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Diabetes vs silent killer: Magnitude and allied factors of hypertension among diabetic patient at hidar 11 hospital, Akesta, Ethiopia

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ABSTRACT

Background

Hypertension is a masked silent killer and one of the perilous non-communicable diseases. Hypertension and diabetes generally coexist because they share similar risk factors, including being overweight, following an unhealthy diet, and living an inactive lifestyle. Despite being preventable disease, diabetes and hypertension fall among top 10 leading causes of death globally. Diabetes mellitus has rapidly become a major threat in almost all developed and developing countries. **Objective:** To determine the prevalence and allied factor of hypertension among diabetic patients attending follow-up at Hidar 11 hospital Akesta, June 2017G.C.

Methodology

Institutional based cross sectional design was used to assess the prevalence and associated factor of hypertension among DM patients. A total of 388 patients were included using simple random as non probability sampling. The blood pressure measurement was collected using manual BP apparatus, patient's height and weight was measured to calculate the BMI. Structured questionnaire was used to gather associated socio-demographic data.

Results

From a total of 388 diabetic patients 175(45.1%) of them have hypertension. significantly association with type of DM medication, stress, hyperglycemic control, and alcohol consumption. **Conclusion:** The prevalence of hypertension among DM patients was in higher end. The prevalence of hypertension among diabetic patients was 45.1% is much higher, and duration of DM and anti-diabetic medication consumers had an association in causing hypertension.

Keywords: Silent Killer, Diabetes, Hypertension, Prevalence, Allied factor

INTRODUCTION

Hypertension is a masked silent killer and one of the perilous non-communicable diseases. Diabetes and high blood pressure tend to occur together because they share certain physiological traits. High blood pressure is a dangerous disease that becomes even more problematic in the setting of diabetes. The well-studied example of the self-reinforcing relationship between diabetes and high blood pressure take place in the kidneys. The number of people with diabetes and hypertension is increasing globally.

Raised blood pressure is estimated to claim 7.5million deaths attributing 12.8% of all deaths worldwide. Despite being preventable disease, diabetes and hypertension fall among top 10 leading causes of death globally. (International Diabetes Federation 2014, WHO 2015) [1-5].

In 2012, an estimated 1.5 million deaths were directly caused by diabetes with more than 80% of diabetes deaths occurring in low- and middle-income countries (WHO - 2015). International Diabetes Federation Atlas (IDFA) in 2011 estimated366 million people suffers from DM and the number is expected to rise to 552 million by 2030 International Diabetes Federation Atlas (IDF) diabetes atlas 2011).

Most of this increase will occur as a result of 150% rise in developing countries. It is estimated that developing countries will bear the brunt of DM epidemic to the extent of 77% of the global burden in the 21st century (Nandeshwar S, et al 2011). As a result of population growth, ageing, unhealthy diets, obesity and sedentary lifestyles (Cho W et al 2005). IDFA estimated that 10.8 million people have DM in sub-Saharan Africa in 2006 and that this would rise to 18.7 million by 2025, Increase of 80%, as such exceeding the predicted worldwide increase of 55% (Levitt NS 2008).

In Ethiopia, national data on prevalence and incidence of DM are lacking. However, patient attendance rates and medical admissions in hospitals are rising (Tamiru S et al 2010). In addition IDFA reported Ethiopia to be ranked 3rd among the ten top countries in Africa with 1.4 million DM cases and estimated prevalence of 3.32% by year 2012. (Diabetes at glance, Africa 2-12). The global prevalence of raised BP IN adult aged 18 years and over was around 22% in 2014 (WHO 2014, Chobanian AV, et al 2003). The prevalence of hypertension according to WHO is highest in the African Region at 46% among adults aged 25 and above, while the lowest prevalence at 35% is found in the Americas. Overall, high-income countries have a lower prevalence of hypertension 35% than other groups at 40 % (WHO 2013).

Modelled estimates of hypertension with an age-adjusted prevalence in Africa indicated the overall prevalence of hypertension have been increasing since 1990. In adults aged ≥20 years, in 1990 prevalence were 19.1%, in 2000 prevalence were estimated 24.3%, in 2010 with prevalence of 25.9% and projected to 25.3% by 2030 (Davies A 2014).

A population-based prevalence study conducted in Addis Ababa in 2009, Ethiopia reported a 31.5% and 28.9% prevalence of hypertension among males and females respectively (Tesfaye F, 2009). DM patients have higher day time and night time BP means than non diabetes patients. In addition, normotensive type 2 DM patients have masked hypertension, which is associated with increase in albuminuria and in left ventricle well thickness (Arquivos Brasileiros, 2007).

