

Diabetes Self-Care Practice, and Associated Factors Among Type 2 Diabetic Patients in Public Hospitals of Tigray Region, Ethiopia

Medina Abdulkadir Wehabrebi

Mekelle University College of Health Sciences

Goitom Molalign Takele (✉ goitommolalign49@gmail.com)

Mekelle University College of Health Sciences <https://orcid.org/0000-0002-9344-3390>

Hiyab Teklemichael Kidane

Mekelle University College of Health Sciences

Kahsu Gebrekirstos Gebrekidan

Mekelle University College of Health Sciences

Birhan Gebresillassie Gebregiorgis

Debre Berhan University

Research

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Abstract

Background: The prevalence of Type 2 diabetes is increasing steadily at an alarming rate and Ethiopia is placed fourth among the top five countries of the Africa region according to the International diabetes federation. Regardless of its burden, the self-care behaviors are still unknown. This study is aimed to determine the level of diabetes self-care practice and factors associated with among Type 2 diabetes mellitus patients in public hospitals of Tigray region.

Methods: Institution-based, cross-sectional study was conducted in six selected hospitals of Tigray region from January to February, 2020. Data was collected by trained nurses with a face to face interview method using Summary Diabetes Self-Care Activities (SDSCA). Bivariate and multivariate logistic regression was used to identify factors associated with self-care practices. Statistical significance was declared at *P-value* < 0.05.

Results: A total of 570 patients with type 2 diabetes were included in this study. The mean age of the participant was 46 ± 14.6 years. Less than half (46.7%) of the participants has good diabetes self-care practices. Urban residency (AOR=2.79, 95% CI 1.858-4.205), age group above 64 years (AOR=2.384, 95% CI 1.258-4.518), not having formal education (AOR=2.616, 95% CI 1.337-4.518), having family or social support (AOR=1.878, 95% CI 1.243-2.837), duration DM above 10 years (AOR=2.325, 95% CI 1.224-4.418), having personal glucometer at home (AOR=5.9, 95% CI 2.790-12.764) were determinant factors of good diabetes self-care practice.

Conclusion: the diabetes self-care practices in the region was found to be low. Health care providers might have to consider actions to act on the identified factors and improve self-care practices of the patients. Especially, focusing on caring and giving follow up services to younger adults and DM patients coming from a rural areas.

Introduction

Diabetes is one of the fastest-growing global health emergencies of the 21st century (1,2). According to the International Diabetes Federation (IDF) report in 2019, estimated 463 million adults aged 20-79 years worldwide have diabetes and by 2030 this figure is projected to be 578.4 million, and by 2045, 700.2 million (2). Ethiopia is placed fourth among the top five countries of IDF Africa members (32 countries) having 1.7 million people with diabetes (age 18-99) (2).

Self-care practices remain the mainstay management of diabetes as the majority of the disease management is carried out by patients themselves or their families (3). Diabetes care is more demanding and complex which needs a better understanding of the disease beyond monitoring blood glucose level (4). The cornerstone of managing type 2 diabetes is a healthy lifestyle, which includes a healthy diet, regular physical activity, not smoking, and maintaining a healthy body weight (5,6).

Even though adherence to diabetes self-care practice has shown a remarkable reduction in the incidence and progression of DM complications (7), there is a poor habit of self-care practice reported in different parts of Ethiopia (8–10). From previous studies, factors like duration of diabetes (early ages), living in a rural areas,

male gender, lack of family support, having comorbidities, poor knowledge about diabetes, lack of self-monitoring glucometer, were found to affect the diabetes self-care practices (8,9,11,12).

Hence most studies are done in other parts of Ethiopia and little is known about the self-care practice at the regional level, this study is aimed in assessing the level of self-care practice and associated factors among T2DM patients in government hospitals of Tigray region.

