

Diabetes mellitus drug adherence and associated factors at selected health centers of Arada sub city, Addis Ababa, Ethiopia

Fikreselassie Getachew^{1*}, Sintayehu Abate¹ and Mihret Getachew²

¹Ethiopian Public Health Institute, P.O. Box 1176, Addis Ababa, Ethiopia

²CDC Ethiopia, Dire Dawa

*Corresponding author: fikreg2006@gmail.com

Abstract

Background: Diabetes mellitus is a chronic disease where the medication regimen contains many aspects that make compliance difficult. Poor adherence is an obstacle in therapeutic control of diabetes. Despite the advances in the treatment of diabetes mellitus over the years, diabetes places an immense burden on the individuals living with the condition, their families and the overall health care system.

Objective: To assess level of diabetic mellitus drug adherence and associated factors at selected health centers of Arada sub city, Addis Ababa, Ethiopia.

Methods: A community based cross sectional study was conducted from March to august/2018. Systematic random sampling technique was used to select 405 samples. Data collection tools were structured questionnaires for identifying the factors associated with drug adherence and Morisky adherence skill to know the extent of adherence among diabetic patients. Data were analyzed using SPSS version 20.00 statistical software. Multiple logistic regression was used to identify independent variables. Factors with $p < 0.05$ were taken as statistically significant.

Results: The study was conducted with 100% respondent rate. The mean age of the respondents were 37 years (SD $\pm$ 6.17 years). Two hundred twenty-two (54.8%) participants were living for 1-5 years with diabetes mellitus. About 70(17.3%) of clients used insulin syringe for self-injection. Two hundred ninety-six (73.1%) participants took oral hypoglycemic agents once a day and 38 (9.4%) twice a day. Age 44-56 years (AOR=1.325, 95% CI (1.169-1.625), age >56 years (3.573(2.364-5.903), level of education who attended primary school (AOR =1.146, 95%CI (1.125-4.092), secondary education (AOR=2.134, 95%CI (1.1-4.092), college diploma and above (AOR=7.590,95%CI(4.156-13.975), income >1000 (AOR=1.436(1.784-2.436), high cost of drugs (AOR=.079, 95%CI (.048-0.130) were identified significant variables.

Conclusion: The overall adherence towards antidiabetic medications in this study was low. Educational status, monthly income and cost of medicine were significantly associated with antidiabetic medication adherence. A lot should be done to maximize the medication adherence of diabetic patients so as to obtain full therapeutic benefits of prescribed therapies.

Key words: Diabetes mellitus, drug adherence

Introduction

Diabetic mellitus is a series of complex and chronic heterogeneous metabolic disorder characterized by elevated blood glucose level, glucose intolerance as well as disordered lipid and protein metabolism (Steilc1999). The 2014 report stated that the global burden of diabetes among adults was 422 million, compared to 108 million in 1980. This prevalence in adults was rising from 4.7% in 1980 to 8.5% in 2014. By the year 2030, this number could be raised to 552 million (Dipiro et al. 2014; WHO 2016).

According to WHO, diabetes was considered a rare case in sub-Saharan Africa even though over 12 million people were estimated to have diabetes, and 330,000 people died from diabetes related conditions in 2010. The 2010 estimate was also predicted that, this number will double in 20 years, 23.9 million by 2030 (Sicree et al. 2009). Over the next 20 years, it is forecasted that sub-Saharan Africa will account the highest number of people with diabetes from any

region in the world. Diabetic mellitus is a chronic disease where the medication regimen contains many aspects that make compliance difficult. Whatever is the efficiency of a drug, it cannot act unless the patient takes it. Treatment may be complex, intrusive and inconvenient (Muhammad et al. 2017). Despite the presence of effective medical treatment for diabetes, a very large number of diabetic patients die every year in Ethiopia (WHO 2009). Though the advancement in adherence research, non-adherence rates have remained nearly unchanged in the last decades (Cramer 2004; Jamous et al. 2011). Factors which influence adherence to medication are lack of information, complexity of regimen, concomitant diseases, side effects, long duration of treatment and emotional strength. Institutional factors such as the availability of medication at the hospital pharmacy, cost of medications, prescription patterns and accessibility also affects adherence. Personal beliefs, knowledge on disease and medication, forgetfulness and financial burden similarly reduce adherence level