Objectives

- To determine the prevalence of hypertension among diabetes patients attending chronic OPD at Hidar 11 hospital, South Wollo, Ethipoia
- To identify the associated factors of high blood pressure measurement among diabetes patients attending chronic OPD at Hidar 11 hospital, South Wollo, Ethipoia [6-7]

METHODS & MATERIALS

- **Study Design:** Institutional based cross sectional study was used to determine the prevalence of high blood pressure measurement among diabetes patients at Hidar 11 hospital at South Wollo, Ethiopia.
- **Study Area & Period:** The study was conducted from February-March 2016G.C at Hidar 11 hospital Akesta town, Ethiopia [8].
- **Source of population:** All diabetes patients who are attending Hidar 11 hospital at South Wollo, Ethiopia.

- **Study Population:** All diabetes patients attending chronic OPD in Hidar 11 during the study period.
- **Sampling technique & Sample size:** Simple random as non probability sampling technique was used to select 388 adult diabetic patients coming to Hidar 11 hospital chronic OPD for follow up during the study period and those fulfilling the inclusion criteria.
- **Dependent Variable:** Hypertension in Diabetic patient
- **Inclusion criteria**
  - ✓ DM patients who are available at the time of data collection.
  - ✓ Age ≥18 year old
- **Exclusion criteria**
  - ✓ Severely ill patients

Data collection Procedure

Data were collected from selected clinically diagnosed diabetic patients who attend the hospital for follow up using structured questionnaire for gathering socio-demographic information like age, sex, income and other associated factors such as alcohol usage, smoking, occupation, obesity, physical activity. Blood pressure was measured in 4 standard intervals twice a day for a week by using manual BP measuring apparatus to determine level of BP using the standard scale of BP measurement and the result above 120\80 mmHg considered to be abnormal. Patient`s weight and height was recorded to determine Body Mass Index (BMI) [9].

Quality was assured through

- Use of structured questionnaire, which was pre tested on 5 patients before the actual survey and some modifications are made.
- The participant investigators were participating actively during the data collections well as regular supervision at the time of data collection.
- Each questionnaire and all measurement findings (BP, BMI) were checked daily for consistency, completeness, clarity and accuracy.

- **Data Analysis procedures:** The collected data were analyzed by Descriptive and inferential statistics and the results were presented in the form of statement, tables and graphs.
- **Ethical consideration:** Ethical clearance was obtained from Wollo University, College of Medicine and Heath Sciences, Department of comprehensive Nursing Ethical Review Committee; permission was obtained from Hidar 11 hospital and informed consent was taken from participants.

RESULTS

Socio demographic characteristic of the respondents

The response rate was of 100% among participants. A total of 388 people were included in the present study of which the majority 309(79.6%) were men and those in the age group of 60-64 years (18.6%). Regarding to religion, Muslim respondents contribute 310(79.9). With respect to educational level 145(37.5%) of respondents cannot read and write, three hundred twenty eight (84.5%) of the participant were married in marital status followed by 59(15.2%) were single. As to their occupation farmer 150(38.7%) were of the highest proportion and 284 (74%) of the respondents get <500 birr monthly [10-15].

Table 1: Socio demographic characteristic of diabetic patients attending chronic OPD at Hidar 11 hospital Akesta March 2017 GC (n=388)

No	Variable	Demographic V	Frequency	Percentage
1	Age	19-24	53	13.7
		25-29	28	7.2
		30-34	31	8
		35-39	23	5.4
		40-44	42	10.8
		45-49	30	7.7
		50-54	36	9.3
		55-59	28	7.2
		60-64	72	18.6
		>65	45	11.6
		Total	388	100
2	Sex	Male	309	79.6
		Female	79	20.4
		Total	388	100
3	Religion	Protestant	16	4.1
		Orthodox	62	16
		Muslim	310	79.9
		Total	388	100
4	Education level	Cannot read and write	145	37.4
		Can read and write	48	12.4
		Primary school	109	28.1
		Secondary school	45	11.6
		Collage and above	41	10.6
		Total	388	100
5	Occupation	Farmer	150	38.7
		House wife	61	15.7
		Government employee	48	12.4
		Private employee	3	8
		Daily labor	14	3.6
		Merchant	15	3.9
		Student	29	7.5
		No job	68	17.5
		Total	388	100
6	Monthly Income	<500	287	74
		500-1000	68	17.5
		1000-2000	24	6.2
		>2000	9	2.3
		Total	388	100
Total			**388**	**100**

General characteristics of the respondents

Out of 388 diabetic patients in the study, 175(45.1%) of them had DM with hypertension. Regarding family history of hypertension 306(78.9%) of study participants have no family history of hypertension. With respect to type of DM 268(69%) of them were type 2diabetic patients and as to the medication type 264(68%) of these patients take oral antiglycemic agent.

