intervention in Iran showed a decrease in consumption of hydrogenated fat, a decline in smoking and increased physical activity. The key aspects were education on healthy diets, increasing physical activity, tobacco control and dealing with stress. They were offered through mass education on radio and television, at workplaces, businesses (fast foods, food industry and grocery) and through health care professionals (76).

A one-year study conducted in Mexico demonstrated that life style practices such as ten minutes' exercise as part of work place routine, reduced body mass index significantly. Three hundred and thirty-five Mexican ministry of health officers were involved in the study (77). A common challenge of screening services offered within the community is the failure of subjects to visit health care centers after the screening. Out of 161 subjects refereed to a health care center in Dar es Salam after a hypertension screening service in their homes, only 54 (34%) complied. Reasons

cited by respondents for not visiting the health facility included the cost of treatment and lack of symptoms associated with raised blood pressure (78).

2.2 Community Based Intervention in the Control and Management of Hypertension

Several researches have shown the positive impact of primary community based interventions on blood pressure control of hypertensive patients. These interventions were often offered by health care practitioners in primary health care facilities and in the residences of hypertensive patients. In Rauch, Argentina a community based intervention, studied among 1307 hypertensive patients, showed changes in blood pressure levels and weight. The SBP decreased from 137.98 to 132.49 mm Hg whilst the DBP decreased from 88.73 to 81.87. The intervention consisted of consultations with the family doctor, provision of free antihypertensives and education on hypertension and lifestyle practices) (79).

Two community based interventions were assessed among 1341 hypertensive patients in Karachi, Pakistan. The intervention comprised annual training of general practitioners within the community on hypertension management and family-based home health education from lay health workers every 3 months. The authors of this research concluded that the intervention reduced blood pressure levels significantly. Furthermore, it was found to be cost effective and affordable than the usual care offered to hypertensive patients (80).

Some authors have also studied the impact of community based interventions on the awareness, treatment and control of hypertension. The Isfahan healthy heart programme in Iran which consisted of educational activities aimed at hypertensive patients, the general population and health professionals; reported a decrease in the prevalence of hypertension, improved level of

awareness of hypertension status and efficient control of blood pressure. Awareness treatment and control were more significant in hypertensive patients older than 40 years (81).

2.3 Pharmacist Interventions and Outcomes in the Detection and Prevention of Hypertension

One of the studies, conducted in a community pharmacy in Shenandoah, Iowa, USA, demonstrated that through on going screening programmes, community pharmacists are in an ideal position to screen patients at risk of cardiovascular and cerebrovascular disease and refer patients to their physician for further evaluation; and also educate those who are at risk. Pharmacists' intervention offered included free screening to all who entered the pharmacy, referring patients whose blood pressure were raised, based on the JNC VI classification, and educating patients whose blood pressure was higher than normal on life style changes. For stroke prevention patients were screened using the American Heart Association Stroke Assessment protocol and were educated on the risk for stroke, ways to reduce stroke and the warning signs of stroke. The intervention was offered over a period of 7 months. Outcome measures included blood pressure and stroke risk (normal, mild, moderate and high) obtained during the screening process and the percentage of patients referred to the physician (71). In the study all clients entering the pharmacy were screened. Such an inclusion criteria would not be appropriate for most Ghanaian community pharmacies because pharmacy staff numbers are low and the work load may be increased. A pharmacy student was responsible for measuring the blood pressure, BMI and performing other tests. In Ghana pharmacy students may not be the right persons to screen clients. They are often available in the community pharmacies for only three month's within a year to undertake their internship training. Medicine counter assistants who are always

available in the pharmacy would be more appropriate for screening patients who are at risk of hypertension.

A six-month study conducted in a community pharmacy in Australia, also showed that a pharmacist delivering a health promotion and screening service for cardiovascular risk factors increased the community's access to screening. Patients who were at risk of developing cardiovascular diseases were identified and educated (72). The intervention offered by the pharmacist in this study was similar to that assessed by Mangum *et al.*, in the USA. In addition, it also included measuring the body mass index, total cholesterol and triglycerides of patients. Outcome measures were body mass index, blood pressure and the cholesterol levels obtained through the screening process. Other measures were life style information given and the number of patients referred during the health promotion period.

2.4 Pharmacist Intervention to Improve Pharmaceutical Care of Hypertensive Patients

A study in Mahasarakham University pharmacy and two primary care units in Thailand showed that hypertensive patients who received pharmacists' input in the maintenance of blood pressure achieved a significantly greater benefit in BP reduction, BP control, and improvement in adherence rate and lifestyle modification compared to no pharmacists' involvement. The study involved 235 hypertensive patients (118 in the intervention group and 117 in the control group). The pharmacist's intervention, over six months, consisted of monitoring patients' blood pressure monthly, reviewing their medications, and providing pharmaceutical care and counselling. The pharmacists also made recommendations to physicians, usually by letter, for medication regimen changes after detecting drug-related problems. The measures assessed included pre and post

blood pressure readings, compliance to treatment through tablet count, life style modifications and pharmacist's recorded recommendations made to physicians (67).

A study conducted in Iowa, USA, to evaluate the effectiveness of a community pharmacist home blood pressure (BP) monitoring programme also showed that the high-intensity (HI) intervention model is more effective in lowering DBP than the low-intensity (LI) one. For the HI intervention a trained pharmacist delivered patient-specific education about hypertension through four face-to-face interviews. After the first three visits a home BP monitoring device was provided and patients were encouraged to measure their BP at least once daily for the next month. Treatment recommendations developed for the patients' physician were based on these readings recorded at home. For the LI intervention, the patient's blood pressure was measured in the pharmacy by the pharmacist and patients were referred to their physician for further evaluation if the blood pressure was not controlled. This study showed that recommendations made by pharmacists to physicians on patients' medication based on regular blood pressure monitoring is more effective in controlling the blood pressure than simply referring patients whose blood pressure is not adequately controlled to the physician (68) With reference to the study in Iowa, USA the main outcome measures were the differences in systolic and diastolic BP from baseline to follow-up periods.

A patient-centred pharmacist intervention among 180 hypertensive patients improved blood pressure control and medication adherence level in a randomised controlled trial in England The study was conducted in 20 community pharmacies (11 interventions and 9 controls). The intervention comprised identification of the actual and potential drug related problems and referrals to the physician based on the assessment of these problems. Usual care was provided by the pharmacists in the control groups. The intervention was offered once every two months

over a period of 6 months. Outcome measures were control of blood pressure, patient satisfaction with pharmaceutical services and self-reported adherence (69).

A non-randomised single center study in Nigeria found out that an intervention provided by the pharmacy staff in a community pharmacy setting improved blood pressure control. These included, acquisition of patient-specific data, pharmacist's training, and implementation of patient- and drug-focused interventions, identification of health and drug therapy problems, and documentation of activities. Other aspects were patient education on lifestyle modifications, hypertension and antihypertensive medication. The intervention was offered to 36 patients, once every month for 6 months. The main outcome measures were changes in body mass index, blood pressure control, patient satisfaction, level of medication adherence and patient knowledge of the disease (82).

A quasi-experiment in Canada among 100 hypertensive patients (41 in the intervention and 59 in the control group) demonstrated that a community pharmacist intervention could improve adherence and improve blood pressure levels of patients on antihypertensive therapy. The study was conducted in nine community pharmacies (4 in the intervention and 5 in the control) and the intervention offered included provision of educational tools to improve adherence, recommendation on dosage adjustments and lifestyle modifications. Outcome measures were adherence level, reduction in blood pressure levels and quality of life (83).

In the same country a randomised controlled study among 150 hypertensive patients showed significant improvement in systolic blood pressure control, adherence and reduction in antihypertensive costs. The intervention, offered once a month for 7 months, included patient education and improving medication adherence, through medication review and drug optimization (84).

In rural Portugal, pharmaceutical care offered by the community pharmacist was associated with significant improvement in blood pressure control. The intervention offered was adherence counselling, health education, assessment and resolving drug therapy problems.

Outcome measures were the number of drug therapy problems identified and blood pressure. The study was done among 82 hypertensive patients and the intervention was offered once a month for every 6 months (85).

2.5 Knowledge of Hypertensive Patients on Administration of Antihypertensives and Life Style Modification for Managing Hypertension

Knowledge on life style modification and the administration of hypertensive medicines for managing hypertension is one measure commonly assessed among hypertensive patients. Thirty percent of 108 patients with hypertension were aware of the name of at least one medicine prescribed for the management for hypertension in a survey conducted in Nigeria. (86). In Turkey 64% of 227 hypertensive patients were aware of the name of their medicines whereas 43% knew the side effects of their medicines. The authors of these reports also stated that hypertensive patient's knowledge of the purpose and duration of antihypertensive prescribed, significantly affected adherence rates (87).

A qualitative study among 28 hypertensive patients in Canada indicated that patients were aware of a number of side effects of their antihypertensives such as dizziness, increased urination, and oedema. However most of them were not aware of the function of their medicines. In addition, 12% and 85% of hypertensive patients (n=26) were aware of lifestyle modifications such as quitting smoking and reducing salt intake, respectively (88). In India among 40 hypertensive

patients studied 45% had poor knowledge whiles 7.5 % had good knowledge of life style modifications for the management of hypertension. The highest perceived barrier to these life style modifications was lack of knowledge (89). Furthermore, of
200 hypertensive patients interviewed in Nigeria 74% were not aware of the role of reduced salt, 62.5% were unaware of the role of reducing weight and 68% were unaware of smoke cessation in the management of hypertension (90).

2.6 Compliance, Adherence and Concordance among Hypertensive Patients.

Compliance refers to the extent to which patients follow doctors' prescription about medicine taking whilst adherence refers to the extent to which patients follow through the clinician's decisions about medicine taking (91). According to Horne et al. (92), the term adherence is a substitute for compliance since adherence stresses the need for an agreement between the patient and prescriber and it is the patients' prerogative to decide whether to follow the prescribers' recommendations by taking the medicines or not. Thus the patient should not be blamed for failure to do so. In most developed countries such as the United Kingdom the term concordance is more and more being used with respect to medication taking. Concordance is defined as "a new approach to the prescribing and taking of medicines. It is an agreement reached after negotiation between a patient and a health care professional that respects the beliefs and wishes of the patient in determining when and how medicines are to be taken" (93). From the above terminologies adherence to antihypertensive medicines is an outcome commonly used by researches when antihypertensive therapy is assessed.

There is no standard method for measuring adherence; since the methods available such as electronic prescribing and patient self-report both have certain faults. Although certain methods

of measuring adherence may be preferred in specific clinical or research settings, when more than one method is used accuracy is maximised (94).

In Taiwan, a survey among 871 hypertensive patients showed that 57.6% adhered to taking their medicines. Belief in efficacy of antihypertensive, lower daily dosing and absence of suffering from side effects were factors associated with adherence (95). Sixty-four percent of study participants in Ethiopia were found to be adherent to their antihypertensives (96). In Nigeria adherence among hypertensive patients surveyed ranged from 45-85%. Factors associated with complete adherence included cost of antihypertensives, number of antihypertensives prescribed, regular clinic attendance and having social support from families (97, 98, 99).

2.7 Pharmaceutical care

According to the American Society of Health System Pharmacists (AHSP) pharmaceutical care is defined as "the direct, responsible provision of medication-related care for the purpose of achieving definite outcomes that improve a patient's quality of life" (100). Helper and Strand also provide a definition similar to the AHSP, they define pharmaceutical care as 'the responsible provision of drug therapy to achieve definite outcomes that are intended to improve a patient's quality of life" (101).

Medication related problems identified and solutions provided are outcomes normally assessed by investigators when pharmaceutical care needs of patients with chronic diseases are evaluated. Nine hundred and twelve medication related problems were identified among 92 patients with chronic diseases patronizing a community pharmacy service in Brazil. Five hundred and sixteen of the medication related problems required an intervention. Causes of these drug related problems were untreated indications, under dosage, over dosage and noncompliance to taking

medications (102) Ninety-two drug therapy problems were identified among 300 hypertensive patients in a study which evaluated the impact of an intervention on the identification and resolution of drug therapy problems. The intervention studied comprised a review of medicines, identification of problems and needs; assessment and development of pharmaceutical care plans. Drug therapy problems caused by medicines such as calcium channel blockers ACE inhibitors, and diuretics were mainly resolved by adjustment of medication regimen (103).

CHAPTER THREE: METHODOLOGY

The study was on two parts. This chapter provides information on the methodology utilised for the study on the prevention and detection and the evaluation of pharmaceutical care among patients with hypertension. This method section details the techniques and procedures that were employed in both studies.

3.1 Prevention and Detection of Hypertension Study

3.1.1 Description of the Interventions

For the screening and detection aspect of the study strategies employed were adopted and modified from the interventions studied by Magnum *et al*. and Houriham *et al.* hence the intervention offered consisted of screening at-risk subjects, identification of other modifiable risk factors, follow up, referrals and health education.

3.1.1.1 Screening at- Risk Subjects

Screening consisted of measurement of blood pressure and Body Mass Index (BMI). The first measurement of blood pressure was always done by the MCA using a validated automatic sphygmomanometer (Omron M6). Hypertension was defined as having blood pressure higher than 140/90 based on an average of three measured blood pressure readings after the patient had rested for at least 5 minutes. This definition was obtained from the Ghana standard treatment guidelines and Joint National Committee Detection on Evaluation, and Treatment of High Blood Pressure (JNC VII) (20, 21).

3.1.1.2 Health education

This was focused on non-pharmacological ways of preventing hypertension. These include reducing alcohol intake, reducing weight if obese, avoiding cigarette smoking, maintaining a low salt diet, diet rich in fruits and vegetables and exercising at least three times a week. A concordance approach was used to educate subjects on these healthy life styles using an educational leaflet designed by the researchers (See Appendix). Participants' preferences and ideas were discussed before any decision on lifestyle modifications were made.

3.1.2 Study Setting

The study was conducted in Kumasi metropolis in the Ashanti region, the most populated region in Ghana. The metropolis is endowed with a number of health facilities including a teaching hospital, four hundred community pharmacies (N=410) and district hospitals. The common diseases in the metropolis include diarrhoea, HIV/AIDS, malaria, hypertension and diabetes mellitus. High doctor-patient ratio and the burden of the common diseases and high cost of health care are some of the challenged facing the metropolis.

The study was conducted in three purposively-selected community pharmacies (n=3) in the Ashanti Region. Three community pharmacies were chosen based on previous studies that have been conducted on the prevention and detection of hypertension within the community pharmacy setting. Magnum *et al.,* studied his intervention on the prevention and detection of hypertension in one community pharmacy whilst Houriham *et al.,* studied his intervention in two community. Therefore, this study was conducted in Charma situated at Aputugya, Kama at Bomso and Bandy at Adum. These are private for profit retail community pharmacy. Their major activities are dispensing prescription and non-prescription drugs, treating illness of common occurrence, counselling and drug information dissemination. All the pharmacies are situated in the Kumasi metropolis except Charma pharmacy which is in the Bosomtwe district.

Furthermore, these settings are typical of pharmacies in Ghana. The inclusion criteria for purposively selecting the pharmacies were:

- A practicing pharmacist should be present at all times
- A "Medicine Counter Assistant" (MCA) should always be on duty There should be a dedicated area for patient care activities.
- There should be a high clientele level (about 300-500 clients in a day)
- The pharmacists and MCAs should be willing to be part of the study.

Three pharmacists and three MCAs working in these selected pharmacies were involved in the study. The community pharmacists had prior experience in treating illness of common occurrences, counselling patients on medicines dispensed and referring clients whose complaints needed further assessment to the hospital. They were also familiar with the use of diagnostic equipment such as BP monitors, rapid diagnostic test for malaria and glucometers. The MCAs on the other hand only had experience in providing dispensing and counselling for over the counter medicines and the use of diagnostic equipment such as Rapid Diagnostic Kits for malaria and pregnancy test kit.

Although in Ghana hypertension is common in both rural and urban settings, community pharmacies in the rural setting were excluded because community pharmacies are rarely situated in them.

3.1.3 Pharmacy Staff Education

Education of the selected pharmacy staff consisted of a two-day training programme using a structured training module. (See Appendix A) The training was undertaken by three academic pharmacists and two community pharmacists from 4-5th January 2012. The pharmacist- taught training module differed from that of the MCAs. Topics covered included prevalence, pathophysiology, risk factors, complication and diagnosis for hypertension and

nonpharmacological ways of preventing hypertension. For the MCAs, the taught training module was focused mainly on risk factors, diagnosis and non-pharmacological ways of preventing hypertension. (See Appendix A)

For the practical part blood pressure measurements using the automatic and manual sphygmomanometer, calculating body mass index and interpreting the BP and BMI measurements and education of participants on the leaflets were undertaken. Furthermore, the trainees were also familiarised with the protocols for conducting the study. These included identifying at risk participants, using the data collection proformas, follow-up forms, referral forms and identifying available referral hospitals.

3.1.4 Inclusion/Exclusion Criteria

3.1.4.1 Study Site

Pharmacies situated the urban and periurban setting were included in the study all pharmacies situated in the rural setting and over the counter medicine shops were excluded from the study.

3.1.4.2 Study Participants

Clients at risk of hypertension as documented by the Ghana Standard Treatment Guideline were included the study. The inclusion criteria were that eligible clients should have at least one of the following: aged over 45 years, be either obese, diabetic, pregnant or smoked (19). Clients with diagnosed hypertension and those who did not have any of the above risk factors were excluded from the study.

3.1.5 Identification, Approach, Recruitment, Consent

Participants who were either aged 45years and over, obese or pregnant were identified by the MCA by observation or by asking as appropriate. Participants with diabetes were also identified

for screening when they visited the pharmacy for refills. Furthermore, some pregnant and diabetic participants were also identified through interaction with the pharmacist when they visited the pharmacy with complaints. Any of these participants entering the pharmacy was approached by the MCA or the pharmacist and invited to be screened. Recruitment of participants was done on a daily basis from February-July 2012 during normal working hours of 9am-5pm. Participants who agreed to be screened appended their signature or thumb print to a consent form. (See Appendix A)

3.1.6 Data collection and Outcome Measures

When participants were recruited, the MCA captured their demographic characteristics (age, sex, educational background and telephone number) and participants were further assessed for risk factors of cardiovascular disease including their measured body mass index (BMI) and blood pressure. Other information obtained were participants awareness of lifestyle practices for the prevention of hypertension and source of this information. Participants were then educated and the time spent on education and screening was documented.

For participants whose blood pressure was normal (91-119/61-79) education on health lifestyle was offered with no follow up. However, with participants whose blood pressure was between 120-139/80-89 a follow up form was filled by the MCA and they were asked to return to the pharmacy after 6 months for further screening and assessment on healthy life style practices by the pharmacist. (See Appendix A) Two follow up attempts were made. For the first attempt, dates were agreed with participants during recruitment, and prior to the day of follow up appointments, a reminder was sent by Short Message Services (SMS). The second attempt, was made when participants missed the first follow up. A phone call was made to ascertain the reason

for missed appointment and new dates were arranged. If participants failed to honour the new date arranged no further follow up attempts were made.

