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Blood Pressure Control Status of Hypertensive Patients Attending an Out-Patient Specialist Clinic in Ghana

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Abstract

Hypertension is a major cardiovascular disease risk factor, yet with availability of innovative and effective medical therapy its control is still a huge challenge in sub-Saharan Africa including Ghana. We undertook a cross-sectional study among hypertensive patients attending an out-patient specialist clinic in a semi-urban community in Ghana to determine blood pressure control rate and characterize antihypertensive medication use among the patients. Three hundred and fifty four (354) hypertensive patients aged between 23 - 79 years with the mean age (± SD) of 46.9 (± 12.1) years were studied. The mean duration of hypertension was 5.5 years (range 1 month to 45 years). Two hundred and sixteen (61.02%) of the patients were prescribed one antihypertensive, 53(14.97%) were prescribed two antihypertensives and 3 (0.85%) were prescribed three antihypertensives; with antihypertensive class being calcium channel blockers in 76.2% of the patients, beta-blockers in 11.4% of the patients, centrally acting agents in 6.9 % of the patients, and angiotensin-converting enzyme (ACE) inhibitors in 3.0% of the patients. The commonest calcium channel blocker, ACE inhibitor and beta-blocker prescribed were nifedipine, lisinopril, and atenolol respectively. One hundred and thirty-eight (39.0%) patients had adequate blood pressure control. Among patients with poor blood pressure control, 74 (34.3%) had blood pressure >160/l00mmHg (hypertension stage II). In conclusion, our study shows that majority of the hypertensive patients studied had poorly controlled blood pressure which indicates a higher future burden of cardiovascular diseases.

Keywords

Hypertension, Blood Pressure, Control Rate, Antihypertensive, Ghana

1. Introduction

Hypertension is largely regarded as a major risk factor for cardiovascular diseases with a growing prevalence and poor control particularly in developing countries [1, 2]. Uncontrolled blood pressure is a major problem in the health care system because of its association with substantially increased risk of cardiovascular diseases as well as sudden death [3–6]. The toll of hypertension as a chronic medical condition on population health and the resultant impact on the often already stressed health systems of developing nations is a serious concern. Shifting existing paradigm and resources from communicable to chronic disease prevention continues to be a huge and difficult task. Hypertension in sub-Saharan Africa is now a widespread problem of immense health and economic importance due to its high prevalence in urban areas, and it is further complicated by inadequate diagnosis and the severity of its complications [4, 7–9]. Hypertensive patients often run the risk of developing complications such as left ventricular hypertrophy, congestive cardiac failure, retinopathy, cerebrovascular

disease and renal insufficiency [10–12]. The relationship between blood pressure (BP) and risk of cardiovascular disease events is continuous, consistent, and independent of other risk factors. The higher the BP, the greater the risk of coronary artery disease, heart failure, cerebrovascular accident, and kidney diseases [13, 14]

Current 'Global Burden of Hypertension' data showed that hypertension is the most common cardiovascular disorder affecting more than a quarter of the world's adult population (about 1 billion), and approximately 7.1 million deaths per year may be attributable to hypertension [15, 16]. Worldwide prevalence of hypertension was estimated to be 26% in 2005, with projected 60% increase by 2025; the population burden being greater in developing countries [17]. In general however, the prevalence rate in urban areas is higher than in rural areas. The prevalence of hypertension is expected to increase even further in the absence of robust and effective preventive measures [13]. Studies done in some African countries, suggested that prevalence of hypertension in both rural and urban communities in Africa is increasing and exceeds 20%–25% in rural areas and is over 30% in urban and semi-urban areas [7, 18]. Various community surveys in Nigeria have shown an adult prevalence of 15%–36.6% [19–22]. More recently, studies on hypertension in Ghana have indicated a crude prevalence between 25% and 48%, with the prevalence higher in urban populations than in rural populations [7].

