


Patients' Adherence to Anti-diabetic Medications and Associated Factors in Mizan-Tepi University Teaching Hospital: A Cross-Sectional Study

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Abstract

Introduction: A number of medications have been demonstrated to lower blood glucose. However, current-day management has failed to achieve and maintain the optimal glycemic level for diabetic patients. Patients' non-adherence is among the most contributing factors. Therefore, the aim of this study was to explore the prevalence of non-adherence to anti-diabetic medications and associated factors. **Methods:** A hospital based cross-sectional study was conducted from November 2020 to January 2021. A systematic random sampling technique was used. Data were collected by structured questionnaire adapted from different literatures. Then, data were entered into SPSS version 25 and analyzed. To determine the association of dependent and independent variables, multiple logistic regression was done. P-value <.05 was considered statistically significant. **Results:** A total of 275 study participants were interviewed with a response rate of 100%. From this 53.8% were females, 59.3% were in the age group of 41-60 years, 35.3% were college/university graduates and 79.3% were not using social drugs. One hundred eighty-seven (68%) of them were adherent to their anti-diabetic medication. Factors found to be significantly associated with anti-diabetic medication adherence were age >60 years (AOR = .276, 95% CI = .124-.611) attending higher education (AOR = 6.203, 95% CI = 1.775-21.93), retired (AOR = 7.771, 95% CI = 1.458-41.427), housewife (AOR = 7.023, 95% CI = 1.485-33.215), average monthly income 1001birr-2000 birr (AOR = .246, 95% CI = .067-.911) and social drug use (AOR = 3.695, 95% CI = 1.599-8.542). Forgetfulness, not affording, side effects, misunderstanding of instructions, and poly-pharmacy were identified reasons for non-adherence. **Conclusions and Recommendations:** Patients' adherence to anti-diabetic medications in the current study is sub-optimal. Age, monthly income, level of education, occupational status, and social drug use were associated with adherence. Forgetfulness, not affording, and side effects were reasons identified to contribute to non-adherence. Therefore, adherence counseling, use of alarms, and the way to mitigate non-affordability, including anti-diabetic medications into a program drug should be considered.

Keywords

diabetes mellitus, adherence, medicines, prevalence

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What do We Already Know About This Topic?

Non-adherence to anti-diabetic medication is a major cause of poor glycemic control among diabetic patients.

How Does Your Research Contribute to the Field?

It explored the magnitude of patients' non-adherence to anti-diabetic medications and associated factors. Attending higher education, being older age, low-income and social drug use were factors associated with non-adherence. It also identified reasons for non-adherence.

What Are Your Research's Implications Towards Theory, Practice, or Policy?

Exploring the magnitude of non-adherence and factors related to them may help prescribing physicians, nurses, and pharmacy professionals to develop their skill on how to support their patients about adherence. It may also be a baseline data for policy makers on how to mitigate reasons for non-adherence.

Introduction

Diabetes mellitus (DM), a collection of metabolic disorders, is rapidly escalating as a crucial public health issue.¹ Globally, the expected number of diabetic patients is swiftly escalating, with 591.9 million in 2035 and 642 million in 2040.^{2,3} The vast majority of these people live in low-and moderate-income countries. Diabetes Mellitus is increasing at a different rate in different parts of the world. The predicted proportional increment in the number of adults with diabetes is 108% for low-income countries and 28% for high-income countries.^{4,5} Like in other low-income countries, the prevalence of diabetes in Ethiopia is high, and the expected proportional increase in the adult population is also high.⁶

Diabetes mellitus impose vast social, health, and economic impacts on individuals and countries in the long term. However, much of these impacts can be lessened by reducing diabetes complications. This can be done with anti-diabetic medications. Although a number of medications have been illustrated to lower blood glucose (glycemia), current-day management has failed to achieve and maintain the optimal glycemic control for diabetic patients.⁷ Non-adherence to anti-diabetic medications is among the most contributing factors for poor glycemic control.⁸ Non-adherence to anti-diabetic medications has numerous consequences. Some of them were: increased out of the pocket expenditure, increased overall health care costs, worsening of morbidity, and increased mortality.⁹⁻¹¹

Increased prevalence of non-adherence with medical treatment continues to be a source of concern for medical professionals and social scientists. As a result, a significant number of patients do not receive adequate benefit from medical treatment, resulting in poor health outcomes, lower quality of life, and increased healthcare costs.¹²

Despite these facts, as far as our knowledge is concerned, there is limited study around the current study area on non-

adherence to anti-diabetic medications and associated factors. Therefore, the aim of this study was to explore the prevalence of non-adherence to anti-diabetic medications among patients attending chronic ambulatory care at Mizan-Tepi University Teaching Hospital and associated factors. This study can be a baseline data for the hospital management and pharmacy department to take appropriate action to increase adherence of their clients. It can also be helpful for future researchers and pharmacy professionals to identify areas that need improvement and tackle the identified factors.

