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Drug Therapy Problems and Related Factors Among Patients with Type 2 Diabetes at Zewditu Memorial Hospital in October 2023.

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Abstract

Background: *Diabetes mellitus is a combination of heterogeneous disorders commonly presenting with episodes of hyperglycemia and glucose intolerance, as a result of lack of insulin, defective insulin action or both. Such complications arise due to derangements in the regulatory systems for the storage and mobilization of metabolic fuels, including the catabolism and anabolism of carbohydrates, lipids and proteins emanating from defective insulin secretion, insulin action, or both. In most hospitals of Ethiopia, the cost of patient attendance rates and medical admissions are rising for diabetic management.*
Objective: To assess drug therapy problems among patients with type 2 Diabetes Mellitus at Zewditu Memorial Hospital in October 2023.

Methods: *From October 1 to 30, 2023, an institution-based prospective cross-sectional study was undertaken among patients with type 2 diabetes at Zewditu Memorial Hospital. The acquired data was entered into Epi-Data Manager 4.0.2.101 and exported to SPSS 21 for analysis. Descriptive statistics and binary logistic regression were applied.*

Result: *84 patients (80.8%) had been found to have issues with their drug therapy. The requirement for further drug therapy was the most common drug therapy issue (38.5%). The majority of drug therapy issues involved statins 37 (61.18%). Age between 45 and 64 [AOR=5.59 95% CI=1.38-22.64], comorbidity [AOR=15.219, 95%CI=1.75-13.47], and a single emergency visit [AOR=5.081, 95%CI=1.14-22.71] were all found to be significantly linked to the occurrence of drug therapy problems.*

Conclusion: *At Zewditu Memorial Hospital, 80.8% of patients with Type 2 diabetes mellitus had medication therapy issues. Zewditu Memorial Hospital should enhance the management of type 2 diabetes mellitus by participating in drug therapy and placing an emphasis on optimizing the use of statins and aspirin. The most frequent drug therapy problem found was the need for additional drug therapy, and the age group of 45–64, the presence of comorbidity, and ED visits were significantly associated with the occurrence of drug therapy problems.*

List of Acronyms/Abbreviations

ACEI: Angiotensin converting enzyme inhibitor
ADA: American diabetic association
ARB: Angiotensin receptor blocker
ART: Anti-retroviral therapy
CVD: Cardiovascular disease
DTP: Drug therapy problem
FPG: fasting plasma glucose
HTN: hypertension
KM: Kilometer
PCNE: pharmaceutical care network Europe
T2DM: Type 2 diabetes Mellitus
WHO: world health organization

Keywords: Drug Therapy Problem, Type 2dabetes Mellitus, Associated Factors.

Introduction

Background

Diabetes mellitus is a combination of heterogeneous disorders commonly presenting with episodes of hyperglycemia and glucose intolerance, as a result of lack of insulin, defective insulin action or both [1].Type 2 Diabetes mellitus (T2DM) is a metabolic disorder characterized by the presence of chronic hyperglycemia, which results from resistance to insulin actions on peripheral tissues as well as inadequate secretion of insulin and an impaired suppression of glucagon secretion in response to ingested glucose. Thus, T2DM involves at least two primary pathogenic mechanisms: a progressive decline in pancreatic islet cell function resulting in reduced insulin secretion and inadequate suppression of glucagon secretion and peripheral insulin resistance resulting in a decrease in the metabolic responses to insulin. The resulting insulin deficiency disrupts the regulation of glucose production in the liver and is a clue element in the pathogenesis of glucose intolerance [2].

The global increase in diabetes will occur because of population ageing and growth and because of increasing trends towards obesity, unhealthy diets and sedentary lifestyles; In developed countries most people with diabetes are above the age of retirement, in developing countries those most frequently affected are aged between 35 and 64 [3]. Risk factors for T2DM include: obesity, dyslipidemia, elevated blood pressure, and elevated fasting blood glucose [4].

In low and middle-income countries, 29% of diabetes deaths occur among people under the age of 50, compared to 13% in high income countries; it is a great burden for the quality of life of affected individuals, their families and for the country's socioeconomic structure at large. Compared to the western world, the burden in the developing world, particularly in Africa, is even worse due to late diagnosis and poor access to diabetic care. The cost of management of diabetes mellitus is complex and multidisciplinary, therefore expensive in poor resource countries including Ethiopia where majority of the population live below a dollar per day [5].

An elevated rate of basal hepatic glucose production in the presence of hyperinsulinemia is the primary cause of fasting hyperglycemia; after a meal, impaired suppression of hepatic glucose production by insulin and decreased insulin-mediated glucose uptake by muscle contribute almost equally to postprandial hyperglycemia [6, 7]. Diabetes often goes undetected because symptoms can be attributed to many other causes and some patients experience no symptoms or fail to heed warning signs. Possible indicators of diabetes include Excessive thirst (polydipsia), Excessive urination (polyuria) and dehydration, Excessive hunger or appetite (polyphagia), Unexplained weight loss, blurred vision, frequent infections, including skin infections, urinary tract infections and yeast infections, Slow healing of sores, Fatigue, lethargy, Shakiness or trembling [8].Often when people have a physical examination they are screened for diabetes with a fasting plasma glucose test (FPG). An FPG is usually performed in the morning because this makes it easier for the patient to fast for the required eight hours. FPG results below 100 mg/dl are normal. Glucose between 100 and 125 mg/dl is considered prediabetes. Glucose above 125 mg/dl indicates diabetes. To confirm diagnosis, another glucose test should be performed on another day [9].

