WOLKITE UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCINCES

DEPARTMENT OF NURSING

MAGNITUDE OF HYPERTENSION AND ASSOCIATED FACTORS AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS IN GURAGE ZONE PUBLIC HOSPITALS, GURAGE ZONE, SOUTHWEST, ETHIOPIA,2023.

THESIS TO BE SUBMITED TO WOLKITE UNIVERSITY COLLEGE OF MEDICNE AND HEALTH SCINCES DEPARTMENT OF NURSING FOR PARITIAL FULFILLMENT OF THE REQUIRIMENT FOR BACHELOR OF SCIENCE DEGREE IN NURSING.

WOLKITE, ETHIOPIA

August, 2023

MAGNITUDE OF HYPERTENSION AND ASSOCIATED FACTORS AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS IN GURAGE ZONE PUBLIC HOSPITALS, GURAGE ZONE, SOUTHWEST, ETHIOPIA,2023

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ACKNOWLEDGEMENT

First of all, we would like to give our deepest gratitude to our advisors Mr. Bitew Tefera (BSC, MSC) and Mr. Zebene Mekonnen (BSC, MSC, ASST.PROFESSOR) for their help in giving our constructive comments and suggestions from the proposal development to the final thesis document preparation. Next, we would like to thank wolkite University College of medicine and health sciences department of nursing for timely title selection and initiation of preparing this research activity. Finaly we would also like to study participant and head of wolkite university specialized teaching Hospital, Attat lurd mariam hospital and Agena primary hospital for their cooperativeness in the data collection process.

ABBREVIATIONS AND ACRONOYM

BMI	Body Mass Index
BP	Blood Pressure
CI	Confidence Interval
CVD	Cardiovascular Diseases
DBP	Diastolic Blood Pressure
DM	Diabetes Mellitus
HRQOL	Health Related Quality of Life
HTN	Hypertension
IDF	International diabetes federation
NCD	Non communicable Diseases
NEMMH	Ingest Ellen Mohamed memorial hospital
NSAP	National strategic action plan
SBP	Systolic blood pressure
T2DM	Type 2 diabetes mellitus
WKUSTH	Wolkite University specialized teaching hospital

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Abstract

Background: Hypertension is the most significantly associated comorbid disease in people with type 2 diabetes and Its prevalence in this population is sharply increasing in all regions of the world. studies on determinants of hypertension among type 2 diabetes populations are scarce in Ethiopia, especially in Gurage zone, so this study to assess magnitude of hypertension and associated factors among type 2 dm and tries to fill gab.

Objective: The aimed of this study was to assess the magnitude of hypertension and to identify the determinant factors among patients with Type 2 diabetes mellitus in Gurage zone at selected public hospital from march18 to August 22, 2023.

Methods: Hospital-based cross-sectional study was conducted in Gurage zone at selected public Hospital among type 2 diabetes mellitus patients. Data were collected by using interview technique. Data were entered and analysis using Statistical Package for Social Science windows version 25. To identify factors associated of hypertension, Bivariable and Multivariable binary logistic regression analyses were done. Statistical significance was considered at level of significance of 5%, and adjusted odds ratio (AOR) with 95% confidence interval (CI) was used to present the estimates of the strength of the association.

Results: In this study factors independently associated with hypertension were being male Sex and eating vegetable. The odds of male sex was2.3 times (AOR = 2.32 95% CI, 1.1,4.9] P = 0.025) being hypertensive than female among type 2 diabetic patients.

Study subjects who were eating vegetable rarely was 1.5 times (AOR = 1.54, 95%CI [1.1,3.3] P = 0.02) hypertensive than always eating of vegetable among type 2 diabetic patients.

Conclusion and recommendation: The overall prevalence of hypertension among type 2 diabetes mellitus clients in this study was 47.9%. Therefore, it is better to design strategies for diabetes clients to lower their blood pressure in addition to anti-hypertensive medication and home to home blood pressure screening program for diabetic patients should be considered.

Key words: Hypertension, Type 2 diabetes mellitus

Chapter One: Introduction

1.1 Background

Hypertension (HTN) is one of the major health problems globally that can be diagnosed when systolic blood pressure (SBP) is ≥140 mm Hg and/or diastolic blood pressure (DBP) is ≥90 mmHg with 2-3 measurements of 1–4-week time gap or by only single measurement when blood pressure is ≥180/110 mm Hg[1].

The prevalence of hypertension among people with diabetes is higher than patients without Diabetes. hypertension among diabetes mellitus (DM) population is the primary reason for cardiovascular mortality and morbidity through its effects on target organs like the heart, brain, eye, and kidney due to different structural alterations in the microcirculation secondary to endothelial dysfunction, inflammation, oxidative stress, insulin resistance in the nitric-oxide pathway, dyslipidemia, sodium fluid retention and other[2-4]. Diabetes mellitus (DM) is a serious, endocrine disease characterized by a state of hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Some predictors of hypertension among type 2 DM patients are being overweight/obese, advanced age, unhealthy diet, lack of physical exercise, family history of hypertension, poor glycemic control, smoking, poor medication adherence, harmful alcohol consumption, and extensive atherosclerosis. Management consists of lifestyle modification, including weight loss if overweight or obese, physical activity, avoidance of tobacco and excessive alcohol intake, Dietary Approaches to Stop Hypertension style (DASH) based nutrition counseling, and reduced sodium intake[5, 6].[6, 7]Therefore, this study was aimed to explore magnitude and associated factor to the development of HTN among T2DM patients that can be used for the effective prevention and control of the condition.

