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Assessment of Antidiabetic Medication Adherence and Its Determinants among Ambulatory Patients with Type 2 Diabetes at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia

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Abstract
Poor adherence to treatment of chronic diseases is a worldwide problem of striking magnitude. Adherence to long-term therapy for chronic illnesses in developed countries averages 50%. Poor adherence to recognized standards of diabetes care is the principal cause of development of complications of diabetes and their associated individual, societal and economic costs. Information on adherence to antidiabetic medications among Type 2 diabetes patients in Ethiopia is scanty. This study therefore sought to assess antidiabetic medication adherence and its determinants among 322 ambulatory patients with Type 2 diabetes mellitus attending the diabetic clinic of Tikur Anbessa Specialized Hospital (TASH). It was a cross-sectional study conducted from 1 May-30 June 2014. Assessment of adherence was performed based on patients' response to the validated four-item Morisky instrument. Adherence rate to antidiabetic medications was found to be 66.8%. Younger age, increased number of prescribed medications and job type (being a farmer/daily laborer) were significantly associated with antidiabetic medication non-adherence. Most of the patients missed their medications because of forgetfulness. Taken together, the findings indicated that adherence to antidiabetic drugs was suboptimal which warrants the need for health care providers engaged in diabetic care to aggressively address the issue.
Keywords: TASH, Antidiabetic Medication Adherence, Type 2 Diabetes, Morisky Instrument

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism, resulting from defects in insulin secretion, insulin action, or both (1). Complications of DM have become a major public health problem in all countries. Type-2 diabetes is an increasing worldwide public health issue and the number **is increasing** in every country with **80%** of diabetic people living in **low and middle income countries.** About 4.36% (1.9 million) of the Ethiopian population is estimated to live with diabetes and the number of deaths attributed to diabetes reached 34,262 in 2013 (2).

In both developed and developing countries, non-adherence to medication remains a significant concern for health care providers as well as patients because of its adverse consequences on therapeutic outcomes. Poor adherence to diabetes treatment recommendations would lead to manifestation of micro- and macrovascular complications and increased health care costs (3,4). Accomplishment of treatment plans by patients with type 2 diabetes are essential in order to ensure normal or near normal fasting and postprandial blood glucose levels necessary for adequate control of diabetes, and subsequent reduction in mortality and reduced risk of complications (5). However, the need to make patients adequately committed to take their medications regularly and appropriately as well as adjusting their long standing lifestyles is among the most common challenges encountered by physicians and other healthcare providers involved in diabetes care (6). Assessment of the reasons for lack of adequate treatment adherence therefore is important before embarking on specific interventions that may fail, if specific regimen barriers are not identified.

To the best of our knowledge, evidence-based research on antidiabetic medication adherence among type 2 diabetes patients in Ethiopia is scanty. The present study was therefore carried out with the objective of assessing the rate of antidiabetic medication adherence and factors associated with poor medication adherence together with reasons for non-adherence among ambulatory type 2 diabetic patients in Tikur Anbessa Specialized Hospital (TASH), Ethiopia. The findings would have contribution to the existing body of knowledge in the area and improve medication adherence through identifying areas of intervention.

METHODS AND MATERIALS

The study was conducted in the Diabetes Clinic of TASH. TASH is a 600-bed, tertiary level and the largest general public hospital in Ethiopia. The hospital is located in Addis Ababa and affiliated with College of Health Sciences of Addis Ababa University (AAU). A cross sectional study was conducted using patient interview which was conducted from 1st of May to 30th of June, 2014. The sample size calculated using single population proportion formula was 385. As the actual number of source population in the study period was 120, the

corrected sample size, using a correction formula was 292; a 10% contingency yielded a final sample size of 322. Systematic random sampling method was used to recruit samples for the study. All patients with type 2 diabetes and on treatment with antidiabetic drugs at least for 3 months, who were ≥18 years of age and who understood Amharic language were included in the study. A Morisky Adherence Predictor Scale-4 item (MAPS-4) was utilized to collect information necessary to assess medication adherence. Patients who scored ≤ 1 to the Morisky instrument were regarded as adherent to their antidiabetic medications. The data collection instrument was assessed by an expert in the field of endocrinology. In addition, pre-testing of the instrument was done among 5% of randomly selected, type 2 diabetes patients, who were not included in the study, ahead of the start of the main data collection.

