Blood Pressure Control Practice and Determinants among Ambulatory Hypertensive Patients Attending Primary Health care facilities in Addis Ababa

Firehiwot Amare (✉ freaeam@gmail.com)

Haramaya University College of Health and Medical Sciences <https://orcid.org/0000-0002-9218-4008>

Teshome Nedi

Addis Ababa University College of Law and Governance Studies

Derbew Fikadu Berhe

Mekelle University College of Health Sciences

Research article

Keywords: Blood pressure control, Hypertension, Primary health care

Posted Date: August 9th, 2019

DOI: <https://doi.org/10.21203/rs.2.12562/v1>

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Version of Record: A version of this preprint was published at SAGE Open Medicine on January 1st, 2020. See the published version at <https://doi.org/10.1177/2050312120946521>.

Abstract

Background Hypertension is the major risk factor for cardiovascular diseases (CVDs) related morbidity and mortality. Blood pressure (BP) is often not adequately controlled in clinical practice. Information regarding BP control in primary care settings is limited in Ethiopia. The aim of this study was to assess BP control and associated factors among hypertensive patients attending primary healthcare facilities in Addis Ababa. **Methods** A cross sectional study was conducted in 12 health centers in Addis Ababa city selected by multistage sampling. A total of 616 hypertensive patients were included by a systematic random sampling technique. Data was collected by patient interview and patients' medical record review. **Results** Out of 634 study participants, 616 had complete information on medical record and during patient interview. The mean age of study participants was 58.90 (SD 13.04), most of them 321 (52.1%) were ≥ 60 years old, and on monotherapy 485 (78.9%). Methyldopa was the most monotherapy prescribed, 128 (20.8%). Only 31% (n=191) of patients had controlled BP. Determinants for poor BP control were age of less than 60 years (Adjusted Odds Ratio (AOR)= 3.06, 95% CI: 1.96, 4.78), work status; government employee (AOR= 2.41, 95% CI: 1.18, 4.90), retired (AOR=1.79, 95% CI: 1.01, 3.18), private business (AOR= 2.09, 95% CI: 1.17, 3.74) and being hypertensive for 10 or more years (AOR= 1.96, 95% CI: 1.11, 3.43). Significant predictors of achieving controlled BP were; weekly BP measurement (AOR 0.57, 95% CI: 0.36, 0.90) and tertiary level education (AOR= 0.26, 95% CI: 0.13, 0.54). **Conclusion** Only one third of patients had controlled BP. Effort should be made to address identified determinants including age, regular BP monitoring and level of education.

Background

Hypertension is the major contributor to global burden of disease and mortality⁽¹⁾. The global prevalence was around 22% in 2014⁽²⁾ and the proportion is estimated to rise to over 29% by 2025⁽³⁾. Globally, hypertension prevalence was highest in Africa (30%) in 2014 and in ranges of 25-41% in Sub-Saharan Africa⁽²⁾. Consequences of poor BP control are known to cause human suffering and impose severe financial and service burdens on health systems^(1, 4, 5). In Ethiopia, non-communicable diseases are estimated to account for 30% of total annual deaths of which 9% is attributed to cardiovascular diseases (CVD)⁽²⁾. A 24% death rate from CVD was also reported in Addis Ababa⁽⁶⁾. The reported prevalence of hypertension in different regions of Ethiopia varied widely⁽⁷⁻¹¹⁾. The prevalence in the country is estimated to be between 20% and 30%^(12, 13).

Drug treatments and life style interventions (as a complement to drug therapy) can be used for the management of hypertension^(5, 14). Despite hypertension being the major known risk factor for CVD, it remains inadequately managed and BP is often not adequately controlled in clinical practice^(15, 16). This is pronounced in developing countries including Ethiopia. Hypertension related studies in Ethiopia mainly are focused on prevalence and conducted in hospital set ups. Most Ethiopian populations receive medical care in primary healthcare facilities and there is limited data on hypertension management at primary healthcare facilities. Therefore, this study had two objectives i) determine proportion of

hypertensive patients on antihypertensive medication(s) and had controlled BP and ii) identify potential determinates of uncontrolled BP at primary healthcare facilities in Addis Ababa, Ethiopia.