1.2 Statement of problem

Comorbid hypertension among people with diabetes is now becoming a worldwide public problem the frequency of HTN among the diabetes population is almost twice that of non-diabetic population and it is reported in over two-thirds of people with type 2 diabetes [2].Hypertension is thought to be responsible for 7.5 million death per year, 57 million disability -adjusted life years, and around 6% of all death in the world [8, 9].According to the 2021 estimation of the International Diabetes Federation (IDF), around 531 million adults aged 20 to79 (10.5% of all adults in this age group) are living with diabetes. This figure is predicted to rise to 643 million by 2030 and 783 by 2045. Among the forty-eight sub-Saharan Africa countries and territories in IDF African region, Ethiopia has fourth largest number of people living with DM in 2021 [10].In Ethiopia, there were about 1.7 million cases and 23,157 deaths in adults due to diabetes in 2019 [11]. The DM expansion rate is growing at an alarming rate, and so are associated morbidity and mortality rates[12] .Hypertension is the most significantly associated comorbid disease in people with type 2 diabetes. Its prevalence in this population is sharply increasing in all regions of the world, which is 50% in most of the studies and 75% in many studies[13] [14] and in Ethiopia the prevalence of comorbid HTN among people with type 2 DM was ranged from 37.4 to 69.1 % [15]. Diabetes, hypertension, or a combination of both, cause 80% of end-stage renal disease globally. The combination of HTN and type 2 diabetes is particularly lethal and can significantly raise a person's risk of having total cardiovascular events such as heart attack or stroke[16]. And increases healthcare resource utilization, the incidence of depression, lower quality of life, and health care costs ([17]. The case-control study conducted in Tigray Ethiopia on determinants of hypertension among people with DM [18] recommended conducting further research that investigates the determinants of hypertension among people with diabetes in a broader social context. This study was tried to fill this gap and examining multiple risk factors which may contribute to the progress of hypertension among people with type 2 DM.

1.3. Significance of the Study

Identifying determinants of hypertension among people with type 2 diabetes would be important for many stakeholders. Primarily, for people with diabetes, this study would provide fruitful information to create awareness in controlling their lifestyle and delaying or preventing the onset of comorbid hypertension among people with type 2 diabetes. Findings from this study could also benefit health care providers (especially physicians and nurses) to develop effective strategies for improving quality of care, for building a trusting relationship, minimizing treatment-related errors & to provide quality care services which are often triangulated with evidence to prevent comorbid hypertension in people with type 2 DM. Currently as many literatures show in different areas of the world, the burden of non-communicable diseases, especially hypertension among type2 diabetes is increasing from time to time. To confirm this fact in the study area and to take appropriate measures the study will play its own roll. For future researchers who are interested in conducting a cohort study on the area, the finding of this study would be used as an input and framework by giving pertinent information on determinants of hypertension among type 2 diabetic clients.

Chapter Two: Literature Review

2.1 Magnitude of hypertension among type 2 DM

The prevalence of HTN among people with diabetes from different parts of the world showed that it is an increasingly important medical and public health issue. Since HTN and DM are closely related diseases, the prevalence of HTN among diabetics is significantly higher than that of non-diabetic population [13, 17, 19].Global prevalence and trends in hypertension and type 2 diabetes mellitus among slum residents: a systematic review and meta-analysis. Prevalence of hypertension and type 2 diabetes in slum populations ranged from 4.2% to 52.5% and 0.9% to 25.0%, respectively[20]

Different cross-sectional studies investigating hypertension prevalence among people with diabetes reported that the prevalence of hypertension among people with diabetes is 25.6% in Bellary [21].76% in Jordan and 92.7% in Malaysia [22] . According to the study conducted in Uganda and Tanzania, the prevalence of HTN among diabetics was 27.3% in Uganda rural, 11.8% in Uganda peri-urban and 13.3% in Tanzania[23]. In a study conducted in Gaborone City Council (GCC) clinics, Botswana, the prevalence of HTN among T2DM patients was 61.2% [24] and it was 69.8% in Tanzania, of which 84.5% was uncontrolled hypertension [25]. Similarly, in Morocco hypertension prevalence of 70.4% was reported in type 2 diabetics [26].

In sub-Saharan Africa the burden of non-communicable diseases like DM and hypertension is on the rise, as a result, the epidemiological transition causes the domination of non-communicable diseases over communicable diseases [3]. A systematic literature review conducted to identify the prevalence of hypertension among people with type 2 DM across different region of the world has shown the prevalence of hypertension among people with diabetes in the continent of Africa varies from country to country in which it ranges from 38.5%-64.9% in Nigeria ,70.1% in Cameroon and 80% in Zimbabwe.

In Ethiopia, the prevalence of co-morbid HTN among people with type 2 DM was 55% (2018, a cross sectional study conducted in Hassana Ingest Eleni Mohammed Memorial (NEMM) Hospital, Southern Ethiopia indicated that the prevalence of hypertension among type 2 diabetics was 55% [27]. General, the burden of HTN is growing in an alarming pace particularly in people with type 2 diabetes.

2.2 Factor Associated with Hypertension among People with Type 2 Diabetes

2.2.1 Socio Demographic Characteristics

Studies conducted in United Arab Emirates [13], Benghazi [28], increased age was positively associated with HTN among DM. Similar study conducted in 1000 T2DM patients in Jordan showed association between age and HTN [29]. Morocco [26], increased age was positively associated with HTN among DM.

