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Prevalence of Hypertension and Its Management Pattern among Type 2 Diabetic Patients Attending, Adama Hospital Medical College, Adama, Ethiopia

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Abstract

Background: Hypertension (HP) and Diabetes mellitus (DM) are independent risk factors for micro-and macro-vascular disease. In Ethiopia, studies on the cardiovascular risk factors and complications of diabetes are lacking. The present study aimed to find out prevalence of hypertension and its management pattern of among Type two diabetic patients.

Method: Cross-sectional study was conducted. Three hundred eighty two (382) type 2 diabetic patients' attending at diabetic and Medical referral follow up clinic was included in the study. After medical cards were selected from attending cards by order of their presentation, the random sampling technique was used.

Result: Two hundred fifteen (215) subjects with Type 2 DM had hypertension and giving a prevalence rate of 56.3% in this study. Individuals with BMI ≥ 25 Kg/m2 have 2.1 times higher risk in developing hypertension than non-hypertensive Diabetic participants. (AOR-2.1, p=0.00025). Duration of Diabetic ≥ 5 year has 4.7 times risk of developing hypertension than non-hypertensive Diabetic participants (AOR-4.7, p=-0.00001). Hypertension was more than 3.6 times likely in those with age 45 years or older (OR=3.688 95% CI, 2.255-6.032).

Conclusion: The study found out that nearly half of DM patients suffer from co-existing hypertension. Duration of Diabetic is the key factor for the development of hypertension in DM.

Keywords: Hypertension; Type 2 Diabetes Mellitus; Management

Introduction

Hypertension (HTN), also known as high blood pressure (BP), affects millions of people. High blood pressure is defined as BP ≥ 140/90 millimeters of mercury (mmHg) [1].

Diabetes Mellitus (DM) is defined as a cluster of metabolic disorders, characterized by hyperglycemia high enough to significantly increase the incidence of retinopathy, nephropathy and neuropathy) [2,3].

DM and HTN are interrelated diseases that strongly predispose an individual to atherosclerotic cardiovascular disease. In 2013, 382 million people had diabetes; this number is expected to rise to 592 million by 2035. Most people with diabetes live in low- and middle-income countries and these will experience the greatest increase in cases of diabetes over the next 22 years [4,5].

International diabetes most of this increase will occur as a result of 150% rise in developing countries. In Africa, International Diabetes Federation (IDF) estimated about 19.8 million adults were estimated to have diabetes and regional prevalence of DM is 4.9%. Out of this more than 50% lives in four highly populated countries namely: Nigeria, South Africa, Ethiopia and Tanzania [6].

In Ethiopia, national data on prevalence and incidence of DM are lacking. However, patient attendance rates and medical admissions in hospitals are rising [7,8]. In Ethiopia, IDF reported about 1.9 million adults aged 20-79 years were estimated to have diabetes in 2013 and another 2.9 million people living with impaired glucose tolerance who are at higher risk of developing diabetes. With national diabetes prevalence of 4.36% and there was about 34,262 estimated diabetes related deaths occurred in same year [6].

The prevalence of hypertension in persons with DM is variable worldwide. Hypertension and DM are independent risk factors for micro vascular and macro vascular disease. It is well established that hypertension and obesity are major risk factors for cardiovascular disease which is considered as a leading cause of morbidity and mortality in Diabetic patient. These complications are serious health problems resulting in deterioration of the quality of life and premature death [9-13].

Prevalence of hypertension is more than twice that of in non-diabetic population largely due to clustering of both disorders in patients with obesity and insulin resistance [14].

Approximately two-thirds of adults with diabetes have hypertension. With this entire shift in diabetic disease trend treating diabetic alone cannot address its complication unless the complication like hypertension will address and increase the survival benefit of diabetic patient [15].

Hypertension is an extremely common co-morbidity amongst persons with diabetes mellitus (DM). And is said to be twice as prevalent in diabetics as in non-diabetic individual [16].