Methods

Study area, design and period

The study was conducted in Addis Ababa, the capital city of Ethiopia, with a population of close to three million in 2014 with annual population growth rate of 2.89%⁽¹⁷⁾. The city has 10 sub cities. Health centers (HCs) provide primary health care services to the population in the city. According to Ethiopian healthcare tier, one HC serves 15,000-25,000 population⁽¹⁸⁾.

Study design

An institution based cross sectional study was conducted in 12 HCs of Addis Ababa located in four sub cities namely; Gulelle, Lideta, Nifasilk-Lafto and Akaki-Kaliti from 3rd August to 30th October 2015.

Sampling technique

The HCs were selected by using multistage sampling considering the 10 sub cities of Addis Ababa as geographical clusters and hence as a primary sampling unit. The HCs in the selected four sub cities were considered as a secondary sampling unit. Simple random sampling was used to select the sub cities and HCs.

Data collection procedure

Participants were asked for their consent and verified for inclusion. The inclusion criteria for the study were hypertensive patients attending the outpatient departments of selected HCs with age of 18 years or above, on medication for hypertension at least for six months at the selected HC. The sample size was calculated using the formula of single proportion with a finite population correction and consideration of the design effect to be 634. Sample size at each HC was allocated using probability proportional to total number of hypertensive patients on medication at specific HC. Study participants from each HC were selected by systematic random sampling.

Data was collected by patient interview and medical record review. A data abstraction format was used to record data regarding co-morbid condition/s, BP measurements and type(s) of antihypertensive medication(s) from patient's medical record. Patients were interviewed to obtain socio-demographic, disease life style and drug related information. Height, weight and waist circumference were measured on the day of the interview. To ensure the quality of data, pre-test was done on 5% of the total sample at one HC.

Data analysis

The data were analyzed using Statistical Package for the Social Sciences (SPSS) version 20.0. Descriptive statistics was used to summarize study variables and evaluate distribution of responses. The level of BP control was assessed by using the average of three BP records obtained from three different visits. Logistic regression was used to identify potential determinant variables for the outcome measure (uncontrolled BP). A variable with $p < 0.25$ in the bivariable analysis (presented as crude odds ratio, COR at 95% CI) was included to multivariable logistic regression analysis (adjusted odds ratio, AOR at 95% CI). A variable was considered to be significant for p -value of less than 0.05 at 95% CI. Controlled BP was defined based on the joint national committee (JNC) 8 guideline⁽¹⁹⁾ as BP <150/90 mmHg in hypertensive patients aged 60 or older, or BP <140/90 mmHg in hypertensive patients aged less than 60 years and all ages of hypertensive patients with diabetes or chronic kidney disease. Sensitivity analysis was done by using a cutoff point of BP <130/80 for those with diabetes and chronic kidney disease (CKD) and BP <140/90 for others. Body mass index was calculated as weight over height per meter square and classified as underweight (< 18.5 kg/m²), normal (18.5- 24.9 kg/m²), overweight (25-29.9 kg/m²), and obese (≥ 30 kg/m²). Central obesity was defined as waist circumference >102 cm for men and >88 cm for women. A patient was described as physically active if he/she performs physical activity at least 30 minutes per day for at least 5 days per week.

Results

Overall 634 participants were included in this study with response rate of 616 (97%). Most study participants were females 346 (56.2%). The mean age of the respondents was 58.9 (SD=13.0) and majority of them 321 (52.1%) were age of 60 or above. Majority 419 (68.0%) were married, 213 (34.6%) had no formal education and 200 (32.5%) were house wives. Of all study participants, 368 (59.7%) had normal bodyweight and 196 (31.8%) were overweight. The measurement of waist circumference showed that 202 (58.4 %) of female and 53 (19.6 %) of male participants had abdominal obesity. Nearly one third ($n = 198$) of patients had a family history of hypertension and 559 (90.7%) had a monthly follow up at the HC. Only few, four (0.6%) measured their BP every day. Only one fifth ($n = 122$) had comorbid illnesses and of which 98 (15.9%) were diabetic. The mean duration of time (year) since the diagnosis of hypertension was 5.59 ± 5.77 . The mean duration of drug therapy for hypertension was 4.6 (SD=4.9) with a range of 0.5- 40 years. Two-third of the patients ($n = 417$) have been taking antihypertensive therapy for less than five years, and nearly half of them obtain their medications for free 294 (47.7%). Among the study participants, 209 (33.9%) reported the experience of at least one side effect from the medication/s (Table 1).