Another cross-sectional study conducted in Hosanna NEMM hospital, Southern Ethiopia indicated the association between increased age and hypertension status among type 2 diabetics [30] . Overall, with increasing age, the prevalence of HTN among people with DM in increased age was positively associated with HTN among DM. Female sex was positively associated with HTN among DM in a cross-sectional study conducted in Botswana [19]. In contrary, female sex was negatively associated with HTN among DM patients in the study conducted in Benghazi [28] and Hossana NEMM Hospital, Southern Ethiopia [27]. Marital status was associated with hypertension coexisting with T2DM [30]. According to a study in Kenya, widowed respondents have a higher risk of having hypertension as compared to married respondents [31]. Contrary to this, a finding from a similar study in Ethiopia showed that married diabetic subjects followed by divorced subjects were found to have higher risk of HTN as compared to unmarried subjects [30].

Living in urban residence was found to have positive association with hypertension among type 2 diabetic patients [27]. Rural residents were 54% (AOR=0.462,95%CI: 1.178-1.198, P=0.002) less likely to have HTN as compared to urban residents[30].Regarding to educational status a study conducted in Nepal revealed that Compared to those who did not have any formal education, those who had completed primary education, secondary level education and higher education were found to have greater developing of hypertension [32-34].and also study conducted in Morocco also showed that Illiterate people were found to be at higher risk of hypertension compared to those with a high school or college education (P<10-3) [34]. Illiterates were 1.5times, grade 9-10

completes were 1.85times and college diploma graduates were about 2 times more likely to have HTN as compared to first degree and above.

Considering residence Prevalence in occupational status Merchants were 2.6 times and retired were 3.43 times more likely to have HTN as compared to government employee [30]. According to study conducted in Kuwait, family history is established risk factor for hypertension. As much as 47% of hypertensive patients have a family history of diabetes and/or hypertension [35].

2.2.2 Clinical Profiles

A recent case control study conducted in central Tigray zone established an association between HTN and type of anti-diabetic agents [36]. A study conducted in India indicated that there was positive association between duration of DM and hypertension among T2DM patients[29]. Another study conducted in Morocco indicated that hypertension is associated with the duration of diabetes. Duration of diabetes is positively associated with the severity of macro- and micro-

vascular complications, both of which contribute to the development of renal and/or atherosclerotic hypertension[37] .study conducted in Tigray Ethiopia, revealed non-adherence to medications as a predictor for hypertension among diabetics. A study conducted in Tigray Ethiopia showed that nonattendance to diabetic education session was determinant for HTN among DM patients. A study in Tigray Ethiopia revealed the association between non-adherence to regular monitoring of glucose and HTN among diabetics [36].

2.2.3 Behavioral and Life style factors

Many pieces of literature have identified that not adhering to a diabetic diet, smoking, harmful alcohol consumption, khat chewing are some of the behavioral factors which often shows significant association with the development of comorbid hypertension among people with DM. In a study conducted in Tigray, non-adherence to diabetic diet showed association with higher risks of hypertension among diabetic patients [36].A study in Tigray Ethiopia revealed the association between non-adherence to regular monitoring of glucose and HTN among diabetics. A study conducted in WA chemo

university NEMMH, Southern Ethiopia showed association between sedentary activity and hypertension among people with T2DM [38]. A facility-based cross-sectional study conducted in Jimma university specialized hospital shows that diabetic patients who chew khat were 19.3 times more likely to develop hypertension as compared with non-chewers[39] and [40] another similar study in Debre tabor also showed that Type 2 DM patients who were current cigarette smokers were 3.9 times more likely to develop HTN than those who were not

2.2.4. Anthropometric Factors

Another study conducted in Morocco showed that obese and overweight patients have a higher risk of hypertension than ones with normal BMI[41]. Poor glycemic control was positively associated with hypertension coexisting with T2DM in a case control study conducted in Tigray Ethiopia [36]. A study conducted in Botswana showed that 27.2% of the DM patients were overweight and 56.4% obese the mean BMI for those who have hypertension was 31.7 (SD=6.2) while for DM patients who are normotensive were 30.8 (SD=6). Although there was no difference in mean BMI in normotensive and hypertensive DM patients (P-value=0.21), hypertension was strongly associated with overweight (P=0.00039) and obesity (P=0.0004) (34)[42]

