RESEARCH ARTICLE

PATTERN OF ANTIDIABETIC MEDICATION UTILIZATION IN PATIENTS ATTENDING DIABETIC CLINIC IN HIWOT FANA SPECIALIZED UNIVERSITY HOSPITAL, HARAR, ETHIOPIA

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ABSTRACT

Purpose: Diabetes mellitus (DM) is a chronic condition that can have a major impact on life expectancy and quality of life, especially if undetected or poorly controlled. Glycaemic control and management of co-morbid conditions and diabetes complications are alarmingly sub-optimal and perhaps one of the worst conditions in the world. This study aimed to assess the utilization pattern of antidiabetic medications in Hiwot Fana Specialized University Hospital (HFSUH).

Methods: A cross sectional study was conducted from April 1 to May 31, 2014 and data were collected using structured questionnaire and data collection format. The data were entered and analyzed with the help of SPSS version 16. Descriptive statistics was used for most variables and Chi-square test was used.

Results: A total of 296 diabetes patients were involved in this study, 42.6% and 57.4% were males and females, respectively. Large proportion of the patients (42.4%) was unable to read and write. Majority of the respondents (64.9%) were from urban. Two hundred and twenty three (75.3%) of the respondents were diagnosed with type-2 diabetes. Almost all patients were on pharmacological therapy at the time of the study. Among those who were on pharmacological therapy, majority of them (42.9%) were taking insulin.

Conclusions: The most prescribed antidiabetic medication was insulin, followed by glibenclamide and metformin, respectively. More than half of the patients used two syringes for monthly consumption. Most of the patients rotated major injection site and some of them also injected on lipodystrophied site. The incidence of microvascular complication was higher.

What this study adds: It adds on the current trend of utilization of antidiabetic medications as well as indicates the widespread of diabetes in the study setting, which will be a baseline for the government and different stakeholders to intervene.

What is already known about this subject: In the study setting, such a study has never been conducted.

Key words: Antidiabetic medications, Diabetes mellitus, Co-morbid conditions, Glycaemic control, Hiwot Fana Specialized University Hospital.

INTRODUCTION

Diabetes mellitus (DM) is a chronic condition that can have a major impact on life expectancy and quality of life, especially if undetected or poorly controlled.[1] The two major classifications of DM are type 1 (insulin deficient) and type 2 (combined insulin resistance and relative deficiency in insulin secretion). They differ in clinical presentation, onset, etiology, drug therapy, and progression of disease. Both are associated with microvascular and macrovascular disease complications that may affect the productivity and quality of life inevitably.[2]

International Diabetes Federation's (IDF) most recent estimates in 2013 indicate that 8.3% of adults – 382 million people – have diabetes, and the number of people with the disease is set to rise beyond 592 million in less than 25 years. Yet, with 175 million of cases currently undiagnosed, a vast amount of people with diabetes are progressing towards complications unawares. Moreover, with 80% of the total number affected living in low- and middle-income countries, where the epidemic is gathering pace at alarming rates, the IDF Diabetes Atlas' latest figures provide a worrying indication of the future impact of diabetes as a major threat to global development.[3]

The prevalence of diabetes mellitus is increasing in developing countries due to population growth, aging, unhealthy diets, obesity and sedentary lifestyles.[4] Diabetes reduces life expectancy by 5 to 10 years. Premature cardiovascular disease is the most common cause of mortality.[5] Indeed, coronary heart disease is already the leading cause of mortality in some developing countries.[6]

In sub-Saharan Africa in particular, the condition is even worse due to late diagnosis and poor access to diabetes care.[5] Diabetes is common in Ethiopia but the incidence and prevalence of the disease is not well known in the community; diabetes has never been given

the attention it deserves in Ethiopia.[6,7] The number of people with diabetes (20-79 years), 2013 in Ethiopia is estimated to be between 1 million to 10 million.[3]

The primary goals of DM management are to reduce the risk for microvascular and macrovascular disease complications, to ameliorate symptoms, to reduce mortality, and to improve quality of life.[2] Near-normal glycemia will reduce the risk for development of microvascular disease complications, but aggressive management of traditional cardiovascular risk factors (i.e., smoking cessation, treatment of dyslipidemia, intensive blood pressure control, and antiplatelet therapy) are needed to reduce the likelihood of development of macrovascular disease.[8]

Appropriate care requires goal setting for glycemia, blood pressure, and lipid levels, regular monitoring for complications, dietary and exercise modifications, medications, appropriate self-monitored blood glucose (SMBG), and laboratory assessment of the for mentioned parameters.[9]

The aim of this study was to assess utilization pattern of antidiabetic medication in patients attending Hiwot Fana Specialized University Hospital Diabetic Clinic, Harar, Ethiopia.

