

## Non-Adherence and Contributing Factors among Ambulatory Patients with Anti-diabetic Medications at Tertiary Hospital, South West Ethiopia: Cross Sectional study

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### Abstract

**Background:** Diabetes mellitus (DM) is a group of metabolic disorders characterized by hyperglycemia and abnormalities in carbohydrate, fat, and protein metabolism. Adherence to or compliance with a drug therapy regimen is generally defined as the amount to which patients take medications as prescribed by their health care providers.

**Objective:** The aim of this study was to determine the magnitude of non-adherence and its contributing factors among diabetic patients attending the diabetic clinic in Jimma University medical center.

**Methods:** Cross-sectional study was carried out among patients with diabetes mellitus attending the diabetes mellitus clinic in Jimma University medical center. Data entry, cleaning and analysis was conducted by use of Statistical package for Social Sciences (SPSS) software version 24. Medication adherence was assessed by using Morisky medication adherence scale (MMAS).

**Results:** Out of 270 DM patients, 140 (51.85%) of patients reported adherence to their anti-diabetic drug therapy. In the ways drug use, 120 (44.44%) of patients have excellent adherence, 20 (7.41%) have good adherence, 130 (47.15%) have poor adherence. A total of 40 (22.96%) of the patients described their non-adherence to forgetting to take their medications. Other factors include travelling, 33 (12.22%), medication side effect, 30 (11.11%), feeling well, 54 (20%), feeling better, 46 (17.03%), High cost of the drug, 6 (2.22%), Lack of trust in the efficacy of the drug, 7 (2.59%), Nature or schedule of mywork, 22 (8.15).

**Conclusion:** In conclusion, poor patient adherence to treatment regimens is a major problem in the study area. Patients' lack of knowledge and forgetfulness are the major causes of non- adherence.

**Keywords:** Diabetes mellitus; Non-adherence; Anti-diabetic medications; Jimma university

### Introduction

Diabetes mellitus refers to a group of common metabolic disorders that share the phenotype of hyperglycemia<sup>[1]</sup>. There has been a fast increase in the prevalence of diabetes mellitus .Despite advances in understanding the disease and its management, the morbidity and mortality rate continues to increase<sup>[2]</sup>. Patients with poor management of DM are at a higher risk of developing chronic micro and macro vascular complications that lead to end organ damage such as kidney, heart, brain, and eyes and affect direct medical costs and indirect healthcare costs and overall quality of life<sup>[3]</sup>.

Adherence to drug therapy regimen is generally defined as the amount to which patients take medications as prescribed by their health care providers<sup>[4]</sup>. There are many kinds of non-adherence. Therapeutic or drug therapy non-adherence which includes first failure to have prescription medications, dispensed, omission of doses and discontinuation of the medication regimen before finish it. The second

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type of non-adherence is nutrition/physical activity non-adherence in which the patient unable to follow the food and physical activity recommendations. The third type is the appointment non-adherence in which the patient fails to show up at the clinics for the scheduled follow up<sup>[5,6]</sup>.

Non-adherence, low income, lack of good understanding and lack follow-ups are the main factors seen in poor glycemic control. Non-adherence rates are relatively increased across disease states, medications regimens and in different age groups<sup>[7]</sup>. The decrease in adherence is noted to be most changed after the first six months of therapy among patients with chronic conditions such as hypertension, epilepsy, diabetes mellitus<sup>[8]</sup>. Drug therapy may contribute to non-adherence secondary to its adverse effects and cost, while poor patient health care provider relationships may also be a major determinant of non-adherence. Hence, health care provider should always look for poor adherence and can increase adherence by considering the value of a patient's regimen, by making the regimen simple, easy and connect the regimen to the patient's lifestyle conditions<sup>[9]</sup>. Most diabetic patients are currently being managed with the most effective available drugs. Because of poor adherence to the prescribed drug regimen and poor knowledge and practice of successful self-management, the desired blood sugar level could not be controlled and maintained<sup>[10]</sup>. The aim of this study was to know and determine the magnitude of non-adherence and its contributing factors among diabetic patients attending diabetic clinic in Jimma University Medical Center.

## Methods and Participants

Jimma University Medical Center is the only teaching hospital in southwest Ethiopia with a bed capacity of 600. Geographically, it is located in Jimma town 352 km Southwest of Addis Ababa, the capital. It provides services for approximately 9000 inpatient and 80,000 outpatient clients per year with a catchment population of about 15 million people. DM clinic is one among chronic follow-up clinics of the hospital occurring twice weekly on Mondays and Tuesdays. The service was provided by medical internists' residents, senior doctors and general nurses. There were about 2766 DM patients who have been following diabetic clinic. This study was done for a period of two months from January to February. The study involves cross sectional interview of consecutive DM patients who visited the DM clinic of JUMC during the study period.