An increase in morbidity associated with hypertension does not only reflect a high prevalence of hypertension, but is also an indication of low treatment and control rate. Despite the availability of numerous, innovative and effective antihypertensive medications and data from clinical trials demonstrating that controlling blood pressure reduces cardiovascular morbidity and mortality, a significant proportion of people with known hypertension from both developed and developing countries have blood pressure exceeding recommended levels [23]. The reasons for inadequate blood pressure control are highly complex and arise from a combination of factors related to the way that physicians treat hypertension, poor patient adherence to therapy, cultural beliefs, access to care, unaffordable drug prices and discontinuation of medicines as a result of side effects, low awareness rate and lack of patients knowledge about the disease [24, 25]. These can generally be categorised as the health-system deficiencies, patients' adherence challenges and the physicians' inertia in treating hypertension; and they seem to be in play in sub-Saharan Africa.

Indeed countries vary in capacity for diagnosis and management of hypertension, but worldwide, the majority of diagnosed hypertensives are poorly controlled. Studies performed in Africa to evaluate blood pressure control in hypertensive patients have shown that blood pressure control is poor, since only a few of them achieve a clinic blood pressure that can be described as optimal [26, 27]. For example, in a study by Isezuo and Njoky [28], 42.7% blood pressure control rate was achieved among hypertensive subjects managed in a specialized health setting in Nigeria. In another study in Cape Town, South Africa, Rayner and Schoeman [29] found that only 39.8% of hypertensive individuals achieved good blood pressure control rate, a figure which again was still less than optimal. 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% [30]. In Ghana, Awuah, et al. found prevalence of 28.3% with only 3.5% of hypertensive individuals had adequate blood pressure control in urban communities in Accra [2]. Data from the United States [31] however revealed that, even high-income countries with virtually full-access to effective antihypertensive therapies have not fared better as only 27% of hypertensive patients had good blood pressure control which was still far below the goal of 50%.

Few epidemiologic data on blood pressure control rate among hypertensive patients are available in sub-Saharan Africa, especially in Ghana [7, 32, 33]. Reliable information on the level of blood pressure control in this semi-urban community is very essential to guide health policy and develop efficient public health intervention towards this huge cardiovascular risk factor. This study was therefore designed to determine blood pressure control rate, and characterize antihypertensive medication use among hypertensive patients attending an out-patient specialist clinic in Techiman, Ghana.

2. Methods and Materials

The study was a hospital-based prospective descriptive study carried out at the hypertension clinic of the Holy Family Hospital, Techiman, Ghana, from November 2014 to April 2015. Informed consent was obtained from each study participant. Patients aged eighteen years and above attending the Hypertension Clinic of the Holy Family Hospital, Techiman, Ghana with clinical diagnosis of hypertension were recruited. Three hundred and fifty four (354) hypertensive patients were selected using simple random sampling. Standardized, pretested, structured questionnaire was used to collect information about the patients' systolic blood pressure (SBP) and diastolic blood pressure (DBP) readings recorded at their clinic visits. Other data included demographics (age, gender), duration of hypertension, current antihypertensive medications, and comorbidities.

Blood pressure was recorded in left arms, with patients lying supine after a 10-minute rest, using a mercury sphygmomanometer with a cuff size 12 cm long and 35 cm wide, placing the stethoscope bell lightly over the brachial artery. The cuff was positioned at the heart level and deflated at 2 mm/s and the blood pressure was measured to the nearest 2 mmHg. Systolic blood pressure (SBP) was recorded as appearance of the Korotkoff sounds (phase I) whilst diastolic blood pressure (DBP) was recorded as disappearance of the Korotkoff sounds (phase V) 16. Three readings were taken. A first measurement was used to familiarise the subject with the procedure. The blood pressure was repeated twice at five minutes intervals, during which the subject remained seated.

The mean of the later two readings was used in the analysis.

The percentage of patients with well controlled blood pressure was determined according to guidelines provided in the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7) [13]. The rate of hypertension control was defined as the number of treated hypertensive individuals with blood pressure less than 140/90 mmHg, divided by the total number of hypertensive individuals. Adequate blood pressure control was defined as BP < 140/90 mmHg. Both the SBP and DBP had to be below these thresholds for BP to be considered controlled [35]. All patients with BP ≥ 140/90 mmHg were further sub-categorized into stage 1 (SBP 140-159 mmHg or DBP 90-99 mmHg) and stage II (SBP ≥ 160 mmHg or DBP ≥ 100 mmHg). The prevalence of isolated uncontrolled systolic and diastolic hypertension was also established by determining the number of patients with SBP ≥ 140 mmHg and DBP < 90 mmHg, and DBP ≥ 90 mmHg and SBP< 140 mmHg, respectively

2.1. Inclusion Criteria

Adults aged 18 years and above with documented diagnosis of hypertension attending hypertension clinic, who met the criteria were included in the study.