Methods

Study Area, Study Design, and Period

A hospital based cross-sectional study was conducted at Mizan-Tepi University Teaching Hospital, Mizan-aman. It is located at about 583 Km south-west of Addis Ababa, the capital of Ethiopia. It was conducted by interviewing patients on follow up at chronic ambulatory care using structured questionnaires. The study was conducted from November, 2020 to January, 2021.

Populations, Sample Size, and Sampling Techniques

All diabetic patients, on follow up at Mizan-Tepi University Teaching Hospital chronic ambulatory care, were source population. The study populations were diabetic patients older than 18 years and who were able to provide information by their own. Critically ill patients were excluded.

The sample size was determined by a single population proportion formula as follows

$$n = \left(\frac{Z\alpha}{2}\right)^2 P \left(\frac{1-P}{d^2}\right)$$

Where n= sample size for a population >10,000

p= 50% estimated population proportion of success (reflects assumption that impact is expected in 50% of the population)

d=.05 margin of error (5%) (The precision of measurement)

$Z_{\alpha/2}$ = Confidence interval (1.96)

$$n = \left[\frac{(1.96)^2(0.5)(1 - 0.5)}{(0.05)^2} \right] = 384$$

Since the total population of diabetic patients on follow up in the current hospital was 975, finite population correction formula was used to obtain the final sample size

$$N_i = \frac{n}{1 + \frac{n}{N}} = \frac{384}{1 + \frac{384}{975}} = 275$$

Where N_i = final sample size

n = sample size

The Systematic random sampling technique was employed. Sampling interval was determined by: $K=N/N_i = 975/275 = 4$

Therefore, the data was collected every 4th person and the first person was selected by lottery method from the first four patients.

Study Variables

Patients' adherence to anti-diabetic medication was dependent variable. Socio-demographic factors (age, sex, religion, educational status, occupation, income and marital status), Clinical characteristics (duration of treatment, type of DM, Insulin use, co-morbidity, and complication), and social drug use were independent variables.

Data Collection and Analysis Method

Structured questionnaires adapted from similar literature with minor revisions were used to collect data.¹³⁻¹⁵ This questionnaire was used after conducting a pre-test on 5% of the sample size in Wacha primary hospital. Cronbach alpha was calculated to test the validity and reliability of the questionnaire, and the value was .78. The questionnaire had socio-

Table 1. Socio-demographic characteristics of the patients with diabetes attending ambulatory clinic of Mizan-Tepi University Teaching Hospital, Ethiopia, January, 2021.

	Socio-Demographic	Frequency	Percentage (%)
Sex	Male	127	46.2
	Female	148	53.8
Age	18–40	39	14.2
	41–60	163	59.3
	>60	73	26.5
Religion	Orthodox	95	34.5
	Muslim	67	24.4
	Protestant	87	31.6
	Catholic	26	9.5
Occupation	Government employee	86	31.3
	Merchant	44	16.0
	Housewife	80	29.1
	Farmer	15	15.5
	Retired	27	9.8
	Others	23	8.4
Marital status	Single	30	10.9
	Married	178	64.7
	Divorced	9	3.3
	Widowed	58	21.1
Education level	Illiterate	40	14.5
	Primary	85	30.9
	Secondary	53	19.3
	College/university	97	35.3
Monthly income ^a	<1000 ETB	32	11.6
	1000–2000 ETB	61	22.2
	2000–3000 ETB	47	17.1
	3000–4000 ETB	72	26.2
	>4000 ETB	63	22.9
Social drug use ^b	Yes	57	20.7
	No	218	79.3

^aETB: Ethiopian birr.

^bSocial drug: a patient, who drinks alcohol and/or chews Khat, and/or smoke Cigarette.

