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ORIGINAL RESEARCH

Blood Pressure Control with Reference to Intensive Blood Pressure Targets Among Hypertension Patients on Chronic Follow-Up at Dessie Referral Hospital, Northeast Ethiopia

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Integrated Blood Pressure Control

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Background: Hypertension is a risk factor for heart, brain, kidney, and other diseases. It is also the major cause of premature death. Thus, it is important to prevent, treat, and control hypertension and to reduce the risk of cardiovascular disease.

Objective: To determine the level of blood pressure control and associated factors based on the new intensive blood pressure goals (<130/80 mmHg).

Methods: A cross-sectional study design was used to assess the level of blood pressure control and associated factors from February 15 to April 15, 2019. Two hundred and sixteen patients were selected through a systematic sampling technique.

Results: From 203 hypertension patients incorporated in the study, 102 (50.2%) were females. The mean age of patients documented during the last date of follow-up was 55.2 (SD=±14.47). About 51.2% of patients were less than 5 years from the day of diagnosis of hypertension. The majority of the study participants (111, 54.7%) were using two antihypertensives. The most common anti-hypertensive medication was hydrochlorothiazide (HCT), at 25 (12.3%). The most common combination drug therapy used was the combination of HCT and calcium channel blockers, at 62 (30.5%). Heart failure (22, 20.8%), stroke (18, 16.98%), and dyslipidemia (17, 16.04%) were the top three comorbidities. Based on the new intensive targets of blood pressure control (<130/80 mmHg), the blood pressure was controlled for only 25 (12%) patients.

Conclusion: The level of blood pressure control for hypertensive patients on chronic follow-up at Dessie Referral Hospital was very poor.

Keywords: blood pressure control, Dessie Referral Hospital, hypertension

Background

Cardiovascular disease (CVD) is responsible for the death of 17.3 million people annually and it is expected to increase to greater than 23.6 million by 2030.[1]

In 2015, 1.13 billion peoples were affected by hypertension globally. It is more common with higher age, with a prevalence of greater than 60%. This higher prevalence of hypertension is consistent across different parts of the world irrespective of income status.[2] In Ethiopia, the prevalence of hypertension was nearly 19.6% in 2015, which is higher in the urban (23.7%) than rural population (14.7%). The prevalence among males (20.6%) and females (19.2%) was relatively similar.[3]

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The 2017 American College of Cardiology/American Heart Association guidelines recommend intensive systolic blood pressure (BP) targets (<120 mmHg) for most patients which was based on evidences from the Systolic BP Intervention Trial (SPRINT). The trial concluded that a primary composite outcome of cardiovascular disease risk and death was reduced by 25% in the intensive treatment group compared with the standard treatment group. Similarly, all-cause mortality was reduced by 27% in the intensive treatment group.[4]

It is known that there is a graded association between higher blood pressure and increased CVD risk. In a meta-analysis of 61 prospective studies, the risk of CVD increased in a log-linear fashion as Systolic BP levels increased from <115 mmHg to >180 mmHg and Diastolic BP levels from <75 mmHg to >105 mmHg.[5]

Worldwide, hypertension is not adequately controlled, and it is worse in lower-income countries. In 2010, control of hypertension (defined as <140/<90 mmHg) was estimated to be 28% in high-income and 8% in middle- and low-income countries.[6]

Hypertension control is a complex issue. To achieve an optimal blood pressure control it needs active cooperation between healthcare providers, patients, and healthcare systems. Hence this study aims to determine the level of blood pressure control and associated factors in a hypertension clinic of Dessie Referral Hospital (DRH), Dessie town, North-East Ethiopia.

Methods

Study Setting and Period

The study was conducted at the hypertension clinic of DRH, Dessie town from February 15 to April 15, 2019. DRH is a referral hospital with 560 beds. Dessie is the capital city of South Wollo zone, Amhara region, which is 401 km from the capital city of the country, Addis Ababa.

Study Design

A hospital-based cross-sectional study design was employed.

Population

All adult hypertension patients on chronic follow-up at Dessie Referral Hospital were taken as a source population.