Method

Study setting and period

An institution-based cross-sectional study was conducted in public hospital in Tigray regional state. Administratively, the region is divided into 7 Zones, and those selected hospitals were found in six of these seven zones. The region has an estimated population of 5 million. An estimated 80.5% of the populations live in rural areas and the majority of them were Orthodox Christian. The study was conducted from January to February 2020.

Study population and size

Sample size was calculated using a single population proportion formula by assuming 95% confidence interval, 5% margin of error (d), and the 50.2% proportion T2DM patients with a good level of diabetes self-care activities, from a study conducted in the southwest of Ethiopia (13). By using design effect of 1.5, the total sample was 576. Patients ≥ 18 years, diagnosed with T2DM, and who had follow up for at least six months were included. Subjects diagnosed with gestational diabetes or mental disorders were excluded.

Data collection procedure and tool

The study was conducted in randomly selected 6 hospitals (4 general hospitals; Wukro general hospital, St. Marry general hospital, Axum, Sihul general hospital, Shire, Lemlem Karl general hospital, Maichew and 2 specialized hospitals; Ayder comprehensive specialized hospital, Mekelle and Axum university referral hospital) of the Tigray region, northern Ethiopia. Participants were recruited from regular outpatient departments and diabetes clinics of the selected hospitals using a systematic random sampling method. The data were collected by eight trained nurses.

The English version standardized instruments were translated into local language Tigrigna and then translated back to English. The tool contains information on socio-demographic, clinical characteristics, Summary of Diabetes Self-Care Activities (SDSCA) instrument (16). SDSCA is a self-report measure with four components of diabetes self-management (diet, exercise, blood sugar testing, and foot care). The respondents were asked to rate how many days during the past 7 days did they performed a specific self-care behavior. The scale ranges from 0 to 7, whereby higher scores correspond to higher diabetes management activities. A mean score is calculated for each domain (diet, exercise, blood glucose testing, foot care, and smoking), whereby the scores were categorized as "good" for scores above mean value and "poor" for scores less than the mean value. The overall mean score was calculated by summation of the mean score for diet, exercise, foot care, and blood glucose testing divided by the sum of the number of questions under each

scale. After calculating the overall mean score, it was classified as having “good self-care practice” if the patient scored ≥ 3 or “poor self-care practice” if the patient scored < 3 .

For the knowledge test, the University of Michigan Diabetes Research and Training Center, diabetes knowledge test (DKT) was used (14,15). The DKT is a 23-item multiple-choice test designed to assess knowledge about diet, exercise, blood glucose levels, and testing, and self-care activities have been adopted and tested (13). Each item has three or four multiple choices with only one correct answer. The first 14 items are designed for all adults with diabetes, while items 15–23 apply only to those taking insulin (15). Scores on the DKT was computed for each participant. The score was determined by dividing the number of correct answers by the total number of questions (23 questions for patients taking insulin and 14 for those receiving oral hypoglycemic agents). Scores $\geq 75\%$, 74-60%, and $\leq 59\%$, respectively, were labeled as high, medium, and low knowledge on diabetes (14).

Data analysis

The data was cleaned, coded, entered into Epidata.3.1, and then exported into SPSS version 25 for analysis. Descriptive statistics including mean, median, standard deviations, and range values for continuous data as well as percentage and frequency tables for categorical data were computed. Variables with p-value less than 0.25 on bivariate analysis were subjected to multivariate analysis and multivariate logistic regression was used to identify factors that were associated with diabetes self-care practices. The level of significance was declared at p-value < 0.05 .

Results

Socio-demographic characteristics of the participants

Out of the 576 participants interviewed 570 of them have responded making a response rate of 99%. The mean (\pm SD) age of the respondents was 46 ± 14.6 years, with majority (32.1%) were within the age range of 34-48 years and more than half (55.8%) of them were males. where 351 (61.6%) of the participants were married. Regarding their educational status, 165 (29%) did not have formal education, and 104 (18.2%) had degrees and above. Almost all 537 (94.2%) of them were Tigrians and nearly two-third (64.7%) of them were urban residents [Table 1].