Hyperglycemia and diabetes are important causes of mortality and morbidity worldwide, through both direct clinical consequences and increased mortality from cardiovascular and kidney diseases. The major therapeutic objective for all diabetes patients to prevent complications arising from diabetes is Control of hyperglycemia [17].

Several researches that in developing country reveal that majority of the diabetic patients fail to achieve adequate level of glycemic control and reasons for poor glycemic control is complex and multi factorial which accelerate the micro and macro vascular complication significantly [18,19].

The prevalence of hypertension in type 2 diabetic patient is associated with a fourfold to fivefold increase in mortality, predominantly from coronary artery disease and stroke [20]. Cardiovascular disease is the most costly complication of DM and is the cause of 86% of deaths in patients with DM [21]. Recent studies have demonstrated the effectiveness of blood pressure treatment in reducing the complications of diabetes [22].

In 2007, a study conducted at the Black Lion Specialized Hospital in Ethiopia, showed that, cardiovascular diseases are the leading causes of mortality among diabetic patients [23].

There is scarcity of studies assessing prevalence and management of HTN in diabetes in sub Saharan Africa including Ethiopia [22].

In view of the growing burden of diabetes and its cardiovascular complications like hypertension in the developing countries like Ethiopia, it is crucial to determine prevalence and management of hypertension in diabetic persons in this part of the world.

Hypertension is a state of elevated blood pressure defined as >140 mmHg systolic and or >90 diastolic blood pressure. More than 90% of hypertension is classified as essential hypertension with no obvious cause. Hypertension is associated with bad prognosis when it is associated with DM, male sex, older age, obesity, hypercholesterolemia, black race, smoking and excessive alcohol intake and lack of exercise [24].

It has been identified as a major risk factor not only for the development of diabetes but also for the development of microvascular and macrovascular complications such as peripheral neuropathy, nephropathy, coronary artery disease and stroke in patients with diabetes [25,26]..

The relative risk of long-term cardiovascular complications among patients with DM is significantly higher compared to the general population [31-34]. it has been demonstrated that 40% and 60% of the patients with DM at age of 45 and 75, respectively, are hypertensive and about 80% of type 2 DM patients are overweight or obese [27-29].

The prevalence of hypertension in persons with DM is variable worldwide. Hypertension and DM are independent risk factors for micro vascular and macro vascular disease. The prevalence of coexisting hypertension and diabetes appears to be increasing in industrialized nations because populations are aging and both hypertension and NIDDM incidence increases with age [30].

In Ethiopia there is so far only one study on pattern of antihypertensive drug therapy among diabetic hypertensive patients and whether it is consistent with the current evidence-based guidelines, which show most treated patients (74%) were on multi-drug regimens. But only one-sixth of patients (15%) reached target blood pressure below 140/90 mmHg. and the reason for this is not well addressed [31]. Thus, the present study was carried out to study the prevalence of hypertension and its management's among diabetic patients attending at Adama Hospital Medical College, Adama, Ethiopia (Figure 1).