T2DM complications are categorized into micro vascular and micro vascular;themicro vascular complications (retinopathy, nephropathy and neuropathy) are relatively specific to diabetes and the risk of these (particularly retinopathy) is used to help define the diagnostic criteria for diabetes, due to delayed diagnosis, these complications may already be present at diagnosis, and coexisting hypertension or dyslipidemia may exacerbate their risk. In type 2 diabetes, 80% of all deaths are due to CVD. People with diabetes develop more severe and generalized disease, which is associated with a worse prognosis and outcome. Coronary artery disease, cerebrovascular disease and peripheral vascular disease all occur more frequently as a result of diabetes [10]. Diabetes nutrition therapy can result in cost savings and improved outcomes and modest weight loss achievable by the combination of lifestyle modification and the reduction of calorie intake benefits overweight or obese adults with type 2 diabetes and also those with prediabetes. Metformin, if not contraindicated and if tolerated, is the preferred initial pharmacologic agent for T2DM.For Patients of age ≥50 years, who have at least one additional major CVD risk factor, (Hypertension, Smoking, Dyslipidemia, and Albuminuria), aspirin should be given as pri-

mary prophylaxis. For people with non-dialysis dependent diabetic kidney disease, dietary protein intake should be ~0.8 g/kg body weight per day. For patients on dialysis, higher levels of dietary protein intake should be considered. For non-pregnant patients with diabetes and hypertension, either an ACE inhibitor or ARB is recommended for those with modestly elevated albumin excretion (30–299 mg/g creatinine) and is strongly recommended for patients with urinary albumin excretion ≥30 mg/g creatinine and/or eGFI <60 [11].

Statement of The Problem

Although medications play a vital role in the cure, palliation and inhibition of disease, they also expose patients to drug therapy problems (DTPs), Therefore, addressing DTPs has become a priority, due to the complexity of today's drug therapy, which consequently makes appropriate drug prescribing increasingly challenging [12].

Drug therapy problems are the dominant reasons for admission. A review of the literature concerning DTPs has shown that 28 % of all emergency department visits were medication-related, including adverse events of which 70%-90% were preventable [13]. Drug related problems are of a major concern in health care because of increased cost, morbidity and mortality. DTP is associated with prolonged length of hospital stay, increased economic burden, and an almost 2-fold increased risk of death. [14]. Ernst and Grizzle found that every United States dollar one spent for medication required US dollar of 1.77 to resolve DTPS [15].

More specifically, hospitalization resulting from DTPS is a major concern to both patients and healthcare professionals due to its tremendous health and economic burdens [16]. In prospective study conducted in University Kembangan Malaysia Medical 88.8% had at least one DTP. A total number of 172 drug-related problems (DTP) were identified with an average of 2.15 ± 1.5 DTPs per patient [13].

The diabetic patients are vulnerable in experiencing drug-related problems. Moreover, T2DM often accompanied by various comorbidities results in increasing the risk of drug-related problems (DRPs) [17]. Institutional based retrospective cross–sectional study conducted at wolaytasodo university teaching hospital 83.1% of the patients had at least one drug therapy problem [5].Studies show that blood glucose levels of diabetic patients still remain high despite the treatment they receive indicating that there is a problem with management of these patients. Therefore; it is unequivocal that drug therapy problems (DTPs) may account the lion share of the problems in diabetes management in the country [18].

Furthermore, resolving and preventing DTPs in T2DM patients has a significant positive impact on their clinical, humanistic, and economic results. In October 2023, this study looked at the prevalence of medication therapy difficulties and the factors that contribute to them at Zewditu Memorial Hospital.

Significance of the Study

Studies show that blood glucose levels of diabetic patients still remain high despite the treatment they receive indicating that there is a problem with management of these patients. Identifying drug therapy problems and factors associated with drug therapy problems helps to avoid them which on the other hand will enhance the patient's goal of therapy and their quality of life as well as the health care giver satisfaction.

This study has identified these drug related problems and the different factors involved in drug therapy problem and provided recommendation to the concerned body so that they will take progress to decrease such problems.

It will also provide baseline information about DTP in patients with type 2 diabetes mellitus for researchers who want to undergo in depth study furthermore it will provide information to the health professionals to understand the status of DTP in the treatment of type 2diabetes mellitus. This study will enhance the existing knowledge about DTP as well.

Literature Review

Prevalence of drug therapy problem

Drug therapy problem is mostly common in patients with T2DM. A study conducted in Malaysia indicated a total of 387 drug therapy problems were identified with a total of 90.5% of the patients had at least one drug therapy problem. The most frequently occurring drug therapy problems were ineffective drug use 87(22.5%), non-adherence 50(12.9%) and dosage too high 44(11.3%) [19].