Among the participants, very few (six) reported being a current smoker and 75 participants reported the use of alcohol. With regard to physical exercise; 185 (30.0%) of participants reported to perform physical exercise from whom 88 (14.3%) were physically active. Above three-fourth of the participants reported to reduce salt in their diet.

The overall utilization of antihypertensive drugs by group showed thiazide diuretics to be the most commonly prescribed 225 (36.5%) followed by ACEIs 180 (29.2%) and CCBs 159 (25.8%). Nearly 80% of

patients were on monotherapy (n=486) and alpha 2 agonist (methyldopa) was the most common monotherapy used 128 (20.8 %). For multiple drug therapy, thiazide and ACEI were the most common combination drugs used 46 (7.5%). The treatment regimen of 523 (84.9 %) patients was not modified at their latest visit. More than one third of study participants had a controlled SBP while half had a controlled diastolic blood pressure (DBP). Based on JNC 8 (table 2), the overall control of BP was achieved in one third (n=191) of the study participants (Table 2). In our sensitivity analysis, level of BP control was only 19 % (n=117) when target BP for diabetic and/or patients with chronic kidney diseases was BP < 130/80 mm Hg and <140/90 for the remaining patients. On the other hand, when a cutoff point of <140/90 was used for all the study participants, only 24% (n= 148) of patients had controlled BP.

In multiple logistic regression analysis, significant determinants for having uncontrolled BP were age < 60 years (AOR= 3.06, 95% CI: 1.96, 4.78, P< 0.001) compared to those with age ≥ 60 years and duration of hypertension diagnosis ≥ 10 years (AOR= 1.96, 95% CI: 1.11, 3.43, P=0.02). On the other hand, tertiary level education (AOR= 0.26, 95% CI: 0.13, 0.54, P< 0.001) and weekly BP measurement (AOR 0.57, 95% CI: 0.36, 0.90, P=0.02) (Table 3) were found to be predictors to achieve controlled BP.

Discussion

The result of the study showed that only one third of hypertensive patients on pharmacologic treatment had a controlled BP (31%). Inadequate control of BP appears to be a prevalent problem challenging the primary care in Addis Ababa. The level of BP control found in this study (31%) is lower than obtained from HC based studies from Chile (59.7%)⁽²⁰⁾, Oman (39%)⁽²¹⁾, Greece (55.6%)⁽²²⁾, USA (49.8 %)⁽²³⁾ and South Africa (57%)⁽²⁴⁾. This difference in the level of BP control might be due to a more aggressive strategy in the treatment of hypertension as the use of combination antihypertensive agents was common in most of the studies. In addition, difference in expertise of health professionals involved in the management of hypertension might have contributed to the discrepancy. Moreover, in three of the studies hypertensive patients on lifestyle modifications who were not on antihypertensive drugs were included^(20, 23, 25) which could have contributed to a better control of BP than this study.

The level of BP control in this study was similar to the result obtained from hospital based studies conducted in Zimbabwe (32.8 %)⁽²⁶⁾, Kenya (33.4%)⁽²⁷⁾ and Nigeria (35.0%)⁽²⁸⁾. This similarity in the level of BP control might be a result of the similarity in the inclusion criteria of the studies as only hypertensive patients on pharmacologic therapy were included in the studies similar to the present study. On the contrary, a study conducted in USA at different level of the health system showed 60% of treated hypertensive people to have a controlled BP⁽²⁹⁾ and hospital based studies from Adama, Ethiopia and Nigeria showed a BP control level of 43.6%⁽³⁰⁾ and 42%⁽³¹⁾ respectively. This difference in level of BP control might have resulted from a more aggressive treatment in hospitals as patients attending hospitals have associated co morbidities.

The proportion of patients with controlled SBP and DBP was almost similar from a study in Saudi Arabia (40.4% and 51.6%)⁽³²⁾ but lower than a study in USA (55.7% and 77.1%)⁽²⁵⁾. This difference in the level of

control of SBP and DBP might be due to age related increase in SBP as large proportion of study participants (52.1%) were older than 60 years of age^(33, 34). More importantly, level of healthcare USA is expected to be better than in Ethiopia in terms of resource and man power.