2.3 Conceptual frame work

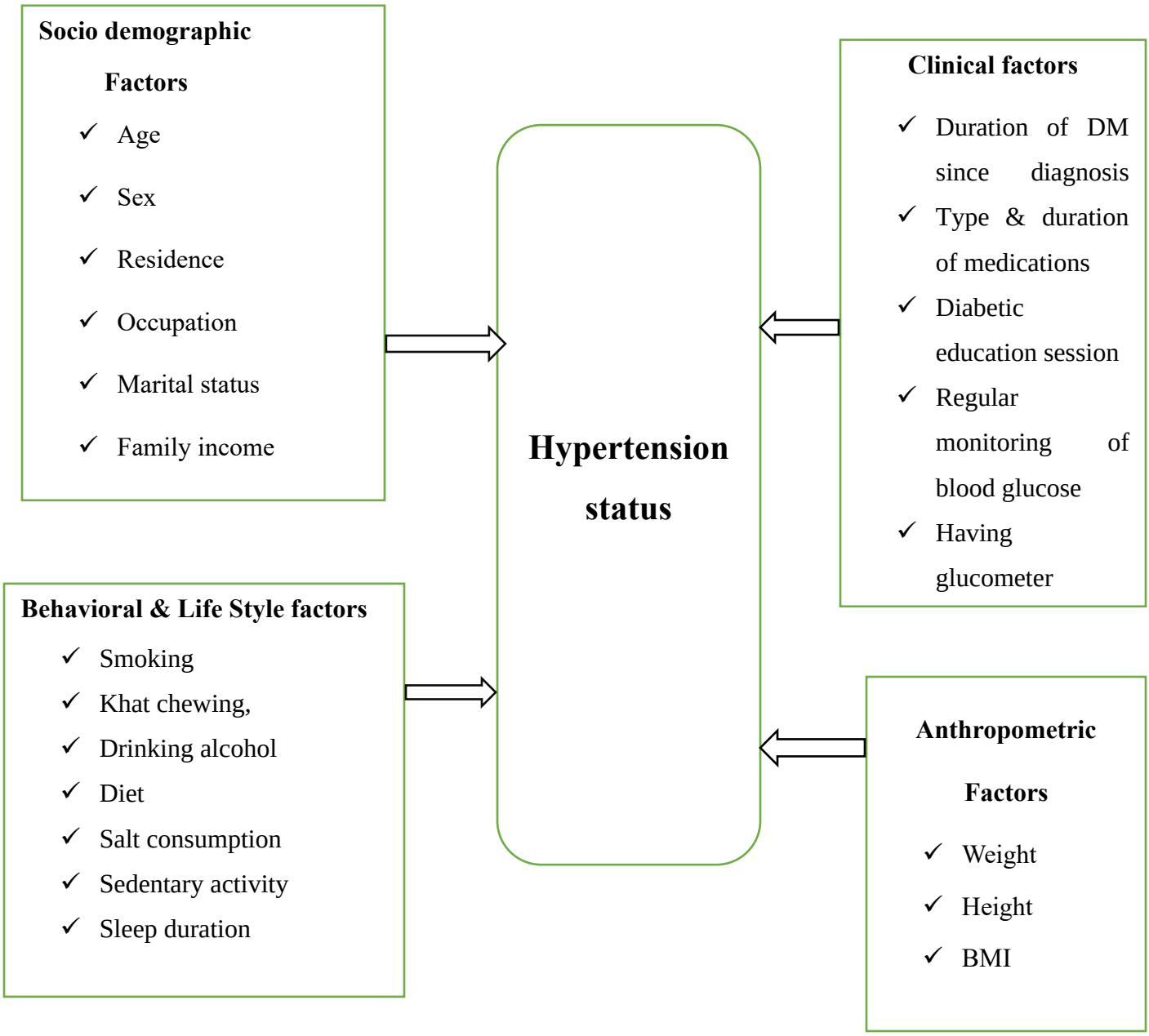

Figure 1: Conceptual framework of magnitude of hypertension and associated factors among type 2 DM patient at public hospital Gurage zone, southwest, Ethiopia 2023 (Sources: adapted after reviewing of different literature)

Chapter Three: Objective

3.1 General Objective

- ✓ To assess the magnitude of hypertension and associated factors among people with type 2 diabetes mellitus at Gurage zone, selected public hospitals, Southwest, Ethiopia ,2023.

3.2 Specific Objective

- ✓ To determine the magnitude of hypertension among people with type 2 diabetes mellitus at Gurage zone, selected public hospitals, southwest, Ethiopia ,2023.
- ✓ To identify factors associated with hypertension among people with type 2 diabetes mellitus at Gurage zone, selected public hospitals, southwest, Ethiopia ,2023.

Chapter Four: Methods and materials

4.1 Study Area and Period

The study was conducted in south nation nationality and peoples of Ethiopia, Gurage zone from March 18 to August 22, 2023, among people with type 2 diabetes mellitus in Gurage zone at selected public hospitals. The zone has a total of 7 hospital ,70 health center 414 health post and 92 clinical. All the hospital provide inpatient, outpatient, emergency, delivery, and many other services including care of chronic illness. Wkusth, Attate, and Agena. public hospitals are included out of the seven public hospitals. The estimated total number of type 2 DM clients in those selected hospitals is 1,000 patients.

4.2 Study Design

Hospital based cross-sectional study will be conducted to determine HTN among type 2 DM in Gurage zone at selected public hospitals employed from March 18 to august 22, 2023.

4.3 Population

4.3.1 Source Population

Type 2 diabetes mellitus patients in Gurage zone at selected public hospital aged between 18 and above were the source population for this study.

4.3.2 Study Population

Type 2 diabetes mellitus patients in Gurage zone at selected public hospital aged 18 and above who fulfilled the inclusion criteria were the study population for this study.

4.3.3 Study unit

Type 2 DM Patient was the study unit.

4.4 Eligibility Criteria

4.4.1 Inclusion Criteria

- ✓ Type 2 DM patients who has at least one prior visit in Gurage zone at selected public Hospital and with age of 18 years and more were included in the study.

4.4.2 Exclusion Criteria

- ✓ Patients In Whom Hypertension Diagnosis Precedes DM Diagnosis were Excluded.
- ✓ Critically Ill Type 2 DM Patients or Those Who Have a Severe Medical Illness That Made It Impossible to Complete Questionnaire.

4.5 Sample Determination

The required sample size of the study was determined using a formula to estimate single population proportion with the following assumption. Confidence interval assumed 95%, margin of error 5%, and proportion =80% (based on previous study conducted in Determinants of HTN among with DM at kembata tambaro zone public hospital)[43].

So,$n = z^2p(1-p)/w^2$ Where, n= required sample size

Z= critical value for normal distribution at 95% confidence interval which was equal to 1.96(at alpha 0.05)

P= an estimate of the proportion of determinants of HTN among type 2 DM patient (80%)

W= margin of error which is 5%

$$n = \frac{z^2p(1-p)}{w^2}$$

$n = \frac{(1.96)^2 0.8(1-0.8)}{0.05^2}$ =246

Then finally we considering 10% non-respondents from the participant

I.e.,$nf = n + 10/100(n)$

$$nf = 246 + \frac{10 * 246}{100} \quad , nf = 270$$

Therefore, our sample size was Include 270 type2 DM.