Table 1
socio-demographic characteristics of participants (n=576)

Variables	Category	N (%)
Gender	Male	318(55.8)
	Female	252(44.2)
Age (in year)	18-33	126(22.1)
	34-48	183(32.1)
	49-63	185(32.5)
	>63	76(13.3)
Marital status	Single	80(14)
	Married	351(61.6)
	Divorced	98(17.2)
	Widowed	41(7.2)
Educational status	No formal education	165(29)
	Primary school	190(33.3)
	Secondary school	111(19.5)
	College and above	104(18.2)
Employment status	Employed	256(44.9)
	Unemployed	147(25.8)
	Farmer	92(16.1)
	Student	32(5.6)
	Others*	43(7.5)
Religion	Orthodox	416(73)
	Muslim	128(22.5)
	Others**	26(4.5)
Family support	Yes	323(56.7)
	No	247(43.3)
Ethnicity	Tigray	537(94.2)
	Amhara	27(4.7)
	Others	6(1.1)
Place of Residence	Rural	201(35.3)

	Urban	369(64.7)
Body mass index	<18.5 (underweight)	54(9.5)
	18.5-25 (normal weight)	429(73.2)
	25-30 (overweight)	77(13.5)
	>30 (obese)	10(1.8)
Knowledge of diabetes	Good	63 (11.4)
	Acceptable	154 (27)
	Poor	351 (61.6)
Self-care practice	Good	267 (46.7)
	Poor	303 (53.3)
*: retired, housewife, **: Catholic, protestant, 7 th day Adventist		

Clinical characteristics

The mean duration of DM was 6 ± 4.36 years and 316 (55.4%) of the respondents had a family history of DM. Diabetes-related complication was seen in more than two-third of them (70.5%). Surprisingly Only 68 (11.9%) of the participants have access to a personal glucometer. Of the 129 (22.6%) who had DM related history of hospitalization 53 (41.1%) were hospitalized twice [Table 2].

Table 2
Clinical and medication characteristics of the participants (n=570)

Variables	Category	N (%)
Duration of living with DM	< 5 years	303 (53.2)
	5-10 years	193 (33.8)
	>10 years	74 (13)
Family history of DM	Yes	254 (44.6)
	No	316 (55.4)
DM related complication	Yes	402 (70.35)
	No	168 (29.5)
Having personal glucometer	Yes	68 (11.9)
	No	502 (88.1)
Smoking	Yes	36 (6.3)
	No	534 (93.7)
Alcohol drinking	Yes	63 (11.1)
	No	507 (88.9)
DM related hospitalization	Yes	129 (22.6)
	No	441 (77.4)
Number of hospitalizations	Once	72 (55.8)
	Twice	53 (41.1)
	Three times and above	4 (3.1)
Cause of hospitalization	Hyperglycemia	41 (31.8)
	Infection	42 (32.6)
	Hypoglycemia	25 (19.4)
	Others	21 (16.3)
Type of anti-diabetic drugs	Oral hypoglycemic agents	301 (52.8)
	Insulin	224 (39.3)
	Both	45 (7.9)

Regarding the diabetes self-care practice domains, more than half of the patients had poor diabetes self-care practice across all domains except for foot care (43%) [Table 3].

Table 3
Distribution of diabetes self-care practice domains (n=570)

Self-care practice domains	Good	Poor
Diet	284 (49.8)	286(50.2)
Exercise	284 (49.8)	286(50.2)
Blood glucose testing	218 (38.2)	352 (61.8)
Foot care	321 (56.3)	249 (43.7)
Good: mean score of ≥ 3 on SDSCA, Poor: mean score of < 3 on SDSCA		

