# EVALUATING THE EFFECTIVENESS OF BLOOD PRESSURE TREATMENT IN MILD TO MODERATE HYPERTENSION AT THE KORLE-BU POLYCLINIC,ACCRA

**BenninC-L[1]& Essuman A.[2]**
[1]Department of Internal Medicine, Thomas Jefferson University Hospital, Philadelphia, Pennsylvania, USA.
[2]Family Medicine Unit, Department of Community Health, University of Ghana Medical School, Accra, Ghana.

## Abstract

***Objective:*** To evaluate the effectiveness of blood pressure treatment in patients with mild to moderate hypertension attending the Korle-Bu Polyclinic in Accra.
***Design:*** An observational study involving a retrospective review of patient charts.
***Subjects and Methods:*** We evaluated charts of patients managed at the Korle-Bu Polyclinic for mild to moderate hypertension over a 3 year period from 2005 to 2007. Charts were selected by multistage sampling and data including initial and follow-up blood pressure measurements were extracted by means of a checklist. Hypertension was diagnosed using the 2003 World Health Organization (WHO)/International Society for Hypertension (ISH) statement on the management of hypertension.
***Outcome measure:*** We expected to document a drop in blood pressure of at least 20mmHg (systolic) and or 10 mmHg (diastolic) as a consequence of treatment instituted at the poly clinic over the period under study.
***Results:*** The study reviewed 455 charts. About 1 in 4 patients (26.7%, [95% CI, 0.20 – 0.35])diagnosed and on drug treatment for hypertension had a decrease in blood pressure of 20 mm Hg (systolic) and or 10 mm Hg (diastolic). A similar number of patients (126, 27.7%) less than 40 years of age were found with elevated blood pressure.
***Conclusion:*** Majority of the patients with mild to moderate hypertension showed poor response to treatment of their blood pressure. A significant proportion of patients with elevated blood pressure were young, i.e. less than forty years of age.

***Key Words: blood pressure, treatment, effective, polyclinic, Accra.***

## Introduction

Hypertension continues to be a major health burden for many nations. This is also true for the sub-Saharan African countries including Ghana[1-3]. With the prevalence of cardiovascular disease and its associated co-morbidities rising in Ghana, there has been a push to improve effective diagnosis and treatment of cardiovascular disease especially hypertension[2,4,5]. These efforts will also reduce the associated co-morbidities. Numerous studies have been conducted in Ghana over the past 60 years evaluating hypertension and its co-morbidities[6-10]. Studies conducted in 2004 revealed that the prevalence of hypertension in Ghana was 29.4%; the prevalence was higher for males [31.0%] than in females [28.0%]. They also noted that prevalence was higher in the urban setting [31.1%] than in the rural setting [27.0%] andrisk factors such as obesity are higher in urban areas than rural areas in Ghana[11-13].A 2007 systematic review of hypertension in Sub-Saharan Africa revealed that the prevalence of hypertension in Ghana ranged from 28.4-29.4% overall; 27.0-33.0% in men; and 27.0-28.9% in women[1].In that same year a report from the Ghana Health Service found that among Ghanaians stroke ranked fourth and hypertension seventh on the mortality list and in the Greater Accra region stroke ranked second along with cardiovascular disease and hypertension which ranked fifth and sixth respectively[4].

Based on prior studies the mean prevalence of hypertension has increased every decade. In 1972 the mean prevalence was 25.5%, increasing to 28.3% (1991–2000) and most recently 29.1% (2001–2010)[13].This represents a modest increase in the prevalence of hypertension. Once again in the urban setting the prevalence for males and females was higher as compared with that for the rural setting[2,4,5,14,15]. The prevalence of hypertension also increased with age in both sexes as was noted in the earlier studies[6,8-10].This increase may be related to increased awareness, and detection of hypertension. There are still numerous other possibilities that could explain the increasing prevalence but lifestyle cannot be overlooked. The current trend in the modernization of most Ghanaian cities brings with it westernization of food habits. This results in an increased intake of processed foods with high sodium and high caloric content[2,3,16].

