



# Factors influencing diabetes self-care practice among type 2 diabetes patients attending diabetic care follow up at an Ethiopian General Hospital, 2018

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## Abstract

**Introduction** Diabetes mellitus is a global public health emergency in the twenty-first century. Diabetes patients who had to adhere to good self-care recommendation can prevent the complication associated with diabetes mellitus. Self-care management of diabetes mellitus in Sub-Saharan Africa was poor including Ethiopia. The aim of this study was to assess factors influencing diabetes self-care practice among type 2 diabetes patients at Debre Tabor General Hospital, Northwest Ethiopia diabetes clinic follow up unit.

**Methods** An institutional based cross-sectional survey was conducted on systematically sampled 405 type 2 diabetes patients at Debre Tabor General Hospital diabetes clinic from June 02/2018 to June 30/2018. Bivariate and multivariable logistic regression was fitted to identify independent predictors of diabetes self-care practice. A *p* value of less than 0.05 was used to declare statistical significance.

**Results** A total of 385 type 2 diabetes patients participated with a response rate of 95%, of which 243 (63.1%) study participants had good self-care practice. The mean  $\pm$  SD age of the respondents and the duration of diagnosed for diabetes mellitus was  $52.28 \pm 12.45$  and  $5.09 \pm 3.80$  years respectively. Type 2 diabetes patients who had a glucometer at home (AOR = 7.82 CI (3.24, 18.87)), getting a diabetes education (AOR = 2.65 CI (1.44, 4.89)), and having social support (AOR = 2.72 CI (1.66, 4.47)) were statistically associated with good self-care practice.

**Conclusion** Despite, the importance of diabetes self-care practice for the management of diabetes and preventing its complications, a significant number of type 2 diabetes patients had poor diabetes self-care practice. So, to enhance this poor practice of diabetes self-care, provision of diabetes self-care education and counseling on self-monitoring blood glucose should be promote by health care providers during their follow up.

**Keywords** Diabetes mellitus · Diabetes patients · Self-care practice · Debre Tabor General Hospital

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## Introduction

Diabetes mellitus is a global public health emergency in the twenty-first century [1]. Globally, the number of people with diabetes (20–79 years) was 425 million in 2017 and it will be predicted to 629 million by 2045. From this Africa accounts 16 million adults have diabetes in 2017 and will be predicted 41 million by the year 2045 [2]. According to IDF diabetics atlas eighth edition, approximately 4 million people aged between 20 and 79 years died from diabetes that equivalent to one death in every eight seconds [2]. Globally, it is estimated that 212.4 million diabetes cases are undiagnosed, among this 84.5% of cases are in low and middle-income countries [2]. Type 2 diabetes mellitus accounts 90–95% among all the cases of diabetes mellitus [3]. The prevalence of type 2 diabetes mellitus was increasing in sub-Saharan Africa due to rapid urbanization and lifestyle changes [4]. Ethiopia ranks third by the prevalence of diabetes mellitus in the Africa region [3].

As far as diabetes mellitus is a chronic medical illness that requires lifelong medical care, continuing patient self-management and requires multifactorial risk reduction strategies beyond glycemic control [5]. Self-management of diabetes mellitus in Sub-Saharan Africa was poor and therefore a serious threat to the health of individuals in the health system [6]. Different studies showed that poor adherence to recommended self-care practice in Ethiopia [7–11].

There are seven essential self-care behaviors in people with diabetes which predict good self-care outcomes. These are healthy eating, being physically active, self-monitoring of blood glucose, compliant with medications, good problem-solving skills, healthy coping skills and risk-reduction behaviors [12–14]. Different studies evidenced that a lot of determinant factors for diabetes self-care practice, which is diabetes education, duration of disease, presence of another disease besides diabetes, regular checking of blood sugar, overweight, physical inactivity, dietary factors, foot care, and Smoking are the most significant factor for type 2 diabetes mellitus [15–18].

Evidence showed that 98% of diabetes treatment depend on having good self-care behaviors and patients with diabetes adhere to self-care can prevent the complications associated with diabetes mellitus (retinopathy, nephropathy, neuropathy, and cardiovascular disease), which take over mostly by patients and their families [19]. Lifestyle management is a central aspect of diabetes care and that includes diabetes self-management support, diabetes self-management education, physical activity, smoking cessation counseling and psychosocial care, and the ultimate prerequisite for diabetes self-management patient education [20]. However, self-care practice highly recommended

for diabetes patients [21], in Ethiopia, there is still a low practice of diabetes self-care behavior. Furthermore, there are limited studies conducted to address the issue of diabetes self-care practice and its associated factors in the study area. In Ethiopia, there is no diabetes self-care recommendation guideline and there is lack of information on the proper self-care practice for people with T2DM. Moreover, because of the paucity of evidence-based research, the health policy of Ethiopia, is still unable to give attention to this diabetes self-care practice recommendation. Conducting and documenting such kind of research would have a positive influence on the designing and implementation of diabetes self-care practice recommendation for people with T2DM in Ethiopian clinicians, policymakers, and health planners.