(Muhammad et al. 2017; HO PM 2006). Adherence to treatment regimen is the key link between treatment and outcome in medical care. Low medication adherence has assumed importance as it seriously undermines the benefits of current medical care and imposes a significant financial burden on individual patient and the health care system as a whole (Wild et al. 2004). The status of patient adherence to anti diabetic therapy practice was not yet known in Ethiopia especially on insulin self-administration. Therefore, the aim of this study was to assess the adherence status and associated factors to antidiabetic therapy among patients having follow-up at Arada sub city selected health facilities.

Materials and Methods

Facility based cross sectional study was conducted in selected health centers of Arada sub city from March to August 2018. Patients having diabetes either type 1 or 2, who were on treatment for 3 months or more were included in the study. Pregnant mothers, patients who had vision impairment and newly diagnosed patients were excluded from the study. Sample size of 405 was determined using single population proportion formula, proportion (p) of 50%, a margin error of 5% and correction factor formula since the source population was less than 10,000. Systematic random sampling techniques was used to select study

subjects. Morisky adherence skill was used to know the extent of adherence among the diabetic patient. Data were coded, cleaned, entered, and analyzed using SPSS window version 20 statistical packages for descriptive and inferential analysis. Independent variables having $P \leq 0.25$ on the bivariate analysis were candidates for the multivariate analysis. Factors with $p < 0.05$ were taken as statistically significant. The degree of association between dependent and independent variables was assessed using AOR at 95% CI. Prior to data collection, ethical clearance was obtained from Research and Ethics committee of Addis Ababa Medical and Business College.

Results

Socio demographic characters: The study was done with 100% respondent rate. The mean age of the respondents was 37 years ($SD \pm 6.17$ years). Among the respondents, 315(77.8%) of them were married and 291(71.9%) were orthodox in religion. Majority of the respondents 400(98.8%) were urban dwellers. Regarding to educational background, 121(29.9%) were unable to read and write and 101(24.9%) attended college diploma and above. Hundred and fifty two (37.5%) of the respondents were merchants and 281(69.4%) had monthly income above 1000 Ethiopian birr. Two hundred and twelve (52.8%) of the respondents were females (Table 1).

Table1: Socio demographic characteristics of respondents who attended OPD at selected health centers of Arada sub city, Addis Ababa, Ethiopia

Variables	Number	Frequency	Percent
Sex	Male	191	47.2
	Female	212	52.8
Age in years	18-30	12	3.0
	31-43	46	11.4
	44-56	139	34.3
	>56	208	51.4
Marital status	Married	315	77.8
	Single	33	8.1
	Widowed	26	6.4
	Divorced	31	7.7
Religion	Orthodox	291	71.9
	Protestant	30	7.4
	Muslim	78	19.3
	Catholic	4	1.0
Educational status	Can't read and write	121	29.9
	who attend primary school	121	29.9
	who attend secondary school	62	15.3
	college diploma and above	101	24.9
Occupation	House wife	126	31.1
	Farmer	3	0.7
	Business	152	37.5
	Daily worker	21	5.2
	Gov't employer	59	14.6
	NGO/private worker	18	4.4
Monthly income (ETB)	Others	25	6.2
	< 500	54	13.3
	500-1000	70	17.3
	>1000	281	69.4

Clinical and Medication Characteristics of Respondents: Two hundred twenty two (54.8%) of

participants were lived for 1-5 years with diabetes mellitus. Three hundred thirty-five (82.7) respondents

took oral hypoglycemic agents and 70 (17.3%) used insulin syringe for self-injection. Eleven percent of the respondents took injection twice a day and 6.2 % took once a day. Two hundred ninety-six (73.1%) and 38(9.4%) of the respondents took their oral medications twice a day and once per day, respectively. Majority of participants, 362 (89.4%) visited health care providers once in a month, 40

(9.9%) once in 3 month and 3(0.7%) once in 6 month. Almost all (98.0%) of the participants have regular follow up. Regarding cost of medications, more than half (220) rated the cost of their drug as cheap and the rest 185(45.7%) rated the cost as expensive. Some respondents had other chronic condition(s) such as hypertension (47.2%), high cholesterol (11.9%), heart disease (6.9%) and 1.7% had lung disease (Table 2).