Although the benefits of treating blood pressure to recommended levels is well known, majority of patients with hypertension do not achieve treatment

Author for Correspondence:
Dr. Akye Essuman
Family Medicine Unit,
Department of Community Health
University of Ghana Medical School
E mail: akyessuman@yahoo.com
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targets[17-21]. The World Health Organization (WHO)/International Society for Hypertension (ISH) statement on the management of hypertension and theSeventh Report of the Joint National Committee onPrevention, Detection, Evaluation, and Treatment of High Blood Pressure(JNC-7 report) respectively state that 75% and 50% of patients with hypertension do not achieve optimal control[17,18].Studies from Ghana report blood pressure control of between <10% and 16.7%[13,22].Multifactorial reasons account for these including problems with diagnosis, initiation of treatment and non-adherence to guidelines on the part of doctors; as well as compliance challenges on the part of patients[17,18]. In developing countries in particular, high illiteracy rates, poor access to health facilities, bad dietary habits, poverty, and high costs of drugs have been identified as contributing to poor blood pressurecontrol[l,2,3].

In the light of the above,this study was to determine the effectiveness of blood pressure [BP] treatment of patients with mild to moderate hypertension at the Korle-Bu Polyclinic in Accra, Ghana with the view of instituting appropriate measures for adequate management of such patients presenting to the health facility.

## Subjects And Methods

A retrospective review of the medical records of patients diagnosed with mild to moderate hypertension, attending the Korle-Bu Polyclinic in Accra, Ghana from2005 to 2007 was done. The study participants were selected using amultistage sampling technique. The terminal filing system at the polyclinic consisted of a cupboard with boxes serially marked with 2 digit numbers [00, 01, 02… 99]. Each box contained charts of patients whose last 2 digits of their identification number matched that on the box. With an equal chance of selection of either even or odd numbered boxes, a simple coin toss was performed and the selection was made of even numbered boxes. Charts from each selected box were arranged numerically in ascending order and those that met the inclusion criteria were retrieved.

The inclusion criteria were: (i) patients older than 18 years of age, (ii) patients evaluated at the Korle Bu Polyclinic during 2005 – 2007 and (iii) patients who had a systolic blood pressure reading ≥140 mmHg and <180 mmHg, and or a diastolic blood pressure reading ≥90 mmHg and <110 mmHg[17].We excluded charts in which the patient had an initial BP ≥180 mm Hg [systolic] and 110 mmHg [diastolic]; and <140 mmHg [systolic] and 90 mmHg [diastolic][17]. Patients aged below 18 years were also excluded.

A total of 2,275 charts were retrieved. Using an estimated design effect size of 20%, 455 charts were selected in 2 stages - the first chart by simple random sampling and subsequently by systematic sampling of every 5th chart.

Data was extracted using a prepared checklist which captured the following information:

a. Socio-demographic characteristics of the subjects;
b. Initial date of visit to the clinic. We documented initial date of diagnosis for a patient who presented to the Korle-Bu polyclinic who might have been already diagnosedelsewhere; patients who developed hypertension while being treated at the polyclinic; and patients who were diagnosed at their initial visit to the polyclinic.
c. Patient's BP reading and date of the recorded BP.
d. Whether patient's hypertension was being treated.
e. Patient's medical co-morbidities e.g. diabetes mellitus, obesity, hypercholesterolemia.
f. Other risk factors as depicted by body mass index (BMI), waist circumference, electrocardiogram (ECG), chest x-ray (CXR), renal function tests, lipid panel, and glucose level.
g. Whether the patient had been advised about lifestyle modifications in diet and exercise as per notes in the chart.

We expected to document a drop in BP of 20 mm Hg (systolic) and or 10 mm Hg (diastolic) as a consequence of treatment instituted over the period under study.

The Statistical Package for Social Sciences (SPSS) version 18 was used for data analysis. Descriptive statistical analysis was employed for all research questions. Figures depicting frequencies and percentages were constructed for selected outcome measures. Ethical approval for the study was given by the Ethicaland Protocol Review Committee of the University of Ghana Medical School while the Polyclinic administration permitted the use of the patients' records.