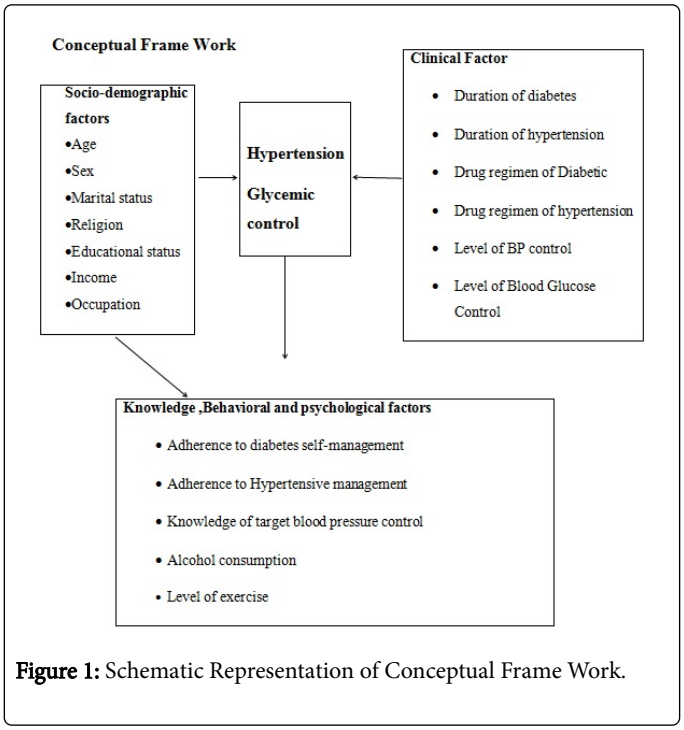

Figure 1: Schematic Representation of Conceptual Frame Work.

Methods and Participants

Study area and period

The study was conducted in Adama Hospital medical college (AHMC), Adama town, Central part of Ethiopia. This study was conducted beginning from February to October 2018 at Diabetic and Medical Referral clinic follow up of the Hospital.

Study design

The study was facility based cross sectional study design.

Source population

The source population of the study was all adults with Type 2 diabetic mellitus who have follow up at Medical referral clinic of AHMC.

Study subjects

Study populations were type 2 selected diabetes patients attending Medical referral of AHMC during data collection period.

Sample size determination

The required sample size for Prevalence of Hypertension in Diabetes patient is estimated using the proportion of hypertension in diabetics

46.5% which was reported from study conducted in Jimma University Specialized Hospital (JUSH), south west Ethiopia [31]. The level of significance (α) equals to 0.05 and marginal error of 5%.

Where n=the desirable sample size (α/2)=the critical value at 95% level of significance (1.96) p=proportion Hypertension in diabetic patient. d=precision of measurement (acceptable marginal error) using this formula

$$n = \frac{(Z\alpha/2)^2 \, p\,(1\text{-}p)}{d^2} = 382$$

p=0.5, d=0.05, n= (1.96)2 × (0.46) × (0.54)=382 after adding 10% non-response rate the final sample size was 420.

Sampling procedures

Simple random sampling technique was used to select the study subjects. While the study hospital was selected using purposive sampling method. AHMC is the one the referral hospital service for diabetic patient. The medical referral clinic enrolled by physician serve diabetic patient all working day but two day for Diabetic patient follow up at two case team and one other day at Medical referral clinic. And average number of patients attending the clinic in one month was estimated to be 720. After all attending patient cards selected on the day of follow up, type two diabetic patients selected based on their diagnosis and after the patients presentation confirmed and lottery methods used until desire sample size achieved. Then every patient visiting the clinic during the data collection period were interviewed using structured data collection questionnaire and Clinical parameter were measured until desired sample size is achieved.

Inclusion and exclusion criteria

Patients who were on Type 2 Diabetes and Willingness to participate in the study were included in the study.

Data Collection Techniques

Data was collected through face to face interview and chart review using structured well designed questionnaire. The clinical tools for blood pressure measurement, blood glucose measurement and patient general medical condition. The tool contains information about socio demographic characteristics of the patient, clinical, behavioral, and tools to review patients' medical record.

Data collectors was given a brief one day training on how to use the questionnaire, on their role in the study and on the procedures to be followed during data collection. During pre-test, discussion was carried out to amend the identified problems based on the experience gained during the pre-test. Thus, interviewers were instructed to make the highest possible care during interview session to record response correctly and completely.

Operational definition

Hypertension according to 2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: Report from the Panel Members Appointed to the Eighth Joint National Committee (JNC 8) recommendation High Coronary artery disease risk (DM,CKD,CAD-equiv)<130/80 mmHg.