Similarly, a retrospective study conducted in Indonesia showed 261drug therapy problems were identified. Drug choose problem 144(55.3%) was the most frequently encountered drug therapy problem with needs additional drug therapy 66(25.3%) being the most frequent problem [17].

Another retrospective study conducted in Nigeria identified 399 drug therapy problems with non-adherence 104 (26.7%) being the most frequently encountered drug therapy problem occurring within the study patients followed by the use of un necessary/ineffective drug 91 (22.8%) and needs for additional drug therapy 81(20.3%) respectively [18].

In another institutional based cross-sectional study conducted in wolaita soddo, Ethiopia 378 drug therapy problems were identified. In individual patients the maximum number of drug therapy problem was four, but most of the patients 85(42%) had two drug therapy problem. From the seven identified drug therapy problems, needs additional drug therapy were found to be the most frequently encountered drug therapy problems with137 (67.7%) and 127(53.3%) frequency respectively [5].

Drugs Most Frequently Involved in Drug Therapy Problem

Even though drugs treat different condition they also can result in drug therapy problem if they are not used appropriately. A study conducted on T2DM patients with hypertension in Malaysia On the assessment of drug therapy problem showed drugs most frequently involved in drug therapy problem were aspirin, clopidogrel, Amlodipine and Metformin [19].

A retrospective study conducted in Nigeria showed drugs most frequently involved in drug therapy problem were endocrine drugs 591 (28,7%), analgesics 297(14.4%) anti-infective 292 (14.2%), GIT drugs 193(9.4%) andCNSdrugs78(3.8%) respectively [18] .

Another hospital based prospective cross sectional study conducted in university of Gondar teaching hospital identified drugs most frequently involved in drug therapy problem were heparin 52(19%), ceftriaxone 22(8.2%), vancomycin 15(5.6%), rifampicin,isoniaside and pyrazinamide 12(4.2%),cotrimoxazole 11(4.1%),atorvastatins 8(3%),warfarin8(3%) and frusemide 7(2.6%) respectively [20].

Factors Related to Drug Therapy Problem In T2dm

Different researches revaled there are factors associated to drug therapy problem. In a study conducted in wolaita soddo, it was identified that age, presence of comorbidity, poly pharmacy and history of hospitalization were found to be independent predictor of drug therapy problem. It was found that the likely hood of having drug therapy problem was increased as age increased. patients with the age of45-54 were 4.8 times more likely to have drug therapy problems where as those above 65 years were nine times more likely to have compared to those less than 45 years ($p<0.01$). It was also found that those who were taking more than or equal to five medications per day were about three times more likely to have drug therapy problem compared to those taking less than five medication ($p<0.025$).Similarly patients with comorbidity were more likely to have drug therapy problem than patients without comorbidity [5].In another study conducted in Jimma university specialized Hospital, univariate logistic regression model analysis revealed that presence of depressive symptom (p=0.002),side effect(p=0.025),complex regimen(p=0.001,diabetic related hospitalization (p=0.001), presence of diabetic complication(p=0.011) and fasting blood sugar(FBG)p=0.023) were significantly associated with non-adherence (21).In a study conducted in university of Gondar, the result of the binary logistic regression showed that association was observed between sex (p=0.003),age (P=0.000),length of hospital stay (p=0.000),number of disease (p=0.027) and number of drugs per patient (p=0.007)and the presence of drug therapy problems and the result of multinomial logistic regression showed that association was observed between length of hospital stay (p=0.028),number of disease (p=0.027)and number of drugs per patient (p=0.033) with the presence of drug therapy problems [20].

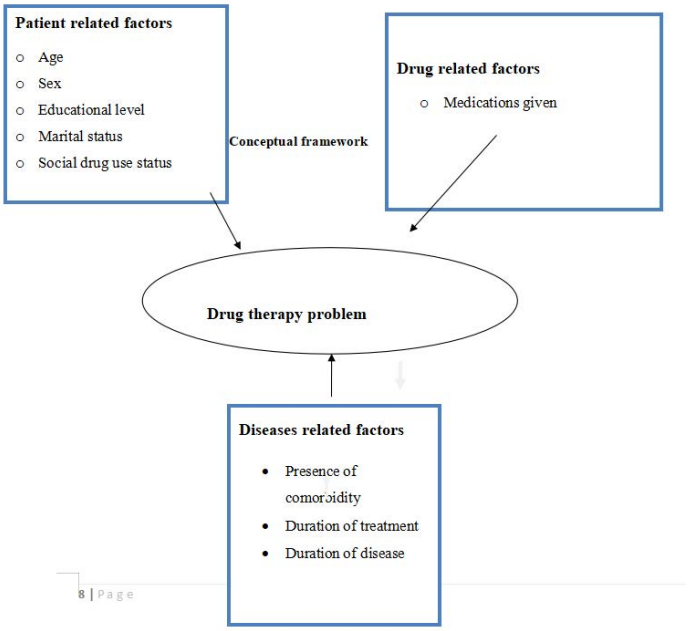

Figure 1: Conceptual frame work showing factors associated to drug therapy problem among patients with type two diabetes mellitus at follow up in Zewditu Memorial Hospital from October 01 to 30, 2023.