2.2. Exclusion Criteria

The following patients were excluded from the study: Patients admitted with suspected hypertension but could not meet the diagnostic criteria.

2.3. Ethical Considerations

All procedures were carried out according to a study protocol approved by the Committee on Human Research Publication and Ethics of School of Medical Sciences, the Kwame Nkrumah University of Science and Technology, Kumasi. Informed consent was obtained from all subjects. The objectives and nature of the study were explained to all subjects. The information about participant's identity was not included with the other data and only the principal investigator had access to this information. All patient information was treated with utmost confidentiality, and no personal identifiers were included in the data.

2.4. Statistical Design and Analysis

Data was collected and edited to exclude errors, re-organized, coded and manipulated with appropriate software for efficient analysis. Data were entered into Filemakerpro11.0 version and then exported to Microsoft Excel 2007 version for cleaning. Data was then transferred to Strata SE version 11.1 for statistical analysis. The findings were expressed as mean ± standard deviation and/or percentages. Categorical variables were compared using Chi-square test and odds ratio with 95% confidence interval. A p-value of less than 0.05 was considered statistically significant.

3. Results

3.1. Clinical Characteristics of the Patients

The total number of patients included in the study was 354 (238 women and 116 men), with an overall mean age (± SD) of 46.9 (± 12.1) years, ranging from 23 to 79 years (Figure 1). The mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) were 138.8 ± 18.69 mmHg and 82.3 ± 10.10 mmHg respectively. The mean duration of hypertension was 5.5 years with a range of 1 month to 40 years.

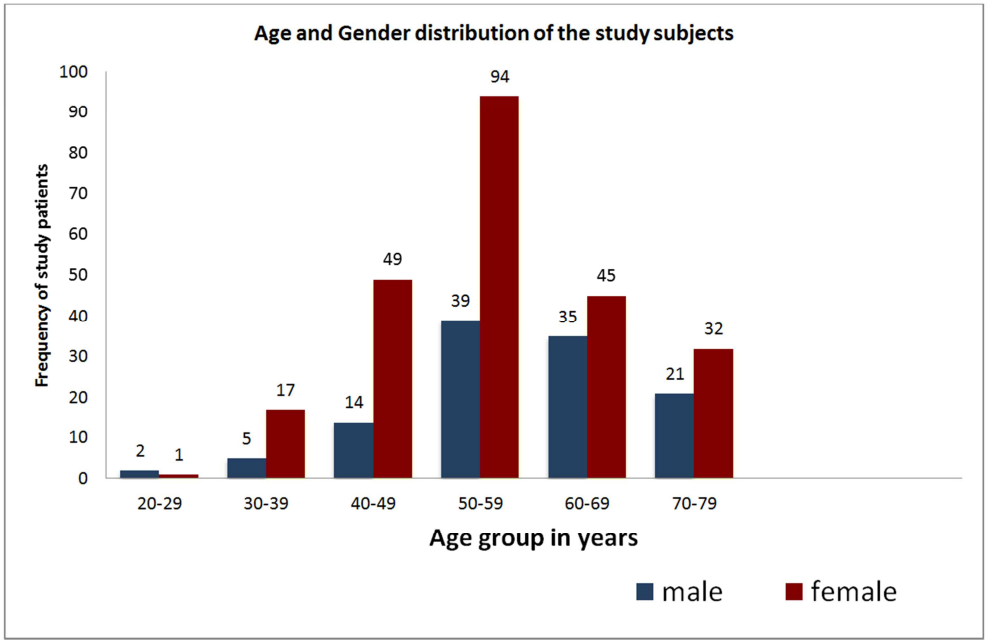

Figure 1. *Age and gender distribution of study patients.*

3.2. Blood Pressure Control

Of the 354 hypertensive patients, 138 (39%) had blood pressure of < 140/90 mmHg which was defined as adequately controlled blood pressure [35]. There was no statistically significant difference between blood pressure control in both genders (p = 0.455). Of the remaining 216 patients with uncontrolled hypertension, 65.7% (142) had blood pressure between l40/90-159/99 mmHg (hypertension stage I) and 34.3% (74) had blood pressure of >160/l00mmHg (hypertension stage II). The prevalence of isolated uncontrolled SBP was more than four times that of isolated uncontrolled DBP (43.5% vs. 9.7%). (Table 1)