As to drinking and smoking habit 80(20.6%) and 15(3.9%) of them were alcohol drinkers and cigarette smokers respectively. Regarding hyperglycemic control 55(31.4%) of them have poor hyperglycemic control [16-18].

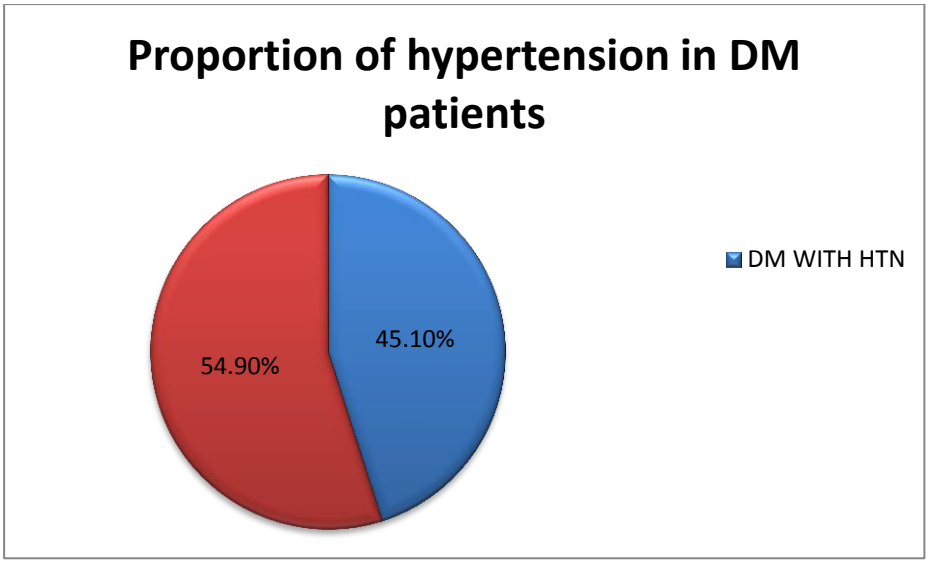

Figure 1: Proportion of hypertension among diabetic patient (n=388)

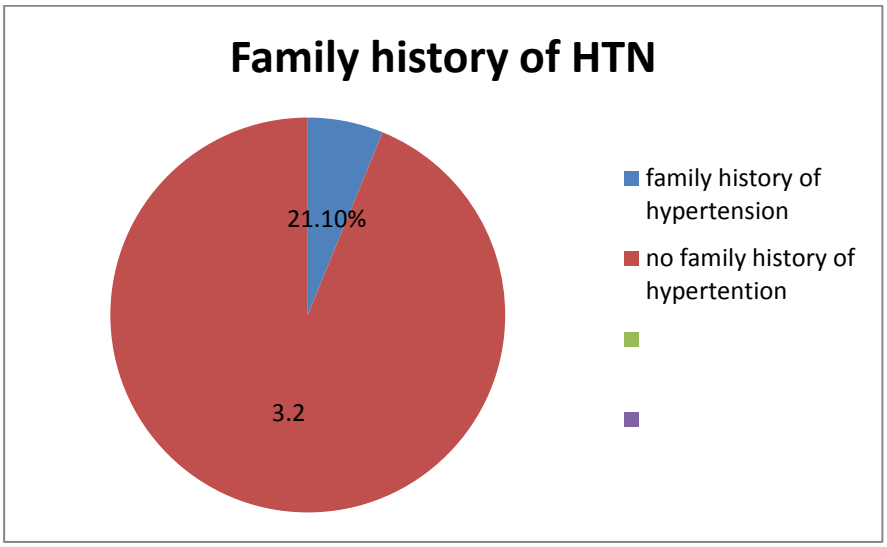

Figure 2: Family history of hypertension among diabetic patients (n=388)

Table 2: General characteristics of diabetic patients (n=388)

Character	Total (388)
	N (%)
Hyperglycemic control	
Poor	118(30.4%)
Medium	139(35.8%)
Good	151(38.9%)
Daily meal	
Sugar free	380(97.9)
Mixed	8(2.1)
Cigarette smocking	
Yes	15(3.9)
No	373(96.1)
Alcohol drinking	