## Results

The demographic and clinical characteristics of the study population are shown in Figure 1and Table 1.

The total number of data analyzed was 455. Two hundred and sixty-eight (58.9%) were females. The mean age was 49.8 ±16.6 years. Elevated BP was commonly found among patients aged between 40 and 49 years (111, 24.4%). One hundred and twenty-six (27.7%) patients aged less than 40 years were found with elevated BP, while 131 (28.8%) were elderly patients aged 60 years and above.

From Table 1, one hundred and thirty-five patients (29.7%,[95% CI,0.26 – 0.34]) had their BP taken more than once before a diagnosis of hypertension was made.

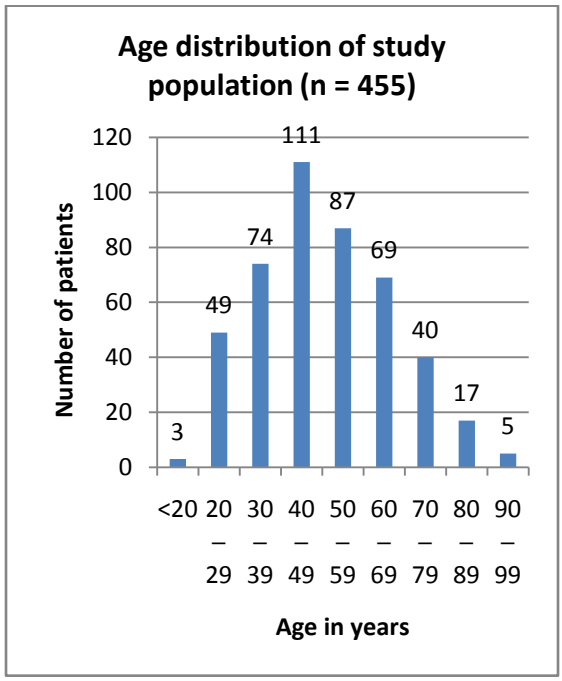


**Fig. 1: Age distribution of study population**

These were analyzed for achievement of the study end point. One hundred and twelve patients out of the 135 were on drug treatment. Thirty-six (26.7%, CI,0.20 – 0.35) achieved the study end point on drug treatment. Twenty-three patients out of the 135(17.0%, CI, 0.12 – 0.24), who were not on drug treatmentalso achieved the study end point.These had been followed up for between 1–26 months and BPs measured at least twice over the period. However, non-drug methods of treatment were not documented except for diet in one patient's chart. Overall, 59 (43.7%, CI, 0.36 – 0.52) of those diagnosed with hypertension had effective treatment of their high blood pressure. Achievement of study end points are as depicted in the Table.

Co-morbidities were recorded in the medical records of 18 patients (4.0%, n=455) as follows: diabetes (7), cerebrovascular disease (5), ischaemic heart disease (3), congestive heart failure (1), chronic renal failure (1) and sickle-cell disease (1). The only documented risk factor was elevated cholesterol levels and this was found for 4 patients. Investigations were noted in the records of 19 (4.2%, n=455) patients.

## Discussion

This study evaluated the effectiveness of BP treatment in patients with mild to moderate hypertension at the Korle-Bu Polyclinic, a primary care centre, in Accra Ghana. The study showed that the treatment of BP of the patients was not satisfactory. About 1 in 4 (26.7%) of patients diagnosed with hypertension and on drugtreatment achieved the study end point of a decrease in the BP by 20 mmHg (systolic) and or 10 mmHg (diastolic). Although this value is higher compared to those reported in previous studiesin Ghana[13,22], it still conforms with the global picture of poor control[17,18]