All DM patients admitted to JUMC during study period were source population. All adult DM patients who fulfilled the inclusion criteria were study population. Patients were eligible for inclusion if they were greater than 18 years of age and willing to give their informed consent; well designed questionnaires were prepared after reviewing different literatures. The questionnaire was translated from English to local language Afan Oromo and Amharic and back to English by licensed linguistic. Data collectors included five senior pharmacists. Information such as socio-demographic characters, past medication history, past medical history and social drug use were collected by data collectors Data collection process and management: First the patient chart was reviewed and the presence of DM was confirmed. Semi structured interview was conducted to record patients' socio-demographic data, ways of medication adherence,

and factors contributing to non-adherence. It also consists of information related to medication prescribed, dose, frequency, and Patients' mean fasting plasma glucose reading at the last Hospital visit.

## Data processing and statistical analysis

The collected data were coded, cleared and checked for completeness and entered into a computer using Epi Data version 4.2.0.0 software and exported to the Statistical package of Social Science (SPSS) version 24.0 for analysis. Results of the study were organized in the form of frequencies and percentages. The data were summarized and described using tables and figures. Subsequently, the appropriateness of drug therapy was evaluated using 2014 Ethiopian standard treatment guideline, Upto- date, Clinical Practice Recommendations for Primary Care Physicians and Healthcare Providers, ADA 2017 was used to asses non-adherence.

## Ethical consideration

Initially Jimma University ethical Review Board (IRB), was approved the research. The letter was communicated to concerned officials. The hospital director was informed about the purpose of the study to get agreement and co-operation each of the respondents were received oral and written information about the study, the participants were signed an informed consent for their voluntary participation. Confidentiality of the patients' was kept by coding the questionnaires with card numbers.

## Results

A total of 270 participants completed the interview giving a response rate of 97.3%. Of these, 130 (48.1%) were female diabetes patient. The mean age ( $\pm$  SD) of the study participant was 45.4 ( $\pm$  16. 7) years. The education level of these responders showed that 70 (25.9%) had neither formal nor informal education while 102 (37.8%) have secondary or post-secondary education. Sixty-seven (24.7%) were retirees from private and government working and 39 (14.4%) were government employees. Fifty-one (18.9%) of the patients were younger than 30 years, one hundred twenty-two (45.2%) were between 30 and 40 years and 97 (35.9%) were greater than 40 years. The duration of DM from first diagnosis shows that 18 (6.7%) had been diagnosed for less than five years, 60 (22.2%) for 5 to 10 years, 67 (24.82%) for >10 years and 125 (46.3%) before five years. The number of female patients non-adherent to their anti-diabetic was 70 (25.93) while male patients 60 (22.22%), but the difference was not statistically significant ( $P > 0.05$ ). Adherence to anti-diabetic medication was found to be higher among respondents whose education level is tertiary and above (14.81%) compared to uneducated and those with up to secondary school education (37.06%), this results was statistically significant ( $P < 0.05$ ). Table 1.

**Table 1:** Socio-demographic Characteristics of DM patients at JUMC, Zone, Jimma, South west Ethiopia, 2019.

Variables		Frequency (%)	Non-adherence	P-value
Age (- years)	<30	40(14.81)	35(12.96)	0.065
	30-40	100(37.03)	35(12.96)	0.083
	>40	130(48.15)	60(22.22)	0.43
Sex	Male	140(51.85)	60(22.22)	0.08
	Female	130(48.15)	70(25.93)	0.32
Level of education	Illiterate	70(25.93)	40(14.81)	0.01
	Primary	102(37.8)	50(18.52)	0.055
	Secondary	38(14.07)	20(7.41)	0.42
	Tertiary and above	60(22.22)	20(7.41)	0.09
Marital status	Married	184(68.1)	80(29.63)	0.04
	Single	16(5.93)	8(2.96)	0.88
	Divorced	30(11.11)	12(4.44)	0.45
	Widowed	40(14.81)	30(11.11)	0.63
Occupation	Employed	39(14.4)	20(7.4)	0.64
	Not employed	60(22.22)	40(14.81)	0.066
	Not working due to illness	30(11.11)	10(3.7)	0.34
	Merchant	31(11.48)	15(5.55)	0.85
	House wife	70(25.93)	20(7.4)	0.74
	Others	40(14.81)	25(9.26)	0.65
Religion	Orthodox	42(15.56)	20(7.4)	1.52
	Muslim	180(66.7)	80(29.63)	1.04
	Protestants	38(14.07)	22(8.15)	0.75
	others	22(8.15)	8(2.96)	0.63
Ethnicity	Oromo	220(81.5)	100(37.03)	0.07
	Amhara	20(7.4)	10(3.70)	0.73
	Tigre	8(2.96)	4(1.48)	0.74
	Others	22(8.1)	16(5.93)	0.99
Disease duration (years)	<5	130(48.12)	60(22.22)	0.09
	5-10	80(29.63)	40(14.81)	0.043
	>10	60(22.22)	30(11.11)	0.003