Factors associated with diabetes self-care practice

More than half (53.3%) of the total participants had poor diabetes self-care practice. On bivariate analysis variables like: age, educational status, family support, place of residency, BMI, duration of diabetes, and having personal glucometer at home were significantly associated with diabetes self-care practices. The multivariate logistic regression analysis result showed that urban resident participants were 2.7 times more likely to have good self-care practice (AOR=2.79, 95% CI=1.858-4.205, $p < 0.0001$) compared to rural residents. The patients' age group was significantly associated with self-care practice: where patients with age groups above 64 were 2.4 times more likely to have good self-care practice than those aged 18-32 years (AOR=2.384, 95% CI=1.258-4.518, $p = 0.004$). Participants who do not have any formal education were 2.6 more likely to have good self-care practice than the degree and above holders (AOR=2.616, 95% CI=1.337-4.518, $p = 0.006$). Patients with family or social support were also 1.8 times more likely to have good self-care practices than their counterparts (AOR=1.878, 95% CI=1.243-2.837, $p = 0.003$). Participants who were living with DM for more than 10 years were 2.3 times more likely to have good self-care practices compared to those with less than 5 years (AOR=2.325, 95% CI=1.224-4.418, $p = 0.027$). Having a personal glucometer at home was also another factor associated with good self-care practices. In which patients with personal glucometer at home were 6 times more likely to have good self-care practices than their counterparts (AOR=5.9, 95% CI=2.790-12.764, $p < 0.0001$) [Table 4].

Table 4
Factors associated with self-care practices among T2DM patients (n = 570)

Variables	Category	Self-care practice		COR(95%,CI)	AOR(95%,CI)
		Good	Poor		
Age	18-33	41	84	1	1
	34-48	77	106	0.621(0.345-1.120)	1.243(0.565-2.735)
	49-63	112	72	0.925(0.538-1.590)	1.550(0.768-3.129)
	>63	33	42	1.980(1.150-3.41)*	2.67(1.374-5.217)*
Educational status	No formal education	116	47	4.86(2.866-8.26)**	2.61(1.337-4.518)*
	Primary school	82	107	1.511(0.918-2.486)	0.841(0.475-1.488)
	Secondary school	30	81	0.730(0.407-1.309)	0.588(0.315-1.098)
	College and above	35	69	1	1
Family support	Yes	125	196	2.00(1.43-2.807)**	1.87(1.243-2.837)*
	No	138	108	1	1
Residential area	Urban	72	127	3.00(2.1-4.3)**	2.79(1.858-4.20)**
	Rural	232	136	1	1
Body mass index	<18.5	11	43	0.17(0.171-0.041)*	-
	18.5-25	198	229	0.576(0.576-0.016)	-
	25-30	48	28	1.143(0.297-4.401)	-
	>30	6	4	1	-
Duration	< 5 years	125	177	1	1
	5-10 years	110	82	1.135(0.672-1.917)	1.93(1.001-3.727)*
	>10 years	28	45	2.156(1.242-3.74)*	2.32(1.224-4.418)*
Having personal	Yes	10	58	5.96(2.98-	5.9(2.79-

glucometer				11.93)**	12.76)**
	No	253	246	1	1
*p-value <0.05: **p-value<0.0001, AOD: adjusted odd ratio, COR: crude odd ratio CI: confidence interval					

Discussion

Self-management strategies such as self-monitoring of blood glucose, dietary restrictions, regular foot care, and ophthalmic examinations have been shown to markedly reduce the incidence and progression of DM related complications (7,17). Self-care practices and lifestyle modification remains the mainstay treatment of T2DM (17). This study was aimed to assess the level of self-care practices and associated factors among T2DM patients in public hospitals of Tigray region, Ethiopia.

This study showed that less than half (46.7%) of the participants had good self-care practice of type 2 diabetes. This was consistent with studies conducted in the Oromia region, Adama (49.1%) (18), and southwest of Ethiopia (49.2%) (13). However, it was higher compared to other studies conducted in Bahir Dar, northwest of Ethiopia, which was only 28.4% (9) and Harar 39% (19). But, the finding of this study was lower than a study from in Nekemte, western Ethiopia 60.7% (8), This difference could be due to variation in cultural, and socio-economic aspects of the society as Ethiopia is a diverse country (20). The majority of participants in our study were from a rural area and they might be faced with difficulties in getting access to health care services, and opportunities for education on the management of their disease.