In the study, younger age was a contributing factor for poor BP control. Similar result was obtained from a study in Brazil⁽³⁵⁾. On the other hand, the result of other studies showed that patients aged younger than 60 years were more likely to have controlled BP than older patients^(25, 27). Better BP control among the elderly in this study may be because of an increased prevalence of comorbidities hence high probability of intensive treatment and/or a better rate of adherence. Additionally, health professionals could have shown more concern in counseling and ordering appropriate management for elders.

Consistent with our finding, a study in Chilean HC set up showed low education level to have a negative association with BP control⁽²⁰⁾. This is most likely associated with level of awareness on hypertension and adherence to life style modifications to decrease BP. Additionally, government employees, retirees and patients on private business were more likely to have uncontrolled BP than house wives. This might have resulted because of forgetfulness and hence non-adherence to antihypertensive medications.

In our study, being hypertensive for longer period of time (≥ 10 years) was found to be a significant predictor for not achieving target BP. This could be due to asymptomatic nature of the disease, a decrease in health seeking behavior from patients and clinical inertia⁽³⁶⁾.

More frequent BP monitoring is one of the important factors to achieve target BP^(5, 15). We found weekly BP measurement to be a significant predictor to have controlled BP. Encouraging home-based BP measurement is one of the ideal interventions that may increase patients' health seeking behavior, adjustment of life style and adherence with their medication.

Antihypertensive medication utilization pattern in this study was more of similar with a study conducted in South Africa⁽²⁴⁾. However, a study conducted in Chile⁽²⁰⁾ and USA⁽²⁵⁾ used ACEI more often than diuretics. This difference in frequent use of ACEI over diuretic may be a result of large proportion of diabetic and CKD patients included in Chile and USA studies. Additional factor that might have contributed to this discrepancy include race^(5, 19). The frequent use of alpha 2 agonist (methyldopa) in this study might have resulted from gaps in knowledge among health professionals involved in the management of hypertension in the HCs or lack of other optional drugs.

Most (80%) of our study participants were prescribed a single antihypertensive agent. This was similar with a study conducted in Zimbabwe (70%)⁽²⁶⁾. However, different results were reported on studies from Chile (34%)⁽²⁰⁾ and USA (29%)⁽²⁵⁾. The high prevalence of antihypertensive monotherapy in this study might have contributed to the low BP control. To achieve optimal BP level, the use of multiple antihypertensive agents is recommended^(5, 14-16, 19, 37). A study also showed the benefit of using multiple antihypertensive agents in order to achieve optimal BP control⁽²⁰⁾. The prevalent use of monotherapy

might have resulted from lack of drug availability at health facility, unaffordability of drugs by patients and less aggressive treatment ⁽²⁶⁾.

Switching to another drug and addition of a drug were the leading type of treatment modifications. This might be because most of the present study participants had uncontrolled BP ⁽³⁸⁾. The treatment modification was low when compared to a study by Banegas et al (2004) which reported treatment modification in 49% of hypertensive patients from which addition of a drug and increasing dose were observed more frequently ⁽³⁹⁾. This discrepancy might be is a result of aggressive treatment of hypertension in the later study and clinical inertia in the present study.

Almost all patients did not smoke which might be result to Ethiopian socio-cultural influence. More than one third of the study participants were overweight or obese and one fifth of the female as well as two third of the male participants had abdominal obesity. This result is different from the result of the study by Tesfaye *et al*/conducted in Addis Ababa which showed 20% of males and 38% of females to have a BMI of $\geq 25 \text{ kg/m}^2$; 12.9% of male and 64.6 of female to have abdominal obesity ⁽⁷⁾. This difference might be a result of difference in the age of the participants; predominance of elderly patients in the present study; difference in the characteristics of the study population; patients without a diagnosis of hypertension were included in the later study; or a change in the lifestyle of population of Addis Ababa. Since high BMI and increased abdominal circumference are risk factors for hypertension and uncontrolled BP among hypertensives, emphasis should be given to counsel patients on the importance of implementing life style modifications.