Selection Criteria

After explaining the purpose of the study and informed consent, hypertension patients ≥18 years who visited the hypertension clinic of DRH during the study period were included in the study after confirmation of being on antihypertensive drug treatment for at least 6 months. Pregnant women and patients with poor cognitive functions were excluded.

BP Measurement

BP (on the day of the visit) was measured using a standard mercury sphygmomanometer of an appropriate size cuff twice with an interval of 2 minutes after resting for at least 5–10 minutes. The mean of two BP readings was calculated and recorded.

Sample Size Determination and Sampling Techniques

The sample size for the study was determined using single population proportion formula. A similar study was done at Gondar Hospital with the prevalence of blood pressure control nearly 45%.[7] Hence a *P*-value of 0.45 and confidence interval 90%, α=0.1, and Margin of error/degree of accuracy=5% was used for sample size calculation. Based on this the calculated sample size was 266. The total population of patients on follow-up at DRH were 750. Using the correction formula, the final sample size was found to be 216. When we divide the total population (750) with the final sample size (216) we can get the sampling interval which is nearly three. Hence patients were selected using systematic sampling method with a sampling interval of three. The first patient was selected based on lottery method. At the first day of data collection 20 patients were appointed. Hence with lottery method the fourth patient was the first to be incorporated into the study.

Data Collection Tool

A structured data abstraction format was prepared and used to collect data from patients as well as patient's medical record chart. A pilot study was done on 10% of the sample size on Boru-Meda General Hospital located at the same city before the actual data collection was done.

Data Analysis

After collection, data was entered to EPI-info 3.5.4 software and exported to SPSS version 20.0 for analysis. Both

binary and multivariable logistic regressions models were used to identify factors affecting BP control. Statistical significance was measured with *P*-values less than 0.05 at 95% confidence interval.

Result

Socio-Demographic Characteristics

From the total of 216 hypertensive patients included in the study, 13 patient medical records were incomplete, hence excluded from the study. From 203 hypertensive patients incorporated in the study, 102 (50.2%) were females. The mean age of patients documented during the last date of visit was 55.2 (SD=±14.47) years, ranging from 20– 85 years. The majority (52, 25.6%) of patients were in the age group 50–59 years. Most (91, 44.8%) patients were found to be illiterate. With regard to their occupation, merchants predominate (72, 35.5%); 54.7% of patients came from rural areas (Table 1).

Table 1 Socio-Demographic Characteristics of Hypertension Patients at Dessie Referral Hospital, Ethiopia, 2019

Variables		Frequency		*P*-value
		N	%	
Sex	Male	101	49.8	0.506
	Female	102	50.2	
Age	20–29 years	8	3.9	0.029
	30–39 years	16	7.9	
	40–49 years	42	20.7	
	50–59 years	52	25.6	
	60–69 years	46	22.7	
	>70 years	39	19.2	
Religion	Orthodox	99	48.8	0.076
	Muslim	99	48.8	
	Protestant	5	2.5	
Ethnicity	Amhara	195	96.1	0.988
	Oromo	7	3.4	
	Tigre	1	0.5	
Marital status	Single	12	5.9	0.019
	Married	127	62.6	
	Divorced	28	13.8	
	Widowed	36	17.7	
Educational level	Not Read and Write	91	44.8	0.447
	Read and Write	40	19.7	
	1–8	34	16.7	
	9–10	13	6.4	
	11–12	16	7.9	
	Diploma	9	4.4	
	Degree and above	0	0.0	
Occupation	Government employed	24	11.8	0.95
	Unemployed	71	35.0	
	Merchant	72	35.5	
	Farmer	36	17.7	
Living area	Urban	92	45.3	0.569
	Rural	111	54.7	