Table 2: Distribution of diabetes patient by duration with diabetic at selected health centers in Arada sub city, Addis Ababa, Ethiopia 2018

Variable	Category	Frequency	Percent
Duration with diabetes	1-5	222	54.8
	6-10	132	32.6
	>10	51	12.6
Type of drug use	Insulin	70	17.3
	Tablet	335	82.7
Dosing schedule of insulin	Once a day	25	6.2
	Twice a day	44	10.9
	More than two times per day	1	0.2
Dosing schedule of tablet	Once a day	38	9.4
	Twice a day	296	73.1
	More than two times per day	1	0.2
Have regular follow up	Yes	397	98.0
	No	8	2.0
Visit health care provider	Once in month	362	89.4
	Once in 3 month	40	9.9
	Once in 6 month	3	0.7
Cost of medicine	Cheap	220	54.3
	Expensive	185	45.7
Chronic conditions	Hypertension	191	47.2
	Heart disease	28	6.9
	High cholesterol	48	11.9
	Lung disease	7	1.7
	Others	131	32.3

Level of medication Adherence: Accordingly, the prevalence of antidiabetic medication adherence of the

current study was 63.5% and 36.5 % of the respondents are found to be non-adherent to medication.

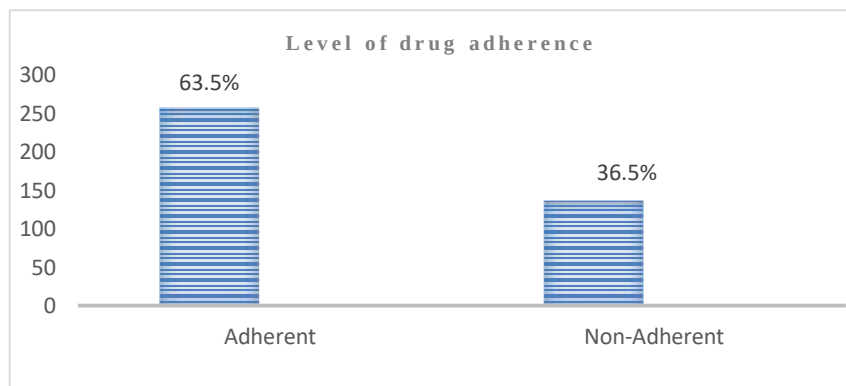


Figure 1: Respondents' level of adherence towards antidiabetic medications among type diabetic patients in in arada sub city selected health centers, Addis Ababa Ethiopia, 2018.

Factors Associated with anti diabetic medications: In multiple logistic regressions analysis age, educational status, monthly income, and cost of medication were significantly associated with anti-diabetic medication adherence. Age group 44-56 years (AOR=1.325; 95%CI: 1.169-1.625), age group >56years (AOR=3.573; 95%CI: 2.364-5.903), level of

education who attended primary school (AOR =1.146; 95%CI: 1.125-4.092), secondary education (AOR=2.134; 95%CI: 1.1-4.092), college diploma and above (AOR=7.590; 95%CI: 4.156-13.975), income>1000 (AOR=1.436; CI: 1.784-2.436), cost of medicine being expensive (AOR=0.079; 95%CI: 0.048-0.130) were the identified significant variables.

Table 3: Logistic regression result for level of diabetes mellitus drug adherence and associated factors in selected health centers of Arada subcity, Ethiopia, 2018.