METHOD AND MATERIALS

Study area and period

The study was conducted in Harar Hiwot Fana Specialized University Hospital, which is one of the governmental hospitals found in the Harari Regional State that provides service to the community and is under administration of Haramaya University. The diabetic clinic which is under the chronic disease clinic has a total 305 registered diabetic patients on follow-up. The study was carried out from April 1 to May 31, 2014.

Study design

A cross-sectional study was conducted on patients attending Diabetic Clinic of HFSUH by using a structured questionnaire and data collection format. The data were collected by reviewing patient card and interviewing patients. Exclusion criteria was diabetic patients who were not registered but on follow-up.

Data processing and analysis

The data were coded, entered and analyzed with the help of SPSS window program version 16. Descriptive statistics was used for most variables and Chi-square test was used to test the association among variables. P-value of < 0.05 was used as statistically significant value. Average blood sugar, which refers to the average

of the last three months consecutive FBS, measures were used.

Ethical consideration

Institutional Research Ethics Review Committee of College of Medical and Health Sciences, Haramaya University approved this study. The participants provided a verbal informed consent because some of the study participants were illiterate so it was not possible to have a written consent from them. Each participant was introduced and briefed about the purpose and objective of the study and unwilling individuals were left over. The Ethics Review Committee of the College also approved the consent procedure. The confidentiality of the patients was also secured by not using their names and card number in the data collection tools during data collection.

RESULT

Socio- demographic characteristics

A total of 296 diabetic patients were involved in this study with response rate of 97.3%; 170 (57.4%) were females. Socio-demographic characteristics of the diabetic patients is shown in Table 1.

Background information of patients

Two hundred and twenty three (75.3%) of the respondents were diagnosed with type-2 diabetes. Family history of DM was reported by 79(26.7%) of patients, with the proportion being higher among type 2 patients 68(86%). Almost all (99.3%) patients were on pharmacologic therapy at the time of the study (Figure 1).
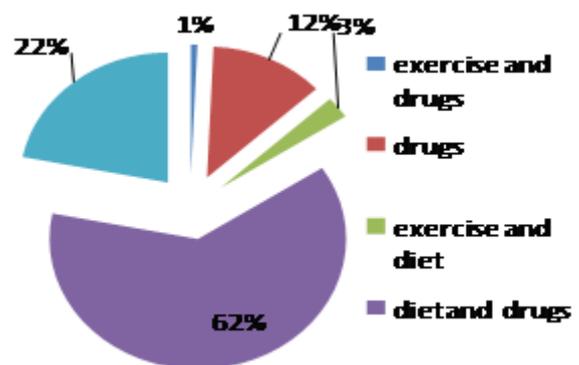

Figure 1: Frequency distribution of diabetic management in patients attending HFSUH Diabetic Clinic, April 1 to May 31, 2014.

Table 1: Socio-demographic characteristics of patients in HFSUH Diabetic Clinic, April 1 to May 31, 2014.

No	Variables		No	%
1	Gender	Male	126	42.6
		Female	170	57.4
2	Age	<14	6	2
		15-29	41	13.9
		30-44	68	23
		45-59	133	44.9
		>60	48	16.2
3	Religion	Orthodox	102	34.5
		Muslim	184	35.4
		Protestant	19	6.4
		Other	11	3.7
4	Marital status	Single	45	15.5
		Married	207	69.9
		Divorced	20	6.8
		Widowed	24	8.1
5	Educational status	Unable to write and read	174	58.8
		Grade 1-8	67	22.6
		Grade 8-12	51	17.2
		Graduated	4	1.4
6	Residence	Urban	192	64.9
		Rural	104	35.1

Among those who were on pharmacological therapy, majority of them 127 (42.9%) were taking insulin alone as shown in Figure 2.
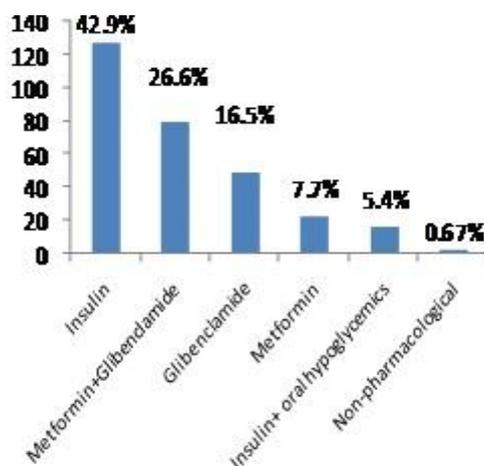
Figure 2: Prescribing pattern of antidiabetic medication in HFSUH Diabetic Clinic, April 1 to May 31, 2014.