Participants whose blood pressure was above 140/90 were referred to the pharmacist by the MCA for a second measurement using a manual mercury sphygmomanometer. If the blood pressure was between 140-159/90-99 on the second measurement, participants were further followed up for two other measurements at three days' interval. If the blood pressure was still above 140/90 the subjects were referred by the pharmacist to the physicians on duty at the hypertensive clinics in the government hospitals with a referral form. (See Appendix) The referral centres, the Management of which had previously been notified, were within the locality of the pharmacies. Participants who were referred to the hospital were further asked to report within a week to the pharmacy to provide feedback on their visit to the hospital. When participants failed to report back to the pharmacy a telephone call was made to ascertain the reason. However, if the blood pressure was between 120-139/80-89 (pre-hypertensive) participants were asked to return to the pharmacy for a follow up visit at 6 months, using the same approach as described above for pre hypertension patients.

Participants whose blood pressure was above 160/100 on the second measurement were not followed up for further measurements on different occasions. They were immediately referred to a physician at the hypertension clinic within three days. Participants were further asked to report back to the pharmacy to provide feedback after their visit to the clinic when participants failed to return a follow-up call was made.

Table 3.1: Summary of Data Collection Procedure

JNC VII classification			Action taken considering other risk factors and characteristics of patient
Blood pressure classification	**SBP mm/Hg**	**DBP mm/Hg**	
Normal	91-119	61-79	To encourage life style modification to prevent hypertension.
Prehypertension	120-139	80-89	To encourage life style changes specific to patient and tackle risk factors such as obesity, etc. Follow up after 6 months. Follow up agreed and planned with patient
Stage 1 hypertension	140-159	90-99	To repeat blood pressure after 30 minutes of relaxation. If BP is still elevated to follow up with patient for two other measurements and then refer.
Stage 2 Hypertension	>160	>100	To repeat after 30minutes and if blood pressure is still elevated to ask patient to see a doctor within the next few days

**This schedule was adopted and modified based on recommendations by the seventh report on the Joint National Committee on Prevention, Detection, Evaluation and Treatment of high blood pressure VII (21).*

Captured subject data was stored in a locker in the pharmacy and only the pharmacist had access to the data.

The following outcome measures were assessed. For participants with prehypertension these outcome measures were assessed at recruitment and also after 6months.

Table 3.2 Outcome Measures

	Outcome	Measure
a	Blood Pressure Categories	A validated automated blood pressure monitor was used in measuring the blood pressure.
b	BMI Categories	BMI was measured with a scale that measured the client's weight and height. Then the formula "weight in kg /Height in m^2''was used in computing the BMI.
c	Consumption of Salty food	Yes/No to question "Do you like eating salty food?
d	Frequency of consumption of Fried food	Amount and rate of fried foods consumed in a week
e	Smoking status	Yes/No to question "Do you smoke?"
f	Alcoholic status and frequency	Yes/No to the question ' "Do you drink alcohol?" The amount of alcohol consumed in a day
g	Frequency of Exercise	Yes/No to the question "Do you exercise?" Amount of aerobic physical activity (e.g., brisk walking, Skipping) undertaken within a week
h	Awareness of life style modification for the prevention of hypertension	Whether the participant was aware of any life style practices listed above for the prevention of hypertension Sources of this information
i	Detection	Number of participants who were referred and reported back with an antihypertensive
j	Changes in lifestyle Practices	Number of patients with prehypertension who adopted healthy life style practices after 6 months of follow up
k	Pharmacy staff acceptance of service	Face-face interview using structured questionnaire

3.1.7 Pharmacy Staff Acceptance Survey

Pharmacy staff acceptance of the service was assessed at the end of the study in a face to face interview using a semi-structured questionnaire. The topics covered effectiveness, modalities, acceptance and challenges of the preventative service offered. Questions that were asked in the interview included;

1. Do you think the community pharmacy is an ideal place to screen and detect hypertension?
2. Do you think the community pharmacist can educate people on lifestyle modifications to prevent hypertension?
3. In your view what are some of the modalities that should be put in place if pharmacies are to offer such services continually in the community in the community pharmacy
4. What are some of the challenges the pharmacists/MCA faced while offering this preventative service?
5. Are you willing to offer such services for free?
6. Was the preventative service offered acceptable to clients who patronised it?

3.1.8 Analysis of Data

Data was entered and analysed using SPSS Version 16 and responses obtained from the pharmacy staff questionnaire were grouped into themes. Closed ended questions were analysed using frequencies and frequencies and descriptive analyses were used to report the demographic characteristics of respondents, risk factors for hypertension and awareness of lifestyle modification, referrals and follow-ups. The Fishers exact test was used to compare BP categories obtained at recruitment with risk factors. The McNemar's chi square test was run to determine if there were any differences between modifiable risk factors identified at recruitment and lifestyle modification adopted at 6months among participants with prehypertension. A p value less than 0.05 was defined as statistically significant.

A scoring system on participants' awareness of life style modification for prevention hypertension was employed. The total number of lifestyle modification assessed was 6 and participants were given a mark for each lifestyle modification. Hence if participants were aware

of three lifestyle modification they had a score of 3 over 6. Men and women who drunk less than 2 drinks and 1 drink of alcohol (1 drink = ½ oz or 15mls ethanol) respectively per day were classified as occasional alcohol users while participants who drunk above this were classified as regular alcohol users. Participants who did not exercise or subjects who exercised less than 30 minutes per day, in less than 3 days were coded as 'no exercise'.

Classification of blood pressure was based on JNC VII recommendation (21)

- Normal: < 120/ < 80mm Hg
- Pre - hypertension: 120-139/ 80-89mm Hg
- Stage 1: 140-159/ 90-99mm Hg
- Stage 2: >160/>100mm Hg.

The JNC VII classifies BP measurements < 120/ < 80mm Hg as normal and does not provide an option for hypotension, hence for the purpose of the study BP measurements. < 90/<60 were classified as hypotension and 90-119 /60-79 as normal. Participants whose systolic blood pressure were above 140 but the diastolic blood pressure was normal (<90) were placed in the JNC VII Category based on the systolic blood pressure. Classification of the BMI was also based on WHO recommendation [Below 18.5- underweight; 18.5-24.9 - normal; 25.0-29.9 – overweight; 30.0 and above – Obese] (105).

3.2 Evaluation of the Pharmaceutical Care Of Hypertensive Patients

3.2.1 Description of the Intervention

The intervention offered was based on the pharmaceutical care model proposed by the American College of Clinical Pharmacist (104). The model consists of three principal components; identification of actual and potential medication related problems, resolving actual medication related problems and preventing potential medication related problems.

Under this, model drug therapy problems are categorised into four. These are;

Category A; Indication (Drug therapy unnecessary; additional drug therapy needed)

Category B; Effectiveness (Dosage too low, drug therapy ineffective)

Category C; Safety (Adverse drug reaction, dosage too high)

Category D; Adherence: (Patient unwilling or unable to take medicines)

Process required when care is offered include;

- Collection of specific patient data to inform decision making with regard to therapeutic management
- Assessment of data to find out if medicines are appropriate and if drug related needs are meet
- Establishment of patient cantered goal of therapy
- Formulation of a care plan which includes intervention to resolve and prevent drug therapy problems and to achieve goals of therapy; follow-up and evaluation of the effectiveness of therapy, adherence and recommendation; and assessment of patient outcomes

Based on the model, the intervention strategies employed were monthly medicines use review, patient education, and adherence counselling.

3.2.1.1 Medicine use review

The objective of the review was to identify and resolve actual and potential drug related problems. Improper drug selection, sub therapeutic doses, over dosage, adverse drug reactions, nonadherence to therapy, drug interactions and medicines use with no indication; were drug therapy problems that were mainly focused on. In resolving drug therapy problems, a care plan was developed in the form of SOAPO notes. SOAPO stands for subjective, objective, analysis, plan and outcome (104). The subjective data was any signs and symptoms reported by the

patient. The main objective data considered was the blood pressure and body mass index measurements. Based on the objective and subjective data an assessment of the medication related problem was made. Medication history of the patient was also considered during the assessment. The plan mainly consisted of recommendation of therapy, goals of therapy, counselling and monitoring. Recommendations for medication regimen change and elevated blood pressure above the patient's targeted blood pressure were communicated to a doctor. In hypertensive patients without diabetes the targeted blood pressure was less than or equal to 140/90. In diabetic hypertensive patients the targeted blood pressure level was less than 130/80 (19).

3.2.1.2 Patient education

A concordance approach was used in educating the patient; in that the patient's views and suggestions were considered before conclusions were drawn. Patients were also educated on the common side effects of their antihypertensive medication, precautionary measures associated with taking their medicines, individualised healthy life style practices that would help in controlling their blood pressure and consequences of not adhering to their therapy. Life style practices discussed included physical activity, diet (in particular sodium reduction and diet rich in fruits and vegetables and less fat), weight loss management and alcohol use.

3.2.1.3 Adherence counselling

Two strategies were used in improving patient adherence. Dissemination of knowledge (making sure that the patient was aware of the name, dosage, side effects and purpose of their medicines) and simplifying dosage regimen

3.2.2 Study Design and Setting

This was a quasi-experimental design study conducted in community pharmacies in the Kumasi and Bosomtwe Metropolis in the Ashanti region. These settings were also used for the prevention and detection study discussed above. The quasi experimental design involved the generation of a comparison group when it is impossible to randomise individuals into treatment and control groups due to lack of logistics. This experimental design was chosen for the evaluation of the pharmaceutical care of hypertensive patients instead of a randomised controlled study which is the gold standard due to the lack of documentation of clients medical and medication history in the community pharmacy.

3.2.3 Ethical Consideration

Permission for both studies was sought and granted by the Committee on Human Research Publications and Ethics, comprising the Kwame Nkrumah University of Science and Technology, School of Medical Sciences and Komfo Anokye Teaching Hospital, Kumasi, Ghana. Hypertensive patients who agreed to be part of the study also appended their signature or thumb print to a consent form (See Appendix).

3.2.4 Training

A two day taught and practical training programme for the three pharmacists who offered the intervention was given. The topic covered included

a. Pathophysiology, prevalence, risk factors, causes, diagnosis and complication of hypertension
b. The goals of therapy for the management of hypertension
c. Non pharmacological methods available for managing hypertension

d. Factors to be considered when choosing an appropriate therapy for hypertensive patients and medicines available for the management of hypertension
e. Development of pharmaceutical care plans (SOAPO)
f. Description of the pharmacist led hypertension pharmaceutical care service
g. Procedures and protocols used in the project

Pharmacists in the control group was taught only the study procedures in the recruitment of subjects, measurement of blood pressure and body mass index.

3.2.5 Sampling

The study was conducted in five purposively sampled community pharmacies. Five community pharmacies were chosen based on studies that have been conducted on the evaluation of pharmaceutical care by community pharmacists. In these studies, the number of pharmacies ranged from one to eleven with an average of 5 pharmacies. The pharmacist led intervention was offered in three community pharmacies and two pharmacies served as the control. This was because in most of the community pharmacist based interventional studies documented the intervention and control facilities were either the same numbers or the facilities where the intervention was offered was higher. In addition, these three facilities where the intervention was offered were the same facilities where the prevention and detection service was studied hence it was easier to train these pharmacists to offer both interventions.

The community pharmacies were purposively sampled based on the following Criteria:

- A practising community pharmacist should always be at post during working hours.
- The pharmacist should have at least one-year experience in community pharmacy practice
- The pharmacist and MCA should be easily available for training
- The community pharmacy should have a dedicated area for care activities.

- The community pharmacist should be willing to be part of the study

Based on these criteria Charma pharmacy situated at Aputugya, Kama pharmacy at Bomso and Bandy Pharmacy at Adum were chosen as the facilities where the intervention was offered. In the other two pharmacies Marrita, situated at Dompoase-Aprabo and Royal Avenue at Manhyia no intervention was offered. All these pharmacies are situated in the Kumasi metropolis except Charma pharmacy which is in the Bosomtwe district.

3.2.6 Sample Size

The formula below was used in calculation the sample size. This formula was proposed by Charan & Bisawa, for testing interventional studies (106) Sample

size = $\frac{2SD\ (Z_{\alpha 2} + Z_{\beta})\ 2}{d^2}$

SD: standard deviation (from previous studies)

$Z_{\alpha 2}$: 1.96 at type 1 error of 5% Z_{β}: 0.842 (at 80% power) d: effect size –difference between mean values

Assuming the following:

Standard deviation of (SBP) = 17. This number was chosen based on previous studies on the impact of interventions offered by the community pharmacist on blood pressure control (107).

Effect size: a figure of ten was chosen because it was assumed that the intervention would reduce the SBP by 10mmHg compared to the controls because there is evidence which suggest that 10mmHg in Systolic blood pressure could reduce complication of hypertension such as stroke (21).

Level of significance at 5%

Power of the study at 80%

The formula becomes $\frac{2(17) * (1.96+0.84)^2}{10^2}$

Sample size = 45 hypertensive patients in each group

Hence a minimum sample of 90 hypertensive patients should be appropriate for the study. However, a sample of 180 was chosen considering similar studies on the pharmaceutical care of hypertensive patients conducted within the community pharmacy setting. In such studies a minimum of 36 and a maximum of 232 hypertensive patients were recruited (67, 68, 69, 82, 83, 84, 85). Also the calculated sample size was adjusted for expected default rate of 20%.

Purposive sampling was used to select the first 180 hypertensive patients who were within the inclusion criteria. Ninety patients were recruited into the Control Group (CG), forty-five patients from each of the two pharmacies which served as the control; and ninety in the Intervention Group (IG) by recruiting 30 hypertensive patients from each of the three community pharmacies.

3.2.7 Inclusion/Exclusion Criteria

3.2.7.1 Study Site

Pharmacies situated in urban and peri-urban setting were included in the study. All pharmacies situated in the rural setting and over the counter medicine shops were excluded from the study.

3.2.7.2 Study Participants

Hypertensive patients diagnosed for at least six months with a review period of at least two months were included in the study. Another criterion considered was that more than 50% of the sample in both the CG and the IG should have blood pressure levels above 140/90. This was achieved by ensuring that about half of the total number of hypertensive patients recruited for

both the CG and the IG in each pharmacy had their blood pressure above 140/90. The only co-morbid condition included was diabetes.

Other hypertensive patients with comorbid conditions such as heart failure, stroke, and ischaemic heart disease, renal and liver diseases were excluded from the study. Furthermore, pregnant women, patients with no contact numbers and patients unwilling to return to the pharmacy for a scheduled visit were excluded from the study.

3.2.8 Identification & Recruitment

Eligible hypertensive patients were identified when they visited the pharmacy with a refill prescription that had a diagnosis of hypertension. After identification they were considered for recruitment by the pharmacist based on their review period, the duration of their hypertension status and blood pressure measurement. The blood pressure was measured at the pharmacy with an automated Sphygmomanometer to ensure that about 50 % of the total study sample in both the IG and the CG had blood pressure levels above 140/90. When recruited the purpose and design of the study were also explained to the patient by the pharmacist.

3.2.9 Outcome Measures

The following outcomes were assessed at baseline and at the end of the study among both groups. However, outcomes 10 and 11 were assessed among only hypertensive patients to whom the intervention was offered.

Table 3.3: Outcome Measures

Outcome	Measure
Blood pressure (systolic and diastolic BP)	A validated automated blood pressure monitor was used in measuring the blood pressure.
Body Mass Index	BMI was measured with a scale that measured the client's weight and height. Then the formula "weight in kg /Height in m^2''was used in computing the BMI.
Level of adherence to antihypertensive	Patient self-report using the 8 item Morsiky scale
Alcoholic Status and frequency	Yes/No to question "Do you drink alcohol?" The amount of alcohol consumed in a day
Consumption of salty food	Yes/No to question "Do you like eating salty food?"
Frequency of exercise	Yes/No to question "Do you exercise?" Frequency of aerobic physical activity (e.g., brisk walking, Skipping) undertaken within a week
Awareness of life style modification	Whether the patient was aware of any lifestyle practices for the management of hypertension (Yes/No)
Awareness of the administration of Medicines	Whether patient was aware of the name, dosage, duration, side effect and purpose of at least one antihypertensive prescribed. (Yes/No)
Modifications in life style modifications	The number of hypertensive patients who adopted healthy life style practices at the end of the study
Pharmaceutical care issues	The number of pharmaceutical care issues identified and the action taken to resolve it.
Patient Satisfaction	Survey

1

2

3

3.2.10 Data Collection

Table 3.4 provides details of the study procedure. Data was collected at baseline (first month), monthly and at 7 months. (See Appendix B) During subsequent monthly visits information obtained was recorded in a note book. Follow up dates for subsequent visit were agreed with the patients and SMS text messages were sent to remind them of these dates. If patients failed to show up, a call was made to ascertain why the appointment was missed and a new follow up date was agreed. Patients with drug related problems that needed a change in therapy were referred to their normal review clinic.

Table 3.4: Summary of procedure

Time	Procedure	Intervention Group (IG)
	Control Group (CG)	
Baseline	Pharmacist interacted with the recruited patient documented the information below and offered the intervention described in Section 4.1 Information documented were Demographic characteristics • Medication history (current medicines for the management of hypertension and other OTCs and alternative medicines) • Life style practices (smoking status, frequency of exercise, alcohol use, consumption of salt) • Awareness of the name, dosage, frequency, side effect and purpose of antihypertensive prescribed. • Awareness of healthy lifestyle modification for managing blood pressure. • Measurement of blood pressure and the body mass index of patient • Level of adherence to antihypertensives Pharmacist interacted with the recruited patient and documented the following information.	• Demographic characteristics • Medication history (current medicines for the management of hypertension and other OTCs and alternative medicines) • Life style practices (smoking status, frequency of exercise, alcohol use, consumption of salt) • Awareness of the name, dosage, frequency, side effect and purpose of antihypertensive prescribed. • Awareness of healthy lifestyle modification for managing blood pressure. • Measurement of blood pressure and the body mass index of patient • Level of adherence to antihypertensives

Time	Procedure	
	Intervention Group (IG)	**Control Group (CG)**
	Pharmaceutical care plan (drug related problems and solutions offered)	

2-6th month	Pharmacist had a monthly 10-30 minutes face-to-face consultation with the patient. • In the consultation the pharmacist measured the patients' blood pressure and BMI and offered the intervention. • Information recorded were the blood pressure, BMI, drug related problem identified and the solution provided and time spent.	No interaction with the pharmacist and no information obtained
7th month	The pharmacist interacted with the patient and documented the following information. No intervention was offered. • Medication history (current medicines for the management of hypertension and other OTCs and alternative medicines) • Life style practices (smoking status, frequency of exercise, alcohol use, consumption of salt) • Awareness of the name, dosage, frequency, side effect and purpose of antihypertensive prescribed. • Awareness of healthy lifestyle modification for managing blood pressure. • Measurement of blood pressure and the body mass index of patient • *Level of adherence to antihypertensives • Patient Satisfaction Survey	rmacist interacted with the patient documented the following Medication history (current medicines for the management of hypertension and other OTCs and alternative medicines) Life style practices (smoking status, frequency of exercise, alcohol use, consumption of salt) Awareness of the name, dosage, frequency, side effect and purpose of antihypertensive prescribed. Awareness of healthy lifestyle modification for managing blood pressure. Measurement of blood pressure and the body mass index of patient Level of adherence to antihypertensives

**The level of adherence was assessed with the 8 item self-reported Morisky Scale. The theory underlying this measure is that failure to adhere to a medication regimen could occur due to several factors such as "do you sometimes have problems remembering to take your medication", "do you sometimes forget to take your medication," and problems with the complexity of the medical regimen such as, "do you ever feel hassled about sticking to your treatment plan" (108).*

3.2.11 Patient Satisfaction Survey

A structured questionnaire was used to conduct a face to face interview among the 90 hypertensive patients in the IG. The questions captured data on patient satisfaction with the medication use review service, health education and adherence counselling.