Diabetics for purpose of this study we categorized patients based on American Diabetic Association (ADA) 2015 recommendation in to two groups:

Good glycemic control: Fasting blood glucose of 80-130 mg/dl.

Poor glycemic control: Fasting blood glucose of <80 mg/dl and >130 mg/dl.

Good Blood pressure control: Systolic BP<140 mmHg and DBP<90 mmHg.

Poor Blood pressure control: Systolic BP ≥140 mmHg and DBP ≥ 90 mmHg.

Fasting blood sugar: Blood glucose measured will be from venous blood after at least 8 hours of overnight fasting.

Adherence to hypertensive medication: If the patients took all his/her anti-Hypertensive medication in last seven days.

Adherence to diabetic medication: If the patients took all his/her anti diabetic medication in last seven days.

Adherence to exercise: If the patient follow recommended level of exercise for more than 3 days in last seven days.

Alcohol consumption: If reported consumption of alcohol twelve month prior to the data collection.

Risk of cigarette smoking: Will be assessed by use of "yes/no" Questions.

Body weight control: If report of BMI in between the normal range (18.5-24.9 Kilogram).

Knowledge of target blood pressure control: Will be assessed by use of "yes/no" Questions.

Data management and quality assurance

To ensure the quality of data, brief training was given for data collectors on the objective of the study, contents of the questionnaires and how to maintain confidentiality and privacy of the study subjects. In order to check the functionality of data extraction forms, a pre-test will be carried out. The collected data was checked for completeness and accuracy and corrected on daily basis before leaving the hospital. Prior to data entry data were coded and edited properly by the principal investigator and then entered into statistical computer package using SPSS version 20 by principal investigator.

Data Analysis Procedure

The collected data were entered in to computer and analyzed using SPSS for windows version 20.0. Chi square test and student t–test were used for statistical analysis. P-value below 0.05 considered as statistically significant. To measure association between variables in Hypertensive and Non hypertensive Diabetic patient a multiple logistic regression was performed. The prevalence of hypertension, physical inactivity smoking and was determined. We employed multivariate regression to identify predictors of hypertension.

Ethical consideration

Ethical approval was secured from the College Institutional Review Board and Hospital administration. Before enrolling any of the eligible study participants, the purpose and the benefit of the study was discussed with each diabetic patient.

Result

Socio-demographic characteristic of the study participant

The study included 382 people with Type 2 diabetes, (176 (46.1%) males, 206 (53.9%) females. 110 (28.8%)study subject were in the age group of 45 to 54 years, followed by 55 to 64 years 91 (23.8%) and >65 age group 86 (22.5%). 179 (83.25) hypertensive diabetic patient were from urban area (Table 1).

Variable		Frequency (n-382)	Percent
Sex	Male	176	46.1
	Female	206	53.9
Age	25-34	4	1
	35-44	91	23.8
	45-54	110	28.8
	55-64	91	23.8
	>65	86	22.5
Residency	Urban	311	81.1
	Rural	71	18.6
Marital Status	Single	55	14.4
	Married	321	84
	Divorced	5	1.3
	Widowed	1	0.3
Religion	Orthodox	267	69.9
	Muslim	58	15.2
	Protestant	43	11.3
	Catholic	14	3.7
Education	Unable to read and write	89	23.3
	Grade 1-6	116	30.4
	Grade 7-8	25	6.5
	Grade 9-12	100	26.2
	Higher Education	52	13.6
Occupation	Unemployment	164	42.9
	Self-employed	113	29.6
	Government/ private Employee	105	27.5

Table 1: Socio-demographic Characteristics of Diabetic patients, AHMC, Adama, Town, Oromia region, Ethiopia, February to October 2018.