Lifestyle of Patients

All study participants were asked about their lifestyle, which may affect the level of blood pressure control. Based on this, 97 (47.8%) respondents use salt in their food. The majority of patients have no history of cigarette smoking or chronic alcohol use, (196, 96.6% and 190, 93.6%, respectively). When patients were asked about the use of hot drinks such as coffee and tea, 136 (67%) use during certain holidays only. Only 41 (20.2%) respondents were doing regular exercise. Except two patients all hypertensive patients participating in this study did not use traditional medicines (Table 2). The mean duration of patients diagnosed with hypertension was 5.2 (±4.27) years, with the range of 6 month, to 30 years. The majority of patients (170, 83.7) did not have a BP measuring device at their home and they were measured at hospital during medication refill time. With regard to the number of anti-hypertensives used to control blood pressure, the majority of the study participants (111, 54.7%) were using two antihypertensives. The use of three combinations was found to be 34 (16.7%) and monotherapy was used by 58 (28.6%) hypertensive patients. The use of more than three drug combinations was not documented (Table 2).

Number and Type of Anti-Hypertensives

The most common class of anti-hypertensive medication was a diuretic hydrochlorothiazide (HCT) (25, 12.3%) followed by calcium channel blockers (12, 5.9%), and angiotensin converting enzyme inhibitors (ACEI) (18, 8.9%). The most common combination drug therapy used was found to be the combination of HCT and CCBs 62 (30.5%), which is followed by HCT+ACEI (12.3%), and HCT+CCB+ACEI (7.9%) (Table 3).

Comorbidities

From 203 study participants, 106 (52.2%) have comorbidities. Heart Failure (22, 20.8%), Stroke (18, 16.98%), and

Table 2 Lifestyle of Hypertension Patients Attending Medical OPD of Dessie Referral Hospital, Dessie, Ethiopia, 2019

Variables		Frequency		*P*-value
		Count	Percent	
Use of salt in your food	Yes	97	47.78	0.001
	No	106	52.22	
Cigarette smoking	Current smoker	1	0.49	
	Stop smoking	6	2.96	0.99
	No smoking ever	196	96.55	
Use of alcohol	Less frequently	13	6.40	
	Frequently	0	0.00	0.99
	No alcohol	190	93.60	
Use of hot drinks	Less frequently	136	67.00	0.082
	Frequently	3	1.48	
	No hot drinks	64	31.53	
Having regular exercise	Yes	41	20.20	0.614
	No	162	79.80	
Use of traditional medicine	Yes	2	0.99	0.999
	No	201	99.01	
Measurement of BP at home	Yes	33	16.26	0.54
	No	170	83.74	
No of years diagnosed for hypertension	<5 years	104	51.2	0.483
	5–10 years	67	33.0	
	10–15 years	25	12.3	
	>15 years	7	3.4	
No of anti-hypertensives used	1	58	28.6	
	2	111	54.7	
	3	34	16.7	

Dyslipidemia (17, 16.04%) are the top three diseases occurring in hypertensive patients (Table 4).

Laboratory Investigations

The average total cholesterol, LDL cholesterol, HDL cholesterol, and triglyceride levels were found to be 200.74±46.4, ranging from 112–309 mg/dL, 140.86 ±63.7, ranging from 67–404 mg/dL, 35.83±9, ranging from 18–56 mg/dL, and 16.7±88.9, ranging from 44–410 mg/dL. As shown in the table, 50% of patients whose total cholesterol level measured has elevated level (>200 mg/dL) of total cholesterol. From the total of 30 patients, 72.4% have elevated level of LDL cholesterol. From the total of 64 patients who have documented liver function test, almost all have normal level of ALT and AST levels. From the total of 203 patients (137, 67.5%) have documented renal function tests. The mean Scr level was 0.899±0.28 ranging from 0.1 up to 1.5 mg/dL (Table 5).

Table 3 Type of Anti-Hypertensives Drugs Used by Hypertension Patients Attending Medical OPD of Dessie Referral Hospital, Dessie, Ethiopia, 2019

Drugs	Count	Percent
HCT	25	12.3
CCB	12	5.9
ACEI	18	8.9
BB	3	1.5
HCT+CCB	62	30.5
HCT+ACEI	25	12.3
ACEI+BB	8	3.9
ACEI+CCB	8	3.9
HCT+BB	5	2.5
CCB+BB	2	1.0
HCT+CCB+ACEI	16	7.9
HCT+CCB+BB	11	5.4
HCT+ACEI+BB	4	2.0
Others*	4	2.0
Total	203	100%

Note: *CCB+ACEI+BB, HCT+ARB, HCT+CCB+ARB, BB+ARB.