In the present study, self-care practice was significantly associated with age and duration of diabetes as predictors, where better self-care practice was seen among the age group greater than 64 years, and duration of diabetes greater than 10 years. Similarly, a study from India (21) and Egypt (20) also showed an increase in age and duration of diabetes were associated with good self-care practices. This might suggest that the longer they stay with the disease, the more they become conscious and aware of their health and adjust their lifestyle.

This study found that those with no formal education were more likely to adhere to diabetes self-care practice. On the contrary, other studies found that the higher the educational status it is likely to have good self-care practice (9,13,19). This might be justified regardless of their educational status patient might adhere to self-care practices based on the information they receive from health care providers or the media.

As the management of diabetes is more complex and multifaceted family and social support play an important role on patients treatment adherence (17). In line with this, we found that patients with a family or social support were more likely to have good diabetes self-care practice. This was supported by other studies conducted in Gondar, Ethiopia (22) and Malesia (22). A study done in Thailand on family oriented self-management program also showed that engaging family support for individuals with T2DM has the potential to reduce the demands on diabetes educators and health services by providing additional support and potentially reducing complications (24) which could be due to good a self-care practice.

The availability of personal glucometer at home was very low (11.9%). Similarly, a systematic review of sub-Saharan countries revealed on average only 15% of all patients were able to test his or her blood glucose level

at home (11). In the present study, the odd of good self-care practices were high among patients who have personal glucometer at home. This finding is also supported by other studies conducted in, central zone of Tigray, Ethiopia, (12) and western Ethiopia (8).

This study showed that patients from urban areas of residency were more likely to have good diabetes self-care practices compared to rural residents. This was in line with studies conducted in different parts of Ethiopia, such as Mekelle (25), Harar and Dire Dawa (19), Gondar (22) and India (22). It was found that there is a misconception, poor knowledge both on the treatment and self-care practices of diabetes among rural residents (27,28). This variation could be explained due to easy access to information through Medias, internet, and health care facilities of urban residents.

Limitations

First, since this was a cross-sectional study, the causal effect relationship between variables couldn't be established. Secondly, as the study asks the self-care activities of patients for the past seven days and there might be a recall bias among respondents.

Conclusion

In conclusion, the level of diabetes self-care practice among T2DM patients in the Tigray region was found to be low. Urban residency, Older age >64 years, duration of diabetes >10 years, having family or social support, not having a formal education, and having personal glucometer at home were predictors of good self-care practices. This suggested that clinicians and nurses might have to consider giving emphasis on caring and giving follow up services to DM patients coming from a rural areas. All stakeholders dealing with this issue should work together to close these gaps.

Abbreviation

DM: Diabetes Mellitus, T2DM: Type 2 Diabetes Mellitus, AOR: Adjusted Odd Ratio, COR: Crude Odd Ratio, IDF: International Diabetes Federation, CI: Confidence Interval SPSS: Statistical Package for Social Sciences, BMI: Body Mass Index, FBG: Fasting Blood Glucose, DKT: Diabetes Knowledge Test,

Declaration

Ethical approval

Ethical approval was obtained from the Mekelle University, College of Health Sciences, Ethical review board ERC 13179/2020.

A written signed consent for participation was obtained before the data collection. Participant autonomy was maintained by telling them that they can refuse or stop participation at any time. To maintain confidentiality of the participants no personal identifiers were used.

Consent for publication

Not applicable

Availability of data and materials

Data supporting the findings in this paper are available upon reasonable request from the corresponding author.

Competing Interests

The authors declare that they have no competing interests.

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Authors' contributions

GM and MA generated the research idea and designed the study, analyzed the data, and prepared the manuscript. HT, KG, GM, and MA have participated in data analysis, preparation of the manuscript. They were actively involved in the interpretation of the data. All authors read and approved the final manuscript.

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