3.2.12 Data Analysis

Data was analysed with SPSS Version 16. Descriptive statistics was used to analyse base line demographic and clinical data.

3.2.12.1 Scoring system

To determine patients' awareness score on the life style modification for preventing and managing hypertension, patients were given a score on each life style modification known. Lifestyle modification assessed were aerobic exercise at least 30 minutes per day, four days per week, reducing dietary salt, limiting alcohol intake to ≤ 2 drinks per day for men and ≤ 1 drink day for women, avoiding cigarette smoking, losing weight if obese and eating a diet high in fruits, nuts and vegetable and low in fat. Patients who did not exercise or patients who exercised less than 30 minutes per day, in less than 3 days were coded as 'no exercise'. A total of 6 marks was graded excellent; 5 was graded very good; 4 above average; 3 average; 2 poor; and 0 to 1 very poor. Hence if patients were aware of three life style modification they were given a mark of 3/6 and were graded as average.

Furthermore, to assess hypertensive patient's awareness on administration of their medicines, a mark each was awarded for their awareness of the name, dosage, duration, side effects and purpose of their anti-hypertensive prescribed. If a patient was on two or more medicines, the score on each medicine was calculated and the average awareness score was used as the patient's overall knowledge score on medicines.

Adherence to antihypertensive medication was measured with the 8 point Morsiky selfreported scale. A 'yes' answer attracted a score of Zero (0) and a 'no' answer a score of one. Patients who scored 8 were considered as highly adherent, 6-<8 medium adherence and < 6 low adherence.

The likert scale was used to determine the responses obtained from the patient satisfaction survey. Strongly agree, (SA), agree (A), neutral (N), disagree (D) and strongly disagree (SD) were scored as follows: SA = 5, A = 4, N = 3, D = 2, SD = 1.

3.2.12.2 Statistical tests

The chi squared test was run to compare baseline characteristics among the intervention group and the control. McNemar test was run to determine if there was any difference in the proportion of subjects who liked eating salty food, consumed alcohol and exercised pre and post intervention. The paired sample T test was used to compare means of end of study outcomes (SBP, DBP, adherence and BMI) within the IG and the CG. In using these tests the following assumptions were made;

- The dependent variables were (SBP, DBP, adherence and BMI) measured at the interval level
- The independent variable consisted of two matched pairs IG and CG

The General lineal model (repeated measures) analysis was run to compare the means difference (SBP, DBP, adherence, BMI, number of medicines and awareness of life style modification.) between the IG and the CG over two time periods (at baseline then after 7 months) Then the Wilks Lambda test obtained was used to determine if there were any significant differences between the two groups. The Fishers Exact test of association was run to determine if there was any association between the intervention offered and adherence and achievement of blood pressure goal. It was also run to determine the association between some patient related factors

and adherence. Cramer's *V* test was used to determine the strength of the association; values of 0–0.30 were considered weak, 0.31–0.70 moderate, and 0.71–1.0 strong.

In the analysis of data, all p values less than 0.05 were said to be significant. (107)

3.2.12.3 Classification

In analysing the data, the blood pressure was classified based on JNC VII recommendation [Normal: 90-199/ 60-79 mm Hg; Pre - hypertension: 120-139/ 80-89mm Hg; Stage 1: 140159/ 90-99mm Hg; Stage 2: >160/>100mm Hg.] Classification of the BMI was also based on WHO recommendation [Below 18.5- underweight; 18.5-24.9 - normal; 25.0-29.9 – overweight; 30.0 and above – Obese]

The American Association of Clinical Pharmacy classification scheme for drug related problem was used to analyse the data on medication related problems (104).

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Prevention and Detection of Hypertension Study

Out of the 250 clients approached 170 (68%) gave their consent to be screened, 30 (12%) were reluctant to wait as the MCA was screening other participants and 50 (12%) were not interested in the study. Most participants who were not interested in the study were pregnant women.

The mean time spent on screening and education was 9.87 ±2.656 minutes (range 5-20).

4.1.1 Demographic Characteristics of Participants

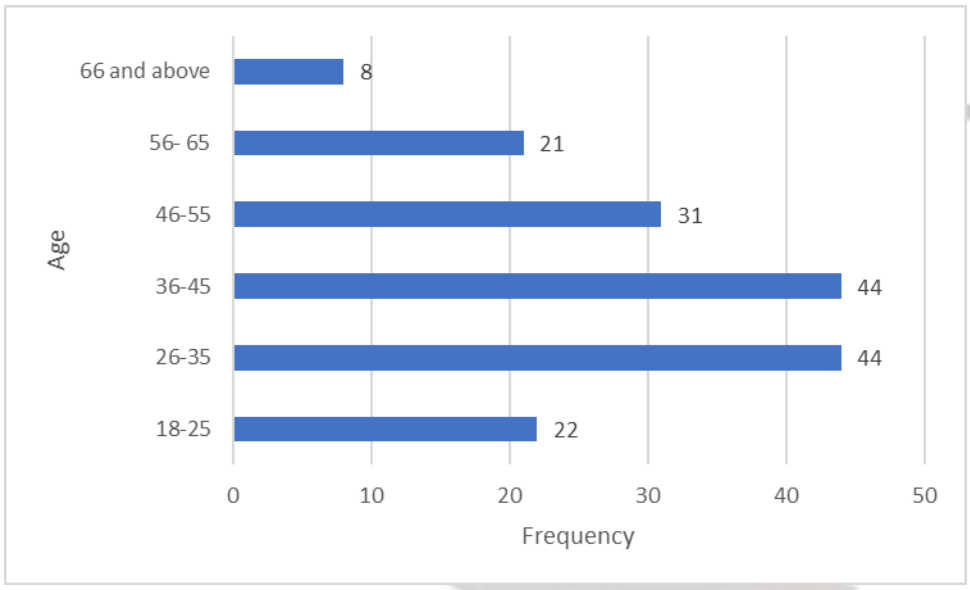


Figure 4.1: Age of Participants

Seventy (41%) of participants screened were males and 100 (59%) were females. The minimum and maximum age were 19 and 77 years respectively with a mean of 41.00 ±12.465 years. A high proportion of participants were aged 26-45years (Figure 4.1).

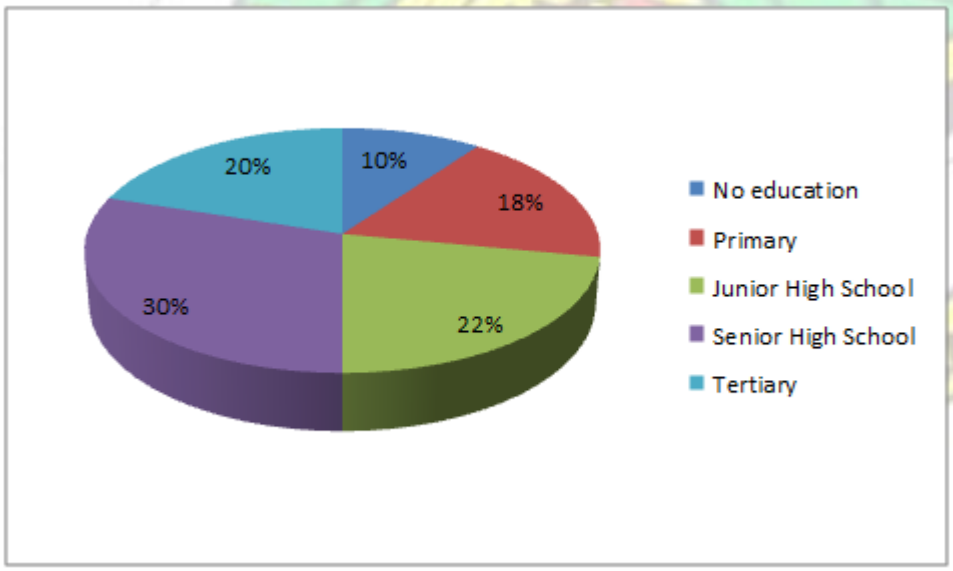


Figure 4.2: Educational Background of Participants

Seventeen participants (10%) had no education, 68 (40%) had primary and junior secondary education, 51(30%) had senior secondary school education and 34 (20%) had tertiary education (Figure 4.2).

4.1.2 Risk Factors for Hypertension

Table 4.1: Risk Factors for Hypertension

Risk Factor	n (%)
Physical inactivity	107 (63)
Excessive intake of Salty foods	63 (37)
Family history of hypertension	45 (27)
Medical history of Diabetics	15 (11)
Smoking	5 (3)
Regular alcohol users	49 (29)
Regular Intake of oily/fried foods	71 (42)

Seven risk factors were identified (Table 4.1). These risk factors for hypertension are well documented in literature (22, 23,25,27,26, and 28). The commonest modifiable risk factor reported in the study, lack of exercise (63%), is similar to a study conducted in a community pharmacy in Australia (72). However, the percentage of participants who were obese and regular alcohol users was higher in this study. (21% as compared to 16% for obesity and 29% as compared 2.9% for alcohol use) The percentage of current smokers was lower (5% as compared to 12.3%) probably due to cultural and climatic differences. Other risk factors identified among participants in this study were increased intake of salt (37%) and family history of hypertension (27%). Similar risk factors have been reported in community based screening exercises in the region. A community screening project in the Adansi South district in the Ashanti region (13) also identified risk factors such as obesity and alcohol use. Furthermore, a community screening exercise conducted in Adankwame in the Ashanti region (109) also identified other risk factors such as family history of hypertension and excessive salt intake among 324 adults. Risk factors

such as obesity and being overweight were also identified among 1292 individuals screened in Kumasi (110). The number of clients identified with risk factors in this study was higher than that reported in the studies in Adankwame and Kumasi in the Ashanti Region probably because this study screened at risk clients whiles in the other studies every willing participant within the community was screened.

4.1.3 BMI and BP Categories

Table 4.2: BMI and BP Categories

Variables	n (%)
BMI Categories	
Underweight	11 (6)
Normal	73 (43)
Overweight (BMI 24- 29.5)	50 (29)
Obese (BMI >30)	36 (21)
Blood Pressure Categories	
Normal (91-120/61-79)	72 (42)
Prehypertension (120-139/80-89)	43 (25)
Stage 1 hypertension (140-159/90-99)	42 (25)
Stage 2 hypertension (>160/>100	13 (8)

	Min	Max	Mean
SBP	96	198	132.07 ± 17.969

DBP	55	120	82.98	±11.976.

The minimum and maximum BMI levels obtained were 16.40 and 42.60 respectively with a mean of 26.27 ± 5.126. Fifty (29%) participants were overweight and 36 (31%) were obese.

The minimum systolic blood obtained was 96 and the maximum was 198 with a mean of 132.07 ± 17.969 whiles the minimum diastolic blood pressure obtained was 55 and the maximum was 120 with a mean of 82.98 ±11.976. (Table 4.2) Half (72) of the participants screened had normal blood pressure measurements and 33% of clients had their blood pressure measurement above 140/90. The latter finding differs from the study in Australia where only 17.6% of 204 clients had their BP measurement above 140/90. The difference may be due to the fact that all willing clients entering the community pharmacy in Australia were screened. Furthermore, the figure obtained in this study is higher than figures reported in some screening studies in the region probably because these studies did not target at risk patients. In Kumasi among 1292 adults screened 20.7% had their blood pressure levels above 140/90 (110).

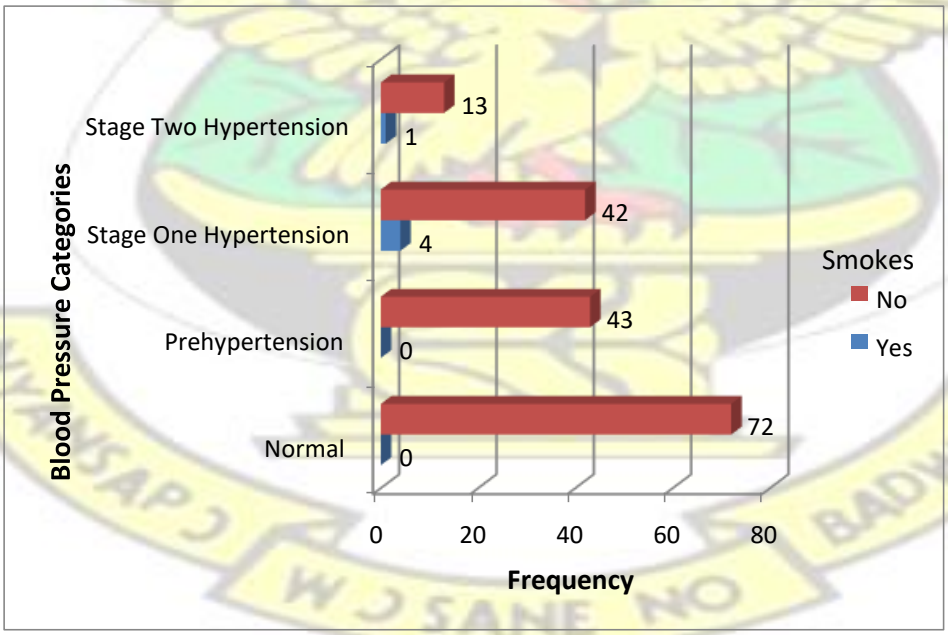


Figure 4.3 Smoking Status and Blood Pressure Measurements

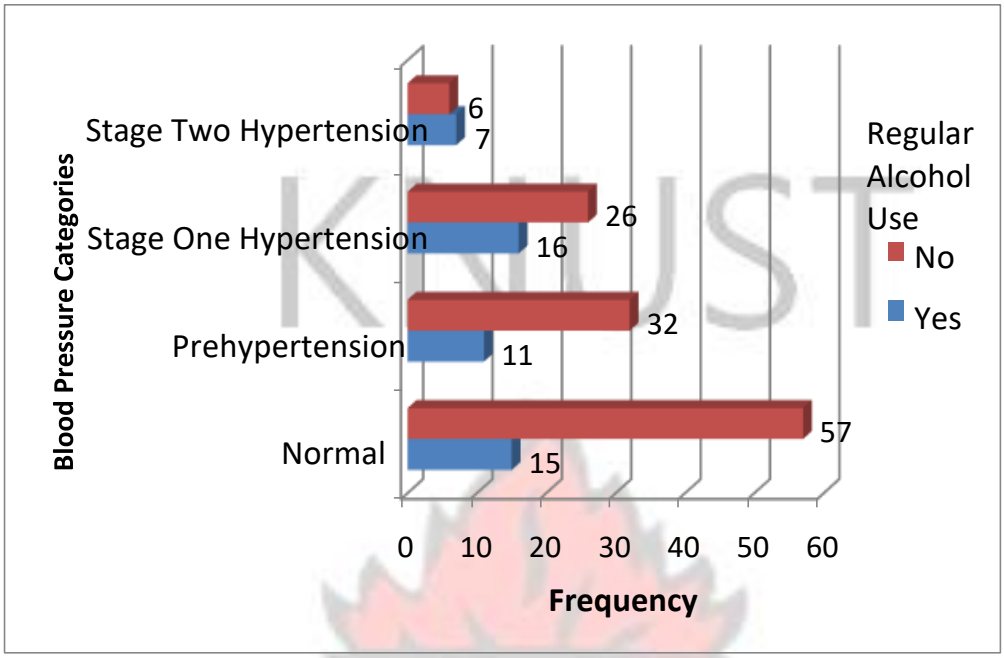


Figure 4.4: Regular Alcohol use compared with Blood Pressure Measurements

Sixteen (38%) of the 42 participants with BP levels classified as stage one on recruitment were regular alcohol users and 4(9.5%) were smokers. None of the participants with BP classified as normal and prehypertension were smokers (Figure 4.3; 4.4).

Table 4.3: Comparing BP Categories with Risk Factors

	Normal	Pre-hypertension	Stage 1 Hypertension	Stage 2 Hypertension	Fishers Exact Test p-Value
Family History of hypertension	N	N	N	N	
Yes	19	13	9	4	0.596
No	31	20	17	3	
Don't Know	22	10	16	6	
Salty food					
Yes	30	15	13	5	0.703
No	42	28	29	8	
Physical inactivity					
Yes	47	29	23	8	0.623
No	25	14	19	5	

Regular Alcohol use					
Yes	15	11	16	7	0.045
No	57	32	26	6	
Intake of fried foods					
Yes	31	19	17	4	0.703
No	41	24	25	9	
Smoking					
Yes	0	0	4	1	0.008
No	72	43	42	13	
Age 18-25		14	5	3	0	
26-35		22	9	12	1	
36-45		19	11	8	6	0.024
46-55		8	8	12	3	
56- 65		6	5	7	3	
66 and above		1	5	1	1	
BMI						
Underweight		5	2	3	1	
Normal		38	15	12	7	0.245
Overweight		19	14	16	2	
Obesity		1	7	2	3	

*Fischer's exact test: $p<0.05$ is statistical significant Smoking and regular usage of alcohol were found to be significant risk factors for hypertension, ($p=0.008$) and ($p=0.045$) respectively. There was no other association between other risk factors and blood pressure measurements obtained except age (Table 4.3).

4.1.4 Awareness of Lifestyle Modification for the Prevention of Hypertension

Table 4.4: Participants Awareness of Life Style Modification for the Prevention of Hypertension

Lifestyle modifications	**n (%)**
Aerobic Exercise At least 30 Minutes Per Day, Four Days Per Week	44 (26)

Limiting Alcohol Intake	40 (23)
Avoiding Cigarette Smoking	38 (22)
Lose weight if obese	34 (20)
Reducing Your Dietary Salt to Less Than 2.4g Per Day	33 (19)
Eating A Diet High in Fruits, Nuts and Vegetables and Low in Fat	26 (15)

Out of the 170 clients screened 44 (26%) and 33(19%) were aware that exercising and reducing salt intake could help prevent hypertension (Table 4.4). These values are lower than that obtained in a study in Guiarat, India; where out of a simple random sample of 500 adults in the general population 63.6% and 40% were aware of exercising and reducing salt intake respectively as life style practices that would aid in the prevention of hypertension (111).