4.6. Sampling Technique and Procedure

Stratified sampling techniques was used in Gurage zone at selected public hospital in type 2 DM patients in Gurage zone has seven hospitals among this randomly selected three hospitals

In wkusth type 2 DM = 200

In agena hospital type 2DM =120

In attate hospital type 2 DM =150

Total=470

To take sample of 270 among type 2 DM patient stratified according to the above Categories (Nj= (n/N*Nj where j=1,2…. K the number of strata

The first step to get total number and percentage of each group

Total number=200+120+150=470 percentage of each group are the following

In wkusth type 2 DM = (270/470) *200=114

In agena hospital type 2DM = (270/470) *120=70

In attate hospital type 2 DM = (270/470) *150=86

Total=270

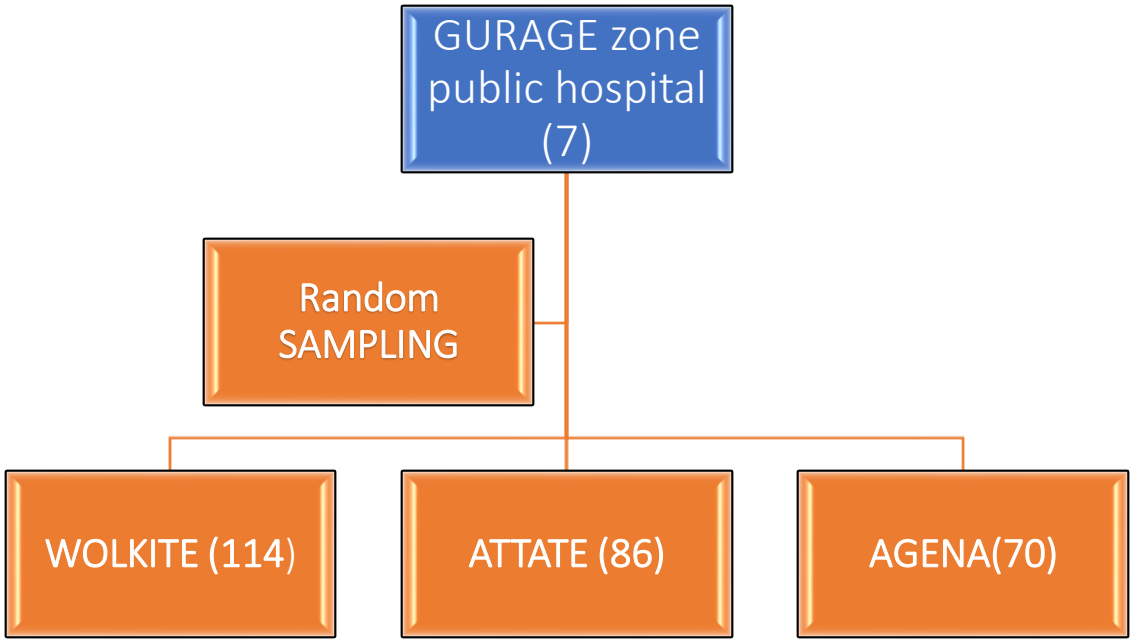

Figure 2:Schematic presentation of sampling procedure of magnitude of hypertension and associated factors among type 2 DM patient at public hospital Gurage zone, southwest, Ethiopia 2023.

4.7. Study Variables

4.7.1. Dependent Variables

- ✓ Hypertension status

4.7.2 Independent Variables

Sociodemographic Factors (age, sex, residence, occupation, marital status, family income, educational level, family history of HTN)

Behavioral & Lifestyle factors (smoking, khat chewing, drinking alcohol, diet, salt consumption, sedentary activity, sedentary activity, sleep duration)

Clinical factor (Duration of DM since diagnosis, type and duration of medication, diabetic education session, regular monitoring of blood glucose, having glucometer, fast blood glucose)

Anthropometric Factors (Height, BMI, Weight).

4.8. Data Collection Tools and Technique

Structured self-administered questionnaire was developed first in English. The questions and statements were arranged according to objectives that they can address. Accordingly, redundancy, vagueness and logical flow of the questions would be corrected. After extensive revision, the final version of the English questionnaire would be translated to Amharic. Data on socio-demographic and lifestyle and behavioral factors were collected by face-to-face interview. Data on clinical and laboratory profiles were obtained from patient card and anthropometric were getting by measurement.

Blood pressure was measured using mercury sphygmomanometer (adult size) and stethoscope. Blood pressure was measured at sitting position after the patient had taken a minimum of five

minutes rest since the reaching of the unit. he two measurements had a gap of at least five minutes, recorded and the average of the two BP records was taken for analysis Weight was measured using a standard weight scale in Kgs approximated to the nearest 0.1Kg reading by leveling at zero for each subject prior to measuring with bare foot and light clothing. Height was measured using a standard height measurement scale in meters with upright standing position and was approximated to the nearest 0.1cm reading. BMI was calculated as (weight (Kg)/height (m)2 .and classified as underweight (<18.5), normal (18.5-24.5), overweight (25-29.9) and obesity(>30)[44]

4.9 Data Quality and Management

Attention would give to check all questionnaires for completeness and accuracy. Pretest of the questionnaire was done among type 2 DM in Gurage zone non selected public hospital in butajra, and the number of patients was 5% of 270 which was (14) before actual data collection for accurate and relevant data collection during questioners, based on the result of pretest necessary amendment was made such as spelling errors, redundant words. The training was given or data collectors and supervisors on the intention of the study, approach to contact with study participants, and data collection techniques by investigators. Completeness, precision, and coherence of data were verified by supervisor who also provided feedback accordingly throughout data gathering time.