Objective

General Objective

- To assess the prevalence of DTP and related factors among patients with type 2 diabetes mellitus at follow up in Zewditu Memorial Hospital from October 01 to 30, 2023

Specific Objectives

- To determine the prevalence of drug therapy problem.
- To identify factors associated with drug therapy problem.
- To identify, drugs that are frequently involved in drug therapy problem.

Methods and Participants

Study Area and Period

Zewditu Hospital is a public hospital in Addis Ababa, Ethiopia. It was built, owned and operated by the Seventh-day Adventist church, but was nationalized during the Derg regime in about 1976. The hospital is named after Empress Zewditu, the cousin and predecessor on the throne of Emperor Haile Selassie. Today Zewditu hospital is operated by the minister of Health. Located at Taitu st, Kirkos sub city, Addis Abeba 9˚1’6”N 38˚45’22”E. The study was conducted from October 01 to 30, 2023

Study Design

An institution-based prospective cross-sectional study was conducted.

Population

Source population

All adult patients with type 2 Diabetes Mellitus

Study population

All patients with type 2 diabetes Mellitus who fulfilled eligibility criteria

Inclusion and exclusion criteria

1Inclusion criteria

- Patients with T2DM older than 18 years

Exclusion criteria

- Those who were not willing to participate
- Patients who have incomplete records

Sample Size Determination and Sampling Technique

Consecutive sampling technique was used to collect data from all the available patients during the data collection period who were eligible.

Study Variables

Dependent Variable

- Drug therapy problem

Independent variables

Patient related factors

- Age
- Sex
- Educational level
- Marital status
- Social drug use status

Disease related factors

- Duration on treatment
- Presence of comorbidity
- Number of co morbidity

Data Collection and Analysis

Data Collection Instrument

Data collection instrument (questionnaire) was developed in English which then be translated into Amharic in only one paper and the patients were asked based on these paper during the data collection period. Open ended questionnaire was prepared to collect pertinent information from the patients with T2DM.

Data Collection Process and Management

Data was collected both from patients with type 2 Diabetes Mellitus through interview using prepared questionnaire and their card by the principal investigator and the collected data was arranged and controlled for its fullness and was checked whether all the questionnaire was addressed. It also was checked whether all the collected data was arranged and kept well to avoid data loss.

Data Quality Assurance

To assure the quality of data, data collection tools (questionnaires) was checked or tested prior to data collection for its completeness. Completeness and consistency of the data was checked during data collection and analysis. The collected data was checked after data collection by the primary advisor for its consistency and completeness.

Data Processing and Statistical Analysis

The collected questionnaire was checked for completeness manually. Then it was entered in to Epi info version 4.0.2.101 and coded and cleaned. After that it was exported to SPSS version 21 for analysis frequency distribution was performed for selected variables. The statistical significance and strength of the association between independent variables and outcome variable was measured using bivariate regression model a variable p value less than 0.25 was transferred into multi variable regression model to adjust confounder effects and a p value less than 0.05 was considered as significantly associated. Finally, the result was presented using tables, figures and texts based on the data obtained.

Ethical Consideration

Prior to gathering data, we obtained a formal letter from Zewditu Memorial Hospital's Department of Internal Medicine, which was approved by the hospital. Afterwards, data collection was carried out. Each patient gave their verbal informed consent before the interview after being informed of the study's purpose. Information confidentiality was guaranteed, and patient privacy was preserved.

Operational Definitions

- **Adverse drug reaction:** An undesirable reaction that is not dose-related (22)
- **Comorbidity**: -any documented chronic disease which coexists with diabetes (6)
- **Drug therapy problem:** is any undesirable event experienced by a patient which involves, or is suspected to involve, drug therapy, and that interferes with achieving the desired goal of therapy [22].
- **Dosage too high:** if dose is too high, the dosing frequency is too short, the duration of drug therapy is too long [22].
- **Dosage too low:** The duration of drug therapy is too short or the dosage interval is too infrequent to produce the desired response [22].
- **Glycemic control:** good when the average FBS is 70-130mg/dl whereas >130mg/dl is poor [6].
- **Ineffective drug:** The drug is not the most effective for the medical problem; the medical condition is refractory to the drug product [22].
- **Non Adherence:** The patient does not take the medication prescribed (patient does not understand the instructions, the patient prefers not to take the medication, the drug product is too expensive for the patient, the patient cannot swallow or self-administer the drug product appropriately, and the drug product is not available for the patient) based on Morisky score those who score greater than 2 were classified as poor adherence (non-adherence) [22].
- **Need for Additional Drug Therapy:** if a medical condition requires the initiation of drug therapy, preventive drug therapy is required to reduce the risk of developing a new condition; a medical condition requires additional pharmacotherapy to attain synergistic effects [22].
- **Unnecessary Drug Therapy:** when there is no valid med-

ical indication for the drug therapy, multiple drug products are being used for a condition that requires single drug therapy, the medical condition is more appropriately treated with nondrug therapy, Drug therapy is being taken to treat an avoidable adverse reaction associated with another medication [22].