**Excellent – Awareness of all six lifestyle modifications : *Very Good – Awareness of 5 lifestyle modifications ;*Good- Awareness of 4 lifestyle modifications *Average – Awareness of 3 lifestyle modifications ; *Poor- Awareness of 2 lifestyle modifications ; *Very Poor – Awareness of one or none six lifestyle modifications*

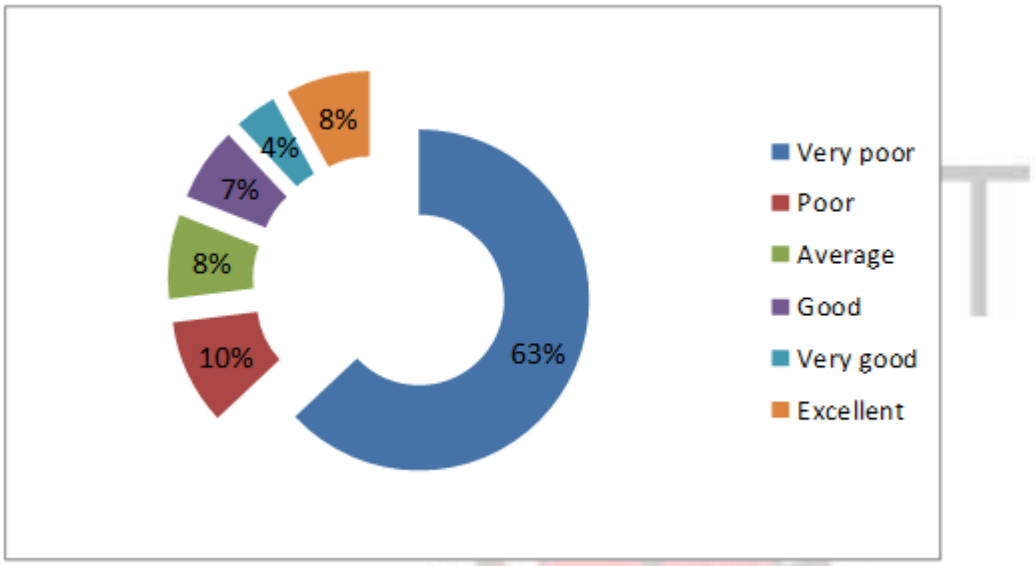


Figure 4.5 Participants Overall Awareness of Lifestyle Modification for the Prevention of Hypertension

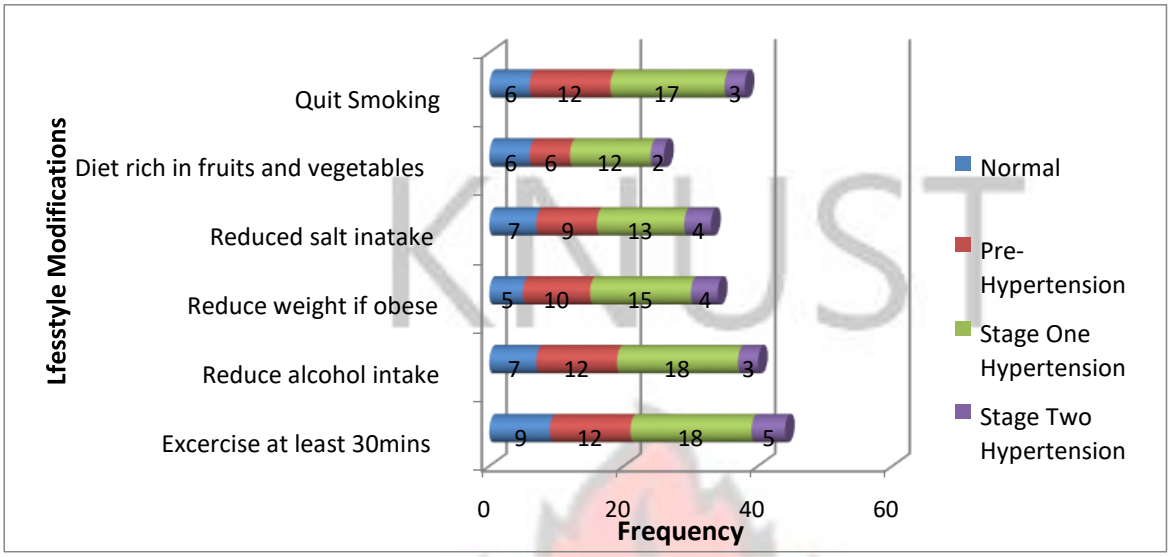
Overall mean awareness score on life style modification for prevention of hypertension was 1.99 ± 1.797. More than 70% of participants had poor knowledge on life style practices for the prevention of hypertension (Figure 4.5).

Table 4.5: Subjects' Awareness on Life Style Modification for Preventing Hypertension with Life Style Practices

Knowledge on lifestyle modification	Exercise least 30n		Reduced quantity of alcohol		Quit smoking		if obese	weight	Reduced salt in ta		Diet rich in fruits and vegetables		p-Value
Lifestyle practice	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Salty Food Intake													
Yes	18	43	14	47	12	49	12	49	10	50	6	55	0.104
No	43	63	25	81	24	82	21	85	22	84	19	87	
Exercise													
Yes	14	49	11	52	13	50	10	53	10	53	7	56	0.672
No	30	77	29	78	25	82	24	83	23	83	9	88	
Alcohol Consumption													
Yes	14	35	12	37	11	38	9	40	6	43	5	44	0.113
No	30	91	28	93	27	94	25	96	27	93	21	100	
Intake of Fried Foods													
Yes	17	54	19	52	17	54	18	53	15	55	11	60	0.345
No	27	72	21	78	21	78	16	83	18	81	15	84	
Smoking													
Yes	3	2	3	2	3	2	2	3	1	4	0	5	0.043
No	42	124	37	128	35	130	32	133	32	132	26	139	

*Fischer's exact test: $p<0.05$ is statistical significant

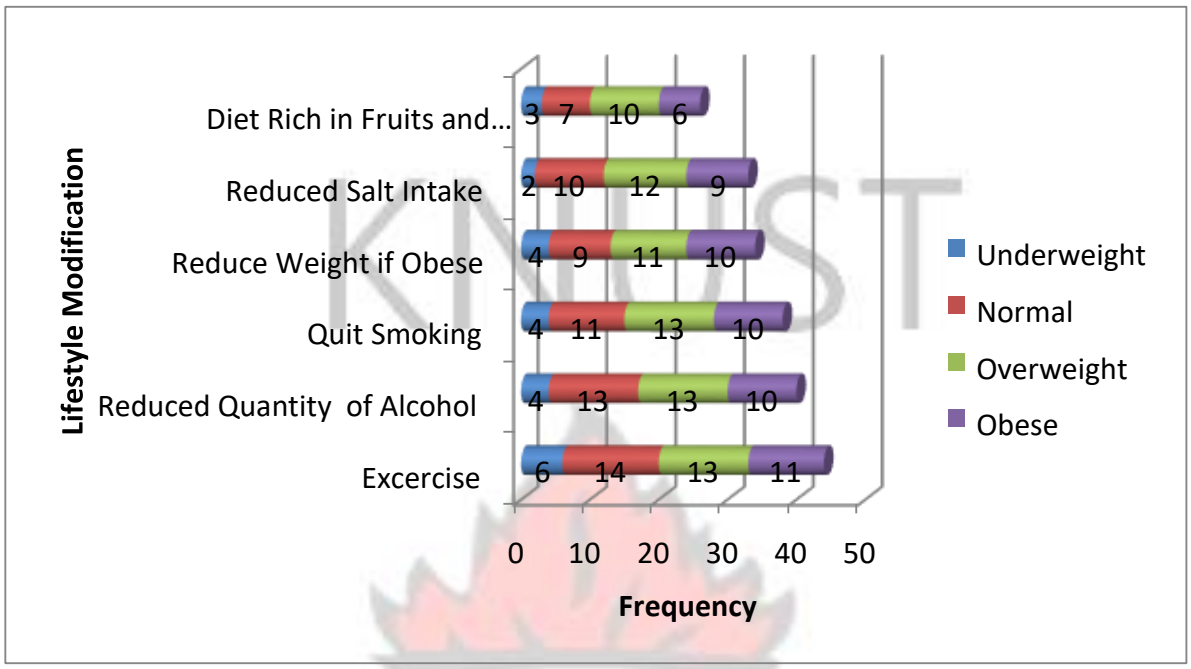
There was a significant association between clients awareness on life style modification and smoking status (12.198; p=0.043). Although 3 subjects were aware of cigarette smoking as a risk factor for hypertension they still smoked. There was no other association between other life style practices and awareness of these practices. Of the 32 subjects who were aware that reducing dietary salt intake could help prevent hypertension, 10 (31%) reported liking salty food intake and 22 (69%) report that they did not (Table 4.5). This implies that, creating awareness on these life style practices does not necessarily mean that everyone would easily adhere to them. Monitoring and follow-ups may be needed to encourage adherence to these life style modifications.



*Fischer's exact test: $p<0.01$ is statistical significant

Figure 4.6 Client's Awareness of Life Style Modification with BP Categories

Subjects who were classified as prehypertension and stage 1 hypertension had better knowledge on all the lifestyle modification that could aid in the prevention of hypertension than those classified as normal (Figure 4.6).



*Fischer's exact test: p=0.148 is statistical significant

Figure 4.7 Client's Awareness of Life Style Modification compared with BMI Categories

Subjects who were overweight had better knowledge on these life style modifications than those whose BMI were normal. Ten patients who were obese were aware that reducing weight if obese, quitting smoking, and reducing quantity of alcohol intake could aid in the prevention of hypertension respectively. There was no significant association between client's knowledge on life style modification and BMI categories obtained from the screening process (Figure 4.7).

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4.1.5 Source of Information on Life Style Practices for the Prevention of Hypertension

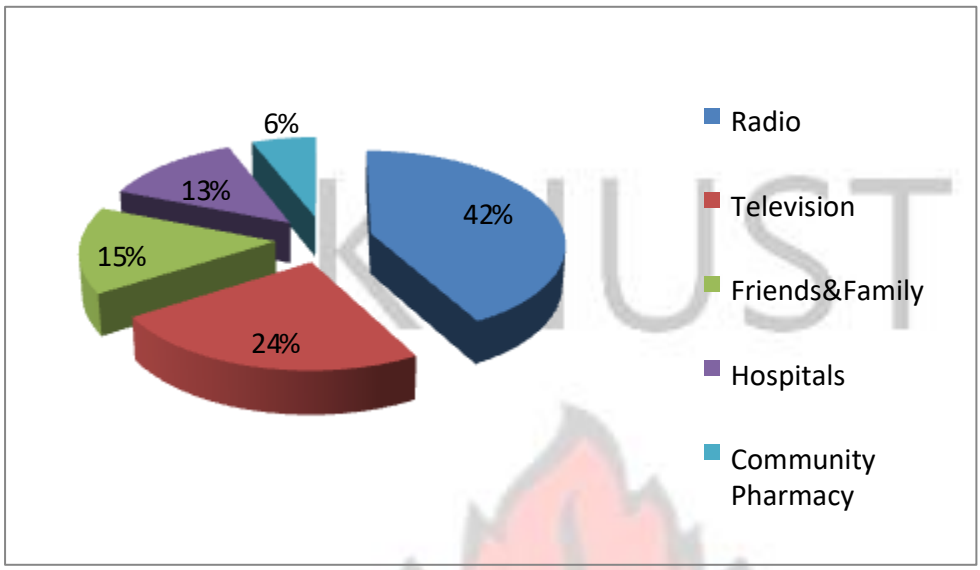

Figure 4.8: Source of Information on Life Style Modification for the Prevention of Hypertension

The common source of information on life style practices for the prevention of hypertension cited by respondents was the radio (42%) and the rare sources were the community pharmacy (6%) and hospitals (13%). The Health Professions Regulatory Bodies Act 857 (Pharmacy Section) is silent on preventative activities by pharmacists, although health promotion and disease preventative activities are part of the pharmacy curriculum for training pharmacists (57).

4.1.6 Referrals and Follow Up

Table 4.6: Summary of follow up and referrals

	No of patient Screened	Followed up	Missing/lost to follow up	Referred	Antihypertensive prescribed
Normal	72	0	0	0	0
Prehypertension	43	28	15	14	0
Stage one hypertension	42	32	10	21	4
Stage two hypertension	13	0	0	13	6
Total	170	60	25	48	10

Twenty-eight (66%) of 43 subjects whose initial blood measurement was categorised as prehypertension were reached for follow up and 14 of these (50%) were referred with blood pressure levels >140/90 (Table 4.6). Ten out of the 14 (71%) reported back with no antihypertensive prescribed and 4 (29%) did not show up. With regard to 42 subjects whose initial blood pressure was classified as stage one hypertension, 32 subjects (77%) were followed up for subsequent measurements. Although 21 subjects were referred, 6 of these (29%) were reluctant to visit the hospital, 4 (19 %) reported back with antihypertensive medicines. No antihypertensive medicines were prescribed for 9 (42%) and 2 (10%) did not report back. All 13 patients, whose initial blood pressure measurements indicated stage 2 hypertension were immediately referred and 6 (46%) reported back with hypertensive medicines. In total ten (5.8 %) out of the 170 clients who were referred to the hospital were diagnosed with hypertension and antihypertensive agents were prescribed. In a similar study conducted in two community pharmacies in the USA, 6(5.8%) out of 103 clients screened were diagnosed with hypertension and medicines were prescribed (71). Although the percentages of clients who were diagnosed with hypertension after referral from a community pharmacy based screening are small it aids in the early detection of hypertension. Patients with prehypertension were mostly lost to follow up, probably because the first follow up occurred six months after the first encounter. Another reason why follow up appointments were missed was that in some instances the telecommunication

coverage was poor, hence some clients were unreachable. Some patients also complained of lack of transport fare to the community pharmacy since they lived in surrounding towns and not within the community where the pharmacy was situated.

Further research on how best these patients could be followed up should be studied.

4.1.7 Life style modifications adopted and practised by patients with prehypertension

Table 4.7: Lifestyle Modifications Changes Among Clients with Prehypertension (N=28)

Risk factor	Pre Intervention	Life style modification adopted	Post Intervention	McNemar test p Value
Obese/Overweight	15	Weight loss	5	0.008
Alcohol intake	11	Reduced alcohol intake	7	0.016
Physical Inactivity	21	Increased physical activity	12	0.12

Life style modifications practised by subjects with prehypertension after 6 months were weight loss 5 (11%), reduced alcohol intake 7 (16%), increased physical activity 12 (28%) and reduced salt intake 10 (23%). (Table 4.8)

4.1.8 Acceptance of Service by Pharmacy Staff

Two of the three pharmacists were females whilst two of the three MCAs were males. All three pharmacists and three MCA were of the view that the community pharmacy is a feasible setting for screening and detection of hypertension if the right structures are put in place. These right structures include guidelines for the implementation of the service, list of referral centers and remuneration for pharmacy staff. It is also appropriate due to easy accessibility for providing information on life style practices to prevent hypertension. However, challenges cited by the pharmacy staff were time constraints, increased work load, language barrier and reluctance of participants to visit the hospital on referral.

*Some patients are usually in a hurry to leave the pharmacy as most of them visit the community pharmacy to quickly collect or purchase medicines to relieve an ailment. Time for any other thing such as education/screening for hypertension is often seen as a waste of time. (**P1)***

*The challenge is the time it demands to offer this service when the pharmacy is filled with patients with prescriptions and complaints **(M2)***

*Some patients were reluctant to visit the hospital after referral because they did not feel sick or their national health insurance had expired. (**P3**)*

Two of the pharmacists involved in the study agreed to offer the service for free whiles one pharmacist and all three MCAs did not. All three pharmacists and MCAs were of the view that the service was acceptable to most screened clients.

*Yes, Majority of the clients appreciated that it was free, and I gained more trust from screened clients which improved the patient-community pharmacist relationship. **(P2)***

***NB:** P1 -Pharmacist 1; P2- Pharmacist 2 P3-Pharmacist 3; M2: Medicine Counter Assistant 2*

4.2 Evaluation of the Pharmaceutical Care Of Hypertensive Patients

4.2.1 Recruitment and Follow up

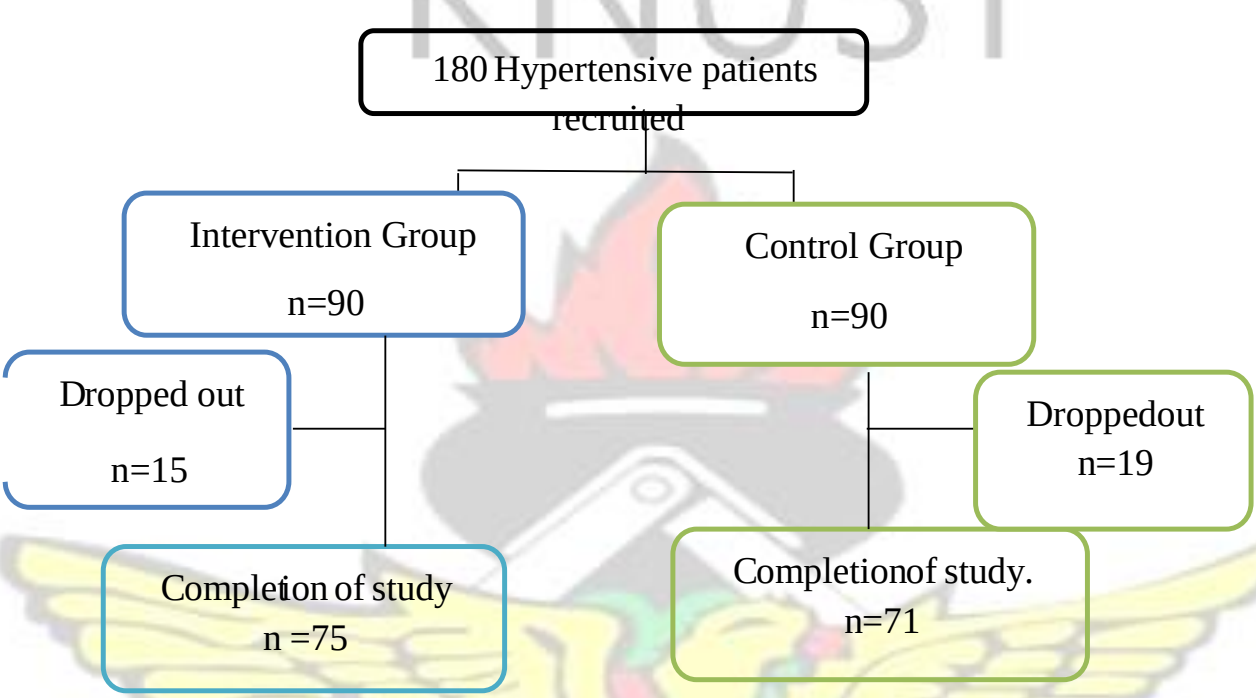

Figure 4.9: Recruitment and Follow up

One hundred and eighty hypertensive patients were recruited. Eight patients in the Intervention Group (IG) dropped out of the study because they moved out of the region whiles 7 patients were not reachable for subsequent follow-ups. Nineteen patients in the Control Group (CG) group were dropped because there were unreachable for follow up after 6 months.

4.2.2 Demographics Characteristics of Subjects

Table 4.8: Demographic Characteristics of Subjects

Demographic Characteristics		IG	CG	Total	Exact .sig 2-sided (p value)
		n (%)	n (%)	N (%)	
Sex	Male	33(44)	29 (40.8)	62 (42.4)	0.700
	Female	42(56)	42 (59.2)	84 (57.6)	
Age	36-45	12 (16.0)	15 (21.1)	27 (18.4)	0.166
	46-55	22 (29.3)	26 (36.6)	48 (32.8)	
	56-65	28 (37.3)	23 (32.4)	51(34.8)	
	Above 65	13 (17.3)	7 (9.9)	20 (14.0)	
Educational Background	No education	10 (13.3)	8 (11.3)	18 (12.3)	0.497
	Basic	14 (18.7)	10 (14)	24 (16.4)	
	Middle School	17 (22.6)	19 (26.7)	36 (24.7)	
	Secondary	18 (24)	20 (28.2)	38 (26.1)	
	Tertiary	16 (21.3)	14 (19.7)	30 (20.5)	

$p<0.05$ is statistically significant

The mean age for the Intervention Group (IG) was 56.56 ± 9.197 whilst that for the Control Group (CG) was 53.45 ± 8.299. Forty-two (56%) and 42 (59.2%) of patients in the IG and CG were females respectively (4.8) indicating that more than 50% of our study sample was females 323(63%). This compares well with studies among hypertensive patients in Thailand, USA and Canada where more than 50% of the population sampled were females (107), this may imply that the incidence of hypertension may be higher in women. An appreciable proportion of subjects in both the IG [18 (24%)] and the CG [20(28.2%)] had secondary education. Comparing the IG with the CG there was no significant difference between the demographic characteristics at baseline (Table 4.8).