The collected data was entered into Epi Info v-3.5.3 and analyzed using SPSS v-21. Descriptive statistics including: frequency, mean and standard deviation was used to summarize patients' baseline socio-demographic data and evaluate distribution of responses. Crude and Adjusted Odds Ratio (COR/ AOR) were calculated and 95% confidence level was used to determine factors associated with antidiabetic medications adherence. A p-value of 0.05 or less was considered statistically significant. Ethical clearance and approval of the study protocols was granted from the Ethical Review Board of School of Pharmacy, AAU. Prior to data collection, individual informed verbal consent was obtained from the study patients.

RESULTS

Socio-demographic Characteristics

Females comprised 59.3% of the sex category. Majority of the patients were in the age group of 51-60 years, which accounted for 30.7%. The mean age of the studied population was 52.68 (SD=11.17) years (range 18 to 82 years). Being a House wife (98, 30.4%) accounted for the highest percentage of occupation. Patients with higher education (94, 29.2%) constituted the highest percentage of educational status category (Table 1).

Table 1: Socio-demographic characteristic of patients with type 2 diabetes attending the diabetic clinic of Tikur Anbessa specialized hospital.

Variables	Frequency	Percent
Sex		
Male	131	40.7
Female	191	59.3
Age (Years)		
≤40	51	15.8
41-50	93	28.9
51-60	99	30.7
61-70	58	18.0
>70	21	6.5
Marital Status		
Single	42	13.0
Married	194	60.2
Divorced	39	12.1
Widowed	47	14.6
Occupation		
House Wife	98	30.4
Gov't Employee	62	19.3
Retired	54	16.8
Merchant/Trade	48	14.9
Unemployed	19	5.9
Farmer	10	3.1
Daily Laborer	7	2.2
Others*	24	7.5
Educational Status		
Cannot Read and Write	70	21.7
Primary	91	28.3
Secondary	67	20.8
Higher Education	94	29.2

*Carpenter, Construction, Driver, Garage (mechanic), Guard, Metal Work, Teacher working in private school

Rate of Antidiabetic Medication Adherence and Reasons for Non-adherence

Assessment of patients' responses to the 4-item Morisky adherence predictor scale showed that 215 (66.8%) patients were adherent to the prescribed regimen of their antidiabetic medications (Table 2).

Table 2: Summary of type 2 diabetic patients' responses to the 4-item Morisky Instrument, diabetic clinic of Tikur Anbessa specialized hospital.

Question	Frequency (%)	
	Response	
	Yes (1)	No (0)
1. Do you ever forget to take your antidiabetic medication (s)?	135(41.9)	187(58.1)
2. Do you sometimes, not being careful in taking your medication (s)?	155(48.1)	167(51.9)
3. When you feel better, do you sometimes stop taking your antidiabetic medication (s)?	28(8.7)	294(91.3)
4. Sometimes if you feel worse when you take your antidiabetic medication (s), do you stop taking them?	9(2.8)	313(97.2)
Distribution of scores	**Total (%)**	
0	123(38.2)	
1	92(28.6)	
2	87(27.0)	
3	19(5.9)	
4	1(0.3)	
Cut off	**Frequency (%)**	**Category**
≤1	215 **(66.8)**	Adherent Non-adherent
>1	107 (33.2)	

Up on evaluation of the reasons for antidiabetic medication non-adherence, it was identified that 100 (93.5%) patients mentioned forgetfulness as the reason for their non-adherence. For each of 29 (27.1%) and 26 (24.3%) patients, experiencing side effects and feeling well without treatment were the reasons for antidiabetic medication non-adherence, respectively. Others included busyness, fasting, sleeping and lack of access to medications (Figure 1).