The ways of use of anti-diabetic drug therapy among the respondents showed that a combination of glibenclamide and metformine as Combination therapy 43 (43%), metformin alone 40 (70.12%) were the most commonly utilized drug therapy. Only Insulin was utilized by 90 (33.33%); glibenclamide alone was utilized by 17 (29.82%); and Combination of metformin and insulin was utilized by 80 (29.62%). There was association between non-adherence and number anti-diabetic used (Table 2).

**Table 2:** Knowledge and use of anti-diabetics among diabetic patients attending JUMC ambulatory clinic, 2018

Anti-diabetics		Number (%)	Non-adherence (%)	P-Value
Anti-diabetics	OHA alone	100(37)	60(22.22)	0.09
	Insulin alone	90(33.33)	40(14.81)	0.06
	OHA and Insulin	80(29.62)	30(11.11)	0.03

Combination therapy (OHA)	Metformin and glibenclamide)	43(43)	30(11.11)	0.04
Monotherapy (OHA)	Metformin	40(70.12)	30(11.11)	0.07
	Glibenclamide	17(29.82)	10(3.7)	0.08

Key: OHA-Oral hypoglycemic agents

One hundred respondents (37.04%) were not follow health eating programs and two third of the patients 210 (77.77%) reported that they were advised by care givers to take five or more servings of vegetables and fruits while only 22.22% of the responders showed that they were not advised. Most patients (44.44%) on average eat three servings per day. Only 120 patients (44.44%) eat five or more serving of fruits and vegetables regularly while only 90 patients (33.33%) eat fat diets such as red meat and fat dairy products. One hundred and fifty (56.66%) responders did not participate in exercises and one hundred twenty (33%) of patients were on specific activity. Out of 270 responders only 56 (20.7%) checked their blood glucose at home and out of those who checked at home, only 38 (14.07%) patients managed their blood glucose regularly. Sixty (22.22%) patients reported that they were not advised on how many times a week they were needed to monitor their blood glucose at home. A summary of self management behaviours of the patients for control of diabetes is shown in (Table 3).

**Table 3:** Self management behaviors' (Diet, physical activity and self monitoring of blood glucose) of DM patients attending JUMC, ambulatory clinic, 2019.

Variable		Frequency(%)
Following health eating plan	$\geq 3$ days	170(62.96)
	<3 days	100(37.04)
Recommended servings of fruits and vegetables taken per day	$\geq 5$ servings	140(51.85)
	<5serving	70(25.93)
	Not advised	60(22.22)
On average servings of vegetables and fruits per day.	$\geq 3$ serving	100(37.04)
	<3 serving	130(48.15)
	3 serving	40(14.81)
Five or more servings of fruits and vegetables.	$\geq 3$ days	130(48.15)
	<3 days	140(51.85)
Eat high fat foods such red meat or fat dairy products?	$\geq 3$ days	90(33.33)
	<3 days	180(66.66)
Participation in at least 30 minutes of physical activity?	$\geq 3$ days	140(51.85)
	<3 days	130(48.15)
Participation in a specific exercise	$\geq 3$ days	120(45.55)
	<3 days	130(48.15)
Testing of blood glucose at home	Do test	56(20.7)
	Do not test	214(79.26)
Recommended numbers of times in testing blood glucose at home per week.	$\geq 5$ times/week	120(44.44)
	<5 days	90(33.33)
	Not recommended	60(22.22)
Regular monitoring of blood glucose	$\geq 5$ days	38(14.07)
	<5 days	232(85.93)

One hundred forty (51.85%) of respondents were adherent to their anti-diabetic medications regimens. In the ways of drug utilization 120 (44.44%) of respondents had high adherence, 20 (7.41%) have intermediate adherence, 130 (47.15%) have low adherence. A total of 40 (22.96%) of the patients attribute their non-adherence to forgetting to take their drug therapy. Other factors include travelling 33 (12.22%), and medication side effect30 (11.11%), feeling well 54 (20%), feeling better 46 (17.03%), High cost of the drug 6 (2.22%), Lack of trust in the efficacy of the drug 7 (2.59%), Nature or schedule of my work 22(8.15). Of the total respondents, 230 (85.18%) of the respondents reported that they check closely their blood glucose levels. There were association between non-adherence and Forgetfulness, Travelling, Medication side effects, Feeling worse and cost of the drug ( $p<0.05$ ).