Magnitude of hypertension and its level of blood pressure control among diabetic

Two hundred fifteen subjects with DM had hypertension, giving a prevalence rate of 56.3% in this study. 105 males (48.8%) had hypertension and 110 females (51.2%) had hypertension, but there was no significant difference between the proportions in both sexes (χ^2=0.1, df=1, P>0.05). The mean duration of diabetes was 8.69 (range 1.0-38.0) year. While Mean Duration of hypertension was 6.81 (range 1.0-28.0). The mean (± SD) systolic blood pressure was 133.26 ± 17.35 mmHg and the mean (± SD) diastolic blood pressure was 83.77 ± 8.36 mmHg. While the mean (± S D) Fasting blood glucose was 170.66 ± 51.67 mg/dl. The recommended target Systolic BP<140 mmHg and DBP<90 mmHg was only achieved in 14 (6.5) and 29 (13.5) respectively. While in Systolic BP ≥ 140 mmHg and DBP ≥ 90 mmHg record in the remaining 201 (93.5 and 186 (86.5) patients respectively. 80 (37.2%) subjects of study were duration of Diabetic was greater than 10 year. Only 75 (19.6%) participants had FBG below 130 mg/dl while 83 (21.7%) had a FBG of ≥ 200 mg/dl. 134 (62.33) hypertensive diabetic patient were overweight and 50 (23.26%) obese. Only 21 (9.7) hypertensive diabetic patients had Blood pressure measuring device and 45 (20.9) were only exercising. The mean (± SD) BMI for study participants were 26.59 ± 4.99 BMI kg/m2.

Parameter	Value
Duration diabetes mellitus (mean in years)	8.69 (range 1.0-38.0)
Fasting blood glucose (mean ± SD)	170.0 ± 51
Type of anti-diabetic treatment	
Oral anti diabetic medications only	286 (74.9)
Insulin only	58 (15.2)
Insulin and oral anti diabetic medication	38 (9.9)
Proportion of Hypertension (among T2 Diabetic patient)	215 (56.3)
Duration of hypertension (mean in years)	6.81 (range 1.0-28.0)
Blood pressure goal for diabetes mellitus	
Systolic<140 mmHg	14 (6.5)
Systolic ≥ 140 mmHg	201 (93.5)
Diastolic<90 mmHg	29 (13.5)
Diastolic ≥ 90 mmHg	186 (86.5)
Type of anti-Hypertensive treatment	
Single therapy	182 (84.65)
Combine therapy	33 (15.35)

Table 2: Characteristics of patients with diabetes mellitus and hypertension, AHMC, Adama Town, Oromia, region, Ethiopia, February to October 2018.

The mean BMI for those who have hypertension was 26.45 (SD=5.25) while for DM patients who are normotensive were 24.47 (SD=4.41). Almost two thirds of diabetics 175 (81.4%) with duration of

diabetes of over 5 years had hypertension while 40 (18.6) patients with duration of diabetes <5 yrs (Table 2).

Analysis of hypertension among diabetic patient determinant factor

Socio demographic and other determinants in relation to Hypertension among Subject of studies were evaluated by bivariate and multivariate logistic regression analyses model. In the bivariate models almost all the socio-demographic variables were not significantly associated with Hypertension among subject of studies (Table 3). In this model BMI ≥ 25 Kg/m^2 and Duration of Diabetic ≥ 5 year were the two determinants which were found significantly associated with Hypertension among Study subject in the bivariate analysis (BMI ≥ 25 Kg/m^2 AOR-2.1, p-value 0.00025) and Duration of Diabetic ≥ 5 year (AOR-4.7, P-value-0.00001). The two factors were then transferred to multivariate model to see the effect of each factor on the dependent when the effect of each factor is considered independently. BMI ≥ 25 Kg/m^2 has 2.1 times higher risk of developing Hypertension compare to non-hypertensive Diabetic Studies participant. Duration of Diabetic ≥ 5 year has 4.7 times risk of developing Hypertension compare to non-hypertensive Diabetic Studies participant (Table 3).