Result

Socio Demographic Characteristics

In this study a total of 104 patients were included. From them 42 were male and 62 were females. Most of the patients 62(59.6%) were females, and about 69(66.3%) of the patients were in the age of 45-64 with a mean age of 49.6 and standard deviation of 2.3. Only 30 (28.8%) of the patients had family history of T2DM. Regarding their marital status, 85(81.7%) were married. Most of the patients 43(41.3%) were orthodox followers followed by protestant 41(39.4%). In this study most of the patients 40(38.5%) had primary education. Fifty-eight (55.8%) were farmer, and only 43(41.3%) were alcohol user with beer being the most prevalently used 14(32.6%). Only 17 (16. %) of the patients sometimes used chat.

Table 1: Socio-demographic characteristics of adult patients with type 2 diabetes mellitus on follow up at diabetic at Zewditu Memorial Hospital from October 01 to 30, 2023

Variables	Frequency	Percent
Gender		
Male	42	40.4
Female	62	59.6
Age Category		
25-44	27	26.0
45-64	69	66.3
> or = 65	8	7.7
Family history of DM		
Yes	30	28.8
No	74	71.2
Educational Status		
No formal education	42	40.4
Primary	40	38.5
Secondary	12	11.5
Tertiary	10	9.6
Occupation		
Farmer	58	55.8
Merchant	21	20.2
government employer	10	9.6
sanitation worker	15	14.4
Marital status		
Married	85	81.7
Single/divorced/widowed	19	18.3
Religions		
Orthodox	43	41.3
Protestant	41	39.4
Muslim	16	15.4
Catholic	4	3.8
Alcohol consumption		
Yes	43	41.3
No	61	58.7
Type of alcohol consumed		
Beer	18	38.30

-tej	16	34.04
tela	6	12.76
caticala	1	2.13
others	35	74.46
khat chewing		
Yes	17	16.3
No	87	83.7

Other: Coffe, Tea.Chemo

Disease Related Factors

Most of the patients 82 (78.8%) was diagnosed for T2DM in the past 5 years. About 58(55.8%) of the patients visited emergency department once in the last year and 37(35.5%) of the patients were hospitalized once in the last year. Forty-six (44.2%) of the patients had comorbidity.

Table 2: Disease related factors among patients with type 2 diabetes mellitus attending Zewditu Memorial Hospital from October 01 to 30, 2023.

Disease related factors	Frequency	Percent
Duration since diagnosis of T2DM		
<5 years	82	78.8
>=5 years	22	21.2
Number of emergency visit since last year		
Zero	29	27.9
One	58	55.8
>=2	17	16.3
Number of hospitalization since the last year		
Zero	62	59.6
one times	37	35.5
>=two times	5	4.8
Duration on treatment		
<5 years	82	78.8
>=5years	22	21.2
Comorbidity		
Yes	46	44.2
No	58	55.8

Medication and Laboratory Value Related Factors

Oral antidiabetic drug was involved in about 61% of drug therapy problem, followed by oral antidiabetic drug plus insulin (26.2%). From the medication used in the treatment of comorbidity statins were involved in 61.1% of drug therapy problem followed by Aspirin which account for about 35% of drug therapy problem. About 60% of the patient who had drug therapy problem had poor glycemic control (FBS>130).