**Table 1: Clinical characteristics of study population**

| Characteristic | Value | 95% CI |
|---|---|---|
| **Blood pressure recordings (n=455)** | | |
| Average SBP (mmHg) | 151 ± 11.2 | - |
| Average DBP (mmHg) | 90.7 ± 10.6 | - |
| Only once | 320 (70.3%) | 0.66 – 0.74 |
| More than once | 135 (29.7%) | 0.26 – 0.34 |
| **Follow-up visits(n=455)** | | |
| Mean follow-up | 1.5 ± 0.9 | - |
| **Documentation of antihypertensive drug (n=455)** | | |
| Documented | 164 (36.0%) | 0.32 – 0.41 |
| Not documented | 291 (64.0%) | 0.59 – 0.68 |
| **Achievement of Study endpoint (BP recorded > once; n=135)** | | |
| On medication | 36 (26.7%) | 0.20 – 0.35 |
| Without medication | 23 (17.0%) | 0.12 – 0.24 |
| Overall achieved | 59 (43.7%) | 0.36 – 0.52 |
| Not achieved | 76 (56.3%) | 0.48 – 0.64 |

The higher figure could also be attributed to the fact that this was an institutional study compared to the population-based studies reported in Ghana. Studies have however shown that reductions in BP provide benefits including decrease in the incidence of cardiovascular (CV) events and strokes[17-21]. The decrease in the incidence of CV events appears to be greater in patients with moderate hypertension compared to patients with mild hypertension. Result from the Medical Research Council (MRC) trial showed lower rates of CV events and strokes when there was a decrease of 13mmHg (systolic) and 6 mmHg (diastolic) from the baseline, and the Felodipine Event Reduction (FEVER) trial showed benefits with a decrease of 17 mm Hg (systolic) and 8 mm Hg (diastolic)[24,25].The Hypertension Optimal Trial (HOT) also showed the benefit of such a decrease i.e. a reduction in associated complications especially in patients with moderate hypertension[26].

The mean age of 49.8 ±16.6 years compares with previous studies in Ghana[5,13,15,22,27].Most patients in this age bracket are either in stage V or VI of the family life cycle according to Duvall'sfamily developmental theory[28].These stages are characterized by physical, mental and emotional stress as patients manage their own lives, their relationships, those of their teenage/young adult children, their ageing parents as well as demands from society in general.In this regard, it is important that primary care physicians pay particular attention to the needs of this age bracket. About a fourth of the study population was less than forty years. There is the need for further studies to ascertain the causes and the factors contributing to this finding in order to plan for effective interventions to minimize morbidity and mortality in this age group. This may include thorough work-up for other systemic diseases, e.g. serum hormone levels and imaging studies may be used to rule out endocrine disorders such as pheochromocytoma, thyroid disorders and reno-vascular hypertension. Other reasons for the elevated BP reading in the younger patients could be from erroneous measurements, stressful environment such as waiting hours to see a physician, or from 'White coat syndrome' – the situation where office BP measurements are higher than those taken out of office as a result of anxiety or conditional response to unusual situations as may be found in the office[29]. Proper techniques in BP measurement can help to reduce oreliminate this. Physicians should however be aggressive in the management of hypertension as patients with long standing uncontrolled hypertension might present at younger ages with complications such as stroke, heart failure or myocardial infarction[30-32].

Our study revealed that more than two-thirds (70.3%) of the patients studied had their BP measured only once. Diagnosis of hypertension could therefore not be determined in these patients and they wereexcluded in our analysis to determine the study end point. Someof these patients were however, on anti-hypertensive medication.Follow-up of patients with elevated BP and subsequent diagnosis of hypertension was therefore a big challenge in the polyclinic. Current recommendations require that for the diagnosis of hypertension, at least two BP measurements, in the sitting position, spaced 1–2 minutes apart are taken.