Variable		HTNsive Diabetic Pt.	Non HTNsive Diabetic Pt.	Crude OR	Adjusted OR	P-value
		NO (%)	NO (%)	(95% CI)	(95% CI)	
Sex	Female	110(53.4)	96(46.6)	0.77(0.516-1.164)	0.790(0.474-1.315)	0.148
	Male	105(59.65)	71(40.34)			
Residency	Urban	179(57.18)	134(42.81)	1.225(0.726-2.065)	1.130(0.690-2.060)	0.691
	Rural	36(52.17)	33(47.8)			
Education	≤ Primary	132(57.4)	98(42.6)	1.120(0.741-1.692)	1.089(0.658-1.803)	0.74
	> Primary	83(54.6)	69(45.4)			
Occupation	Unemployment	91(55.5)	73(44.5)	0.945(0.628-1.421)	1.26(0.716-2.222)	0.422
	Employment	124(56.9)	94(43.1)			
Exercise	Yes	45(60.8)	29(39.19)	0.794(0.473-1.333	0.890(0.519-1.528)	0.674
	No	170 (55.19)	138(44.81)			
Smoking	Yes	14 (56)	11(44)	0.988(0.436-2.236)	0.893(0.378-2.113)	0.798
	No	201(56.30)	156(43.69)			
Alcohol	Yes	28(59.6)	19(40.4)	1.166(0.627-2.171)	1.331(0.663-2.672	0.421
	No	187(55.8)	148(44.2)			
DM treatment	Oral anti-DM	152(54.3)	128(45.7)	0.491(0.241-1.002)	0.856(0.391-1.872)	0.697
	Insulin	34(55.7)	27(44.3)	0.521(0.225-1.209)	0.780(0.416-1.462)	0.439
	Both	29(70.7)	12(29.3)	2.035(0.998-4.150)	1.162(0.531-2.541)	0.707
BMI	≥ 25 Kg/m^2	81(46.28)	94(53.71)	2.130(1.411-3.216)	2.173(1.433-3295)	0.00025*
	<25 Kg/m^2	134(64.73)	73(35.27)			
Duration of DM	<5 year	40(32)	85(68)			
	≥ 5year	175(67.8)	82(31.8)	4.535(2.868-7.172)	4.725(2.928-7.626)	0.00001*
FBG level	< 180mg/dl	141(57.1)	106(42.9)	0.912(0.598-1.391)	1.105(0.684-1.784)	0.684
	≥ 180 mg/dl	74(54.8)	94(43.1)			

HTNsive--Hypertensive. BMI-Body mass Index Pt.-patient DM-Diabetic Mellitus FBG-fasting Blood Glucose. *= P- value below 0.05 considered statistically significant.

Table 3: Analysis predictors of Hypertension among Diabetic patient when compared to non-Hypertensive Diabetic patient AHMC, Adama town, oromia region, Ethiopia, 2018.

Pattern of management of hypertension among hypertensive diabetic patient

The mean number (± SD) of antihypertensive medications prescribed per patient was 1.15 (± 0.39). From Hypertensive Diabetic patients were 182 (84.65) on Single therapy while 33 (15.35%) were on combination therapy (Figure 2).

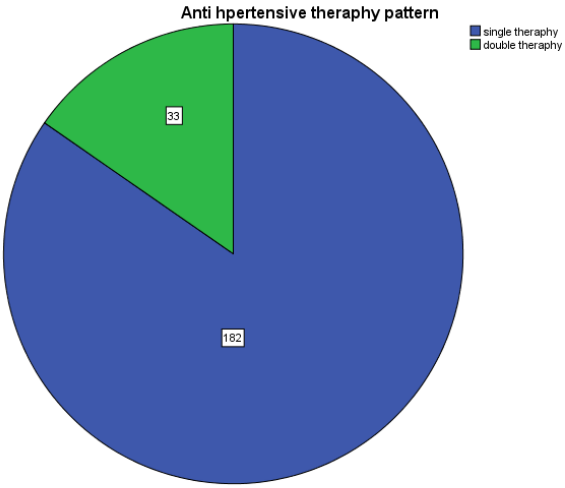

Figure 2: Number of antihypertensive medications used in patients with Hypertensive diabetic patient, AHMC, AdamaTown, Oromia Region, Ethiopia, February to October 2018.