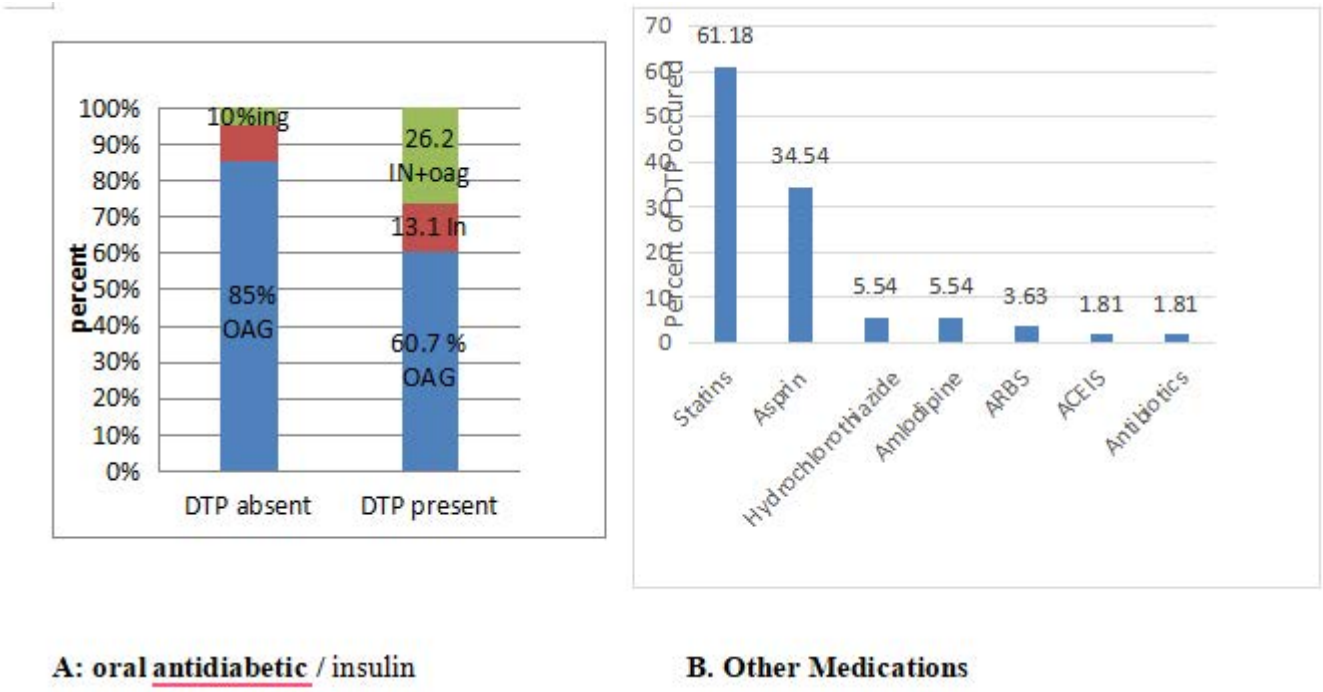

Figure 2: Antidiabetic medication (Figure A) and other medications (Figure B) involved in drug therapy problem in patient with type 2 diabetes mellitus attending Zewditu Memorial Hospital from October 01 to 30, 2023.

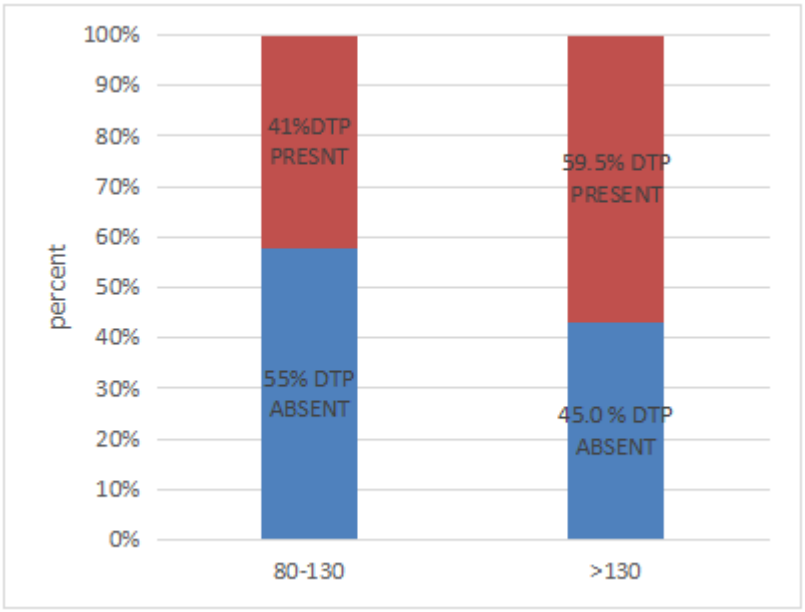

Figure 2: Average Fasting blood sugar among patients with type 2 diabetes mellitus attending Zewditu Memorial Hospital from October 01 to 30, 2023.

5.4. Types and prevalence of drug therapy problems.

From 104 patients with T2DM included in the study, 84 (80.8%) had at least one drug therapy problem.

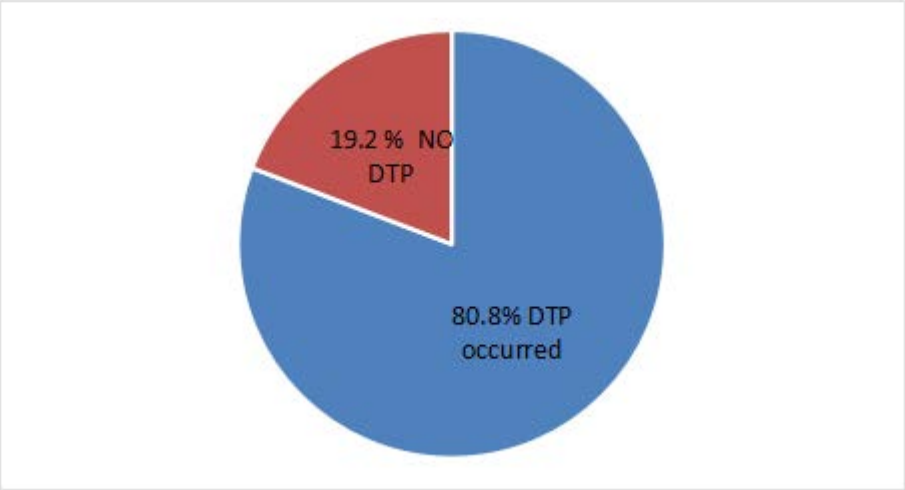

Figure 4: Prevalence of drug therapy problems among patients with T2DM attending Zewditu Memorial Hospital from October 01 to 30, 2023

From the seven drug therapy problems identified needs additional drug therapy and non-adherence were found to be the most frequent, 40 (47.62%) and 34 (40.4%) respectively.