Variables	Frequency (%)	P-value	COR(CI)	P-value	AOR(CI)
Age					
18-30	12(3)	0.003	1		1
31-43	46(11.4)	0.001	7.759(2.029-29.670)	0.003	0.129(0.034-0.493)
44-56	139(34.3)	0.016	3.079(1.600-5.924)	0.001	1.325(1.169-1.625)
>56	208(51.4)	0.000	1.745(1.107-2.749)	0.016	3.573(2.364-5.903)
Level of education					
Can't read and write	121(29.9)	0.067	0.167(0.093-0.300)	1	1
Who attend 1 ^o school	121(29.9)	0.000	0.131(0.072-0.241)	0.067	1.146(1.125-4.092)
Who attend 2 ^o school	62(15.3)	0.020	0.466(0.244-0.889)	0.000	2.146(1.135-5.092)
College diploma and above	101(24.9)	0.002	1.866	0.020	7.621(4.156-13.975)
Monthly income					
<500	54(13.3)	0.000	2.351(1.641-3.370)	0.000	1
500-1000	70(17.3)	0.074	1.143(1.125-2.342)	0.122	1.545(0.890-2.683)
>1000	281(69.4)	0.065	1.121(1.120-2.254)	0.115	1.436(1.784-2.436)
Cost of medicine					
Cheap	220(54.3)	0.063	0.146(0.139-1.243)	0.062	1
Expensive	185(45.7)	0.000	12.659(7.691-20.837)	0.000	.079(.048-.130)

Discussion

Ensuring patients' adherence to antidiabetic medications to prevent complications of diabetes remains a major challenge. Poor medication adherence has negative consequences for patients, health care providers, physicians, and for the sustainability of the healthcare system. Currently, there is no single measure accepted as the gold standard to measure medication adherence since all commonly employed methods have drawbacks. The magnitude of adherence level in this study was 63.5%. This was higher than the study findings reported from Zewditu hospital (54.8%) (Muhammad et al. 2017) and another study conducted by the world Health Organization which shows 50% adherence level (WHO 2003). The findings of the current study was lower than the patients self-reported adherence rate to anti-diabetic medication of 72.2% documented by Gelaw and colleagues (Gelaw et al. 2014) and the 68.8% self-reported adherence documented by Mohammed and colleagues (Mohammed et al. 2014); in a study done in Gonder University hospital (85.1%) (Mastewal et al. 2016). It was also lower than the findings reported from Malaysia (66%), Iran (74.8%) Mann (2009); Nigeria (72.5%) (Omarandk 2014) and Uganda (71%) (Yekta 2011). The difference could be attributed to different in socioeconomic characteristics.

From different studies, education has been identified as major socioeconomic determinant of adherence to anti-diabetic medication. Low educational level has been associated with higher rates of non-adherence. Similarly, educational was found to be significantly associated with the level of adherence to the treatment regimen in the current study. Respondents who attended secondary school education were 2.1 times

more likely to adhere than those who were unable to read and write. This finding was in line with the study done in the University of Gondar, where individuals with elementary educational status were more likely to be adherent than those who were unable to read and write (Mastewal et al. 2016), accordingly patients who attended college and above were 7.6 times more adherent to the treatment regimen than those who were unable to read and write. Similarly, it was in line with the study done in Zewditu Memorial hospital, in which those patients who were unable to read and write were 13 times more likely to be non-adherent than literates (Muhammad et al. 2017). The possible justification could be that being unable to read and write make learning more difficult; as diabetes drug therapy gets more complex, patients are required to have more complex cognitive skills to be able to understand the prescribed drug therapy and to adhere to treatment for good glucose control (Muhammad et al. 2017). In this study, patients who rated the cost of medication as expensive was 0.079 less likely to adhere than those who rate the cost as cheap. Respondents who had monthly income >1000 birr were 1.4 times adherent than those having less monthly income. Having less income could lead to non-adherence as the drug tend to be unaffordable.