Strength and limitation of the study

This study gives insight into determinants of BP control practice in primary healthcare centers of Addis Ababa. BP measurements were analyzed as recorded in patient medical records, which reflect actual clinical practice, but may be subject to recording and measurement error. The finding of this study may not be generalizable to private practice or hospital settings.

Conclusions

BP control to target goal was suboptimal and achieved only in one third of pharmacologically treated patients attending HCs of Addis Ababa. The frequently used antihypertensive drug classes were found to be thiazide diuretics, ACEIs, CCBs, alpha 2 agonist and β -blockers. Majority of the patients were on monotherapy. Alpha 2 agonist was the frequently used monotherapy while the combination of thiazide and ACEIs was the commonest combination therapy. Switching to another drug was the most common type of treatment modification. Age younger than 60 years, work status (being a government employee, a retired and in a private business) and hypertension diagnosis of ≥ 10 years were identified factors for poor BP control. While weekly BP measurement and tertiary level of education were important contributing factors that facilitate achieving target BP. This implies the need for closer monitoring of hypertensive patients attending at primary healthcare center. More emphasis should be given on

identified determinants including age-based care, consider patient level of awareness, and encourage patients to have more often BP monitoring practice especially older patients with prolonged history of hypertension.

Abbreviations

ACEI=Angiotensin Converting Enzyme Inhibitor; AOR=Adjusted Odds Ratio; ARB=Angiotensin Receptor Blocker; BP=Blood Pressure; CCB=Calcium Channel Blocker; CKD= Chronic Kidney Disease; COR=Crude Odds Ratio; CVD=Cardiovascular Disease; DBP=Diastolic Blood Pressure; HC=Health Center; JNC=Joint National Committee; OPD=Out Patient Department; SBP=Systolic Blood Pressure; SD=Standard Deviation; USA=United States of America; WHO=World Health Organization

Declarations

Ethics approval and consent to participate

Ethical clearance was obtained from the ethics review committee of School of Pharmacy, Addis Ababa University and Addis Ababa city administration health bureau institutional review board. A support letter was obtained from the health bureau to the studied sub cities health offices. A support letter was written from the four sub cities health offices to HCs residing in each sub city. Permission was obtained from each HC medical director to conducts the study. The benefit and risks of the study was explained to each participant included in the study and oral informed consent was obtained from each patient involved in the study. To ensure confidentiality, name and other identifiers of patients and health care professionals was not recorded on the data collection tools.

Consent for publication

Not applicable.

Availability of data and materials

All the data used for the study is contained within the manuscript.

Competing interest

The authors have declared that there is no conflict of interest

Funding statement

Authors disclosed reception of financial support from Addis Ababa University for conducting this research work.

Authors' contribution

FA, TN, and DFB conceived the study and drafted the proposal. All authors had substantial contribution in the study design and development of data collection checklist. All authors were also involved in data acquisition, analysis, interpretation and write up. FA drafted the manuscript, TN and DF revised the manuscript and prepared the final version for publication. All authors read and approved the final version of the manuscript.

Acknowledgments

Authors thank study participants, data collectors and staffs of all HCs, without them this research would not be realized.

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Tables

Table 1: Socio-demographic, anthropometric and clinical characteristics of hypertensive patients attending health centers of Addis Ababa, 2015.

Variable	Frequency (%)
Sex	
Female	346 (56.2)
Male	270 (43.8)
Age	
< 60 years	295 (47.9)
≥ 60 years	321 (52.1)
Marital status	
Married	419 (68.0)
Widowed	120 (19.5)
Divorced	46 (7.5)
Single	31 (5.0)
Educational status	
No formal education	213 (34.6)
Primary education	209 (33.9)
Secondary education	110 (17.9)
College/university	84 (13.6)
Work status	
House wife	200 (32.5)
Private business	144 (23.4)
Retired	123 (20.0)
Government employee	95 (15.4)
Unemployed	33 (5.4)
Others*	21 (3.4)
Body mass index	
Under weight	14 (2.3)
Normal weight	368 (59.7)
Over weight	196 (31.8)
Obese	38 (6.2)
Waist circumference	
Female	
<88cm	144 (41.6)
≥88cm	202 (58.4)
Male	
<102cm	217 (80.4)
≥102cm	53 (19.6)
Family history of hypertension	
Yes	198 (32.1)
No	418 (67.9)
Duration of hypertension diagnosis	
< 5 years	368 (59.7)
5-10 years	141 (22.9)
≥ 10 years	107 (17.4)