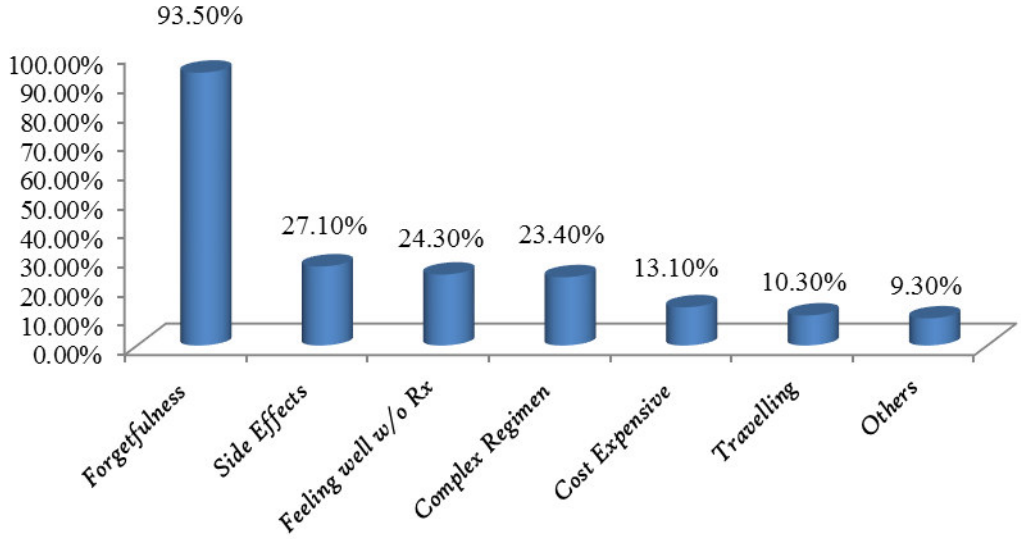

Figure 1: Reasons for antidiabetic medication non-adherence among type 2 diabetic patients attending the diabetic clinic of Tikur Anbessa specialized hospital.

Factors Associated with Antidiabetic Medication adherence

After controlling different demographic, economical and other factors through the use of multivariate logistic regression analysis, this study showed that only age, occupation and total number of prescribed drugs had significant association with antidiabetic medication adherence (Table 5).

DISCUSSION

In the present study, adherence to antidiabetic medications was observed in 66.8% of the studied population. Similar studies conducted in Nigeria reported a prevalence rate of 60% (7) and 72.5% (5), to which the present study was relatively comparable with. The prevalence was greater than the result found in Malaysia 47% (8), India 16.6% (6), and US-Mexico Border 40% (9). However, it was lower than the prevalence found in the Brazilian study 78.3% (10). Lower adherence rates to drug therapy for diabetes management is a matter of

concern as chronic complications due to poor glucose control are likely to increase with time. In the light of poor blood glucose control and alleged failure of therapeutic regimen, health providers are urged to measure diabetic patient treatment adherence. When accurate and clear information on the importance of medication adherence is provided, patients are encouraged towards self-care and adherence to drug therapy.

Table 5: Multivariate logistic regression analysis result of factors associated with antidiabetic medication non-adherence among type 2 diabetic patients attending the diabetic clinic of Tikur Anbessa specialized hospital.

Variables	Adherence		COR , 95 % CI	AOR, 95% CI
	No (%)	Yes (%)		
Age Category				
≤40	20(39.2)	31(60.8)	1.00	1.00
41-50	31(33.3)	62(66.7)	1.29(0.64, 2.62)	1.97(0.86, 4.51)
51-60	27(27.3)	72(72.7)	1.72(0.84, 3.52)	2.93(1.23, 6.98)*
61-70	20(34.5)	38(65.5)	1.23(0.56, 2.68)	2.11(0.75, 5.90)
≥71	9(42.9)	12(57.1)	0.86(0.31, 2.41)	1.54(0.42, 5.61)
Educational Status				
Cannot Read and Write	31(44.3)	39(55.7)	1.00	1.00
Primary	29(31.9)	62(68.1)	1.70(0.89, 3.24)	1.24(0.58, 2.63)
Secondary	25(37.3)	42(62.7)	1.34(0.67, 2.65)	0.93(0.40, 2.18)
Higher Education	22(23.4)	72(76.6)	2.61(1.33, 5.09)*	1.12(0.43, 2.96)
Occupation				
Farmer/Daily Laborer	10(58.8)	7(41.2)	1.00	1.00
Gov't Employee	13(21.0)	49(79.0)	5.39(1.72, 16.89)*	5.89(1.34, 24.95)*
Merchant	15(31.3)	33(68.8)	3.14(1.00, 9.85)*	3.76(0.90, 15.68)
House Wife	35(35.7)	63(64.3)	2.57(0.90, 7.35)	3.46(0.97, 12.35)
Retired	18(33.3)	36(66.7)	2.86(0.93, 8.75)	3.55(0.81, 15.64)
Unemployed	6(31.6)	13(68.4)	3.10(0.79, 12.14)	4.85(0.89, 26.40)
Other Occupation	10(41.7)	14(58.3)	2.00(0.57, 7.06)	2.35(0.52, 10.68)
Family Income Category				
Very Low	36(36.4)	63(63.6)	1.00	1.00
Low	45(40.9)	65(59.1)	0.86(0.47, 1.44)	0.83(0.42, 1.63)
Average	11(18.97)	47(81.03)	2.19(1.03, 4.66)*	1.71(0.67, 4.37)
Above Average	5(25)	15(75)	2.29(0.71, 7.36)	1.50(0.36, 6.23)
High	10(28.6)	25(71.4)	1.43(0.62, 3.31)	1.08(0.35, 3.33)
Presence of Glucometer				
No	69(39.7)	105(60.3)	1.00	1.00
Yes	38(25.7)	110(74.3)	1.90(1.18, 3.07)*	1.60(0.90, 2.84)
Total Number of Drugs				
1	5(17.2)	24(82.8)	1.00	1.00
2	25(31.3)	55(68.8)	0.46(0.16, 1.34)	0.31(0.09, 1.04)
3	18(34.0)	35(66.0)	0.41(0.13, 1.24)	0.23(0.06, 0.84)*
4	24(32.9)	49(67.1)	0.43(0.14, 1.25)	0.25(0.07, 0.92)*
5	15(33.3)	30(66.7)	0.42(0.13, 1.31)	0.25(0.07, 0.94)*
>5	20(40.6)	22(52.4)	0.23(0.07, 0.72)*	0.12(0.03, 0.44)*
Overall Exercise Adherence				
No	93(35.8)	167(64.2)	1.00	1.00
Yes	14(22.6)	48(77.4)	1.91(1.00, 3.65)*	1.82(0.90, 3.66)