Additional measurements are taken if thefirst two are quite different and an average BP considered if deemedappropriate. Alternatively, the physician may make use of the 24-hour ambulatory BP monitoring (ABPM) or home BP monitoring (HBPM)[18,29].Over a third of the patients seenwho had elevated BP were started on drug treatment. Although it is possible that most patients could have had mild hypertension and could have been on non-drug treatment, such as lifestyle changes, these were not documented. One can also consider that there is probably less emphasis on the management of mild hypertension hence less emphasis on non-drug treatment for patients with mild hypertension. Unfortunately only 1 in about 4 patients who were diagnosed with hypertension and were on drug treatment had effective response. Poor compliance with medications and with doctors' office visits could be reasons for these results. However the question of physicians prescribingdrug treatment at optimal doses needs also to be addressed.

More education is needed so that patients are well informed about the complications and associated mortality of uncontrolled hypertension. The use of drug and non-drug methods should be employed and documented in patients' records. Non-drug methods such as lifestyle modifications – dietary changes, increasing one's activity, for example through exercise, decreasing alcohol and cessation of use of tobacco products etc., should be attempted initially as well as duringdrug treatments. Patients should also be encouraged to keep scheduled appointments, especially those in whom management of their hypertension is complicated.

There were several limitations to this study. The retrospective nature, poor documentation and illegible handwriting of physicians made it difficult to extract information on medical co-morbidities, risk factors, investigations and education on lifestyle modification. A prospective study is needed to evaluate the diagnosis, management modalities and barriers to effective treatment of hypertension at the Polyclinic.

## Conclusion

The study found that only 26.7% of those diagnosed and on drug treatment for mild to moderate hypertension achieved effective response of their BP; while 43.7% achieved effective response overall. A significant proportion (27.7%) of patients were young; this requires further investigation. There should be aggressive management of BP with adequate dosing of medications and more frequent follow-up for hypertensive patients. Documentation is a huge challenge. A template can be created to improve documentation of information during the clinic visit. A prospective study is needed to evaluate the diagnosis, effectiveness of management modalities and barriers to effective control of hypertension at the primary care level in order to improve on the quality of care.

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## References

1. Addo J, Smeeth L, Leon DA. Hypertension in sub-Saharan Africa: a systematic review. *Hypertension*. 2007;50:1012–1018.