Table 4 Comorbidities Diagnosed on Hypertensive Patients Attending Chronic OPD of Dessie Referral Hospital, Dessie, Ethiopia, 2019

Comorbid Condition	Count	Percent
Heart failure	22	20.75
Stroke	18	16.98
Dyslipidemia	17	16.04
Peripheral neuropathy	12	11.32
Thyrotoxicosis	9	8.49
Parkinson's disease	5	4.72
Ischemic heart disease	5	4.72
RVI	3	2.83
Osteoarthritis	3	2.83
Rheumatoid arthritis	2	1.89
Asthma	2	1.89
Other	8	7.55
Total	106	100

Table 5 Latest Laboratory Investigations Done for Hypertension Patients Attending Medical OPD of Dessie Referral Hospital, Dessie, Ethiopia, 2019

Variables		Count	Percent	*P*-value
Total cholesterol	<200 ≥200	25 25	50 50	0.14
LDL cholesterol	<100 ≥100	8 21	27.59 72.41	0.998
HDL cholesterol	<40 ≥40	21 8	72.41 27.59	0.998
Triglyceride	<150 ≥150	26 28	48.15 51.85	0.91
AST	<40 ≥40	63 1	98.4 1.6	0.99
ALT	<40 ≥40	62 2	96.9 3.1	0.99
Scr	<1.2 ≥1.2	108 29	78.8 21.2	0.351
Fasting BG	<125 ≥125	44 8	84.6 15.4	0.99
Random BG	<200 ≥200	54 1	98.2 1.8	0.99

Blood Pressure Control

The mean systolic blood pressure and diastolic blood pressure documented during the day of visit was 133.07 ±16.9 mmHg (ranging from 90–190 mmHg) and 85.09 ±10.6 mmHg (ranging from 60–110 mmHg).

Based on the new intensive targets of blood pressure control (≤130/80 mmHg) recommended by AHA/ACC only (25, 12.3%) patients have controlled blood pressure. The rest (87.7%) of the patients have suboptimal blood pressure. The blood pressure control based on JNC 7 guidelines (≤140/90 mmHg) was found to be 43.8% (Figure 1).

When the blood pressure targets were compared against the previous recommendations (<140/90 mmHg) the level of blood pressure control is slightly higher (12.3% vs 43.8%) (Figure 2).

Factors Affecting Blood Pressure Control

From the bivariate analysis age, marital status, use of salt in food was having significant association with $P \leq 0.05$. But on multivariate analysis all the factors mentioned does not have significant association.

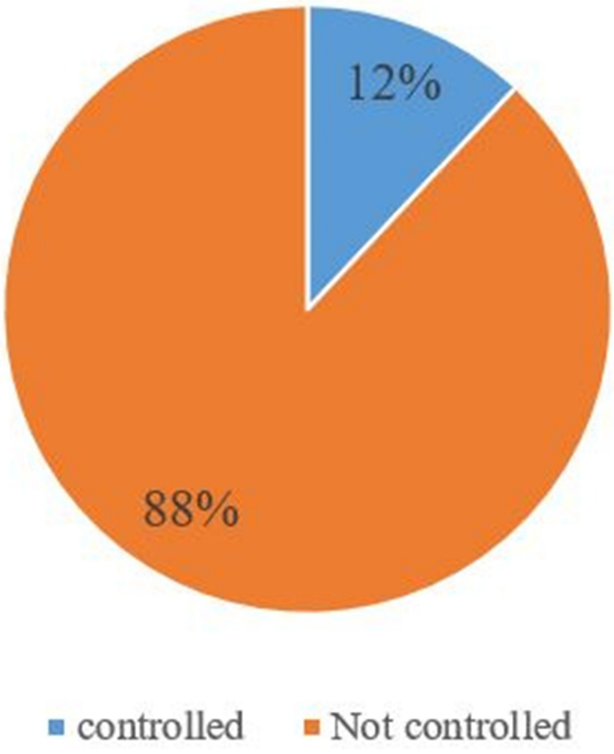

Figure 1 The level of blood pressure control for hypertension patients attending medical OPD of Dessie Referral Hospital, Dessie, Ethiopia, 2019.