Frequency of follow up	
Weekly	4 (0.6)
Every two weeks	33 (5.4)
Monthly	559 (90.7)
Every two months	16 (2.6)
Others**	4 (0.6)
Frequency of BP measurement	
Monthly	304 (49.4)
Weekly	150 (24.4)
Every two weeks	135 (21.9)
When feeling ill	16 (2.6)
Every day	4 (0.6)
Others***	7 (1.1)
Comorbid conditions	
Diabetes mellitus	98 (15.9)
Asthma	6 (1.0)
CVD	5 (0.8)
HIV/AIDS	3 (0.5)
Others****	10 (1.6)
Duration of therapy	
< 5 years	417 (67.7)
5-10 years	125 (20.3)
≥10 years	74 (12)
Source of medication/s	
Free of charge	294 (47.7)
By sponsorship	44 (7.1)
Self-sponsored	278 (45.1)
Side effect	
Yes	209 (33.9)
No	407 (66.1)
Side effects	
Headache	103 (16.7)
Weakness	92 (14.9)
Dry mouth	38 (6.2)
Postural hypotension	37 (6.0)
GI Complaint	7 (1.1)
Erectile dysfunction	5 (0.8)
Others*	21 (3.4)

*Daily laborer, Farmer, Construction, Guard, ** every three months, *** twice weekly, every two months **** musculoskeletal disease, gout, migraine, CVD- cardiovascular diseases, HIV- Human immune virus, AIDS- acquired immune deficiency syndrome

Table 2: Drug therapy, treatment modification and blood pressure control among hypertensive patients attending health centers of Addis Ababa, 2015.

Drugs	Frequency (%)
Monotherapy	485 (78.7)
Methyldopa	128 (20.8)
Enalapril	123 (20.0)
Hydrochlorthiazide	108 (17.5)
Nifedepine	108 (17.5)
Amlodipine	1 (0.2)
Atenolol	13 (2.1)
Propranolol	4 (0.6)
Two drugs combinations	125 (20.3)
Hydrochlorthiazide+ Enalapril	45 (7.3)
Hydrochlorthiazide+ Nifedepine	42 (6.8)
Hydrochlorthiazide+ Atenolol	13 (2.1)
Hydrochlorthiazide+ Propranolol	3 (0.5)
Hydrochlorthiazide+ Methyldopa	9 (1.5)
Enalapril + Nifedepine	1 (0.2)
Enalapril + Atenolol	1 (0.2)
Enalapril + Propranolol	2 (0.3)
Enalapril + Methyldopa	2 (0.3)
Nifedepine + Methyldopa	3 (0.5)
Atenolol + Methyldopa	1 (0.2)
Atenolol + Amlodipine	3 (0.5)
Three drugs combinations	6 (1.0)
Hydrochlorthiazide+ Enalapril + Atenolol	4 (0.6)
Enalapril + Nifedepine + Atenolol	1 (0.2)
Hydrochlorthiazide+ Enalapril + Methyldopa	1 (0.2)
Treatment modification	
No modification	523 (84.9)
Switch to another drug	62 (10.1)
Addition of drug	19 (3.1)
Increase in dose	3 (0.5)
Decrease in dose	1 (0.2)
Deletion of drug	2 (0.3)
Increase in frequency	1 (0.2)
Decrease in frequency	5 (0.8)
Control of BP	
Uncontrolled SBP	359 (58.3)
Uncontrolled DBP	297 (48.2)
Uncontrolled BP	425 (69)

Table 3: Determinants of uncontrolled BP among hypertensive patients attending health centers of Addis Ababa, 2015.