4.10. Data Processing and Analysis

After coding and checking for completeness and consistency, the data entered and analyzed by using SPSS version 25. First frequency distributions of sociodemographic, clinical, anthropometry, lifestyle and behavioral characteristics of study subjects were explored, and descriptive statistics were used to summarize and present the information in the form of mean, percentages, and tables with 95% confidence intervals for prevalence estimates. Bivariate logistic regression and multiple logistic regressions were used to identify associated factors & the strength of association was measured by odd ratios with 95% CI. Frist in Bivariate logistic regression Variables that had p value ≤ 0.25 was identify and then those variables were enter into multivariable logistic regression model. In a Multivariable logistic regression model using adjusted odds ratio (AOR) independent

predicators of factors associated hypertension among type 2 dm was identify and variables that had P-Value < 0.05 were taken as statistically significant.

4.11. Operational Definitions

HTN Comorbid with type 2 DM: diabetic individuals diagnosed by a physician and on antihypertensive medications or those who has systolic blood pressure 140 mmHg and/or diastolic blood pressure 90 mmHg [29].

DM duration: the duration of DM was calculated as age at data collection minus age at onset DM

Adherence to dietary regimen: on perceived dietary adherence questionnaire (PDAQ), patients are classified as having good dietary adherence if they eat a healthy diet for at least four days in the week[45].

Glycemic control: the patient is considered as having good glycemic control if the average of the last three fasting blood glucose level is between 70mg/dL and 130mg/dL and Poor glycemic control if the average of the last three fasting blood glucose level >130 mg/dL [19, 46].

A**dherence to self-blood glucose monitoring**: the patient is considered adhere to blood glucose monitoring when he/she score at least 50% self-blood glucose monitoring-related questions[7] [47].

Body Mass Index: patients are considered as Underweight if BMI is less than 18.5 Kg/m2, healthy weight if BMI is 18.5 to 24.9 Kg/m2, overweight if BMI is from 25 to 29.9 Kg/m2, and obese if BMI is 30Kg/m2[28].

4.12. Ethical Consideration

Ethical letter was obtained from Wolkite University, college medicine and health science department of nursing. At the time of data collection, a verbal consent was asked from the participants and given the right to do so. Confidentiality and privacy of respondent was ensured by not including names of respondents and by ensured to participants that their identification was not public, and the objective of this study was clarified to respondents which may helped to keep the confidentiality of the respondents throughout the research process

Chapter Five: Results

5.1 Socio-demographic characteristics of Type 2 diabetes patients

Complete data were collected from 257 study participants with 100 % respondent rate. The mean and standard deviation age of the respondents was (45.7) and (14.2 SD) years with the age ranges between 18 and 80years. 88(34.2%) reported family history of HTN. More than half, 149(58 %) of the participants were males and (75.1%) were urban residents. Among the respondents, 78(30.4 %) primary education whereas 37(14.4%) of them were unable to read and write. 78(30.4%) of study participants were self Employed. While the 100 (38.9%) of the had reported Estimated household monthly income between 5000 and 10,000. The details are shown in table1.

Table 1: Socio-demographic characteristics of type2 Diabetes clients in Gurage zone publicHospital,2023.

	Category	Frequency	Percent
Age(years)	18-25	25	9.7
	25-40	46	17.9
	40-60	121	47.1
	60-80	65	25.3
Sex	Male	149	58
	Female	108	42
Residence	Urban	193	75.1
	Rural	64	24.9
Marital Status	Single	34	13.2
	Married	183	71.2
	Divorced	31	12.1
	Widowed	9	3.5

your main work status over the past 12 months?	Gov.	69	26.8
	Self-employ	78	30.4
	Housewife	68	26.5
	Unemployed	17	6.6
	Other	15	9.7
Educational Status	Illiterate	37	14.4
	Non formal	55	21.4
	Primary school	78	30.4
	Secondary/pre.	64	24.9
	diploma/degree	23	8.9
Estimated monthly income	1000-2000	49	19.1
	2000-3000	45	17.5
	3000-5000	42	16.3
	5000-10000	100	38.9
	10000-20000	21	8.2
family history of hypertension	Yes	88	34.2
	No	169	65.8

5.2 Clinical factors of type 2 diabetes patients

Majority of the clients166(64.6%) had experienced DM for less than or equal to five years and most of them 165(64.2%) were frequently takes one times per day. Regarding ever used DM medications, Majority (41.6%) were reported that they had history of using metformin and insulin use was reported by 28.8%. Proportion of reported ever missing diabetic medication was 24.1% and 33.9% have history of glucometer at home. Majority (63.5%) were test 1-2 times per

week.39.7% of reported that they were attending diabetic education session. The details are shown in (Table 2)

Table 2: Clinical factors of type 2 diabetes patients.