Patients practice towards antidiabetic drug utilization

Almost all patients (98.8%) on oral medication kept their drugs in safe place. Majority of patients 93(65%) who were either on insulin therapy alone or in combination with OGLA used two syringes for monthly consumption (Table 2). Ninety six (67.1%) and 33(23.1%) patients used traditional places prepared and fridge for insulin storage, respectively.

Table 2: Frequency distribution of syringe number used by patients in HFSUH Diabetic Clinic, April 1 to May 31, 2014.

Syringe number		Frequency	Percentage
Valid	2	93	65.0
	4	17	11.9
	5-10	24	16.8
	.>10	9	6.3
	Total	**143**	**100.0**

Fifty one (35.7%) patients used only their arm as insulin injection site (Table 3). One hundred and twenty five (87.4%) patients rotated insulin injection site and from those who rotated, 55(44%) used the same injection site. Twenty three (16%) had developed lipodystrophy and 9 of them injected in the lipodystrophied site.

Table 3: Frequency distribution of injection site used by patients in HFSUH Diabetic Clinic, April 1 to May 31, 2014

Injection site		Frequency	Percentage
Valid	Abdomen	17	11.9
	Thigh	9	6.3
	Arm	51	35.7
	Thigh and arm	44	30.8
	All but not buttock	22	15.4
	Buttock	0	0
	Total	**143**	**100.0**

Monitoring and the incidence of microvascular complication

Most of the patients 277(93.6%) had blood sugar monitoring once per month and the remaining 10(3.4%) had two times and only 9(3%) had more than four times monitoring habit. The average FBS of patients during last 3 consecutive visits was 181.3 mg/dl (Table 4).

Table 4: Average FBS value of patients for the last three consecutive months in HFSUH Diabetic Clinic, April 1 to May 31, 2014.

Average blood glucose level		Frequency	Percent
Valid	<70	6	2.0
	70-130	118	39.9
	130-200	116	39.2
	200-250	36	12.2
	250-300	14	4.8
	300-600	6	2.0
Total		**296**	**100.0**

Most of the patients (202) were complaining of microvascular complications. From these, 28 of them complained of having neuropathy, nephropathy and sight problems and 48 patients had nephropathy with sight problem (Figure 3).
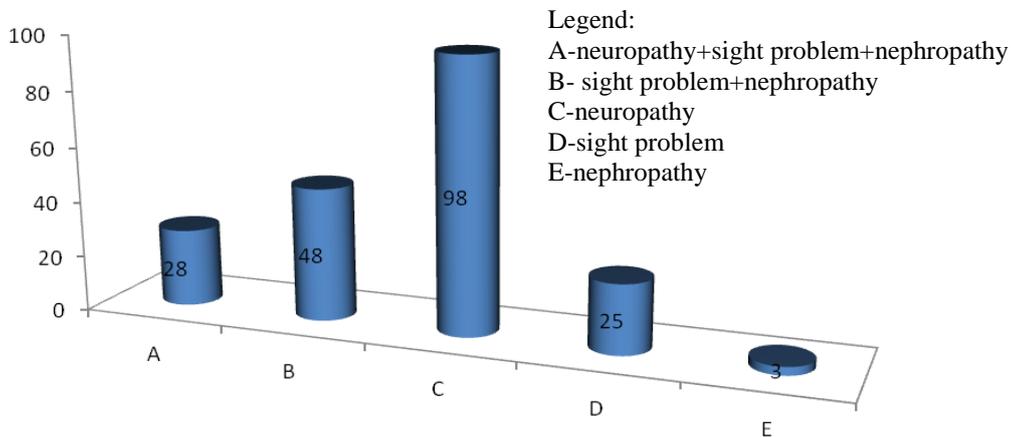

Legend:
A-neuropathy+sight problem+nephropathy
B- sight problem+nephropathy
C-neuropathy
D-sight problem
E-nephropathy

Figure 3: Frequency distribution of microvascular complication in patients attending HFSUH Diabetic Clinic, April 1 to May 31, 2014.