Table 1. *Blood pressure characteristics among the study subjects according to sex (n=354).*

Predictor variables		Sex			
		Male, n (%)	Female, n (%)	Totals	P-value
Blood pressure	Controlled	42(36.21)	96(40.34)	138 (38.98)	0.455
	Uncontrolled	74(63.79)	142(59.66)	216(61.02)	
Hypertension stage	Stage I	51(68.92)	91(64.08)	142(65.74)	0.477
	Stage II	23(31.08)	51(35.92)	74(34.26)	
Isolated hypertension	Systolic	30(40.54)	64(45.07)	94(43.52)	0.783
	Diastolic	7(9.46)	14(9.86)	21(9.72)	
Duration of hypertension	<1year	28(24.14)	30(12.61)	58(16.38)	0.009*
	1-5years	55(47.41)	133(55.88)	188(53.11)	
	6-10years	13(11.21)	48(20.17)	61(17.23)	
	11-15years	8(6.90)	13(5.46)	21(5.93)	
	>15years	12(10.34)	14(5.88)	26(7.34)	

Table 2. *Antihypertensive Medication used by Patients in the Study.*

Medication class	Specific type	n (%)
Calcium Channel (N=253)	Nifedipine	205(81.35)
	Amlodipine	47(18.65)
Beta Blocker (N=38)	Propranolol	1(2.63)
	Atenolol	37(97.37)
Centrally Acting Agents (N=23)	Methyldopa	23(100)
Diuretics (N=3)	Frusemide	1(33.33)
	Bendrofluazide	2(66.67)
ACE-I (N=10)	Ramipril	1(10.00)
	Lisinopril	9(90.00)
ARB(N=2)	Losartan	2(100)
Arterial vasodilator (N=3)	Hydralazine	3(100)
Number of prescribed antihypertensive drugs	None	82 (23.16)
	One	216(61.02)
	Two	53(14.97)
	Three	3 (0.85)

ACE-I = Angiotension converting enzyme inhibitor
ARB = Angiotension receptor blocker

3.3. Antihypertensive Medication Use by Patients in the Study

The classes and pattern of antihypertensive medications are showed in table 2. The classes of antihypertensive medications prescribed were calcium channel blockers in 253 (76.20%) of patients, β-blockers in 38 (11.45%), centrally acting agents in 23 (6.93%) and angiotensin-converting en zyme (ACE) inhibitors in 10 (3.01%). The commonest calcium channel blocker, ACE inhibitor and beta-blocker prescribed were nifedipine, lisinopril, and atenolol respectively. Two hundred and sixteen (61.02%) of the patients were prescribed one antihypertensive, 53 (14.97%) were prescribed two antihypertensive and 3 (0.85%) were prescribed three antihypertensive.

4. Discussion

This study showed low blood pressure control rate among the hypertensive patients attending a specialist clinic in Ghana. The blood pressure control rate in hypertensive patients in most literatures varies from 19% – 54% based on the populations studied [36]. The blood pressure control rate of 39.0% among the hypertensive patients in this study is within this global control rate.

The blood pressure control rate in this study is also comparable to the control rate of 41.9% of the hypertensive patients attending a district hospital in Kwazulu-Natal, but higher compared to the findings of 26.0%, 6.2%, and 33.4% in Kenyatta National Hospital, Ghana and Regional Referral Hospital in Central Kenya respectively [36, 37, 38, 39]. It is clear that this control rate is lower considering the magnitude of cardiovascular complications of poorly controlled hypertension. There are wealth of literature that links poor blood pressure control to increased cardiovascular disease morbidity and mortality such as coronary artery disease, hypertensive heart disease and cerebrovascular accident which greatly affects the burden placed on health care resources in Ghana [5, 41]. Indeed, the morbidity and mortality caused by hypertension and its related cardiovascular complications have such a huge impact on the country's economy, and already overburdened health care system. Decreasing this has become very important and this can be achieved if hypertension is detected and treated early.