Yes	80(20.6)
No	308(79.4)
Life style modification	
Yes	300(77.3)
No	88(22.7)
Duration of DM	
<5 years	192(49.5)
5-10 years	193(49.7)
>10 years	3
Type of diabetes	
Type 1	120(30.9)
Type 2	268(69.1)
Type of DM medication	
Oral	264(68)
Injection	124(32)

Clinical measurements

After conducting different clinical measurements from 388 respondent, 156(40.2.%) were found to have BP measurement of >140/90 during the study, Blood pressure was measured in 4 standard intervals twice a day for a week by using manual BP measuring apparatus to determine level of BP using the standard scale and regarding the blood glucose level ,227(58.5%) 0f them had FBS level>130mg/dl which above the normal range of FBS for diabetic patients.

Table 3: Clinical measurement for diabetic patients (n=388)

Measurements	Total (388)
Current BP	N (%)
<120/80	226(58.2)
130-139/85-89	6(1.5)
140-159/90-99	146(37.6)
160-179/100-109	10(2.6)
Fasting blood sugar level	
70-130	161(41.5)
>130	227(58.5)

Anthropometric measurement

The study participants height and weight was measured to assess the prevalence of obesity and to look over its association with the co-morbidity of DM and hypertension.

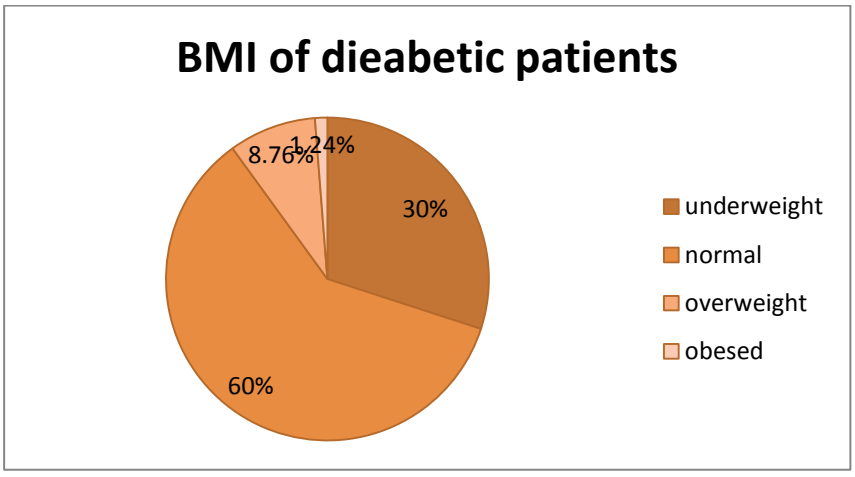

Figure 3: BMI of diabetic patients in Hidar 11 hospital Akesta March 2017G.C

Factors associated with hypertension among diabetic patients

During Bivariate analysis age, sex, marital status, educational status, occupation, hyper glycemic control, duration of DM, type of DM, type of medication and blood sugar level were statistically significant variables.

Those respondents whose age group (50-54years) were 7.68 times more likely to develop hypertension as compare to age group (19-24 years),(COR=7.683CI:2.879-20.498). Those single respondents by marital status were 0.204times less likely to develop hypertension as compare to married respondents,(COR=0.204CI:0.100-0.417).

Respondents with educational status of secondary school were 8.202 times more likely to develop hypertension as compare to those respondents with educational status college and above (COR=8.202CI:3.772-17.834). Female respondents were 2.233 times more likely to develop hypertension as compare to male patients.

House wives were 0.491 times less likely to develop hypertension as compare to respondents who were farmers (COR=O.491CI:0.260-0.929), merchants were 4.304 times more likely to have hypertension as compare to those who were farmers (COR=4.304CI:1.154-16.054), and those who do not have jobs were 2.455 times more likely to develop hypertension as compared to those who were farmers.

Participants with good hyperglycemic control were 0.567 times less likely to have hypertension as compare to those who have poor hyperglycemic control (COR=0.567CI:0.345-0.931) With5-10 years duration of DM respondents were 3.184 times more likely to develop hypertension as compare to those with less than 5 years duration of DM(COR=3.184CI:2.093-4.844). Those respondents diagnosed with type 2 DM were 9.482 times more likely to have hypertension as compare to those diagnosed with type 1 DM.(COR=9.482CI:5.309-16.935). Respondents who are taking oral anti diabetic medication were 12.282 times more likely to have hypertension as compare to those taking inject able anti diabetic medications (COR=12.282CI:6.682-22.573). Respondents with FBS>130mg/dl were 1.755 times more likely to have hypertension as compare to those respondents with FBS<130mg/dl(COR=1.755CI:1.150-2.677).