Discussion

From the total of 203 study participants, 102 (50.2%) were females. It was similar with that of a study done at Zewditu Memorial hospital in Addis Ababa (55.6%).[8] The same study was done in Gondar which reported that 61.9% of patients were females.[9] The mean age of patients in this study was found to be 55.2 which is almost similar with that of a study done in Gondar (57 years).[10]

Figure 2 The level of blood pressure control <130/80 mmHg vs <140/90 mmHg for hypertension patients attending outpatient department of Dessie Referral Hospital, Dessie, Ethiopia, 2019.

Heart failure, stroke, and dyslipidemia were found to be the top three comorbid conditions documented at Dessie Referral Hospital; 20.75%, 16.98%, and 16.04%, respectively. In a study done in Jordan, diabetes mellitus was the leading followed by dyslipidemia and coronary artery disease.[11] A similar study done in Kenya mentioned that 41.85% of patients have DM as a comorbid condition.[12] These differences were observed since DM patients with hypertension were followed separately at the diabetic clinic.

The mean duration after the diagnosis of hypertension in this study was found to be 5.2 (±4.27) years. Similarly, since the start of drug therapy, patients were treated on average for 8.22±7.07 years (range=0.5–39) in a similar study done in Gondar.[8] The duration was 11.27±8.34 at Zewditu Memorial hospital according to the study done in 2016.[13]

The majority of patients (33.7%) participated in a study done on four health centers in New York used a single drug to control their blood pressure as compared to the present study which showed that 54.7% of the study participants were on two drugs.[14] A similar finding like the present one was observed on a study done at six public primary care clinics in Malaysia (46.7% were on dual therapy).[15] From the class of anti-hypertensives used, the diuretic, HCT was the most common (12.3%) followed by calcium channel blockers and ACE inhibitors. The same is true for HCT but ACE inhibitors slightly higher than CCBs (8.1% vs 5.52%) according to a study done by Tadesse et al[16] in Gondar hospital. In a study done in Cameroon, Yaounde beta-blockers are the second next to diuretics.[17] A combination of HCT and CCBs was the most common. But this combination is not the preferred one since most guidelines recommend the combination of HCT and ACEIs.

According to the recommendation by ACC/AHA intensive blood pressure targets (<130/80 mmHg) should be implemented so as to reduce cardiovascular morbidity and mortality.[18] On the current study only 12% of the study participants were found to have controlled blood pressure (<130/90 mmHg). With reference to less intensive blood pressure targets (<140/90), 43.8% of study participants have controlled blood pressure. One hundred and sixty-two (36.81%) patients had their blood pressure controlled (<140/90) in a study done at Cameroon[17] which is slightly less as compared to the current study. The prevalence of uncontrolled hypertension in a study done at the rural communities of Thailand was 54.4%.[19]

Conclusion

Based on the study findings, the level of blood pressure control for hypertensive patients at Dessie Referral Hospital was very poor (12.3%) with a reference to the intensive blood pressure targets. A combination of two antihypertensive medications was most commonly used by those patients. Hydrochlorothiazide is the most commonly used drug from monotherapy. The combination of HCT and CCBs is the most prevalent combination anti-hypertensive drug used. Heart failure and stroke were the most common comorbid conditions identified.

Data Sharing Statement

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

Ethics Approval and Consent to Participate

The ethical clearance was obtained from the Department of Pharmacy, College of Medicine and Health Sciences, Wollo University. Informed verbal consent was obtained from the respondents and the Department of Pharmacy Ethical Review Board approved the verbal consent process. To keep the privacy, name of participants were omitted from the data collection format. The confidentiality of their personal information was kept according to the Declaration of Helsinki.

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Author Contributions

All authors contributed to data analysis, drafting or revising the article, have agreed on the journal to which the article will be submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no conflict of interest.

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