Variable	Category	Frequency	Percent
DM Duration	<=5	166	64.6
	>=5	91	35.4
antidiabetic medications?	Metformin	107	41.6
	Glibenclamide	55	21.4
	Insulin	74	28.8
	Gliben and metformin	21	8.2
How frequently are to take anti-diabetic drug per day	1	165	64.2
	2	92	35.8
Have you ever missed any of the doses	Yes	62	24.1
	No	195	75.9
Are you on regular follow up for diabetes?	Yes	121	47.1
	No	136	52.9
Do you attend diabetic education session?	Yes	102	39.7
	No	155	60.3
Do you have glucometer at home	Yes	87	33.9
	No	170	66.1
	1-2	163	63.5

how many of the last SEVEN DAYS did you test your blood sugar	2-5	60	23.3
	5-7	34	13.2
Fast blood glucose	<=130	122	47.5
	>130	135	52.5

5.3 Life style and behavioral factors of type 2 diabetes patients.

Majority 175(68.1%) of the respondents were nonsmokers, 115(44.7%) alcohol drinkers, (29.6%) chat chewers. (33.9%) used fatty foods like meat sometimes,74 (28.8%) eats sugar and sweets sometimes, 158(61.5%) were frequently eating fruits and 128(49.8%) were eating vegetables frequently. Majority (66.5%) of were vegetable oil users. Among the respondents (47.5%) of them were adding salt to their food always, among whom 40(15.6%), 161(62.6%) and 52(20.2%) of them had thought that they consume too much, just right amount and too little salt or salty sauce respectively. The details are shown in table.

Table 3: Lifestyle and behavioral factors of type 2 diabetes patients.

Variable	Category	Frequency	Percent
Smoking habit	Current smoker	60	23.3
	Nonsmoker	175	68.1
	Pervious smoker	22	8.6
Alcohol Drinker	Yes	115	44.7
	No	142	55.3
chew chat	Yes	76	29.6

	No	181	70.4
Eat fatty Foods	Always	7	2.7
	Often	58	22.6
	Sometimes	88	33.9
	Rarely	99	38.5
	Never	6	2.3
Eat sugar and sweets	Always	21	8.2
	Often	30	11.7
	Sometimes	74	28.8
	Rarely	124	48.2
	Never	8	3.1
Fruit consumption	Always	4	1.5
	Often	57	22.2
	Sometimes	158	61.5
	Rarely	38	14.8
Vegetable consumption	Always	24	9.3
	Often	50	19.5
	Sometimes	128	49.8
	Rarely	55	21.4
Add salt to Food	Always	122	47.5
	Often	72	28
	Sometimes	52	20.2
	Rarely	11	4.3
Salt consumption	Far too much	4	1.6
	Too much	40	15.6
	right amount	161	62.6
	Too little	52	20.2
	Vegetable oil	171	66.5
	Cholesterol oil	75	29..2

type of oil or fat is most often used for meal	Butter or ghee	11	4.3
Sleep time	<7	77	30
	>7	180	70

Table 4::Anthropometric and blood pressure status measurement of type 2 diabetes patients.

Weight	<50 kg	52	20.2
	50-70 kg	148	57.6
	>70 kg	57	22.2
Height	<1.5 m	98	38.1
	1.5-1.75 m	122	47.5
	>1.75 m	37	14.4
BMI (kg/m2)	<25 kg/m^2	146	56.8
	25-30kg/m^2	96	37.4
	≥30kg/m^2	15	5.8
SBP (mmHg)	<120	58	22.6
	120-139	62	24.1
	140-159	123	47.9
	>=160	14	5.4
DBP (mmHg)	<80	*60*	23.3
	80-89	*66*	25.7
	90-99	*123*	47.9
	>=100	*8*	3.1
HTN	*Yes*	*123*	47.9
	No	*134*	52.1
Anti HTN Drug	*Yes*	*95*	37
	No	*162*	63

5.4 Independently associated factors of Hypertension

On Bivariate logistic regression analysis: twelve variables (age, occupation, sex, marital status educational status, type of anti-Diabetics Drug, missed anti diabetic drug, frequency take anti diabetics drug, salt consumption, vegetable consumption, add salt to food, having glucometer were associated with the dependent variable at a p-value < 0.25.

From them, on multivariate logistic regression analysis two variables (being male and eating vegetable) were significantly associated with hypertension among type 2 dm.

The odds of male sex was2.3 times (AOR = 2.32 95% CI, 1.1,4.9] P = 0.025) being hypertensive than female among type 2 diabetic patients.

Study subjects who were eating vegetable rarely was 1.5 times (AOR = 1.54, 95%CI [1.1,3.3] P = 0.02) hypertensive than always eating of vegetable among type 2 diabetic patients.

Chapter Six: Discussion

The overall prevalence of hypertension among type 2 diabetes mellitus clients in this study was 47.9%.This result is less than a study conducted on the prevalence of hypertension among T2DM clients in Hosanna, Nigist Ellen Mohamed memorial Hospital, Southern Ethiopia which was 55%[30] .and also slightly higher (46.5%) than a study conducted in Jimma University Specialized Hospital[48].This difference may be due to the life style and socio-demographic differences of the study participants among different regions of the study area.

In this study factors independently associated with hypertension were being male Sex and eating vegetable. Our study showed that male was 2.3 times (AOR = 2.32 95% CI, 1.1,4.9] P = 0.025) being hypertensive than female among type 2 diabetic patients[45]. This finding is discordant with the study conducted at in Botswana[19]. The reason for the disagreement might be the difference in the characteristics of the study population, small sample size and failing to control for the confounding effect of stress in the previous studies might have masked the association. Our study showed that rarely eating of vegetable 1.5 times (AOR = 1.54, 95%CI [1.1,3.3] P = 0.02) being hypertensive than always eating of vegetable among type 2 diabetic patients. This finding is supported by a study conducted in Tigray [18]. This might be because high fiber intake is associated with lower serum cholesterol concentrations, lower risk of coronary heart disease, reduced blood pressure, enhanced weight control, better glycemic control, and reduced risk of cardiovascular diseases.

Chapter Seven: Strength and Limitation of the study

7.1. Strength of the study

Using information from patients' medical cards, SPSS25 version and being a multicenter study were major strengths of this study.