The most common co-existing illness 82(49.1%) was found to be hypertension, followed by chronic kidney disease 31(18.5%), heart failure 10(16.7%), arthritis 9(5.9%) and asthma 5(2.9%), respectively. Ten of them (16.7%) had both hypertension and heart failure.

A total of 750 drugs were prescribed during the study period. From those, 389 (51.86%) were antidiabetic medications. The average number of drugs per prescription were 2.5 with minimum of one drug for 77(26%) and maximum of 7 drug for four (1.4%) patients per prescription. Most of the patients 186(62.8) had free drug access.

From drugs which were prescribed for managing diabetes related complication and co-morbid illness, angiotensin converting enzyme inhibiters (ACEI) accounts for the largest portion that were prescribed for 104(28.8%) patients (Table 5).

Table 5: Frequency of mostly prescribed drugs for treating co-morbid illness and complication in HFSUH Diabetic Clinic, April 1 to May 31, 2014

Drug name	Frequency	Percentage (%)
ACEI	104	28.8
Hydrochlorothiazide	68	18.8
Aspirin	36	9.9
NSAID	20	5.5
Amitriptyline	30	8.3
Acetaminophen	12	3.3
Multivitamins	22	6.1
Statin	16	4.4
B-blocker	9	2.5
CCB	6	1.6
Antibiotics	40	11.1

From the total 296 patients, 215(72.6%) and 222(%) had never examined their eyes and kidneys, respectively and 68(23%) and 69(%) had examined their eyes and kidneys once, respectively. Weight measurement was not practiced by 173(58.4%) patients while 99(33.4%) and 23(7.7%) patients had occasional and monthly weight measurement, respectively.

Most of the patients 186(62.4%) confirmed that they did not use any substance (chat, cigarette, alcohol and shisha); whereas 85(28.6%) patients chewed chat and 18(6%), 3(1%) and 1(0.33%) used alcohol, cigarette and shisha, respectively.

DISCUSSIONS

The study attempted to assess the utilization of antidiabetic medication. Among the 296 diabetic patients in this study, the majority 223(75.3%) were type II which might be consistent with other reports in the country but higher as compared to the western countries; this might be due to diagnosis merely dependent on age of onset and clinical presentation rather than antibody test.[10]

The study revealed that the mean FBS of patients during the last three consecutive month visits was found to be 180.3 mg/dl. More than half of the patients (58.1%) had FBS level above 130 mg/dl and 6(2%) had lower FBS level from the goal of therapy, which were higher than a study done in Jimma, where FBS level was 171.7 ± 63.6 mg/dl. The mean FBS levels of 73.1% of patients was found to be above 130 mg/dl, showing large deviation from the goal of therapy indicating poor blood glucose control despite the fact that most of them 186(62.8%) were taking medications provided free of charge.[6]

Even though sex, age, residence, marital status and cost of drug did not show significant association with the average FBS value, educational status showed significant relation ($p < 0.05$) which showed similar trend with the previous study in the area. Individuals with elementary educational status were four times more likely to perform self care than those who were unable to read and write.[4]

Almost all patients were on pharmacological therapy for their diabetes at the time and only two patients were undergoing lifestyle modifications alone. From pharmacological agents, insulin was being used alone or in combination with OGLA, accounting for the largest proportion (48.3%). The study in Jimma showed all diabetic patients were on pharmacologic therapy except for one patient and more than half of the patients were taking insulin alone or in combination with OGLA.[6] A small number decrement on insulin use in the study area might be either due to a small proportion of type 1 DM patients or most of type 2 DM patients were respondent for OGLA only. The lower number of patients on non-pharmacological therapy might be due to lack of routine medical check-up and lack of knowledge of diabetic symptoms which resulted in patients presenting only when they were overtly sick.

Whereas, a study in India showed that the most frequently prescribed drug for diabetic patients was insulin (80.5%), followed by biguanides, sulfonylureas.[11] The lower utilization of biguanides in local studies might be due to existence of contraindication or low information dissemination about survival benefit of metforimin.