Variable	Blood pressure control		COR (95% CI)	AOR (95% CI)
	Uncontrolled (%)	Controlled (%)		
Age category				
≥ 60 years	191(31.0)	130(21.1)	1.00	1.00
< 60 years	234(38.0)	61(9.9)	2.61 (1.82, 3.74)	3.06 (1.96, 4.78)*
Marital status				
Married	297(48.2)	122(19.8)	1.00	1.00
Single	24(3.9)	7(1.1)	1.41 (0.59, 3.36)	1.56 (0.59, 4.12)
Divorced	31(5.0)	15(2.4)	0.85 (0.44, 1.63)	0.93 (0.45, 1.93)
Widowed	73(11.9)	47(7.6)	0.64 (0.42, 0.98)	0.75 (0.45, 1.24)
Education level				
No formal education	143(23.2)	70(11.4)	1.00	1.00
Primary education	149(24.2)	60(9.7)	1.22 (0.80,1.84)	0.82 (0.51, 1.32)
Secondary education	83(13.5)	27(4.4)	1.51 (0.89,2.53)	0.70 (0.36, 1.35)
College/university	50(8.1)	34(5.5)	0.72 (0.43, 1.21)	0.26 (0.13, 0.54)*
Frequency of BP measurement				
Monthly	220(35.7)	84(13.6)	1.00	1.00
Every day	2(0.3)	2(0.3)	0.38 (0.05, 2.75)	0.56 (0.06, 5.01)
weekly	87(14.1)	63(10.2)	0.53 (0.35, 0.79)	0.57 (0.36, 0.90)*
Every two weeks	99(16.1)	36(5.8)	1.05 (0.67, 1.66)	1.13 (0.69, 1.86)
When feeling ill	13(2.1)	3(0.5)	1.66 (0.46, 5.95)	1.34 (0.35, 5.14)
Others	4(0.6)	3(0.5)	0.51 (0.11, 2.32)	0.41 (0.08, 2.06)
Work status				
House wife	124(20.1)	76(12.3)	1.00	1.00
Private business	110(17.9)	34(5.5)	1.98 (1.23, 3.20)	2.09 (1.17, 3.74)*
retired	83(13.5)	40(6.5)	1.27 (0.79, 2.04)	1.79 (1.01, 3.18)*
Government employee	73(11.9)	22(3.6)	2.03 (1.17, 3.55)	2.41 (1.18, 4.90)*
unemployed	24(3.9)	9(1.5)	1.63 (0.72, 3.70)	1.81 (0.75, 4.41)
others	11(1.8)	10(1.6)	0.67 (0.27, 1.66)	0.70 (0.26, 1.90)
Duration of diagnosis				
< 5 years	249(40.4)	119(19.3)	1.00	1.00
5-10 years	94(15.3)	47(7.6)	0.96 (0.63, 1.44)	1.06 (0.65, 1.71)
≥10 years	82(13.3)	25(4.1)	1.57 (0.95, 2.58)	1.96 (1.11, 3.43)*
Source of medication/s				
Free of charge	194(31.5)	100(16.2)	1.00	1.00
By sponsorship	27(4.4)	17(2.8)	0.82 (0.43, 1.57)	0.96 (0.45, 2.05)
Self-sponsored	204(33.1)	74(12.0)	1.42 (0.99, 2.04)	1.35 (0.88, 2.06)
Drug group				
Thiazides	70(11.4)	38(6.2)	1.00	1.00
ACEI	87(14.1)	36(5.8)	1.31 (0.75, 2.28)	1.20 (0.66, 2.20)
CCB	72(11.7)	37(6.0)	1.06 (0.60, 1.85)	1.07 (0.58, 1.96)
β-blockers	7(1.1)	10(1.6)	0.38 (0.13, 1.08)	0.35 (0.11, 1.13)
Alpha 2 agonist	100(16.2)	28(4.5)	1.94 (1.09, 3.45)*	1.78 (0.94, 3.39)

Thiazide + ACEI	35(5.7)	11(1.8)	1.73 (0.79, 3.78)	1.52 (0.65, 3.56)
Thiazide + CCB	24(3.9)	18(2.9)	0.72 (0.35, 1.49)	0.85 (0.38, 1.91)
Thiazide + β -blockers	10(1.6)	6(1.0)	0.91 (0.31, 2.68)	0.81 (0.25, 2.57)
Other combination	20(3.2)	7(1.1)	1.55 (0.60, 3.99)	1.460.52, 4.10)

* Statistically significant