Table 2. Clinical characteristics of the diabetic patients attending chronic ambulatory clinic at Mizan-Tepi University Teaching Hospital, Ethiopia, January, 2021.

	Clinical Characteristics	Frequency	Percentage
Co-morbidity	Present	80	29.1
	Absent	195	70.9
Complications	Present	62	22.5
	Absent	213	77.5
Duration of treatment	<1 year	48	17.5
	1–5 years	128	46.5
	6–10 years	70	25.5
	>10 years	29	10.5
Type of DM	Type 1	53	19.3
	Type 2	222	80.7
Insulin use	Insulin users	61	22.2
	Non-insulin users	214	87.8

demographic characteristics and adherence measurement scale questions. It was prepared in the English language and translated into Amharic by principal investigators. Then, the principal investigators gave a 1-day training for data collectors on the data collecting procedure and COVID-19 protocols. Then, the data collectors filled the questionnaire by interviewing patients, keeping their distance, having a face mask for themselves and patients. The collected data were checked for completeness, accuracy, and clarity every day by principal investigators. It was translated back to English by principal investigators and entered into the Statistical Package for Social Science (SPSS) version 25 for analysis. Independent variables with a *P*-value less than .25 in bivariate logistic regression were fitted for multiple logistic regression models to determine factors associated with adherence, and *P*-value <.05 was considered statistically significant.

Results

Socio-Demographic Characteristics

A total of 275 diabetic patients were participated in this study with a response rate 100%. Majority (53.8%) of them were females, 163 (59.3%) were in the age group of 41–60 years, 95 (34.5%) were Orthodox Christians, and 178 (64%) were married. Regarding the educational status and social drug use, 97 (35.3%) of them were college/university graduates and majority (79.3%) of them were not using social drugs (Table 1).

Clinical Characteristics of the Patients

Patients' clinical characteristics like, duration of treatment, co-morbidity, and complications were assessed. Accordingly, 128 (46.5%) of the participants were on treatment for 1–5 years, 195 (70.9%) patients had no co-morbidities, and 213 (77.5%) of study respondents had no diabetic complications (Table 2).

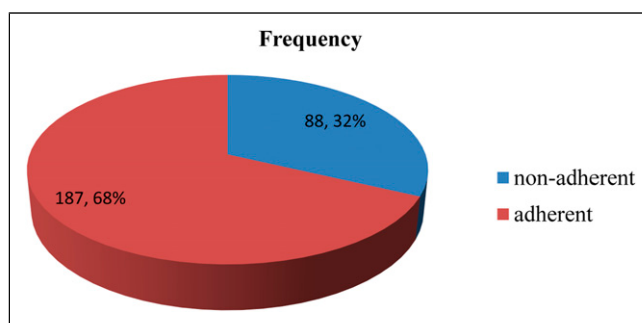


Figure 1. Patients' adherence to anti-diabetic medications at Mizan-Tepi University Teaching Hospital, January, 2021.

Patients' Medication Adherence

Four non-adherence measuring questions were used to measure the patients' level of adherence. One point was given to each "yes" answer and the total score were calculated for each patient. Then, patients who scored ≥ 2 points were classified as non-adherent and those who scored <2 points were classified as adherent. Accordingly, 187 (68%) of assessed patients were found to be adherent to their anti-diabetic medicines (Figure 1).

Reasons for Non-Adherence

This study also explored reasons for patients' non-adherence to anti-diabetic medicines. Among these, 102 (37.1%) patients reported that they miss their medication due to forgetting, while 91(33.1%) due to not affording the drug (Figure 2).

Factors Associated With Adherence

Multivariate logistics regression analysis was done to determine the association between independent and dependent variables. Accordingly, age >60 years (AOR=.276, 95%