4.2.3 Clinical Characteristics of Respondents at Baseline

Table 4.9: BMI, Systolic and Diastolic Blood Pressure

	IG				CG				Sum of squares	Df	P-Value
	Min	Max	Mean	Std.Dev	Min	Max	Mean	Std.Dev			
1	114	221	SBP 152.3 0.149	19.5193	106	233	147.20	23.2576	967.71		
DBP	60	112	87.60	11.9704	64	116	90.74	11.9865	354.996	1	0.118
BMI	15.40	43	27.52	5.3359	12.80	38.0	27.51	5.335	3564.68	0.00	0.984

Seventeen (22.7%) and 15 (21%) subjects of the IG and CG had diabetes respectively. Diabetes is also a common complication among patients with hypertension. In total 32% of subjects in this study had diabetes whiles a study in Ethiopia reports that 42% percent of the hypertensive patients sampled had diabetes (112).

The mean systolic blood pressure for the IG was 152.3± 19.519 whiles that for the CG was 147.2 ± 23.257 (Table 4.9). There was no significant difference between the mean SBP, DBP and BMI at baseline for the two groups.

Table 4.10: Blood pressure and BMI categories

Blood Pressure Categories	IG	CG	Total	Exact .sig (2sided (p value)
	n (%)	n (%)	N (%)	
Normal	8 (10.7)	7 (9.9)	15 (10.3)	
Prehypertension	23 (30.7)	25 (35.2)	48 (32.7)	
Stage One Hypertension	27 (36.0)	24 (33.8)	51 (34.9)	0.952

Stage Two Hypertension	17 (22.7)	15 (21.1)	32 (22.0)	
BMI Categorises				
Underweight	3 (4)	1 (1.4)	4 (2.7)	
Normal	36 (48)	29 (40.8)	65 (44.5)	0.567
Overweight	21 (28)	25 (35.2)	46 (31.5)	
Obese	15 (20)	16 (22.5)	31 (21.4)	

*p<0.05 is statistically significant

There was no significant difference between the BP and BMI categories at baseline for the two groups. Obesity is a common clinical characteristic among hypertensive patients. [88, 90] Seventy-seven (52.7%) of subjects were either obese or over weight (Table 4.10). Obesity in association with hypertension significantly increases the risk of other cardiovascular and renal diseases. Although the mechanism is not fully understood it is thought that in obese hypertensive patients, there is an increase in the activation of the renin angiotensin system, sympathetic activity and increase in sodium reabsorption resulting in volume expansion and an increase in blood pressure (113).

4.2.4 Medicines Prescribed for the Management of Hypertension at Baseline

Table 4.11: Combination of Classes of Antihypertensive Prescribed

Class	IG n (%)	CG n (%)
Calcium Channel Blocker , Thiazide Diuretic ,ACE Inhibitor, Alpha blocker	1 (1.3)	
Calcium Channel Blocker , Thiazide Diuretic, Angiotensin 2 Receptor Blocker		3 (4.2)
Calcium Channel Blocker , Thiazide Diuretic, ACE Inhibitor		1(1.4)

Calcium Channel Blocker, Beta blocker, Centrally acting Vasodilator		1(1.4)
Calcium Channel Blocker, Beta blocker, ACE Inhibitor		1(1.4)
Calcium Channel Blocker, ACE Inhibitor	14 (18.7)	11(15.5)
Calcium Channel Blocker , Thiazide Diuretic	11 (14.7)	8(11.3)
Calcium Channel blocker ,Beta blocker	7 (6.7)	1(1.4)
Thiazide Diuretic ,ACE Inhibitor	4 (5.3)	
Beta Blocker , Thiazide Diuretic	1(1.3)	
Thiazide Diuretic , Angiotensin II Receptor Blocker	1(1.3)	
Thiazide Diuretic, Alpha Blocker	1(1.3)	
Calcium Channel Blocker ,Angiotensin II Receptor Blocker		1(1.4)
Calcium Channel Blocker, Centrally acting Vasodilator		2(2.8)
Calcium Channel Blocker only	29 (37.3)	35(49.3)
Angiotensin II Receptor Blocker only	3 (4.0)	
ACE Inhibitor only	1(1.3)	5(7.0)
Centrally Acting Vasodilator only	1(1.3)	1(1.4)
Thiazide Diuretic only	1(1.3)	
Beta blocker only		2(2.8)
Total	**75**	**71**

Medicines	**IG n (%)**	**CG n (%)**
Nifedipine, Methyldopa ,Bendrofluazide, Lisinopril	1(1.3)	
Nifedipine ,Bendrofluazide, Losartan		2 (2.8)
Nifedipine ,Bendrofluazide, Lisinopril		1 (1.4)
Amlodipine ,Atenolol , Lisinopril		1 (1.4)
Amlodipine ,Atenolol , Methyldopa		1 (1.4)
Nifedipine ,Lisinopril	6 (8.0)	6 (8.5)
Nifedipine, Bendrofluazide	6 (8.0)	3 (4.2)
Amlodipine, Bendrofluazide	3 (4.0)	4(5.6)
Amlodipine ,Propranolol	3 (4.0)	
Amlodipine , Lisinopril	2 (2.6)	5(7.0)
Nifedipine, Atenolol	2 (2.6)	1(1.4)
Nifedipine, Losartan	2 (2.6)	
Nifedipine, hydrochlorothiazide	2 (2.6)	
Atenolol ,Bendrofluazide	1 (1.3)	
Candesartan ,Hydrochlorothiazide	1 (1.3)	

Bendrofluazide, Losartan	1 (1.3)	
Carvedilol , Amlodipine	1 (1.3)	
Felodipine , Hydrochlorothiazide	1 (1.3)	
Felodipine, Lisinopril	1(1.3)	
Losartan , Amlodipine	1(1.3)	
Lisinopril, Furosemide	1(1.3)	
Lisinopril, Hydrochlorothiazide	1(1.3)	
Lisinopril, Bendrofluazide	1(1.3)	1(1.4)
Methyldopa , Hydrochlorothiazide	1(1.3)	

Table 4.12: Individual Medicine combinations for the Management of Hypertension

Medicines	IG n (%)	CG n (%)
Methyldopa , Nifedipine		2 (2.8)
Nifedipine , Losartan	1(1.3)	1(1.4)
Ramipril , Nifedipine	1 (1.3)	
Nifedipine	18 (24.0)	28 (39.4)
Amlodipine	8 (10.7)	8 (11.3)
Losartan	3 (4.0)	
Bendrofluazide	1(1.3)	
Felodipine	1 (1.3)	
Lisinopril	1 (1.3)	5 (7.0)
Carvedilol	1 (1.3)	
Atenolol		1 (1.4)
Methyldopa	1 (1.3)	1(1.4)

The mean number of medicines prescribed for the management of hypertension in the IG was 1.57 ± 0.573 (Range 1-4). In the CG the mean number of medicines prescribed was 1.46± 0. 628 (Range 1-3). Calcium channel blockers were the commonest group of antihypertensive prescribed and nifedipine was the commonest antihypertensive in both the IG and the CG (Table 4.11; Table 4.12). Calcium channel blockers were the common classes of antihypertensive prescribed both as a monothearpy or combination therapy. This is in line with the management of primary hypertension recommended by the Ghana standard treatment guidelines and the National Institute of health and Clinical Excellence Guideline (NICE) (19, 20). Furthermore, a meta-analysis of fifteen trials suggested that black hypertensive patients generally respond well to calcium channel blockers and diuretics than other antihypertensives (114). Among some hypertensive patients studied in Turkey the common classes of antihypertensive prescribed were ACE Inhibitors and diuretics (89). This pattern differs slightly from the results of this study probably due to the fact that Caucasians have high amounts of renin and respond well to ACE inhibitors (115).

About 45% of subjects were prescribed combination therapies. In some studies, in Nigeria, India and Turkey, the proportion of hypertensive patients prescribed combination therapies ranged from 30-60% (87, 89,116,117,118). Hypertensive patient are commonly prescribed combination therapies and this is appropriate because these combination therapies tend to be more effective (119). In addition, similar and fewer side effects may be experienced with combination therapy than high dose monotherapy. A meta-analysis of eleven thousand hypertensive subjects from 42 trials found out that combining medicines from two different classes reduced the blood pressure five times greater than doubling the dose of one drug (120). The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) further reports that a high proportion of subjects on two or more antihypertensive had their blood pressure controlled to 140/90 than patients who were on monotherapy (39).

Six subjects (8% in the IG and 9 subjects (12.7%) in the CG group were prescribed aspirin.

The use of low dose aspirin in hypertensive patients is further backed by the Hypertension Optimal Treatment (HOT) study in which 19,000 hypertensive patients were randomised to either high or low dose aspirin or placebo. The results of the study showed that low dose aspirin reduces the risk of major cardiovascular events. However, its use is limited due to the fact that long term use is associated with gastrointestinal bleeding (121).

4.2.5 Knowledge on the Administration of Antihypertensive Medicines at Baseline

Table 4.13: Awareness on Antihypertensive Administration

	IG	CG	Total	Exact (2sided)	.sig (p - value)
Awareness of	**n (%)**	**n (%)**	**N (%)**		
Name	56 (74.7)	50 (70.4)	106 (72.7)	0.655	
Dosage	65 (87.0)	61 (85.9)	126 (86.3)	0.895	
Duration	69 (92.0)	49 (69.0)	118 (80.8)	0.000	
Side-effects	23 (30.7)	26 (36.6)	49 (33.6)	0.446	
Purpose	58 (77.3)	56 (78.9)	112 (76.7)	0.822	

McNemar test: p<0.05 is statistically significant

In total eighty-one percent, 77%, 73% and 43% of subjects could recall the duration, purpose, name and the side effects respectively of at least one antihypertensive prescribed (Table 4.13). Out of 227 hypertensive patients surveyed in Turkey 97%, 80%, 64% and 43% were aware of the duration, purpose, name and side effects of antihypertensive dispensed respectively (87). Seventy-seven percent (n=1015) of hypertensive patients in France knew the names of their antihypertensive 8whiles 43% of respondents (n=28) in Canada were aware of side effects of antihypertensive dispensed (88). This may imply patients are mostly cognisant of the name, purpose and duration of therapy of their antihypertensive and not the side effects. It is essential that patients are made aware of some common side effects of their antihypertensive as unwarranted anxiety could be reduced when patients' starts experiencing these side effects. With regard to patients' awareness of the name of antihypertensive every patient should be mindful of this feature as this could decrease some dispensing errors. Some staff of the pharmacy may make mistakes whiles dispensing, and if patients are mindful of the names of their anti-hypertensive queries could be made and any blunders amended.

**A total of 6 marks was graded excellent; 5 was graded very good; 4 above average; 3 average; 2 poor; and 0 to 1 very poor.*

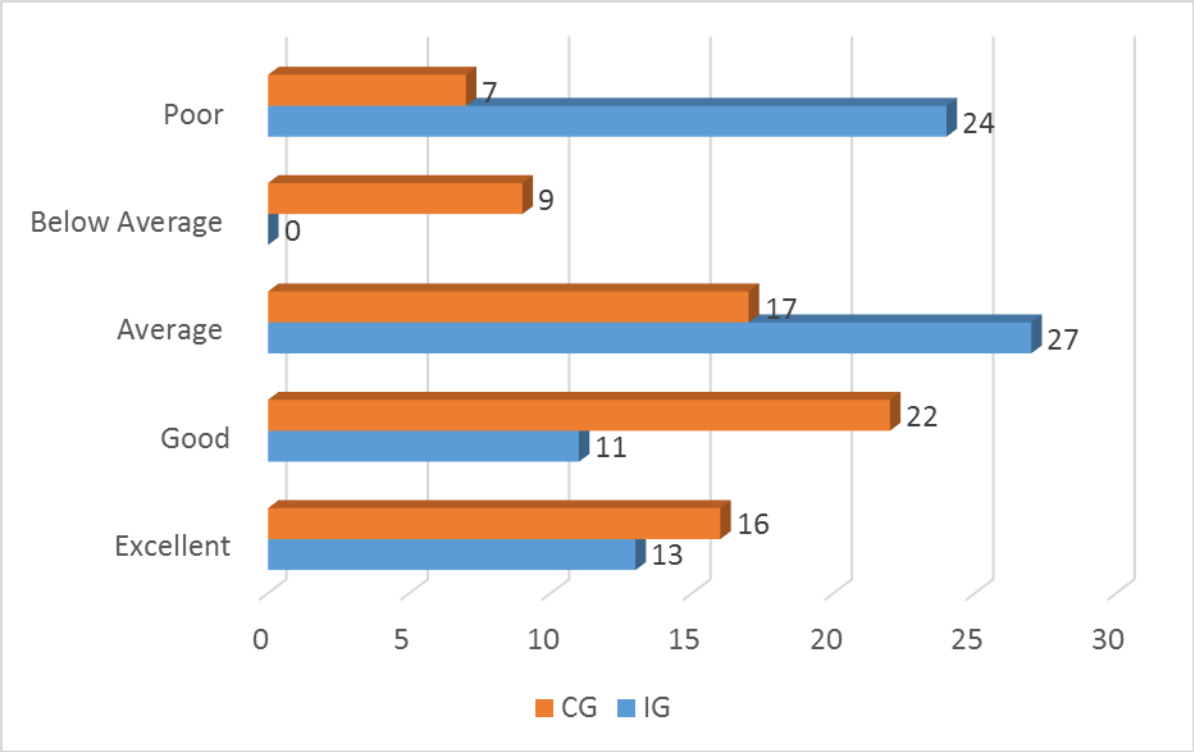

Figure 4.10: Overall subjects' Awareness on Antihypertensive Administration at Baseline

The mean score on the awareness of administration of antihypertensives in the IG was 3.1733±1.070 whilst that for the CG was 3.4366 ±1.251. A high proportion of patients within the IG had an average score on the awareness of administration of antihypertensives. However, there was no significant difference in the mean scores on the awareness of antihypertensive administration (2.528; f=1.875; p=0.173) (Figure 4.10). The mean antihypertensive administration awareness score obtained was approximately 3 out of 5 for both the IG and the CG. From these scores, patients' awareness on the administration of antihypertensive at baseline can be graded as above average.

Subjects' awareness of the administration of medicines should be improved as studies have found out that these could improve blood pressure control and adherence to therapy (123).

Physicians and pharmacists, by virtue of their training are to offer education on the administration of medicines, but the pharmacist, who is the custodian of medicines, is more qualified to provide such education. In addition, the last individual the patient frequently sees before leaving the health care facility is the pharmacist. The seventh report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC VII) advocates that pharmacists should be encouraged to monitor patients' use of medications and offer information that would prevent drug interactions and possible adverse effects (21).

In Ghana, there are no polices or guidelines concerning how and who should educate hypertensive patients about their medication. In most community pharmacies and hospitals, patients are counselled at the counter when medicines were dispensed. Often any member of the pharmacy staff available could offer counselling, and hardly is written educational information given. Furthermore, medication labels are mostly handwritten. There is the need to study an intervention that would improve medication counselling especially for hypertensive patients of low level of education. This counselling should be patient centred and be conducted in a conducive environment.

Table 4.14: Side Effects Cited By Subjects at Baseline

	Side Effects	**IG n**	**CG N**
Amlodipine	Headache	5	4
Lisinopril	Dizziness	8	5
Bendrofluazide	Frequent urination	7	5
Losartan	Headache	3	0
	Sexual dysfunction	1	
Nifedipine	Headache Dizziness	15 4	17 2
Methyldopa	Impotence	1	2
Atenolol	Dizziness	1	1

Side effects cited by respondents include headache for amlodipine and frequent urination for bendrofluazide (Table 4.14).

4.2.6 Patients' Practices and Awareness of Life Style Modification at Baseline

4.2.6.1 Unhealthy life style Practices

Table 4.15: Unhealthy Lifestyle Practices of Subjects at Baseline

	IG n (%)	CG n (%)	Total N (%)	Exact (2sided value)	.sig (p
Smoking	2 (2.7)	0 (0)	2	0.001	
Consumption of salty foods	28 (37.3)	19 (26.8)	47 (32.1)	0.215	
Alcohol					
Regular	8 (10.6)	9 (12.7)	17 (11.6)	0.001	
Occasional	10 (13.3)	23(32.4)	33 (22.6)		
Intake of fried foods	25 (33.3)	45 (63.4)	70 (47.9)	0.682	
Lack of exercise	24 (32.0)	32 (45.1)	56 (38.4)	0.058	

$p<0.05$ is statistically significant

Acceptance of healthy life style practices by hypertensive patients form an integral part in the management of their disease. Common unhealthy lifestyle practices recorded were consumption of salty foods, lack of exercise and regular alcohol use (Table 4.15). The proportion of patients who smoked were significantly greater in the IG whilst the proportion of patients who drunk alcohol were significantly greater in the CG (4.15), poor life style practices such as regular intake of alcohol, increased consumption of salty food and cigarette smoking have also been reported among hypertensive patients in Nigeria (124). Hypertensive patients should be supported to adopt healthy lifestyle as these modifications enhance efficacy of antihypertensives, reduce

blood pressure and decrease cardiovascular risks. In addition, a combination of two or more life style modification promotes better outcomes.

4.2.6.2 Awareness of Lifestyle Modifications

Table 4.16: Awareness of Lifestyle Modification for the Prevention of Hypertension at Baseline

Life Style Modifications	IG	CG	Total	Exact. sig (2sided (p value)
	n (%)	n (%)	N (%)	
Aerobic Exercise At least 30 Minutes Per Day, Four Days Per Week	34(45.3)	37 (52.1)	71 (48.6)	0.734
Reducing Your Dietary Salt to Less Than 2.4g Per Day	58 (77.3)	50 (70.4)	108(74.0)	0.353
Limiting Alcohol Intake	40 (53.3)	38 (53.5)	78 (53.4)	0.815
Avoiding Cigarette Smoking	21 (28.0)	33 (46.5)	54 (37.0)	0.026
Eating A Diet High in Fruits, Nuts and Vegetables and Low in Fat	33 (44)	50 (70.4)	83 (56.8)	0.446
Lose weight if obese	29 (38.7)	32 (45.1)	61 (41.8)	0.141

$p<0.05$ is statistically significant

In the study subjects knew of lifestyle modification adjunct to the management of hypertension such as avoidance of cigarette smoking (37%), regular exercising (49%), reduced alcohol intake (53%), eating a diet high in fruits, vegetables and low in fat (57%) and reduced salt intake (74%) (Table 4.16). In the United States hypertensive patients (N=28,457) have reported receiving advice on life style modification adjunct to medicines for the management of hypertension. These include regular exercise (78%) reduced alcohol intake (43.5%) healthy eating habits (61.9%) and reducing salt intake (69.3%) (125). Thirty percent (30%) of hypertensive patients interviewed in South Africa reported that they were aware of the benefits of exercise, 69% were aware of

reduced salt intake and 50% were aware of a balanced diet. Forty-four percent of subjects were aware of reduced alcohol intake and 35% were advised on cigarette smoking cessation (123). Life style practices that patients are less familiar with are often reduced alcohol intake and smoking cessation, probably because counselling on life style modification are more directed toward hypertensive patients who practice these lifestyles. However, this should not be the case, every hypertensive patient should be made aware of these lifestyle modification so that any future tendencies could be curtailed Comparing the IG with the CG there was a significant difference ($p= 0.026$) in the proportion of patients who were aware that avoidance of cigarette smoking was a lifestyle modification for prevention hypertension (Table 4.16).