The most frequently prescribed antihypertensive monotherapy was the angiotensin converting enzyme inhibitor (ACEI) class, used to treat 125 (32.7%) of the patients. Next followed by CCB class 53 (13.9). While among the combination of five different antihypertensive regimens used, the most frequently prescribed combinations were ACEI plus calcium channel blocker (CCB), 24 (6.3%). Enalapril, Nifedipine, Atenolol, and Hydrochlorothiazide were the only ACEI, CCB, BB, and Diuretic (DI) prescribed antihypertensive drugs, respectively (Table 4).

In the univariate analysis on Drug regimen type use effect on the level of Systolic and diastolic BP controlled there is no difference in systolic and diastolic Blood pressure controlled among those using Single therapy and combination therapy. (AOR-0.4 p-value-0.16 and AOR-2.3, p-value-0.167 for combination single therapy respectively).

Regarding adherence to anti-hypertensive almost half of patients with hypertensive 115 (53.48%) not adherence to their medication on the last seven day. The most reason for not adherence was 20.7% from side effect of drug, 5.5% think they are improving and 3.9% forget to take their medication.

Drug Therapy Class (%)		Overall Number (%)	Systolic BP		Diastolic BP	
Single	ACEI	125 (32.7)	6 (4.8)	119 (95.2)	11 (8.8)	114 (91.2)
	CCB	53 (13.9)	4 (7.54)	49 (92.45)	14 (26.4)	39 (73.58)
	BB	3 (0.8)	0 (0)	3 (100)	0 (0)	3 (100)
	DI	1 (0.3)	0 (0)	1 (100)	0 (0)	1 (100)
	Subtotal	182 (84.65)	10 (5.5)	172 (94.5)	25 (13.7)	157 (86.3)
Combination	ACEI + CCB	24 (6.3)	3 (12.5)	21 (87.5)	3 (12.5)	21 (87.5)
	ACEI + DI	4 (1.0)	1 (0)	3 (100)	1 (33.3)	3 (66.7)
	ACEI + BB + DI	4 (1.0)	0 (0)	4 (100)	0 (0)	4 (100
	ACEI + BB	1 (0.3)	0 (0)	1 (100)	0 (0)	1 (100)
	Subtotal	33 (15.35)	4 (12.1)	29 (87.9)	4 (12.1)	29 (87.9)

Abbreviations-ACEI (Angiotensin Converting Enzyme Inhibitor), CCB (calcium channel blocker)
BB (beta blockers), DI (Diuretics), and + (plus)

Table 4: Pattern of antihypertensive drugs in patients with controlled versus uncontrolled sBp and dBP. AHMC, Adama Town, Oromia region, Ethiopia,Adama February to October 2018.

Discussion

In our study 215 (56.3 %) study subjects were hypertensive diabetic patients. The prevalence of hypertension in persons with DM is variable worldwide. Studies done in Jimma, Ethiopia the prevalence of hypertension, obesity, dyslipidemia, physical inactivity and current smoking was 46.5%, 23.4%, and 63.5%, 55.1%and 5.5% respectively [32]. Study conducted in Benin shows as the prevalence rate of hypertension among diabetes was 54.2%. Emirate, UAE shows the prevalence of hypertension and obesity in Emirati patients with type 2 DM were 63% and 57%, respectively. In Bombay, India in 2003 a study concluded 318 patients observed that 178 (56%) subjects had high blood pressure [33]. Also in 2006 a study carried out in Delhi, India including 819 diabetic subjects, 63.2% hypertensive [34].

Our findings of prevalence of hypertension in diabetic are in agreement with the Study in Beninand UAE and also studies in Delhi [34-36].