This study showed that a significant proportion of patients with uncontrolled blood pressure (34.3%) were at hypertension stage II (SBP ≥ 160 mmHg or DBP mmHg ≥ 100), indicating a poorer blood pressure control. This finding compares well with an earlier Ghanaian study which reported

38% of patients with blood pressure levels above 160/100 mmHg [42], but lower than a similar study in Nigeria in which about half (53.5%) of patients interviewed had their blood pressure measurement categorized as hypertension stage II (>160/100) based on JNC 7 classification [13]. The low blood pressure control rate in this study population, in the background of high prevalence of hypertension, underlies the rapid growing public health burden of hypertension and the expected epidemic of morbidity and mortality from hypertension-related cardiovascular diseases [13]. This represents a situation that demands keen attention if its potential cardiovascular morbidity and mortality are to be minimized.

It was also shown that the levels of uncontrolled blood pressure were different with respect to systolic blood pressure (SBP) and diastolic blood pressure (DBP), where the proportion of isolated uncontrolled SBP was more than four times as high as that of isolated uncontrolled DBP (43.5% vs. 9.7%). A similar phenomenon was reported in a study in the Regional Referral Hospital in Central Kenya, where the prevalence of patients with uncontrolled SBP and DBP were 29.7% and 11.7%, respectively [38]. This clinical finding is very significant, given the existing evidence which shows that, both systolic and diastolic hypertension are associated with increased cardiovascular risk, but SBP appears to be the most important, consistent and significant risk factor for cardiovascular disease than DBP [44–46]. A clear benefit of SBP reduction has been demonstrated in several studies [47–49].

There are a wide range of anti-hypertensive pharmacotherapy available for the treatment of hypertension. The mostly prescribed classes of antihypertensive for our study were calcium channel blockers (76.2%) and beta-blockers (11.4%), and this is consistent with the management of essential hypertension recommended by the most standard hypertension treatment guidelines [50, 51]. ACE inhibitors are among the most commonly prescribed medications for hypertension. ACE inhibitors are seen as more appropriate for first-line use when target organ damage or other comorbidities such diabetes mellitus are present. However few patients (3.0%) in this study were found to be on ACE inhibitors. In an earlier study among Ghanaian hypertensive patients [42], the common classes of antihypertensives prescribed were calcium channel blockers (41%) and diuretics (27%). In Turkey a similar study reported ACE Inhibitors (49.8%), diuretics and calcium channel blocker as the common classes of antihypertensive prescribed [52]. The reasons for lower use of ACE inhibitors in our study may be probably due to clinician's prescription preference, medication availability and patients' affordability.

It is worth noting that, majority of the patients (61.0%) were prescribed a single antihypertensive therapy, and only 0.85% of the patients received triple antihypertensive therapy. However earlier studies in Ghana and Turkey, reported a proportion of 64.0% and 53.7% respectively, of hypertensive patients sampled were prescribed combination therapies [42, 52], reflecting varied profile of antihypertensive prescriptions in these populations. Several studies have acknowledged that for adequate blood pressure control, majority of the patients needed combination therapy [53]. The high percentage of single anti-hypertensive therapy may be the reason for the poorer blood pressure control rate seen in this study.

The findings of this study have important public health implications as prevalence of hypertension is expected to continue to increase, especially as our population ages with associated unhealthy lifestyle and bad dietary habits. As such hypertension-related cardiovascular morbidity and mortality are undoubtedly going to become more apparent.

5. Conclusion

This descriptive cross-sectional study among hypertensive patients attending an out-patient specialist clinic in a semi-urban community in Ghana showed that majority of the hypertensive patients had poorly controlled hypertension, indicating a higher long-term risk of cardiovascular diseases. Our findings provide important information on blood pressure control status in a semi-urban community setting in sub-Saharan African country where information is especially lacking. This would underscore the urgent need for the formulation of relevant, targeted control strategies in order to reduce, delayed or prevent overt clinical hypertension-related cardiovascular diseases.

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