The mean score on the awareness of life style modification for the management of hypertension among the IG were 3.17 ± 1.070 whiles that for the CG was 3.4366 ± 1.250. These mean knowledge score could be graded as average. There is therefore the need to improve subject's knowledge of life style modification for managing hypertension. However, the critical question here is whose responsibility is it to ensure that the patients are efficiently educated and supported to practice life style modification important for the management of hypertension. Several interventions conducted by pharmacists, physicians and nurses have shown improvement in the patient's knowledge and practice of life style modifications (126, 127, 128). These interventions were offered during regular or quarterly visits to the hospital and consisted of face to face counselling with educational materials. To offer efficient and effective counselling on life style modification counselling it is essential that each health care facility considers its staff capacity and then decide which intervention would be appropriate so that this aspect of care for hypertensive patients is not overlooked.

4.2.7 Adherence Level of Hypertensive Patients at Baseline

Table 4.17: Assessing Adherence using the Morisky Scale

	Variables	IG n (%)	CG n (%)	Total N (%)
1	Did you at any point in time forget to take your hypertension medication?	25 (33.3)	38 (53.5)	63 (43.1)
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?	28 (37.3)	26 (36.6)	54 (36.9)
3	Did 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?	15 (20.0)	23 (32.4)	38 (26.0)
4	When you leave home, do you sometimes forget to take along your hypertension medication	19 (25.3)	33 (46.5)	52 (35.1)
5	Did you take your hypertension medicine yesterday?	64 (85.3)	37 (52.1)	110 (75.3)
6	When you felt like your hypertension symptoms were under control, did you stop taking your medicine?	16 (21.3)	31 (43.7)	46 (31.5)
7	Taking medication every day for 3 days is a real inconvenience for some people. Did you ever feel hassled about sticking to your hypertension treatment plan?	18 (24)	35 (49.3)	54 (36.9)
8	Did you have any difficulty remembering to take your hypertensive medication			
	Never	1 (0.7)	1 (1.4)	2 (1.3)
	Once in a while	42 (28.0)	41 (57.7)	83 (56.8)
	Sometimes	18 (12.3)	14 (19.7)	32 (21.9)
	Usually	10 (6.8)	4 (5.6)	14 (9.6)
	All the time	4 (2.7)	11 (15.5)	15 (10.2)

**IG;*

*[n=the number of patients within the intervention group who gave positive responses]: *CG [n= the number of patients within the control group who gave who gave a positive response] The 8th question has five options. Patients who responded the first option 'Never' attracted one mark whiles the other options attracted a 0 mark.*

Nonadherence to medication is a major concern among patients with chronic diseases. WHO estimates adherence level of 50 % among patients with hypertension. Factors associated with medication adherence are multifaceted and may relate to the patient, therapy, condition, socioeconomic or healthcare system (129). From the Morisky scale used in the study, some reasons why patients did not adhere to therapy were forgetfulness, feeling their hypertension was under control and feeling worse when they took their medications (4.17). Similar reasons for nonadherence have been identified among hypertensive patients in Nigeria. Feeling worse and feeling better after the administration of antihypertensive were reported as major reasons of nonadherence (97).

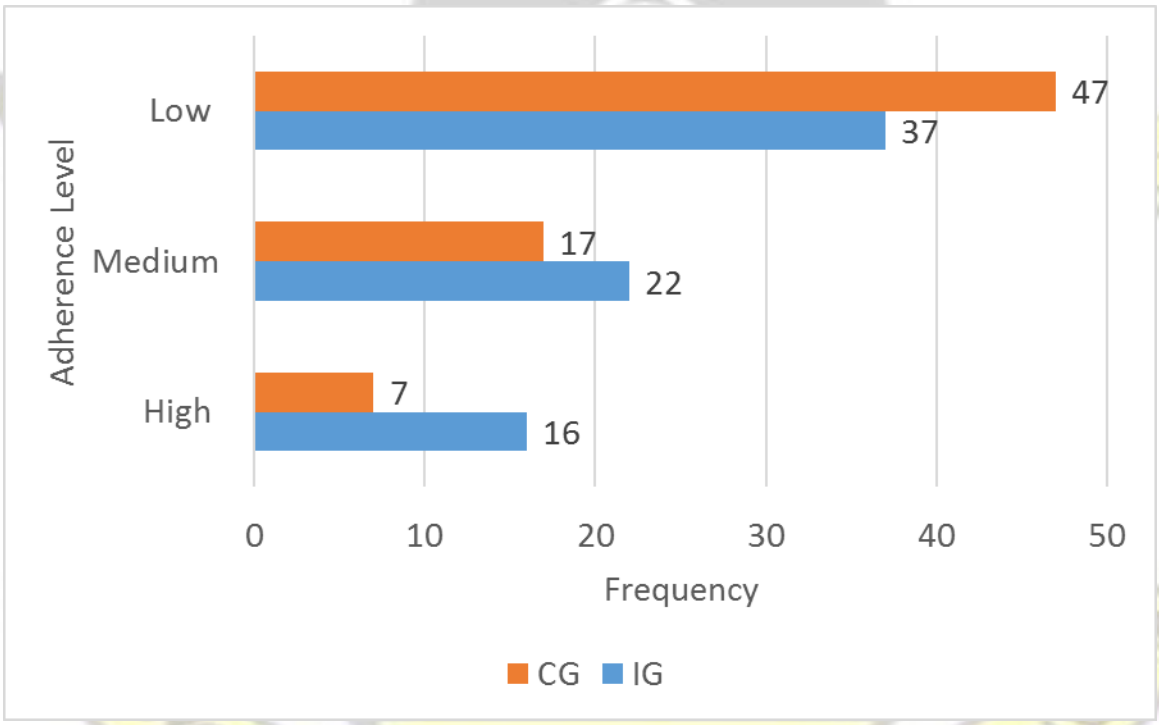

Figure 4.11: Adherence Level of Subjects at Baseline

The mean adherence scores for the IG were 5.53± 1.826 whilst that for the CG was 4.35 ±1.972 and this difference was statistically significant [50.890; df=1; p=0.01]. Sixty-two subjects (42%) (IG (n=24); CG (n=38)) had either high or medium adherence level (Figure

4.11). Other studies on hypertensive patients in Ghana have reported adherence levels ranging from 7% to 48 % (130,131). Several studies among hypertensive patients in developing countries have reported high to low adherence levels ranging from 85% to 15% (132,133,134). High adherence to antihypertensive medication is associated with better blood pressure control and reduction in healthcare costs (135). It is therefore essential that measures and polices are established to achieve high adherence levels among hypertensive patients. In most clinical settings in Ghana adherence to antihypertensive are not assessed. Hospital folders lack documentation of adherence to therapy for patients with most chronic diseases. Ideally adherence to medication should be assessed in the consultation room during each review visit before decisions on medicines are taken. Then again adherence could also be assessed by the pharmacist before medicines are dispensed. These could enable these health care personnel to identify any adherence concerns of the patient which could be addressed.

Table 4.18: Patient Related Factors and Adherence

Variables	ADHERENCE			Fishers exact test p-Value	Risk Estimate		
	Low	Medium	High		Odd Ratio (OR)	95% Confidence Interval Lower	Upper
Gender					-	-	-
Male	33	17	12	0.537	1.000	0.519	1.928
Female	51	22	42				
Age							
36-45	17	6	4	0.273			
46-55	28	9	11				
56-65	30	17	4				
Above 66	9	7	4				
Number of medicines							
Monotherapy	43	20	14	0.737	1.317	0.687	2.526
Combination Therapy	41	19	9				
Awareness on the Administration of medicines							
Name	69	25	12	0.006	0.871	0.421	1.804
Dosage	79	38	19	0.032	1.545	0.417	5.720
Duration	65	34	19	0.470	1.711	0.739	3.964
Side effects	30	9	10	0.218	0.649	0.325	1.297
Purpose	46	20	9	0.040	0.486	0.252	0.941

*p<0.05 is statistically significant

There was a significant association between patient awareness of the purpose, name and dosage of the antihypertensive prescribed and adherence (Table 4.18). A research in Turkey also showed that patient awareness of the duration and reasons of use of antihypertensive prescribed significantly increased adherence rates. However, patient's awareness of the name of the medicine did not have any effect on adherence (87).

4.2.8 Drug Therapy Problems Identified among the Intervention Group and Solutions Provided

Table 4.19: Drug Related Problems and Action Taken to resolve them.

***Action taken by the physician on referral*

Pharmaceutical care issues	n (%)	Recommendations and action taken to resolve it
Effectiveness of therapy (B)		
Patients whose blood pressure levels were above or equal to 160/100	15(20)	Referred to the hospital with recommendations such as dosage adjustments and add on therapy. **Changed dosage of antihypertensive (n=9)* **Added an additional antihypertensive (n=5)*
Aspirin prescribed when BP was not controlled.	5(6.67)	Patient referred to the hospital. **Aspirin stopped (n=3)*
Atenolol and carvedilol prescribed as monotherapy for the management of hypertension.	2(2.60)	Recommended that beta blocker changed to Calcium channel blocker or a diuretic **Beta blocker changed to a diuretic (n=2)*
Furosemide prescribed for the management of hypertension	1(1.33)	Recommended that Furosemide changed to bendrofluazide **Stopped furosemide and changed to Bendrofluazide*
Sub Total	23	
Safety (C)		
Side effects of medicines		
Drowsiness and dizziness on medicines methyldopa, nifedipine, lisinopril bendrofluazide	1 (1.33)	Advised patient to take lisinopril and nifedipine at night.
Blurred vision with hydrochlorothiazide	1(1.33)	Recommended that hydrochlorothiazide changed to CCB. **Hydrochlorothiazide changed to Nifedipine*
Headache due to Nifedipine	8(10.67)	Advised patients: To take paracetamol for headache To take nifedipine at night Two patients with persistent headache were referred. For one patient paracetamol was prescribed and the other patient nifedipine was changed to amlodipine.

Sexual weakness with methyldopa	1(1.33)	Recommended patient visit the hospital for a change of antihypertensive

Pharmaceutical care issues	**n (%)**	**Recommendations and action taken to resolve it**
		**Methyldopa not changed*
Cough due to lisinopril	3 (4.00)	Recommended that Lisinopril should be changed to losartan. **Lisinopril changed to Bendrofluazide* **Lisinopril changed to amlodipine* **Lisinopril changed to losartan*
Frequent urination due to bendrofluazide	5(6.67)	Advised patients to always take bendrofluazide in the morning
Constipation with furosemide	1(1.33)	Advised patient to take in lots of fluids and referred to the hospital for change in therapy. *Stopped furosemide and changed to Bendrofluazide*
	Sub Total 20	
Adherence (D)		
Nonadherence		
Patient has not taken medication For the past two weeks because she feels blood pressure is low. She was given lisinopril 20mg instead of 10 mg daily on her last visit to the hospital	1 (1.33)	Agreed with the patients on measures that would aid adherence to therapy, such as; • To always check blood pressure in a health facility and seek assistance when she feels her BP is low • Education on the need for continuous medication use.
Patient decided to double the dosage of Nifecard to 30mg twice daily as she was not well	1(1.33)	Recommended that patient seeks advice from a health practitioner before adjustment on dosages is done.
Patient only takes medicines when symptoms such as headache or dizziness are felt.	11(14.6)	Agreed with patients on regular medication use and offered education on the advantage of continuous medicines administration.
Stopped taking antihypertensive and currently on herbal medicines.	5 (6.67)	Advised to see herbal medicine practitioner at the Kumasi South Hospital.

Noncompliance to doctor's appointment	10(13.3)	Agreed with patient on measures that would ensure adherence to the doctor's appointment These measures were; • The pharmacist/family member reminding patients of the appointment • Seeking financial help for transportation to the hospital • Prompt renewal of national health insurance Offering education on the importance of
Pharmaceutical care issues	**n (%)**	**Recommendations and action taken to resolve it**
		adhering to the doctor's appointment.
Using antihypertensive with herbal medicine for fever	3 (4.0)	Advised patient not to take medicines together.
Patient has not taken medication because antihypertensive is finished and has not visited the hospital for a refill.	9(12.0)	Agreed with patient on measures that would ensure continuous administration of medication and ways to acquire a refill when medicines were finished. Such measures were: • Keeping the medicines pack and consulting a community pharmacist for few days refill • To visit the hospital for a refill before medicines get finished. • Pharmacist/family member reminding patients of refill appointments • Education on the importance of continuous medicines administration.
Sub Total	40	

Pharmaceutical care issues identified included noncompliance to therapy, inappropriate drug selection by the physician, side effects of antihypertensives and uncontrolled blood pressure (Table 4.19). The common care issues identified among subjects was nonadherence to antihypertensive therapy. Issues related to non-adherence to therapy were missed doses, doubling the dose of antihypertensive, out of medicines and noncompliance to doctor's appointment (Table 4.19). Some studies among hypertensive patients have also reported

nonadherence as a major care issue commonly encountered. A study in Malaysia among 477 hypertensive patients identified 146(62.1%) pharmaceutical issues related to nonadherence. Some issues related to non-adherence were forgetting to take medication and patients medicines running out (136).

Another category of pharmaceutical problems witnessed among subjects were side effects of the antihypertensives. These are pharmaceutical issues often seen among patients with chronic diseases. In Nigeria one study among 42 hypertensive patients indicated that adverse drug reaction to antihypertensive was one pharmaceutical problem addressed (83). The study in Malaysia also reports an adverse drug reaction of 15.2% (136).

In our study, headache was the common side effect associated with nifedipine (Table 4.14). Headache is one short lasting side effect of nifedipine often reported among patients with hypertension in randomised control trials assessing antihypertensive (137,138). Only three subject (15%) on an ACE inhibitor complained of drug cough (Table 4.19). About 5-35% of patients treated with ACE inhibitors have reported of dry persistent cough. ACE inhibitors exhibit their pharmacological action by competitively inhibiting the angiotensin converting enzyme responsible for converting angiotensin I to angiotensin II (A potent Vasoconstrictor). The inhibition of the enzyme results to the accumulation of bradykinin which accumulates in the lungs causing cough (139). Another patient on hydrochlorothiazide complained of blurred vision. Such side effects of hydrochlorothiazide were experienced by some patients in the HOT 2 study (121).

Some subjects were still on dispersible aspirin although their blood pressure was not optimised. Low dose aspirin is an antiplatelet and its long term use is associated with major gastrointestinal

and extracranial bleeding (20). Patients whose blood pressure are not optimised are at risk of complications such as stroke and this could be haemorrhagic if patients are on low dose aspirin. Therefore, low dose aspirin is recommended for the primary prevention of cardiovascular events in hypertensive patients aged over 50 years with a baseline CVD risk level >20% and whose blood pressure has been controlled to an audit standard of 150/90 (140).

Another drug therapy problem was the use of beta blockers as monotherapy in the management of hypertension in the black population. Beta blockers are often recommended as add on therapy when drugs such as diuretics and calcium channel blockers have not worked. (19, 21). Compared with placebo beta blockers are effective in reducing the blood pressure by reducing the heart rate due to the blockade of β1 receptors in the sino-atrial node and also decreases the cardiac contractility by blocking the β1 receptors in the myocardium (141). However, the blood pressure lowering efficacy of beta blockers are suboptimal compared to other antihypertensive (142,143). Furthermore, there is evidence that suggests that beta blockers not do not reduce mortality. The Anglo Scandinavian Cardiac Outcomes Trial-Blood Pressure (ASCOT-BPLA) which involved 19, 2572 hypertensive patients report that the atenolol based treated group showed a greater risk of stroke and coronary events compared with the amlodipine regimen (42).

One subject on hydrochlorothiazide complained of blurred vision and the pharmacist recommended that it should be changed to a calcium channel blocker and it was accepted. Another subject on methyldopa complained of sexual weakness and was referred to the hospital for a review but the methyldopa was not changed (Table 4.19).

4.2.9 End of Study Outcome Measures

4.2.9.1 Blood Pressure and BMI

Table 4.20: Paired Sampled T Test Comparing Means within the IG and the CG

Outcome	Mean Diff	Std. Deviation	Paired differences 95% confidence interval of the difference		t	df	Sig(2-tailed) Std. Error Mean
			Lower	Upper			
SBP							
IG	9.280	15.27457	1.76376	5.76564	12.79436	5.262	74	0.01
CG	1.338	15.28766	1.81431	-2.28050	4.95656	.737	70	0.463
DBP							
IG	9.040	16.21264	1.87207	5.30981	12.77019	4.829	74	0.01
CG	-.535	9.72454	1.15409	-2.83697	1.76655	-.464	70	0.644
BMI							
IG	1.463	3.76234	.43444	.59783	2.32910	3.369	74	0.01
CG	-.098	3.22254	.38245	-.86121	.66431	-.257	70	0.798

The paired sample t-test was used to determine if there was a statistically significant difference mean in study outcome measures within the IG and the CG. In the IG there was a reduction in mean SBP at the end of the study (143.04 ± 13.679mmHg) compared to baseline (152.30 ± 19.519mmHg), a statistically significant decrease of 9.280 (95% CI, 5.766 to 12.794), (t (74) = 5.262, p = 0.01). There was also a reduction in mean DBP at the end of the study (78.5867±11.5818) compared to baseline (87.60±11.9704), a statistically significant decrease of 9.040 (95% CI, 5.310 to 12.770), (t (74) = 4.829, p = 0.01). In the CG although there was a decrease of 1.388 (95% CI, 2.2805 to 4.9565) in SBP at the end of the study compared to baseline it was not statistically significant. (Table 4.9& 4.20) There was a decrease in the mean SBP, DBP and BMI level within the IG at the end of the study and this was statistically significant.

Similar outcomes were reported in a community pharmacist intervention studied in Nigeria. At the end of the study there was a decrease in the mean SBP and DBP and these were significant. ($p>0.01$) That study was a single site non-randomised study (79).

Table 4.21: Multivariate Tests comparing the mean clinical characteristics between the IG and the CG across the time period.

Effect :Time	Value	F	P – Value	Partial Eta Squared
SBP	0.891	17.610	0.01	0.109
DBP	0.908	14.572	0.01	0.092
BMI	0.963	5.515	0.02	0.037
Effect: Time*Intervention				
SBP	0.936	9.852	0.002	0.064
DBP	0.886	18.470	0.000	0.114
BMI	0.952	7.221	0.008	0.048

Table 4.22: Tests of Between Subjects Effect

Source	df	Mean Square	F	P value	Partial Eta Squared
SBP	1	101.569	.152	0.69	0.001
DBP	1	4561.064	20.250	0.01	0.123
BMI	1	46.407	1.209	0.27	.008

*Partial Eta Squared ($\eta 2$) is indicative of the effect size. [0.01-small effect; 0.06-medium effect 0.14-large effect.