The high prevalence rate of 56.3% in our study as opposed to the earlier reports in our country may be attributed to overweight and cultural habits of salt intake. In our study, 50 (23.26%) of the participants were obese which is similar with the studies done in Jimma, Ethiopia [32].

Hypertension was more than 1.5 times likely in those overweight (OR=1.59 95% CI 1.031-2.451) and 1.7 times in obese (OR=1.72, 95% CI; 1.013-2.924) patients than their respective counterparts.

The prevalence of hypertension among BMI<25 kg/m^2 and BMI ≥ 25 Kg/m^2 were 134 (62.32) and 81 (37.7). Body mass index was also significantly associated with Hypertensive Diabetic patient in this study. BMI ≥ 25 Kg/m^2 were about 2.1 times more likely to develop the disease of interest than normal body mass index individuals. Similar studies in Swedish Also reveal 47.4% with high BMI had hypertension [29]. Obesity/Overweight increase the risk of developing Hypertension several studies now reveals obesity is now emerging as a factor even in the poor population of the developing countries.

Hypertension was more than 3.6 times likely in those with age 45 years or older (OR=3.688 95% CI, 2.255-6.032). Similar studies In Jimma, Ethiopia reveals Hypertension was more than two times likely in those with age 45 years or older [32] and their significant association between higher ages in diabetic patient with development of hypertension.

In our study Duration of Diabetic ≥ 5 year has 4.7 times risk of developing Hypertension compare to non-hypertensive Diabetic Studies participant. Similar to findings that DM and HTN common risk factors reported in other studies in other countries the risk of hypertension increased, as DM patients got older.

The choice of antihypertensive drug should be determined by the drug's capacity to lower blood pressure, protect the diabetic patient's kidneys from ongoing injury and reduction of cardiovascular complications. ACEI have shown a reduced incidence of cardiovascular events compared to diuretics and CCB [37,38].

In our study, an ACEI was the most commonly prescribed drug 125 (32.7%), followed by CCB 53 (13.9%) and BB 3 (0.8%). The majority of our patients 182 (84.65%) were on single therapy and the most frequently prescribed therapy was an ACEI125 (32.7%).

In a similar study conducted in India, the most frequently prescribed monotherapy were ACEI (59%), CCB (29%) and DI (27%) classes. But ARBs (97%) were utilized more frequently than ACEIs (78%) among patients on combination therapy [39].

Our findings indicate that medication use was mostly as guideline for therapy as using ACEI as mostly used medication in hypertensive diabetic patients but combination use was only 33 (15.35%). But, Contrary to our finding in Zuweditu hospital, Addis Ababa shows majority of hypertensive diabetic patients (74%) on combination therapy [40].

Several large clinical trials demonstrated that most patients with hypertension could achieve adequate and sustained blood pressure control only with the use of multiple anti-hypertensive drugs [40].

The majority of our treated patients 125 (32.7%), were on Single therapy regimens. And only (10.06%) reached target blood pressure below 140/90 mmHg. This finding was similar with studies in Zuweditu hospital, Addis Ababa. Only 15% hypertensive diabetic patients reached target blood pressure below 140/90 mmHg [40].

Regarding adherence to anti-hypertensive almost half of patients with hypertensive 115 (53.48%) not adherence to their medication on the last seven day. There were no significant associations with controlled or uncontrolled sBP or dBP.

Limitations of the study

This study has some sort of limitations. Since it is hospital based, the findings may not be applicable to the general population. Uncontrolled sBP and dBP might be overestimated by use of single measurement but we used standard operational definitions.

Author's Contribution

AG and AD identifies the gap, selected the title, designed the study, supervised data collection and data entry and made data analysis. The protocol development, reviewing of the data analysis, and edition were made by AG, AD, GJ and AM. AD drafted the manuscript and all authors reviewed and approved the final manuscript.

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