Those variables whose p value less than 0.2 were enter to compute in multivariate logistic regression. Duration of DM and type of medication were important positive determinant factors for hypertension among diabetic patients. Respondents with duration of 5-10 years were 6.304 times more likely to develop hypertension as compare to respondents with less than 5 years duration (AOR=6.304CI:3.314-11.99). Respondents who were diagnosed with type 2 DM were 11.485 times more likely to develop hypertension as compared to those who were diagnosed with type 1 DM(AOR=11.485CI:4.346-30.349).

Table 4: List of Bivariate and multivariate analysis of hypertension among DM patients (n=388)

Variable	Hypertension with diabetic		COR (CI (95%))	AOR(CI(95%))
Age of respondents	Yes	No		
19-24	22(12.6%)	14(6.6)	1	1
50-54	9(5.1%)	44(20.7%)	7.683(2.879-20.498)*	0.91(0.038-21.867)
Marital status				
Single	10(5.7%)	49(23%)	0.204(0.100-0.417)*	1.554(0.298-8.098)
Married	164(93.7%)	164(77%)	1	1
Education status				
Secondary school	9(5.1%)	36(16.9%)	8.202(3.772-17.834)*	53.673(4.559-31.059)
Collage and above	12(6.9%)	29(13.6)	1	1
Occupation status				
House wife	18(10.3%)	43(20.2%)	0.491(0.260-0.929)*	0.437(0.184-1.040)
Merchant	11(6.3%)	4(1.9%)	4.304(1.154-16.054)*	0.568(0.114-2.826)

No job	46(26.3%)	22(10.3%)	2.455(1.346-4.477)*	2.180(0.889-5.287)
Farmer	69(81%)	81(38%)	1	1
Hyperglycemic control				
Poor	55(31.4%)	63(29.6%)	1	1
Good	50(28.6%)	101(47.4%)	0.567(0.345-0.931)*	1.268(0.511-3.149)
Duration of DM				
<5 year	59(33.7%)	133(62.4%)	1	1
5-10 year	113(64.6%)	80(37.6%)	3.184(2.093-4.844)*	6.304(3.314-11.99)*
Type of DM				
Type 1	16(9.1%)	104(48.8%)	1	1
Type 2	159(90.9%)	109(51.2%)	9.482(5.309-16.935)*	0.900(0.072-11.272)
Type of medication				
Oral	161(92%)	103(48.4%)	12.282(6.682-22.573)*	11.485(4.346-30.349)*
Injection	14(8%)	110(51.6%)	1	1
Blood sugar level FBS				
70-130mg/dl	55(32.4%)	94(45.6%)	1	1
>130mg/dl	115(67.6%)	112(54.4%)	1.755(1.150-2.677)*	1.227(0.647-2.324)

DISCUSSION

In this study the prevalence of hypertension among diabetic patients was 45.1% is much higher than 2% prevalence in Nepal's cross sectional study conducts on 4200 study participants(Dr Kavitha HS, 2014). This deference might be due to smaller sample size is 388 and institutional cross sectional study respectively. While this study is lower than 64% prevalence in Mysore's community based cross sectional study on 104 DM patients (Cooper-DeHoff RM, et al 2010). The difference might be due to small sample size used in their study. Similarly this study is lower than the study from Morocco's cross sectional study with prevalence of 70.45%. (Dr.Meghnath Dhimal 2015).

Likewise this study is also lower than 70% prevalence in Benin's cross sectional study on 400 type 2 DM patients. This difference may be due to the study participants.

Those respondents with duration of DM 5-10 years were 8 times more likely to develop hyper tension. This study is contradicted with the study of Benin's (18). Respondents taking oral anti-diabetic medication were 11.485 times more likely to develop hypertension. These might be due to type 2 DM patients 9.482 times more likely to develop hypertension and most of them were taking oral anti-diabetic medication.

CONCLUSION

Hypertension is a masked silent killer and one of the perilous non-communicable diseases. The prevalence of hypertension among diabetic patients was 45.1% is much higher, and duration of DM and anti-diabetic medication consumers had an association in causing hypertension.

Recommendations

The study results recommend Ethiopian Ministry of Health, Hospital Management and Wollo University to consider need and the current WHO recommendation to give emphasize on the rapidly rising incidence of non communicable disease and make a management protocol guide for all health institute and control applicability of the guide lines with some interventions in preventing and managing HTN among diabetic patients and other population at various level.

Conflict of Interest: The authors declared no conflict of interest.

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