Table 3: Type of DTPS among patients with T2DM attending Zewditu Memorial Hospital from October 01 to 30, 2023

Type of drug therapy problem	frequency	Percent
Un necessary drug therapy	8	7.7
Needs additional drug therapy	40	47.62
Needs different drug product	5	4.8
Dosage too low	7	6.5
ADR	3	3.57
Dosage too high	3	3.57
Non adherence	34	40.4

The most common cause for drug therapy problems in this study was the underutilization of statins and aspirin for the prevention of cardiovascular disease.

Table 4: Common causes of each DTP identified among patients with T2DM Zewditu Memorial Hospital from October 01 to 30, 2023

VARIABLES	frequency	Percent
Unnecessary drug therapy	8	7.7
No medical condition	5	62.5
Drugs with overlapping effect	3	37.5
Needs additional drug therapy	40	38.5
Untreated condition	1	2.5
Prophylaxis	37	92.5
Synergistic	2	5.0
Needs different drug product	5	4.8
More effective drug available	5	71.4
In appropriate dosage form	2	28.6
Dosage too low	7	6.7
Wrong dose	4	57.1

Long frequency	3	42.9
ADR	3	3.57
Unsafe drug for the patient	2	33.3
Undesirable effect	1	66.7
Dosage too high	3	3.57
Wrong dose	1	33.3
Short frequency	2	66.7
Non adherence	34	40.4

Factors Associated with Drug Therapy Problem

Bivariate Analysis

Out of 10 variables entered into bivariate logistic regression, age, educational status, comorbidity, marital status, types of antidiabetic medication, number of emergency visit, and number of hospitalizations have p-value less than 0.25 and candidate for multivariate logistic regression (Table 5).

Multivariate Analysis

After the bivariate analysis was conducted, a multivariate analysis was done for factors that have p- value of less than 0.25 in bivariate analysis of 7 variables entered into multivariate analysis 3 variables age of 45-64 (AOR=5.597,95%CI=1.384-22.637 ,p=0.016).presence of comorbidity (AOR=15.219,95%CI=1.75-13.47,P=0.014 and number of emergency department visit(AOR =5.081,95%CI=1.14-22.71,P=0.033) were significantly associated with drug therapy problem as depicted in the table below.

Table 5:Bivariate logistic regression of factors associated with the occurrence of Drug therapy problem in patients with T2DM at follow up at Zewditu Memorial Hospital from October 01 to 30, 2023.

COR-Crude odd ration

Variable	DTP present	DTP absent	COR	p-Value
Gender				
Male	36(42.9%)	6(30.0%)	1.75(0.61-4.99)	0.296
Female	48(57.1%)	14(70.0%)	1	1
Age Category				
25-44	13(15.5%)	14(70.0%)	1	1
45-64	64(76.2%	5(25.0%)	13.785(4.22-44.97)	0.000*
≥65	7(8.3%)	1(5.0%)	7.538(0.81-69.91)	0.075*
Educational Status				
No formal education	39(46.4%)	3(15.0%)	8.667(1.54-48.69)	0.014*
Primary	34(40.5%)	6(30.0%)	3.778(0.82-17.52)	0.090*
Secondary	5(6.0%)	7(35.0%)	0.476(0.086-2.628)	0.395
Tertiary	6(7.1%)	4(20.0%)	1	1
Comorbidity				
Yes	1(5.0%)	45(53.6%)	21.92(2.81-171.34)	0.003*
No	19(95.0%)	39(46.4%)	1	1
Duration of diabetes				
<5 years	67(79.8%)	15(75.0%)	1.314(0.42-4.12)	0.640
>5years	17(20.2%)	5(25.0%)	1	1
Marital status				
Married	66(78.6%)	19(95.0%)	1	1
Single/divorce d/widowed	18(21.4%)	1(5.0%)	5.18(0.65-41.37)	0.121*
Types of antidiabetic medication				
OAG	51(60.7%)	17(85.0%)	1	1
Insulin	11(13.1%)	2(10.0%)	1.83(0.37-9.11)	0.459
OAG plus Insulin	22(26.2%)	1(5.0%)	7.333(0.92-58.57)	0.060*

Duration on treatment				
<5 years	67(79.8%)	15(75.0%)	1.31(0.42-4.12)	0.640
≥5 years	17(20.2%)	5(25.0%)	1	1
Number of emergency Visit				
Zero	44(52.4%)	18(90.0%)	1	1
one times	36(42.9%)	1(5.0%)	14.73(1.88-115.69)	0.011*
≥two times	4(4.8%)	1(5.0%)	1.636(0.171-15.66)	0.669
Number of hospitalization				
Zero	15(17.9%)	14(70.0%)	1	1
One times	54(64.3%)	4(20.0%)	12.60(3.61-43.97)	.000*
≥2 times	15(17.9%)	2(10.0%)	7.00(1.35-36.28)	.020*