2. Kuller L,.Epidemic Hypertension in Sub-Saharan Africa [Editorial]. *Hypertension*. 2007;50:1004–1005.
3. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *Lancet*. 2005;365:217–223.
4. de-Graft Aikins A. Ghana's neglected chronic disease epidemic: a developmental challenge. *Ghana Med J*. 2007; 41: 154–159.
5. Amoah AG. Hypertension in Ghana: a cross-sectional community prevalence study in greater Accra. *Ethn Dis.* 2003;13:310-315.
6. Colbourne MJ, Edington GM, Hughes MH, Ward-Brew A. A medical survey in a Gold Coast village. Trans R Soc Trop Med Hyg. 1950;44:271-290.
7. Blankson JM, Larbi EB, Pobee JO. Blood pressure levels of African children. *J Chronic Dis*. 1977;30:735-743.
8. Pobee JO, Larbi EB, Belcher DW, Wurapa FK, Dodu SR. Blood pressure distribution in a rural Ghanaian population. Trans R Soc Trop Med Hyg. 1977; 7:66-72.
9. Pobee JO, Larbi EB, Dodu SR, Pisa Z, Strasser T. Is systemic hypertension a problem in Ghana? *Trop Doct.* 1979;9:89-92.
10. Pole D, Ikeme AC, Pobee JO, Larbi E, Williams H, Blankson J. The Mamprobi Survey-a screening survey for cardiovascular disease and risk factors in Africa: methodology and validity. *Bull World Health Organ.* 1979;57:81-87.
11. Agyemang C. Rural and urban differences in blood pressure and hypertension inGhana, West Africa. *Public Health* 2006; 120:525-533.
12. Agyemang C, Bruijnzeels MA, Owusu-Dabo E.Factors associated with hypertension awareness, treatment, and control in Ghana, West Africa. *J Hum Hypertens* 2006; 20:67-71.
13. Bosu WK. Epidemic of hypertension in Ghana: a systematic review. BMC Public Health 2010; 10:418 doi:10.1186/1471-2458-10-418
14. Kaufman JS, Owoaje EE, James SA, Rotimi CN, Cooper RS. Determinants of hypertension in West Africa: contribution of anthropometric and dietary factors to urban-rural and socioeconomic gradients. *Am J Epidemiol*. 1996;143:1203-1218.
15. Addo J, Amoah AG, Koram KA. The changing patterns of hypertension in Ghana: a study of four rural communities in the Ga District. Ethn Dis. 2006;16:894-899.
16. .Nyarko NK, Adubofour KO, Ofei F, Pobee JO, Owusu SK. Serum lipids and lipoprotein in adult Ghanaians. *J Intern Med.* 1994;236:251-253.
17. World Health Organization (WHO)/International Society of Hypertension (ISH) Statement on the management of hypertension. *J Hypertension* 2003;21:1983-1992.
18. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA.* 2003;289:2560-2572.
19. Effects of treatment on morbidity in hypertension II. Results in patients with diastolic blood pressure averaging 90 through 114 mm Hg. *JAMA.* 1970;213:1143.
20. Hebert PR, Moser M, Mayer J, Glynn RJ, Hennekens CH. Recent evidence on drug therapy of mild to moderate hypertension and decreased risk of coronary heart disease. *Arch Intern Med.* 1993;153:578-81.
21. Hypertension Detection and Follow-up Program Cooperative Group. The effect of treatment on mortality in "mild" hypertension: results of the hypertension detection and follow-up program. *N Engl J Med.* 1982;307:976-80.
22. Addo J, Smeeth L, Leon DA. Prevalence, detection, management, and control of hypertension in Ghanaian civil servants. *Ethn Dis*. 2008;18:505-511.
23. Ibrahim MM, Damasceno A. Hypertension in developing countries.Lancet. 2012;380(9841):611-9. doi: 10.1016/S0140-6736(12)60861-7.
24. Medical Research Council Working Party. MRC trial of treatment of mild hypertension: principal results. *Br Med J* (Clin Res Ed). 1985;291(6488):97-104
25. Liu L, Zhang Y, Liu G, Li W, Zhang X, Zanchetti A; FEVER Study Group. The Felodipine Event Reduction (FEVER) Study: a randomized long-term placebo-controlled trial in Chinese hypertensive patients. *J Hypertension*. 2005; 23: 2157-2172.
26. Kjeldsen SE, Hedner T, Jamerson K, Julius S, Haley WE, Zabalgoitia M, Butt AR, Rhaman NS and Hansson L. Hypertension Optimal Treatment (HOT) trial. *Hypertension*. 1998;31:1014-1020 doi: 10.1161/01.HYP.31.4.1014
27. Amoah AG, Kallen C. Aetiology of heart failure as seen from a National Cardiac Referral Centre in Africa. *Cardiology*. 2000;93(1-2):11-18.
28. 28.Family developmental theory. Scott Plunkett's FES 432Course Pack. http://www.csun.edu/~whw2380/542/Family%20Developmental%20Theory.htm. Accessed 24/08/2013.
29. 29.The Task Force for the management of arterial hypertension of the European Society of
30. Hypertension (ESH) and of the European Societyof Cardiology (ESC). 2013 ESH/ESC Guidelines for the managementof arterial hypertension. *Eur Heart J* doi:10.1093/eurheartj/eht151.
31. Plange-Rhule J, Phillips R, Acheampong JW, Saggar-Malik AK, Cappuccio FP, Eastwood JB. Hypertension and renal failure in Kumasi, Ghana. *J Hum Hypertens*. 1999;13:37-40.

32. 31.Amoah AG, Schuster DP, Gaillard T, Osei K. Insulin sensitivity and cardiovascular risk factors in hypertensive and normotensive native Ghanaians. *Diabetologia*. 2003;46:949-955.

33. 32.Agyemang C, Addo J, Bhopal R, Aikins A deG, Stronks K. Cardiovascular disease, diabetes and established risk factors among populations of sub-Saharan African descent in Europe: a literature review. *Global Health*. 2009;5:7.