Majority of the patients 93(65%) on insulin used two syringes for monthly consumption. However,

manufacturers recommend that syringes must be used only once to ensure sterility, prevent tissue damage, decrease injection site pain and prevent infection.[12] The reasons for long term use of syringes in the study area might be due to inability to afford or shortage of supplies. Ninety six (67.1%) patients used place prepared for insulin storage which should be appreciated and encouraged but 14(9.8%) used wrong storage conditions which might lead to loss of pharmacologic activity. Most of the patients (94.4%) used opened vial for less than 28 days and the remaining used for more than 28 days, which did not comply with the manufacturers' instructions, i.e., opened insulin vial should be used for 28 days.[13] The reason for their usage could be due to inability to afford and lack of awareness.

Majority of the patients rotated 125(87.4%) injection site and 88 of patients rotated with different major site after each injection, which was not in consistent with the American association of diabetes educators guideline which states rotation is typically made within the general area rather than from major site to site and the panel also noted that the thigh is the preferred site for NPH insulin to ensure optimal absorption.[12]

This might be due to lack of awareness, and recklessness. From those who developed lipodystrophy, nine of them injected in it and eight of them did not have reason to do so and only one preferred because there was no pain around it but lipohypertrophy has been linked to poorer glycemic control and may reduce absorption by as much as 25%; this might be due to not rotating site or use of syringes repeatedly.[13]

As the study result revealed that 9(3%) patients practiced self monitored blood glucose level (SMBGL) which corresponds with most studies in the country[6,8]; this might be due to inability to afford as it is expensive. From these patients, 66.7% had controlled blood glucose level. A study done in Malaysia also showed a significant decrease in HbA1c level in patients who practiced SMBGL.[14] This might be because the practice improved medication adherence and motivated patients to make necessary lifestyle changes and need to be encouraged.

From the total patients, 202(68.2%) had complained of at least one microvascular complication and 174(58.7%) of patients had neuropathy which is followed by 101(50%) sight problem and 79(39.1%) nephropathy. Whereas, the study done in Jimma showed 160(52.5%) patients had one or more of the chronic complications, the major ones being neuropathy in 90(29.5%), nephropathy in 48(15.7%) and visual disturbances in 103 (33.8%).[10] Our study had indicated much higher complication rate which might be due to poor blood glucose control that is an average of 180.3 mg/dl as compared to 171 mg/dl in Jimma, as near-normal glycemia reduces the risk of microvascular disease complications.[2] The result of the study showed poor control with respect to goal set by American diabetic association. A prospective diabetes study in U.K. showed that each 1% reduction in HbA1c was associated with a 37% decrement in risk for microvascular complications but measurement of HbA1c was not done in our setting.[14]

Polypharmacy, which is one of the major problems in managing DM, was observed in our study setting due to high incidence of comorbid diseases and complications. In this study, the average number of drugs per prescription was 2.5 with minimum of one drug for 77(26%) and maximum of 7 drugs for 4(1.4%) patients per prescription; this might not be considered to be polypharmacy as it does not comply with the definition that states use of five or more regular medications as polypharmacy.[15] A study in Nepal showed the average number of drugs per prescription was 6.51±2.3 and all prescriptions contained more than one drug, 17.6% of prescriptions contained 2 to 4 drugs, 71.13% of prescriptions contained 5 to 9 drugs, and 10.54 % of prescriptions contained 10 or more drugs.[16]

From drugs which were prescribed for managing diabetes related complication and comorbid illnesses, ACEI accounted for the largest portion 104(28.8%) patients. This could be because of higher incidence of hypertension, CKD and heart failure, which is similar with different studies.[6,10,17,18]

CONCLUSIONS

The majority of patients were with type II diabetics and the most prescribed antidiabetic medication was insulin, followed by glibenclamide and metformin, respectively. Blood glucose controls were far below any recommended standard for most of the patients. The average FBS value was associated with the educational status of patients significantly showing as educational level rose there was better blood glucose level control. More than half of the patients used two syringes for monthly consumption. Most of the patients rotated major injection site and some of them also injected on lipodystrophied site. Very small number of patients practiced SMBGL and significant blood glucose control were observed. Monitoring for microvascular complication was poor even though the incidence of microvascular complications was higher with peripheral neuropathy being the most common.

ACKNOWLEDGMENTS

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

FA and MB involved in conception of the original idea, helped to draft the proposal, participated in all implementation stages of the project, and write up; TG reviewed it critically and involved in all implementation stages of the project and write up. All authors read and approved the final version of the manuscript.

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