Variable	DTP present	DTP absent	AOR	p-Value
Age Category				
25-44	13(15.5%)	14(70.0%)	1	1
45-64	64(76.2%	5(25.0%)	5.597(1.384-22.637)	0.016*
≥65	7(8.3%)	1(5.0%)	3.228(0.223-46.65)	0.390
Educational Status				
No formal education	39(46.4%)	3(15.0%)	2.986(0.310-28.75)	0.344
Primary	34(40.5%)	6(30.0%)	1.165(0.135-10.04)	0.890
Secondary	5(6.0%)	7(35.0%)	0.210(0.016-2.695)	0.231
Tertiary	6(7.1%)	4(20.0%)	1	1
Comorbidity				
Yes	1(5.0%)	45(53.6%)	15.219(1.75-13.47)	0.014*
No	19(95.0%)	39(46.4%)	1	1
Marital status				
Married	66(78.6%)	19(95.0%)	1	1
Single/divorce d/widowed	18(21.4%)	1(5.0%)	5.641(0.453-70.303)	0.179
Types of antidiabetic medication				
OAG	51(60.7%)	17(85.0%)	1	1
Insulin	11(13.1%)	2(10.0%)	1.661(0.18-15.12)	0.653
OAG plus Insulin	22(26.2%)	1(5.0%)	4.553(0.29-70.91)	0.279
Number hospitalization				
Zero	44(52.4%)	18(90.0%)	1	1
one times	36(42.9%)	1(5.0%)	4.661(0.46-46.94)	0.191
≥two times	4(4.8%)	1(5.0%)	1.129(0.055-23.01)	0.937
Number of emergency visit				
Zero	15(17.9%)	14(70.0%)	1	1
One times	54(64.3%)	4(20.0%)	5.081 (1.14-22.71)	0.033*
≥2	15(17.9%)	2(10.0%)	4.183(0.62-28.23)	0.142

AOR-Adjusted Odd Ratio

Discussion

This study showed that 84 (80.8%) of patients with T2DM had at least one drug therapy problem .This is consistent with a study conducted in wolaita soddo (83.1%) [5], but the prevalence of DTP in this study is lower than the DTPS study conducted in Malaya, which showed 90.5%DTP [19] and Nigeria which found 94% drug therapy problem [18] the discrepancy with the previous studies might be due to sample size difference, different DTP identification method .The previous studies used PCNE classification of DTP but this study used cipolle's classification of DTP, and sample size difference this also may have influence for variation of the prevalence of DTP. The most common type of drug therapy problem found was needs additional drug therapy 40(47.62%) similar study conducted in Wolaita Soddo showed 67.7% of needs additional drug therapy (5).The cause for its high prevalence is underutilization of statins and aspirin for the prevention of CVD which accounted 37(61.18%),and 19(34.54%) respectively. This was contradicted with the study conducted in Malaya which identified ineffective drug therapy (22.5%) as the major drug therapy problem(19) and study done in Nigeria which found non adherence (26.7%) to be the most prevalent(18).This study reveals that the most prevalent drugs involved in drug therapy were statins 37(61.18%) and aspirin 19 (34.54%).This is different from what was found in Malaya which identified aspirin, clopidogrel,Amlodipine and metformin the prevalent drugs involved in DTP. The study conducted in Nigeria was also found different drug involved in DTPs like endocrine drugs, analgesics and antimicrobials were the most prevalent [19].

This study identified that age, presence of comorbidity and number of emergency department visit were significantly associated with occurrence of drug therapy problem.

It found that patients of age group 45-64 were 6 times more likely experience DTP than patients of age group 25-44. This is in line with study conducted in wolaita which identified that patients of age 45-54were 5 times more likely to develop drug therapy problem than patients of age 25-44 and patients of age >65 were 9 times more likely to develop DTP than those of age group of less than 45. This study also identified that those patients with co morbidities were 15 times more likely to develop DTP than those without comorbidity. Which is in line with the study conducted in wolaita and Jimma University specialized Hospital [5,21]. It was also identified that patients with one emergency department visit were 5 times more likely to develop DTP compared with those with emergency department visit.

Limitation of this Study

It did not study economic status of the patients as it may affect Drug therapy problem

Recall bias in adherence assessment since it was based on respondent's self-report

Absence of laboratory data during chart review

Shortage of the study period which decreased the sample size

Conclusion and Recommendation

Conclusions

The most prevalent DTP found was the need for additional medication therapy as a result of non-adherence and underuse of aspirin and statins for cardiovascular prevention. According to this study, the number of ED visits, comorbidity, and age between 45 and 64 were all strongly linked to the occurrence of drug therapy issues.

Recommendation

Based on this finding we recommend

- Zewditu Memorial Hospital should improve the management of T2DM by using involvement in drug therapy and giving emphasis to optimize utilization of statins and asprin
- Ethiopian minister of health should develop up to date guideline for management of T2DM.
- Health professionals in the hospital should give proper counselling to improve adherence
- Researchers should undergo prospective study to get large sample size so that conclusive result will be obtained in this Hospital to solve drug therapy problems

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