To compare mean SBP, DBP and BMI between the IG and the CG a mixed between –within subject analysis of variance was conducted across two time periods (Baseline and at the end of the study). There was an interaction between the intervention and the SBP (Wilks

Lambda=.926; f=9.852 p=0.02). There was a significant effect on SBP control (Wilks Lambda = .899; f=17.61 p=0.01; partial η2=109) with both groups showing a decrease in SBP at the end of the study. However, the mean SBP difference between the two groups for the time period was not statistically significant (F =101.569, p = 0.69 partial η2 = 0.001). There was an interaction between the intervention a during the time period (Wilks Lambda = .886; f=18.470; p=0.01). There was a significant effect on DBP control (Wilks Lambda =908 f=14.572; p=0.01 partial η2 = 0.092) with the IG showing a decrease in DBP and the CG showing an increase in DBP at the end of the study. The mean DBP difference comparing the IG and the CG was significant (F =20.250, p = 0.01 partial η2 = 0.123). (Table 4.21; 4.22) Overall the intervention studied led to a mean DBP difference between the IG and the CG and this was statistically significant (p=0.01). A similar intervention (medicines review, adherence and counselling) studied among 118 hypertensive patients in Canada reported a significant reduction in SBP in the intervention group compared to placebo. The difference in the number of subjects who had their blood pressure controlled was also statistically significant. Although the average age, of participants 58years, was similar to that in our study the study was a randomised study (84).

Table 4.23: Cross Tabulation of the Intervention Offered and Achievement of BP Goal

			Did patient achieve BP goal		Total
			YES	NO	
Whether patient was given the intervention	Yes	Count	44	31	75
		% within whether patient was given the intervention	58.7%	41.3%	100.0%
	No	Count	29	42	71
		% within whether patient was given the intervention	40.8%	59.2%	100.0%

* OR, 2.509 95% CI, 1.683-3.739, p=0.02; φ .177

Cross tabulation conducted to determine the association between the intervention offered and achievement of BP control at the end of the study showed that 44(58.7%) of patients in the IG and 29 (40.8%) of patients in the CG achieved BP control. There was also a statistically significant association between the intervention offered and attainment of BP goal (p=0.02) however the association was weak (=φ .177) (Table 4.23). Subjects who were offered the intervention were more likely to achieve BP Goal than subjects who were not offered the intervention. Patients whose blood pressure are controlled to <140/90 had a low incidence of cardiovascular complications such as stroke, myocardial infarction and death (21).

Table 4.24: Blood Pressure categories at the end of the study compared with Blood Pressure categories obtained at baseline among the Intervention Group (IG)

		BP Category At The End Of The Study				Total
		Normal	Prehypertension	Stage I	Stage 2	
Blood pressure at baseline	Normal [90-119/60-79]	4	3	1	0	8
	Prehypertension [120-139/80-89]	2	17	4	0	23
	Stage 1 Hypertension [140-159/90-99]	1	15	9	2	27
	Stage 2 Hypertension >160/>100	0	3	12	2	17
Total		7	38	26	4	75

The number of subjects in the IG classified as stage 2 hypertension decreased from 17 at baseline to 4 at the end of the study whilst the number of subjects classified as prehypertension increased from 23 at baseline to 38 at the end of the study. (Table 4.24).

Table 4.25: Blood pressure categories at the end of the study compared with Blood Pressure categories at baseline among the Control Group (CG)

		BP Category at the end of the study				Total
		Normal	Prehypertension	Stage1	Stage 2	
Blood pressure at baseline	Normal [90-119/60-79]	3	1	3	0	7
	Prehypertension [120-139/80-89]	3	18	3	1	25
	Stage One Hypertension [140-159/90-99]	1	1	21	1	24
	Stage Two Hypertension >160/>100	1	1	3	10	15
Total		8	21	30	12	71

In the CG the number of patients classified as stage 2 hypertension at baseline decreased from 15 to 12 at the end of the study whilst the number of subjects classified as prehypertension decreased from 25 at baseline to 21 at the end of the study (Table 4.25).

4.2.9.2 Adherence

Table 4.26: Paired sampled T Test Comparing Mean Adherence within the IG and the CG

Outcome	Mean Diff	Std. Deviation	Paired differences			t	df	Sig(2tailed
			Std. Error Mean	95% confidence interval of the difference Lower	Upper			
Adherence								
IG	-.693	2.66089	.30725	-1.30555	-.08112	-2.257	74	0.027
CG	.408	1.50786	.17895	.05155	.76536	2.282	70	0.026

The paired sample t-test was used to determine if there was a significant difference in the mean adherence within the IG and the CG. Data are mean ± standard deviation, unless otherwise stated. In the IG there was an increase in mean adherence score at the end of the study (6.22 ± 2.109 vs. 5.57 ± 1.825), a statistically significant increase of .693 (95% CI, 1.30555 to .08112, t (74) = 2.257, p = 0.027). In the IG there was a decrease in mean adherence score at the end of the study (3.94 ± 1.835 vs.4.35 ± 1.971) a statistically significant decrease of .408 (95% CI, .05155 to .76536, t(70)= 2.282, p=0.026). (Table 4.21)

Table 4.27: Cross Tabulation between the Intervention offered and Adherence

			Did patient Adherence		Total
			YES	NO	
Was patient was given the intervention	yes	Count	53	22	75
		% within whether patient was given the intervention	70.7%	29.3%	100.0%
	no	Count	20	51	71
		% within whether patient was given the intervention	28.2%	71.8%	100.0%
Total		Count	73	73	146
		% within whether patient was given the intervention	50.0%	50.0%	100.0%

To compare mean adherence between the IG and the CG a mixed between –within subject analysis of variance was conducted across the time period [Baseline and at the end of the study]. There was an interaction between the intervention and adherence [Wilks Lambda=.939; f=9.333 p=0.003] with the IG showing an increase in mean adherence score and the CG showing a decrease in adherence scores at the end of the study. The difference in the mean adherence scores between the two groups was statistically significant [F =218. 851, p = .001 partial η2 = 0.228]. Cross tabulation conducted to determine the association between the intervention offered and adherence at the end of the study showed that 53(70.7%) of respondents were adherent. (Tab 4.22) Fischer's exact test run showed a statistically significant association between the intervention offered and adherence [OR, 6.143 95% CI, 2.998-12.586, p=0.000]. The association was moderately strong. (φ = 0.425) Subjects who were offered the intervention were more likely to adhere to treatment than subjects who were not. Some studies on pharmacist intervention on adherence have shown similar or conflicting results. There was a significant mean difference in adherence level in the intervention group compared to the group that were offered the usual care in a randomised study sample in Thailand and United Kingdom (67,69). However, a randomised controlled study by Zillch *et al* showed no significant difference in adherence between the intervention group and the group that was offered the usual care (68).

4.2.9.3 Modifications in Lifestyle style practices

Table 4.28: Self-Reported Healthy Lifestyle Practices within the IG and CG

Variables	Post Intervention N (%)	Exact Sig .(2-Tailed) p-value
Intake of salty food		
IG	15(20.0)	0.011
CG	16(22.5)	0.508
Exercise		
IG	58 (77.3)	0.01
CG	22 (31.0)	0.031
Regular alcohol use		
IG	2 (2.7)	0.01
CG	3(4.2)	0.005
Smoking status		
IG	2 (2.7)	1.000
CG	0(0)	1.102

The McNemar test run showed that the proportion of patients who consumed salty food in the IG had decreased from 28 to 15 post intervention with a statistical difference of p=0.011. In the CG although the proportion of patients who liked consuming salty food decreased from preintervention value of 19 to 16 after 6 months the difference was not statistically significant (p=0.508). The proportion of patients in IG who exercised increased from a pre-intervention value of 24 to 58 post intervention with a statistical difference of (p=0.01) (Table 4.15 &4.28).

4.2.10 Patient Satisfaction with Intervention

Table 4.29 Patient Satisfaction

Variables	SA n (%)	A n (%)	N n (%)	DA n (%)	SDA n (%)	Mean	SD
The pharmacist spends as much time with me as necessary	17 (22.7)	25 (33.3)	14 (18.7)	10 (13.3)	9 (12)	2.59	1.305
The pharmacist explains the possible side effects that medication may cause	13 (17.3)	26 (34.7)	18 (24.0)	8 (10.7)	10 (6.8)	2.68	1.264
If I have a question about my medicines a pharmacist is always available to help me	14 (18.7)	31 (41.3)	11 (14.7)	8 (10.7)	11 (14.7)	2.65	1.340
The pharmacist knows how to explain things in a way I understand	21 (28)	18 (24)	15 (20)	9 (12)	12 (16)	2.64	1.420
The pharmacist makes sure that I understand how to take my medication	16 (21.3)	31 (41.3)	14 (18.7)	9 (12.0)	5 (6.7)	2.41	1.152
The service provided by the pharmacist has helped me in taking my medicines	10 (13.3)	17 (22.7)	30 (40)	10 (13.3)	8 (10.7)	2.85	1.147
Advice given by the pharmacist has affected my life style	14 (18.7)	36 (48.0)	14 (9.6)	7 (9.3)	4 (5.3)	2.31	0.986
I am very satisfied with the pharmacy service I received	35 (48)	17 (22.7)	13 (17.3)	9 (12)	0	1.960	1.071
The pharmacist should provide this kind of service to all hypertensive patients	30 (40)	12 (16)	15 (20.0)	10 (13.3)	8 (10.7)	2.387	1.403
The pharmacist should be paid for offering such a service	6 (8.0)	36 (48)	13 (17.3)	12 (16.0)	8 (10.7)	2.733	1.154

**Results were coded as follows: SA- Strongly Agree = 1; A-Agree =2; N- Neutral=3; D-Disagree = 4; SD-Strongly Disagree=5*

Thirty (40%) of subjects were uncertain as to whether the intervention provided by the pharmacist had assisted in the taking of medicines. However, 59 of subjects (67.6%) agreed that the advice given by the pharmacist had affected their life style. About half of hypertensive

patients (56%) agreed that the pharmacist should be paid for offering such a service and the pharmacist should offer this kind of service to all hypertensive patients. Although most pharmacies are private for profit organisations, offering such a service could be one of their social corporate responsibilities to the community. Alternatively, the outcomes of this research could be used to make a case for the National Health Insurance Scheme (NHIS) to pay a token fee to accredited pharmacies for offering such a service. In the United Kingdom the community pharmacist is mandated to offer so many pharmaceutical services apart from their primary role are paid a commission by the National Health Service (NHS) for each care service they offer (56).

CHAPTER FIVE: LIMITATIONS, CONCLUSION AND RECOMMENDATIONS

5.1 Limitations of the Study

Although the pharmacists and MCAs were fluent in English and the local language prevalent in the Ashanti region, language barrier could have been a limitation to the service. Reluctance by participants to visit the hospital after the screening could also have affected the outcome of the study. Reasons given by these subjects were that they were not sick, they had no money to go the hospital and their national health insurance cover had expired. Owing to the fact that community pharmacies in Ghana lack medical data on clients, identification of risk factors was done by mere observation of clients and this might have introduced some bias in the study.

5.2 Strength of the Study

The strength of the study is the detailed nature of the intervention for the prevention and detection of hypertension. It is also the only study published in Africa that has studied such an intervention focused on prevention and detection of hypertension.

5.3 Conclusions

The Ghanaian community pharmacy is a suitable setting where preventative services can be offered to assist in the nation's effort in the prevention and detection of hypertension. The pharmacist led hypertension preventative service was effective in the identifying; following up and referring subjects whose blood pressure was above normal. In addition pharmacists and their support medicine counter Assistants (MCAs) were successful in identifying clients at risk of hypertension and this lead to the detection of hypertension in people who were not aware they

had it. Thus the service aided in the early detection of hypertension. Education on lifestyle modification was offered and some modifiable risk factors for hypertension among subjects with prehypertension were reduced as subjects opted for related healthy life style practices. Pharmaceutical care provided by the pharmacist led to the identification and resolution of drug related problems such as ineffectiveness of therapy, side effects of antihypertensive and nonadherence to therapy. Further there was an improvement in blood pressure control and adherence among hypertensive patients to whom the intervention was offered. Clients were also satisfied with the service offered.

5.4 Recommendations

- There is the need for public health initiatives to address life style practices such as lack of exercise, alcohol intake and smoking. Some initiatives backed by policies from the government to assist people who want to quit smoking should be made available.
- Community pharmacists and their support staff such as the MCA, could play an active role in preventative services within the community pharmacy. Periodic training of community pharmacists and their support staff to upgrade their skills in health promotion activities such as this screening is essential if health promotion activities are to be enhanced in the community pharmacy.
- Screening for high blood pressure among clients who patronise community pharmacy service should be endorsed by the ministry of health and pharmaceutical governing bodies. Currently there is no guideline detailing what kind of care services the community pharmacist should offer with regard to chronic diseases. The Pharmacy

Council, Ghana in conjunction with the Pharmaceutical Society of Ghana (PSGH) and Community Pharmacy Pharmacist Association (CPPA) could provide a guideline on care services the community pharmacist can provide.

- The Ghanaian community pharmacist should be encouraged to offer pharmaceutical service to patients with hypertension as this can improve blood pressure control and adherence. Pharmaceutical care issues could be identified and solved and this could enhance the public image of the pharmacy profession in the country. Pharmacists who cannot offer pharmaceutical care services continually to patients with hypertension could offer pharmaceutical care when patients visit the pharmacy any time for their refill as pharmaceutical issues could be identified and resolved.

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APPENDIX A

Data Collection Tool for Primary Prevention and Detection

We seek your assistance in this study to assess how community pharmacies can assist in the prevention of hypertension. The study seeks to screen patients who are at risk of hypertension by measuring their blood pressure, body mass index, offer health education on healthy lifestyle and follow up when necessary. The research is anonymous, data collected and the analysis will be carried out in a way that reassures respondents of their anonymity. In performing this study we therefore guarantee your absolute confidentiality. You are free to decline or withdraw from the research at any time. Thank You.

Signature/Thumbprint ……

1. Patient name..... 2. Sex: M / F 3. Age:

Educational level ..... Occupation.....

4. Risk factors (initial assessment) . ○ Age.....

Weight..... ○ Smokes Yes/No Diabetes

Yes/No/ Don't Know

○ Family History of cardiovascular disease Yes/No/ Don't Know ○ Do you like consuming salty foods Yes/No ○ Exercise Yes /No If YES : Amount .....

Frequency.....

○ Intake of alcohol Yes/No IF Yes: Amount.....

Frequency..... ○ Intake of fried foods: Amount .....

Frequency ..... ○ Initial blood pressure measurement .....

○ Initial BMI .....

5. Knowledge on life changes to prevent cardiovascular changes :

5b: Source of information on lifestyle modification :

Did the patients know the following life style modification can help reduce their blood pressure?			Educated patient on life style modification	
	Yes	No	Yes	No
○ Regular exercise at least 30 minutes per day ,four days per week				

○ Reduced quantity of alcohol 21 units per week for men and less than 14 units per week for women				
○ Quit smoking				
○ Reduced Weight				
○ Reduced Salt to less than 2.4g per day				
○ Eating a diet high in fruits ,nuts and vegetable and low in fat				

6. Follow up Card given Yes/No

7. Referral to physician Yes/No

8. Returned from physician with antihypertensive medication prescribed Yes/No

9. Time spent on Patient……

Date: _____ Tel…….Source: Adopted and modified from WHO

(2005) 'A pharmacy-Based hypertension management model: Protocol and Guidelines'

Follow up form

Name of patient …….. Pharmacy No……

Date	Time	B.P (mmHg) S/D	Weight (kg)	Obs.	Date of next visit

Life Style Changes Achieved

Date	Weight Loss	Less Salt	Regular Exercise	Diet rich in fruits and vegetables	Stopped Smoking	Reduced Alcohol

Referral Form

Pharmacy Referral Form

Date: Provider Address Name

of patient: Age:

Dear Medical Officer

Hypertension Clinic

…… Hospital

We have referred …… to your office as a result of their high blood pressure reading taken at..... Pharmacy on ……... After they rested for at least ……..minutes their blood pressure was obtained as ……. /…….. .

They have been advised to seek your advice within the following time frame……...

Attached is a table listing the average of two blood pressures taken at the pharmacy in the recent past. If you have any questions please contact me on ……. …….

Sincerely …….

Pharmacist :

Date	Time	Systolic Blood pressure mm/Hg	Diastolic Blood pressure mm/HG

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI FACULTY OF PHARMACY AND PHARMACEUTICAL SCIENCES

Department of Clinical and Social Pharmacy

Module for Training Medicine Counter Assistants /Dispensing Technicians on Hypertension and Stroke Prevention in Ghanaian Community Pharmacies

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Introduction

Welcome to the module on training medicine counter assistants or technicians on hypertension and stroke prevention in community pharmacies. Whatever the reason, we hope that you find the material challenging and stimulating and that your practice will benefit as a result.

The aim of this module is to develop professional competence in the prevention of cardiovascular diseases especially hypertension and stroke.

On Completion of the module you should be able to:

1. Describe the causes , signs and diagnosis of hypertension .
2. Demonstrate an understanding of drugs and life style modification used in the treatment of Hypertension.
3. Provide a background on the hypertension and stroke prevention project in community pharmacies
4. Describe the various components' of the hypertension and stroke prevention in community pharmacies project
5. Describe the duties of the medicine counter assistant in the prevention of hypertension and stroke.
6. Understand the protocols available for offering such a service in the community pharmacy.

Causes and Pathophysiology of Hypertension

Hypertension can be defined persistently elevated blood pressure. There are two main types of hypertension: primary / essential Hypertension (90-95%) and secondary Hypertension (510%). The Cause of essential high blood pressure remains unknown however some risk factors are associated and this would be discussed later. Causes of secondary hypertension include renal disease, pregnancy, vascular disease, endocrine cause and drugs. Mean Arterial Blood Pressure (MAP) is the product of Cardiac Output (C0) and Total Peripheral Resistance (TPR). (MAP = CO X TPR). Whiles cardiac output is a product of stroke volume and heart rate**. (**CO = Stroke Volume x Heart Rate)

Stroke volume (**SV**) is the volume of blood pumped from one ventricle of the heart with each beat.

Heart Rate : The number of heart beats per unit time, usually per minute

Total peripheral resistance; a measure of the total resistance to blood flow provided by the entire vascular system.

Therefore an increase in the cardiac output (CO) or Total Peripheral Resistance (TPR) would increase the MAP and persist increase in MAP is known as hypertension.

Prevalence of Hypertension

In Ghana one of the top five conditions reported in the Greater Accra and Ashanti region and stroke was the leading causes of death in adults above 45 years of age. Crude prevalence of hypertension is estimated as 28.3%. In the United States of America 30% of the population have high blood pressure and the prevalence is 30.1% Men and 27.1% in women. In the United Kingdom 40% of the adult population have a sustained blood pressure of ≥ 140/90 mmHg. A third of people in middle age have hypertension and would thirds of older people have hypertension.