**Table 4:** Medication adherence and contributing factors for non-adherence among diabetic patients attending JUMC ambulatory clinic, 2019

Factors	Frequency (%)	Non-adherence	P. Value
Forgetfulness	40 (14.81)	40 (14.81)	0.001
Travelling	80 (29.63)	30 (11.11)	0.008
Medication side effects	70 (25.93)	22 (7.41)	0.005
Feeling worse	20 (7.41)	8 (2.96)	0.004
Feeling better	10 (3.7)	6 (2.22)	0.063
Inconvenient	10 (3.7)	5 (1.85)	0.074
High cost of the drug	6 (2.22)	5 (1.85)	0.002
Lack of confidence in the efficacy of the ant-diabetic medications	23 (8.52)	8 (2.96)	0.055
Nature or schedule of my work	11 (4.07)	6 (2.22)	0.055

## Discussion

Males were predominated in this study which is similar with the studies done in India<sup>[10,11]</sup> and United States<sup>[12]</sup>. In this study it was found that 48.15% patients were not aware about the medicines taken, 11.11% patients stopped taking any medicine due to some adverse effect. Similar studies conducted in Nigeria reported a prevalence rate of 60%<sup>[13]</sup> and 72.5%<sup>[14]</sup> to which this study was relatively comparable. The prevalence was greater than the result found in Malaysia 47%<sup>[15]</sup>, India 16.6%<sup>[16]</sup> and US-Mexico Border 40%<sup>[17]</sup>. However, it was lower than the prevalence found in the Brazilian study 78.3%. These discrepancies might be due to difference in the study population, study period, study setting.

Adherence to one regimen component may be unrelated to adherence in other regimen areas suggesting that adherence is not one-dimensional paradigm<sup>[18-22]</sup>. In this study, DM patients with low adherence reported several reasons for not adhering to anti-diabetic drug therapy. The most common reasons were found to be forgetfulness, experiencing side effects and feeling of being well without treatment/symptom free and cost of prescribed medications. Most of the patients did not take their anti-diabetic medications due to forgetfulness which is similar to that reported in other studies<sup>[24-26]</sup>. In the current study medication non-adherence was related to number of treatment regimen, type of medications used, and duration of diseases and insurance status of the patient ( $p<0.05$ )<sup>[27-29]</sup>. The high number of drugs

per participant as well as co morbidities could also contribute to the high prevalence of non-adherence<sup>[30-34]</sup>. The high cost of medications was reported by most of the patients as the major important reason preventing optimal adherence<sup>[35]</sup>. For example the study done in South Nigeria showed that the monthly cost of anti-diabetic drug therapy was US \$22.9 and most patients could not afford to have constant supply of medications<sup>[38]</sup>. The effect of non adherence to drug therapy due to cost may also be contributed by the fact most of the DM patients had no insurance for health care<sup>[36-39]</sup>. Study done previously showed that patients with more than two drug therapy regimens were more likely to be non-adherent<sup>[27]</sup>. Similar studies also reported the number of prescribed medications to have a significant inverse association with anti-diabetic medication adherence<sup>[28,29]</sup>. These findings can be attributed to failure of the patients to understand their disease process and the benefits of adhering to medications as prescribed.

Patients with poor adherence to prescribed anti-diabetic medications had significantly high prevalence of poor glycemic control when compared with those with high and medium medication adherence. Patients with poor adherence in this study were greater than 2.11 times likely to have poor glycemic management when compared with patients with good medication adherence. These findings are consistent with several studies<sup>[31,32]</sup> which reported that poor adherence to anti-diabetic medications was related with low glycemic control. For instance study conducted in Ethiopia indicated 58.2% of the prevalence of non adherence to medication while patients with poor medication adherence had high level of FBG<sup>[33]</sup>.

## Conclusion

Poor patient adherence to treatment regimens is a main problem in the management of DM. lack of knowledge; poor affordability and forgetfulness are the major reason of non adherence.

**Data Availability:** The data used to support the findings of this study are available from the corresponding author upon request

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**Conflict of Interest:** We declare that there is no conflict of interest and we all contributed equally to this work.

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