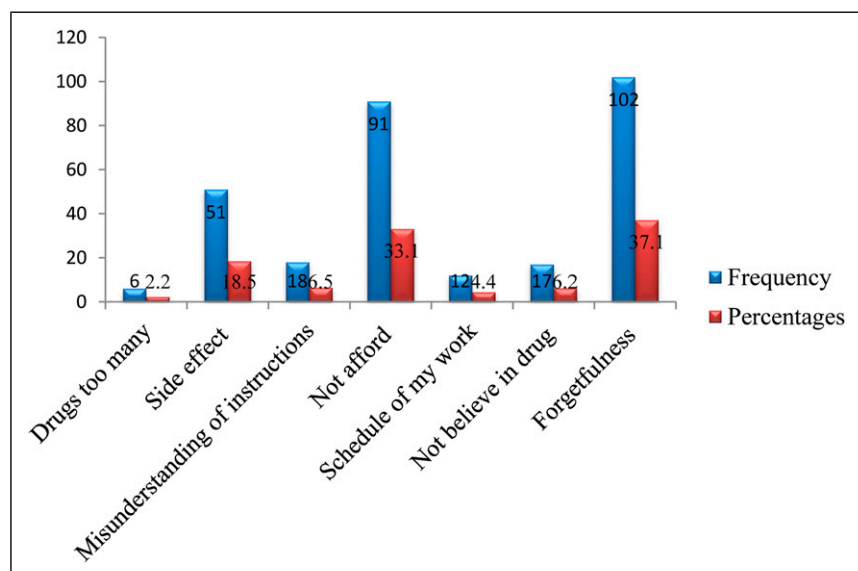


Figure 2. Reasons for non-adhering to anti-diabetic medicines in Mizan-Tepi university teaching hospital, Ethiopia, 2021.

CI=.124-.611), attending higher education AOR=6.203, 95% CI=1.755-21.93), retired (AOR=7.771, 95% CI=1.458-41.427) and housewife (AOR=7.023, 95% CI=1.485-33.215), monthly income of 1001 ETB-2000 ETB (AOR=.246, 95% CI=.067-.911), and not using social drugs (AOR=3.695, 95% CI=1.599-8.542) had significant association with adherence to anti-diabetic medications (Table 3).

Discussions

Drug therapy is a cornerstone of diabetes management. However, many patients fail to adhere to their drug therapy. Poor adherence to medications is a single major reason for uncontrolled blood sugar, diabetic complications, and health care financial wastage.¹⁶ Several factors were identified as contributing factors for not taking medicines as prescribed. Therefore, this study emphasized on assessing the DM patients' adherence to anti-diabetes medication and associated factors.

The prevalence of adherence to anti-diabetes medications in this study was 68%. This result is similar to the studies done in Iran and Ethiopia (Adama referral hospital).^{15,17} However, it is slightly less than the results of studies conducted in east Uganda (83.3%) and north-west Ethiopia, University of Gondar hospital (85.1%).^{12,18} The difference could be due to differences in the method used to measure adherence and the study setting. The study conducted in east Uganda used different metrics from the current study. On the other hand, the University of Gondar hospital has specialized services and professionals, which could generally improve services and could be brought better adherence. Moreover, the current result is better than the study conducted in general hospitals in Cameroon, Sudan, and different hospitals in Ethiopia (Dilla

university referral hospital, Jimma university specialized hospital, and Zewditu memorial hospital).¹⁹⁻²³

Adherence to anti-diabetic medicines had a significant association with attending higher education and using social drugs (like cigarette smoking, chewing khat, and alcohol use). Similar findings were reported by studies conducted in United Arab Emirates, Saudi Arabia, and Ethiopia (University of Gondar Hospital), which showed attending higher education is associated with non-adherence to anti-diabetic medicines.^{12,16,24} This might be because individuals, who attended higher education, understand the complex anti-diabetic regimen; and the complications of not taking anti-diabetic medicines. Again, study done in Tanzania, Dar es Salaam, reported social drug use (especially cigarette smoking) is one of the factors affecting adherence to anti-diabetic medications.²⁵

Being elderly (>60 years) and an average monthly income of 1001 ETB to 2000 ETB was also negatively associated with adherence to anti-diabetic medication. This could probably be because of forgetting and not affording. Elderly people are more forgetful than younger people. Moreover, people with low monthly income might not afford medicines, as respondents also raised not affording as one of the reasons for non-adherence. These findings are in line with other studies findings.^{26,27}

Other factors that were significantly associated with adherence to anti-diabetes medicines were being retired from work and being housewife. The possible justification for this can be, their medication schedule will not overlap with working time and they spent majority of their time around their residency so that they might not forget taking their medications.

This study also revealed several reasons for non-adhering to anti-diabetic medications among study participants. This

Table 3. Factors associated with Adherence to anti-diabetic medications.