Conclusions and Recommendations

The overall adherence towards antidiabetic medications in this study was low. Educational status, monthly income and cost of medicine were significantly associated with antidiabetic medication adherence of patients. A lot should be done to maximize the medication adherence of these patients so as to recognize the full importance of prescribed therapies.

References

- Cramer JA (2004). A systematic review of adherence with medications for diabetes, *Diabetes care*, 27(5):1218–1224.
- Dipiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG & Posey LM (2014). *Pharmacotherapy: A pathophysiologic approach*. USA: McGraw-Hill Professional. 9th edn: <https://access.pharmacy.mhmedical.com/book.aspx?bookID=689>.
- Gelaw BK, Mohammed A, Tegegne GT, Defersha AD, Fromsa M, Tadesse E, et al (2014). Non adherence and contributing factors among ambulatory patients with antidiabetic medications in Adama Referral Hospital. *Journal of Diabetes Research*: <http://dx.doi.org/10.1155/2014/617041>.
- HO PM, Rumsfeld JS & Masoudi FA (2006). Effort of medication adherence on hospitalization and mortality among the patient with diabetes. *Archives of internal medicine*, 21:161-168.
- Jamous RM, Sweileh WM, Abu-Taha AS, Sawalha AF, Zyoud SH & Morisky DE (2011). Adherence and satisfaction with oral hypoglycemic medications: a pilot study in Palestine, *International Journal of Clinical Pharmacy*, 33(6):942–948.
- Mann DM, Ponienan D, Leventhal H & Halm EA (2009). Predictors of adherence to diabetes medications: the role of disease and medication beliefs. *Journal of Behavioral Medicine*, 32(3):278–284.
- Mastewal A, Anteneh M, Mignote H & Fisseha Z (2016). Adherence and associated factors towards antidiabetic medication among type II Diabetic patients on follow-up at university of Gondar Hospital, Northwest Ethiopia. Hindawi Publishing Corporation. *Advances in Nursing*, <http://dx.doi.org/10.1155/2016/8579157>.
- Mohammed A, Lisha JJ, Jayadevan S, Jayakumary M & Sheikh AB (2014). Patients adherence to anti-diabetic medications in a hospital at Ajman, UAE. *Malays Journal of Medical Science*, 21(1):44–9.
- Muhammad A, Tigestu A & Oumer S (2017). Medication adherence and its associated factors among diabetic patients at Zewditu Memorial Hospital, Addis Ababa, Ethiopia. *BMC Research Notes*, 10:676.
- Omarandk MS & San L (2014). Diabetes knowledge and medication adherence among geriatric patient with type 2 diabetes mellitus. *International Journal of Pharmacy and Pharmaceutical Sciences*, 6(3):103–106.
- Sicree R, Shaw J & Zimmet P (2009). The global burden: diabetes and impaired glucose tolerance. *Open Journal of Epidemiology*, 5(3):15-71.
- Steilc F (1999). Diabetes mellitus. *Pharmacotherapy A pathophysiologic approach*. Dipiro JT, talbert RL, yeeGc. *Appleton and Lange*, 4th edition:1219-1241.
- WHO (2016). Global report on diabetes. Geneva: World Health Organization. <https://www.who.int/diabetes/global-report/en/>.
- Wild S, Roglic G, Green A, sicree R & king H (2004) Global prevalence of diabetes .estimates for the year 2000 and projection for 2030. *Epidemiology/Health Services/ Psychosocial Research*, 27(5):1047-53.
- WHO (2003). Adherence to long term therapies, time for action. Geneva: 17-19. https://www.who.int/chp/knowledge/publications/adherence_report/en/
- WHO (2009). Global health risks. Mortality and burden of disease attributable to selected major risks. Geneva: World Health Organization. pp 62. https://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf.
- Yekta Z, Pourali R, Aghassi MR, Ashragh N, Ravanyar L & Pour YR(2011). Assessment of self-care practice and its associated factors among diabetic patients in urban area of Urmia, northwest of Iran. *Journal of Research in Health Sciences*, 11(1):33–37.