*Statistically Significant: $P \leq 0.05$

In this study, older patients were more likely to adhere to their antidiabetic medications compared to younger patients. This result was consistent with studies conducted among diabetic patients in different

corners of the globe (8,11–15). It is possible that younger patients were less aware of their disease and were thus more likely to be more non-adherent. On the other hand, older patients showed better adherence since these people might have more severe form of the disease compared to the other age groups. This particular scenario observed in the present study emphasizes the need for educating the younger generation. Occupation was the other variable that had significant association with antidiabetic medication adherence in the present study. Patients who were government employees were more likely to engage in adherence compared to those who were farmers and daily laborers. Here, it is also possible that farmers and daily laborers might be less aware of their disease and the importance of medication adherence when compared with governmental employees and thus more likely to be more non-adherent. On the other hand, as the number of prescribed drugs increased, patients were found to be less likely to adhere to their medications. A vast number of literatures support this finding which describe as pill burden negatively affects patient adherence to treatment(16–19). Drug regimen for patients with diabetes can become complex and adherence may definitely be a challenge for patients.

In this study, patients with poor adherence reported several reasons for not adhering to antidiabetic medications. The most common reasons were found to be forgetfulness, experiencing side effects and feeling of being well without treatment. Most of the patients missed their antidiabetic medications due to forgetfulness which is similar to that reported in other studies (9,17,20–22). Adherence to therapies is a primary determinant of treatment success. Failure to adherence is a serious problem, which not only affects the patient but also the health care system. It leads to substantial worsening of disease, death and increased health care costs. Identifying specific barriers for each patient and adopting suitable techniques to overcome them will be necessary to improve medication adherence.

CONCLUSIONS

Overall, the findings from the present study indicated that the antidiabetic medication adherence of ambulatory type 2 diabetes patients in TASH is suboptimal (66.8%). Socio-economic status and pill burden had an important role in deciding adherence rate. Younger age, increased number of prescribed drugs and job being a farmer/daily laborer were significantly associated with non-adherence. Forgetfulness was the most important reason preventing optimal adherence to prescribed medications.

RECOMMENDATIONS

Since adherence in the present study was below that of recommended in the literature and in the light of poor blood glucose control, health providers who are engaged in diabetic care are urged to measure diabetic patient treatment adherence, because it is key to adequate diabetes management with drugs. They also should make every effort to assist patients who wish to do so to improve adherence to their treatments. Prospective studies with multiple methods of adherence assessment, involving pill count and biological assay may be required to detect patient who report adherence but who may in fact be non-adherent to antidiabetic medications. Mechanisms have to be devised to minimize forgetfulness which was reported as the main reason for antidiabetic medication non-adherence.

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