Variables	Adherence		AOR(95% CI)	P-value
	Adherent	Non-adherent		
Sex				
Male	86	41	1.00	-
Female	101	47	1.289(.609–2.727)	.507
Age				
18–40	24	15	1.00	-
41–60	120	43	1.063(.366–3.092)	.91
>60	43	30	.276(.124–.611)	.002*
Marital status				
Single	21	9	1.00	-
Married	123	55	1.581(.373–6.70)	.534
Divorced	6	3	1.601(.685–3.74)	.277
Widowed	37	21	.971(.113–8.321)	.978
Educational status				
Illiterate	22	18	1.00	-
Primary education	62	23	2.904(.835–10.092)	.094
Secondary education	42	11	2.005(.0653–6.16)	.224
Higher education	61	36	6.203(1.755–21.93)	.005*
Occupation				
Government employee	61	25	1.00	-
Retired	16	11	7.771(1.458–41.427)	.016*
Farmer	12	3	2.226(.253–19.555)	.47
Merchant	30	14	5.542(.993–30.929)	.051
Housewife	48	32	7.023(1.485–33.215)	.014*
Others	20	3	3.13(.716–13.675)	.129
Religion				
Orthodox	62	33	1.00	-
Muslim	50	17	1.81(.521–6.287)	.35
Protestant	55	32	1.342(.355–5.067)	.665
Catholic	20	6	2.891(.8–10.451)	.105
Monthly income				
>4000	37	26	1.00	-
3001–4000	50	22	.485(.18–1.302)	.151
2001–3000	31	16	.412(.16–1.064)	.067
1001–2000	43	18	.246(.067–.911)	.036*
<1000	26	6	.5(.203–1.233)	.132
Duration of disease				
<1 year	39	9	1.00	-
1–5 years	82	46	.655(.156–2.745)	.563
6–10 years	46	24	1.86(.563–6.142)	.308
>10 years	20	9	1.686(.508–5.592)	.394
Complication				
No	130	65	1.00	-
Yes	57	23	.905(.401–2.039)	.809
Social drug use¹				
Yes	31	26	1.00	-
No	156	62	3.695(1.599–8.542)	.002*

*P-value <.05 was considered significant.

includes forgetfulness, not affording, misunderstanding instructions, side effects, poly-pharmacy, and schedule overlap with working time. Previous studies also reported similar

reasons for non-adherence.²⁸⁻³¹ The statistical analysis also showed being older age and earning low monthly income were negatively associated with adherence. Other studies also

revealed forgetfulness and not affording medications as a common reason for non-adherence.^{23,24}

Limitations: Even though, this study revealed prevalence of non-adherence to anti-diabetic medicines and associated factors, it has limitations. First, since the results were obtained from patients' self-reported adherence, adherence might be overestimated, and subjective. Secondly, it did not assess the outcome of non-adherence. Therefore, future researchers can fill these gaps, by considering different metrics and further investigate the outcome of non-adherence to anti-diabetic medicines.

Conclusion and Recommendation

Patients' adherence to anti-diabetic medications in the current study is below most of the previous studies. It has a significant association with age >60 years, retired and housewife, attending higher education, and social drug use. Forgetfulness, not affording, and side effects of medications were reasons identified for non-adherence to anti-diabetics. Therefore, the prescribers and dispensers should improve adherence counseling by encouraging the use of alarms and time arrangements for taking medications. Since non-affordability was among the reasons for non-adherence, the Ethiopian Ministry of Health and its partners should consider including anti-diabetic medications in program drugs.

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Declaration of Conflicting Interests

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Abbreviations

AOR: Adjusted odds ratio; CI: Confidence Interval; DM: Diabetes Mellitus; ETB: Ethiopian Birr; MTUTH: Mizan-Tepi University Teaching Hospital; SPSS: Statistical package for Social Science

Ethical Considerations

The study was conducted following the declaration of Helsinki. Accordingly, a formal letter was taken from Mizan-Tepi University, College of Medicine and Health Sciences, School of Pharmacy ethical review committee to Mizan-Tepi University teaching hospital (Ref. no CP019/13). Then, data collectors collected data after

obtaining written consent from each participant. Data collectors also assured each respondent about the confidentiality of the information, and the personal identifiers were not presented in the study.

Data Availability

The data sets generated and/or analyzed during the present study are available from the corresponding author on reasonable request.

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