7.2. Limitation of the study

Since the study was hospital-based the finding may not be generalized to the general populations and using fasting blood glucose level instead of HgA1C were limitations of this study.

Chapter Eight: Conclusion and Recommendation

8.1 Conclusion

The prevalence of hypertension among type 2 diabetes patients in this study was moderate. which was (47.9%) of type 2 diabetes patients in this study were hypertensive. The study found out that half of type 2 DM patients suffer from co-existing hypertension. So active search for early detection of hypertension and related cardiovascular risk factors should be important part of DM follow up. The results in this study concluded that there was a significant association between, being male and rarely eating of vegetable.

8.2 Recommendation

Based on the findings of our study, the following recommendations are forwarded for the respective organs:

Diabetic patients:

- People with type 2 diabetes are recommended to modify their nutrional status and other risk factors to minimize their direct and indirect effects on the risk of hypertension.

Clinicians:

- It is good if clinicians consider and be curious about the risk factors and teach, Identify, and treat the risk.

Government

- Government is also recommended to take intervention on nutrional support and committed to prevent other associated factors

Researchers:

We would like to recommend conducting prospective cohort and community-based studies to overcome the limitations of this study on the prevalence of hypertension and associated factors among type 2 DM patients considering by different variable.

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Annex III Questionnaire

English version

Date of interview_____ Participant's Unique ID_____

Sr. No	Questions	Response and coding	Skip
	Section I: Socio-demographic factors		
101	How old are you?	_____yrs	
102	Sex	1. Male 2. Female	
103	Where is your residence?	1. Urban 2. Rural	
104	What is your current marital status?	1. Single 2. Married 3. Divorced 4. Widowed	
105	Which of the following best describes your **main work** status over the past 12 months?	1. Government employee 2. Self-employed 3. House wife 4. Unemployed 5. Others (specify)…….	
106	What is your level of education?	1. Illiterate 2. No formal education 3. Primary school 4. Secondary school and pre	

		5. Higher education	
107	What is your household monthly income?	_____(Birr)	
108	Do you have family history of hypertension?	1. yes 2. no	
Section II: Clinical factors			
201	Date of DM diagnosis	Dd____mm_____yyyy_____	✓
202	For how long have you been diabetic?	_____yr	
203	Indicate the date of start for only those medications you ever used out of the following antidiabetic medications?	1. Metformin_____ 2. Glibenclamide_____ 3. Insulin_____ 4. Other, _____ Specify other_____	
204	How frequently are you ordered by your doctor to take anti-diabetic drug per day?	_____times/day	
205	Have you ever missed any of the doses that was ordered by your doctor?	1. Yes____ 2. No___	
206	If yes to question 205, how many doses have you missed in the last month?	_____doses/month	
207	Are you on regular follow up for diabetes?	0. Yes____ 1. No___	
208	Do you attend diabetic education session?	0. Yes____ 1. No___	
209	Are you a member of diabetes association?	0. Yes____ 1. No___	
210	Do you have glucometer at home?	0. Yes____ 1. No___	

211	On how many of the last SEVEN DAYS did you test your blood sugar?	0 1 2 3 4 5 6 7	
212	Fast blood glucose		
Section III: Life style and behavioral factors Now I am going to ask you some questions about various health behaviors. This includes things like smoking, drinking alcohol, diet and physical activity. Let's start with tobacco.			
300	What is your Smoking habit	1. . Current smoker 2. Non smoker- 3. Pervious smoker	
The next questions ask about the consumption of ALCOHOL.			
301	Have you ever consumed an alcoholic drink such as beer, wine, spirits, fermented cider or tejj, tella, areke?	1. Yes____ 2. No___	
302	During the past 12 months, how frequently have you had at least one alcoholic drink?	1. Daily 2. 5-6 days per week 3. 1-4 days per week 4. 1-3 days per month 5. Less than once a month 6. Never	
	The next questions ask about chewing chat		
303	Do you chew chat?	1. Yes 2. No	
	If yes for Q-303, how often do you chew?	1. Less than once a month 2. Once to three times per month 3. Once a week 4. Two to four times per week 5. Daily	

DIET: The next questions ask about diet that you usually eat. As you answer these questions, please think of a typical week in the last year.			
304	How often do you eat fatty foods like meat?	1. Always 2. Often 3. Sometimes 4. Rarely 5. Never	
305	How often do you eat sugar and sweets?	1. Always 2. Often 3. Sometimes 4. Rarely 5. Never	
306	How often do you eat fruits	1. Always 2. Often 3. Sometimes 4. Rarely 5. Never	
307	How often do you eat vegetables	1. Always 2. Often 3. Sometimes 4. Rarely 5. Never	
308	How often do you add salt or a salty sauce such as soy sauce to your food right before you eat it or as you are eating it?	1. Always 2. Often 3. Sometimes 4. Rarely 5. Never	
309	In a typical week, on how many days do you eat vegetables?	_____days/wk	

310	What type of oil or fat is most often used for meal preparation in your household?	1. Vegetable oil 2. Cholestrol oil 3. Butter or ghee 4. Other specify……	
311	How much salt or salty sauce do you think you consume?	1. Far too much 2. Too much 3. Just the right amount 4. Too little 5. Far too little	
312	How many hours of actual sleep do you get in a 24-hour period?	_____hr	
400. Section IV: Measurements			
401	Weight	_____kg	
402	Height	_____cm	
408	BP	Systolic _____ (mmHg) Diastolic_____ (mmHg)	
409	Are you taking drug for hypertension?	1. Yes 2.No	
410	Status	1. HTN 2. NO → Thank you	