Diagnosis of Hypertension

Mostly hypertension causes no symptoms. However some reported symptoms includes: headache that lasts for several days, nausea, dizziness, drowsiness, blurred, or double vision, nosebleeds and irregular heartbeat (palpitations), or shortness of breath. Hypertension is diagnosed by measuring the blood pressure with mercury or aneroid Sphygmomanometer or automated devices in. Millimetres of Mercury (mmHg). If a patient has a persistent high blood pressure of more than 140/90mmHg on at least two different occasions the patient is said to be hypertensive. The Numerator of 140mm/Hg is known as the systolic value and that is when the left ventricle contracts whiles the denominator of 90mm/Hg is known as the diastolic and that is when the left ventricle relaxes. A patient's blood pressure should be measured 5 minutes after rest.

Main Modifiable Risk Factors

These include

- ✓ High intake of salt
- ✓ Excessive intake of calories
- ✓ Excess intake of alcohol
- ✓ Inadequate physical activity
- ✓ Smoking
- ✓ High intake of saturated fatty acids

Non Pharmacological Methods Available For Managing Hypertension

Healthy Diet:

- ✓ Reduction of salt intake: it should be limited to 6g/day. In practice individuals should take into account the salty spices such as Maggie cubes, Onga Cubes and Benny before adding salt to stews and soups.
- ✓ Reduction in alcohol intake : if alcohol consumed , its intake should be limited to no more two drinks (each containing 10 g alcohol) per day,(20g is approximately equivalent to 2 small glasses of wine , a pint of beer or 2 measures of spirit.
- ✓ Control of fat intake: Fat intake should be limited and most saturated fats should be replaced with unsaturated vegetable oil.
- ✓ Sufficient Consumption of fruits and vegetables: Variety of fruits and vegetables should be eaten several times in a day

Regular physical activity: Exercises such as brisk walking, Skipping and swimming should be encouraged at least 30 minutes a day, 5 times a week.

Smoking Cessation: all hypertensive patients who smoke should receive appropriate counselling and assistance for smoking cessation and drug treatment when necessary (Nicotine replacement, bupropion).

Medicines Available for Managing Hypertension

- ✓ ACE Inhibitors: these medicines help to control hormones that affect the blood pressure. Most of these drugs have names that end in 'pril'e.g Lisinopril and Enalapril
- ✓ Angiotensin Receptor Blockers: these also control hormones that affect blood pressure. Most of these medicines have names that end in 'artan' e.g. lorsatan and candesartan
- ✓ Calcium Channel Blockers: These medicines make the artery walls relax making them wider which lowers blood pressure. Most of these medicines that end in 'pine' e.g. Felodipine and nifedipine

- ✓ Thiazide diuretics**:** these medicines remove unwanted fluid from the body which helps lower blood pressure. Most of these medicines have names that end in **'**ide' e.g. bendrofluazide .
- ✓ Beta Blockers: beta blockers were formally given to people to control the blood pressure

Complications of Hypertension

- ✓ Cerebrovascular disease (e.g. stroke, transient ischaemic attack, or dementia)
- ✓ Ischaemic heart disease
- ✓ Peripheral vascular disease
- ✓ Renal impairment, indicated by raised creatinine and/or microalbuminuria or proteinuria

Background to the hypertensive and stroke prevention project in the community pharmacy.

Rationale:

Prevalence of hypertension ranges from 19% to 48% and stroke is one of the leading causes of death in Ghanaian adults over 45 years. Most patients are diagnosed after attending hospital for an un-related condition. Also patients have even died from complications without ever being previously diagnosed as hypertensive. For a number of those who have being diagnosed and are being treated, their hypertension is not adequately controlled and this is often due to inadequate monitoring .The increase in Non Communicable Diseases is adding to the existing burden of communicable diseases. According to the MOH, Ghana given the development of non communicable diseases (NCDs) with sharp increases in diabetes and hypertension, a growing segment of the population being overweight; it is the appropriate time to put healthier lifestyles and improvement of determinants of health in the spotlight. Community pharmacists could play an active role in the prevention of hypertension and stroke.

Description of the pharmacist led hypertensive and stroke prevention project in the community pharmacies.

The intervention strategies to be employed in the project include health education, blood pressure measurements, screening for risk factors and counselling. The objectives of the project include:

- ✓ To screen at-risk groups (the elderly, obese, pregnant and socially disadvantaged adults) for hypertension by calculating their body mass indices;

offering referrals where necessary and discussing hypertension and lifestyle modifications.

- ✓ Patients who already have hypertension will be followed up by the pharmacist and those needing pharmacological interventions will have regular blood-pressure checks and regular in-depth concordance counselling on medication use and healthy lifestyles in order to reduce their risk of developing complications like strokes.

The services to be offered include:

Screening for Hypertension

Not all patients entering the pharmacy would be screen. For this service the aim is to target those at higher risk, yet the service will not be restricted to this group. Any patient entering the pharmacy may also patronise this service.

The targeted group include the following

- ✓ Patients aged over 45 years

- ✓ Obese patients
- ✓ Family history of cardiovascular disease
- ✓ Diabetic Patients
- ✓ Customers who smoke
- ✓ Pregnant Women

Classification of Hypertension: From the Ghana Standard treatment guidelines hypertension is defined as having blood pressure higher than 140/90 in non diabetics and 130/80 in diabetics, based on an average of two or more measured blood pressure readings and these readings should be taken when the patient has rested for at least 30 minutes. For this service the JNC VII classification would be used as this is the current report. (See Table 1)

Table 1: JNC IV Classification and the Proposed Action to Be Executed.

JNC IV classification			Proposed action to taken considering other risk factors and characteristics of patient
Blood pressure classification	SBP mm/Hg	DBP mm/Hg	
Normal	<120	<80	To encourage life style modification to prevent hypertension.

Prehypertension	120-139	80-89	To enforce life style changes specific to patient and tackle risk factors such as obesity, etc. Follow up to be agreed and planned with patient
Stage 1 hypertension	140-159	90-99	To repeat blood pressure after 30 minutes of relaxation. If BP is still elevated to follow up with patient for a period
			(measuring the blood pressure on two different occasions) and then refer.
Stage 2 Hypertension	>160	>100	To repeat after 30minutes and if blood pressure is still elevated to ask patient to see a physician within the next few days

Source: Adopted and modified from JNC VII and RPSGB (2003)

Monitoring Body Mass Index (BMI)

In patients who are overweight the body mass index would be assessed by measuring the weight and height and calculating the BMI using the following equation.

$$BMI = \frac{\text{Weight in kg}}{(\text{Height in m})^2}$$

Interpretation of the BMI should be as follows: The standard weight status categories associated with BMI ranges for adults are shown in the following table.

Table 2: **The International Classification of adult underweight, overweight and obesity according to BMI**

Classification	**BMI(kg/m²)**	
	Principal cut-off points	**Additional cut-off points**
Underweight	**<18.50**	**<18.50**
Severe thinness	<16.00	<16.00
Moderate thinness	16.00 - 16.99	16.00 - 16.99
Mild thinness	17.00 - 18.49	17.00 - 18.49
Normal range	**18.50 - 24.99**	**18.50 - 22.99**
		23.00 - 24.99
Overweight	**≥25.00**	**≥25.00**
Pre-obese	25.00 - 29.99	25.00 - 27.49
		27.50 - 29.99
Obese	**≥30.00**	**≥30.00**
Obese class I	30.00 - 34.99	30.00 - 32.49
		32.50 - 34.99
Obese class II	35.00 - 39.99	35.00 - 37.49
		37.50 - 39.99
Obese class III	≥40.00	≥40.00

Source: Adapted from WHO, 1995, WHO, 2000 and WHO 2004.

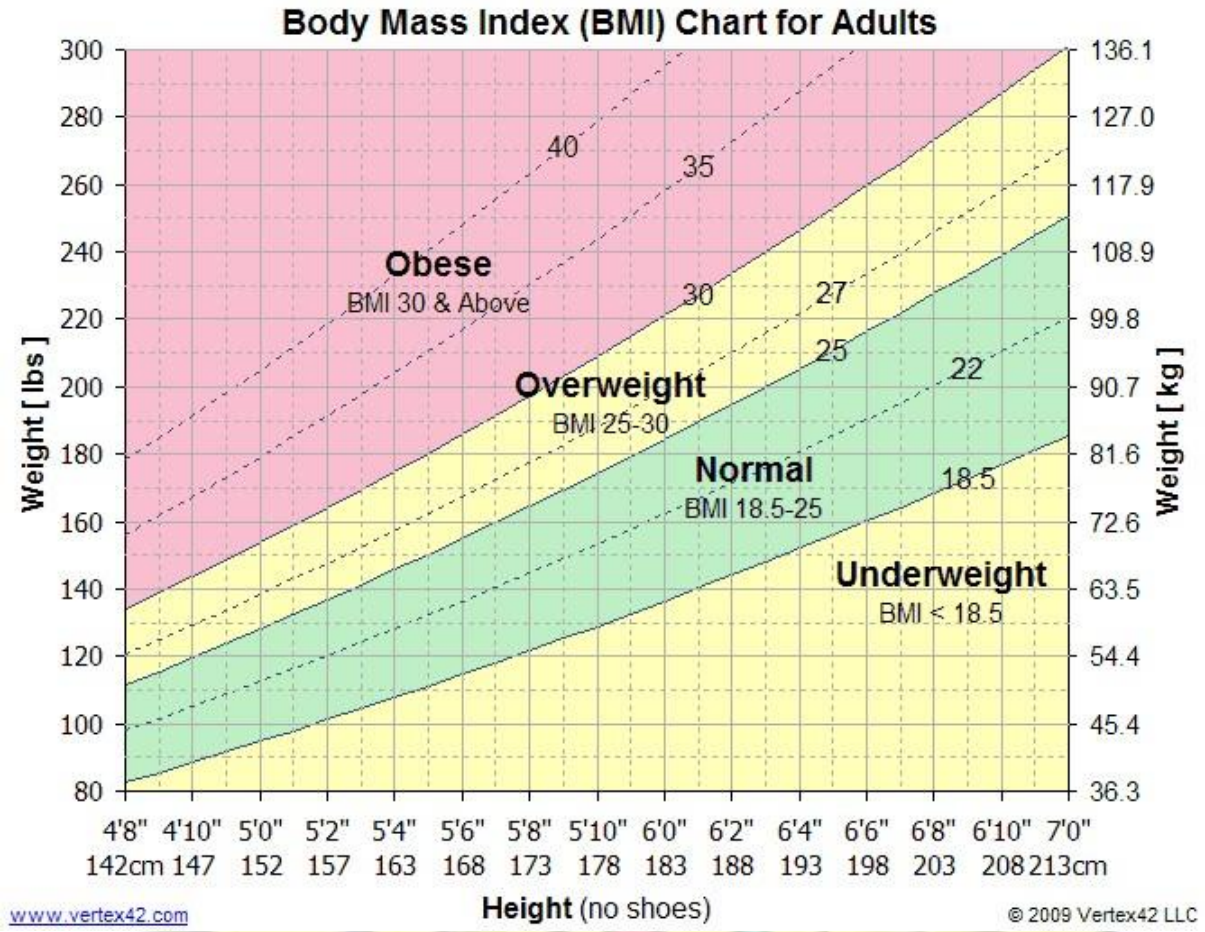

Fig1: Body Mass Index Chart For adults 18 Year and above

Table 3: BMI Classification for Adults and the Proposed Action executed

BMI	Weight Status	Proposed action to taken considering other risk factors and characteristics of patient
Below 18.5	Underweight	To encourage life style modification to gain weight.
18.5 – 24.9	Normal	To encourage life style modification to prevent obesity.

25.0 – 29.9	Overweight	To enforce life style changes specific to patient and follow up to be agreed with patients
30.0 and Above	Obese	Ask patient to see a physician within the next few days

Referrals/Follow-up

With reference to follow up after screening, the following would be eligible:

- ✓ Patients who are referred to physicians
- ✓ Patients who are prehypertensive and are educated on lifestyle modification so as to assess the effectiveness of the education given.
- ✓ Patients who have increased body mass index and are educated and those referred to the hospital to monitor lipid levels.
- ✓ Hypertensive patients who attend monthly consultations.

Follow up dates for all patients would be planned and agreed with patients. (See Appendix for follow up reminder form and referral Form)

Management of hypertensive patients

This service will be offered by the pharmacist to recruited hypertensive patients. The target group includes:

- ✓ Patients on antihypertensive therapy
- ✓ Patients who were referred upon screening and newly diagnosed with hypertension

Services to be offered include the following

- Measuring the patients' blood pressure. All hypertensive patients are eligible for this service and they can walk in at any time and have their blood pressure measured.
- A 20 minute face-to-face interview with pharmacist every month. In the interview the pharmacist will assess the following:
    - Patient's understanding of his or her medications
    - Counselling on the use of medications and life style modifications ○ Assess adherence and lifestyle habits. (adherence would be assessed by counting patients tablets) ○ Review adverse events due to drug-related problems
    - Discuss factors associated with uncontrolled BP and disease state control.
- Recommendations for medication regimen changes after detecting drug-related problems and elevated blood pressure above the patient's normal blood pressure would be made to the patient's doctor in the form of a letter.
- This medicines review service will be provided at least once a month within the months before the review. Patients would have to book appointments initially to patronise this service and subsequent reviews would be agreed on the initial visit.

Education on life style modification

Education would be provided for the following customers;

- All patients who are at a higher risk and hypertensive patients. Hypertensive patients would also be educated on the signs and symptoms of stroke.
- All adults who are 18 years and above who visit the pharmacy irrespective of their risk as advice on health are helpful for everyone. With this group educational leaflets would be

given. Educational leaflets would be available in English and two main Ghanaian languages. (See Appendix for a sample educational leaflet)

Documentation

Data to be documented includes blood pressure and body mass index measurements obtained through screening. In addition patient details, current medication use if any, any known diagnosis, any life style factors that might affect blood pressure would also be obtained. Pharmaceutical care given to hypertensive patients would be documented. These records would be kept at the pharmacy and is very essential as it would aid in meeting the pharmaceutical needs of the patient and also in auditing the service. However patients consent would be sort before these data are collected and kept.

Help line

A helpline would be provided to assist patients with enquiries on appointments, clarifications on pharmaceutical care given and any other pharmaceutical problems.

The duties of the MCA in a pharmacist led hypertensive service in the community pharmacy.

These includes the following

- ✓ Measuring of blood pressure using the appropriate technique
- ✓ Measuring of weight and height and calculating body mass index
- ✓ Interpret BP and BMI measurements
- ✓ Refer those at raised BP and BMI to the pharmacist
- ✓ Educate those whose blood pressure are normal on life style modification
- ✓ Collection of data from patient during screening
- ✓ Maintenance of pharmacy records

- ✓ Book appointments for consultations
- ✓ Keeping the pharmacy clean
- ✓ Perform other duties as required

Quality Assessment and Assurance

With quality assessment and assurance of this service, a retrospective audit would be carried out by assessing the following outcomes.

- ✓ Blood pressure categories obtained through the screening process and number of at risk patients identified.
- ✓ Changes in BMI of obese patients.
- ✓ Referrals made to physicians .
- ✓ Changes in systolic and diastolic pressure of prehypertensive and hypertensive patients.
- ✓ Compliance to hypertensive treatment.
- ✓ Pharmacist recommendations made to physician.
- ✓ Hypertensive patients who develop stroke whiles patronising the service.
- ✓ Life style information given and lifestyle modification achieved.
- ✓ Patient satisfaction with service

These information would be obtained from the pharmacy records, patient's compliance survey and patient satisfaction survey.

Activity 1.1

a) Mr AA is a 60 kg man, with a height of 190 cm. Calculate his BMI and gives an interpretation.

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b. Miss DM is a 70 kg woman with height of 1.75m. Calculate her BMI and give an interpretation.

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c. Esther weighs 140kg and her height is 178cm. Calculate her BMI and give an interpretation.

……

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d. Mrs X visits your pharmacy and she looks heavily pregnant, would you screen her for hypertension. Explain

……

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……

e. Adowa a 20 years old lady presents a prescription of Lorsatan to be dispensed. On questioning she informs you it's for her daddy. Is she eligible for screening for hypertension?

Explain

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f. When screening for hypertension which group of people are we likely to calculate the body mass index.

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E. What does a blood pressure reading of 130/80 mean? Give an interpretation for this reading and provide a list of lifestyle changes you would give to a patient with the above Blood pressure reading

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f. Which group of patients entering the Pharmacy Should be screened for hypertension.

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Activity 1.2

Practical training on how the blood pressure and the BMI are measured

Practical training on how to use the leaflets and data collection tools for the Research

Guideline for Conducting the Research

Part A: Primary prevention and detection

1. Identify a patient at risk of hypertension and stroke.
2. Seek patients consent.

"*We seek your assistance in this study to assess how community pharmacies can assist in the prevention of hypertension and stroke. The study seeks to screen patients who are at risk of hypertension by measuring their blood pressure and body mass index and also offering health education on healthy lifestyles. The research is anonymous, data collected and the analysis will be carried out in a way that reassures respondents of their anonymity. In performing this study we therefore guarantee your absolute confidentiality. Thank You*

3. Measure the blood pressure and the BMI and interpret using Tables 1 , 2, and 3
4. Document data using form B1
5. Provide life style modifications to patient using educational leaflet
6. If follow up is necessary consult the pharmacist and Form A should be used
7. If referrals are needed consult the pharmacist and use form C.

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APPENDIX B

Form B3: Data Collection Tool Management of Hypertensive Patients on Treatment on the first and last Visit

Telephone Number ……... Date: …….

1. Patient Name _____

2. Sex: M / F 3. Age : _____

4. Risk factors (initial assessment) ○ Weight……

Smokes Yes/No ○ Diabetes Yes/No/Don't Know Family History of hypertension Yes/No/Don't Know ○ Consumption of salty foods Amount …… Frequency ……

- ○ Intake of alcohol: Amount …..... Frequency…….
- ○ Intake of fried foods: Amount……. Frequency……..

○ Exercise: Amount…….. Frequency…….. ○ Blood pressure measurement ……

- ○ BMI ……
- ○ 4B. for how long has patient had hypertension…….

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

6. Current Medicines for the management of hypertension

Name of Medicine	Dosage

7. Patients Knowledge on Life style 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		

8. PATIENT KNOWLEDGE on administration of antihypertensive medicines

Did the patient know	Yes (state it)	No
The name of the medicine		
Know how to take the medicine		
The duration of the medication		
The common side effects of the medicine		
Purpose of antihypertensive medicine		

FORM E: Patient Compliance Survey

Patients Name.....

	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?		

8. Did you have any difficulty remembering to take all your malaria medication? Please circle the correct number

Never/Rarely……. 0 Once in a while……1

Sometimes…… 2 Usually……3

All the time……. 4

Source: Morisky DE, Ang A, Krousel-Wood M, Ward H. Predictive Validity of a Medication Adherence Measure for Hypertension Control. Journal of Clinical Hypertension 2008; 10 (5):348-354.

Patient Satisfaction survey

Variables	SA	A	N	DA	SDA
The pharmacists spends as much time with me as necessary					
The pharmacist explains the possible side effects that medication may cause					
If I have a question about my medicines a pharmacist is always available to help me					
The pharmacist knows how to explain things in a way I understand1					
The pharmacist makes sure that I understand how to take my medication					
The service provided by the pharmacist has helped me in taking my medicines					
Advice given by the pharmacist has affected my life style					
I am very satisfied with the pharmacy service I received					
The pharmacist should provide this kind of service to all hypertensive patients					
The pharmacist should be paid for offering such a service