The aim of this study was to assess factors influencing diabetes self-care practice among type 2 diabetes patients at Debre Tabor General Hospital, Northwest Ethiopia diabetes clinic follow up unit.

## Methods

### Study design, period and settings

An institution based cross-sectional study was conducted at Debre Tabor General Hospital diabetes clinic from June 02/2018 to June 30/2018. Debre Tabor General Hospital is found in Debre Tabor Town, South Gondar Zone of Amhara Regional state which is 667 km far from Addis Ababa the capital city of Ethiopia in Northwest direction and 102 km far from Bahir Dar town the capital city of Amhara Regional State.

### Study participants

All Type 2 diabetes (T2DM) patients aged >18 years who had diabetes follow up from Debre Tabor General Hospital for at least 12 months were included in the study whereas, newly diagnosed type 2 diabetes patients, severely ill, unable to hear and/or speak and having mental disorder among type 2 diabetes patients were excluded from the study.

A total of 405 study participants were included for the study by using single population proportion formula, considering that the prevalence of good self-care practice of 60.3% from a previous study [11] with assumptions of 95% CI, 5% margin of error and by adding of 10% non response rate. Systematic random sampling technique was employed to select the study participants. A total of 920 type 2 diabetes patients were registered per month for diabetes follow up then we calculated the  $K^{\text{th}}$  interval that was 2. So, we interview the study participants every 2 T2DM patients.

## Data quality control technique

The data were collected by two trained nurses and supervised by one public health officer. The data were collected by face to face interview and Patient chart review. The structured questionnaire first prepared in English then translated to the local language (Amharic) again translated back to English to check consistency. Training was given for data collectors and supervisors. The questionnaire was pretested of 5% of the sample size before the actual data collection period. The internal reliability of the tool (SDSCA) was evaluated with a Cronbach alpha value of 0.78 which is tested on 30 individual patients.

## Data collection tools

The data collection tool for this study was used after adaptation of from previous validated studies. The structured questionnaire has two major parts for the interview. Part one: Socio-demographic characteristics and other associated factors. Part two: The revised scale of Summary of Diabetes Self-Care Activities Measure (SDSCA) was used for diabetes self-care practice measurement [22]. The revised scale of SDSCA contains fifteen items which are to measure the adherence of diabetes self-care practice. The response is based on the seven-point Likert scale to answer the question phrased as “On how many of the last SEVEN DAYS have/did you ...?” (Table 2), and diabetic related knowledge was assessed by after adaptation of Revised brief Diabetes Knowledge Test (DKT2) validated by the University of Michigan scholars [23].

## Operational definitions

**Good self-care practice** The overall score of the mean number of days  $\geq 4$  days per week from the total self-care practice measurement items were considered as good self-care practice [22, 24].

**Poor self-care practice** The overall score of the mean number of days less than 4 days per week from total self-care practice measurement items were considered as poor self-care practice [22, 24].

Revised brief Diabetes Knowledge Test (DKT2) questionnaire has 23-item multiple choice questions which have three up to four choices with only one correct answer. Item 1–14 designed for all adult diabetes patients and item 15–23 for only insulin-dependent diabetes patients. The DKT2 was recorded as zero for incorrect response and one for a correct response. Patients answering greater than seven correct answers were declared as having good diabetic related knowledge.

Good controlled blood glucose level was defined as an average of three consecutive fasting blood glucose (FBS)

measurement of 80–130 mg/dl. Poor controlled blood glucose was defined as patients who had average blood glucose measurements on three consecutive visits  $>130$  or  $< 70$  mg/dl [21, 25].

## Data processing and analysis

The collected data first has been rechecked manually for its completeness and consistency. The data were entered into EpiData version 3.1. The entered data were exported in to with Statistical Package for Social Science (SPSS) version 24 software for windows for analysis. Descriptive statistics was employed for the socio-demographic and clinical characteristics of the respondents. Bivariate logistic regression was performed for each independent variable with the outcome variable. A variable whose bivariate test had a  $p$  value  $<0.20$  was considered as a candidate for the multivariable logistic regression model. Hosmer and Lemeshow’s goodness-of-fit test was used to check the data appropriateness for the multivariable logistic regression model. Finally, by backward LR variable selection method, a multivariable logistic regression model was fitted to determine the independent predictors of diabetes self-care practice. Crude Odds Ratio (COR), Adjusted Odds Ratio (AOR) with 95%CI were computed to determine the associated factor of type 2 diabetic patient self-care practice and  $P$ -value less or 0.05 was considered as declared statically significant.

## Ethical consideration

The study was conducted after getting an ethical clearance letter from Debre Tabor University College of Health Sciences and collected after obtaining permission from Debre Tabor General Hospital. Informed consent was secured from each study participants and personal identifiers were excluded during the data collection to assure confidentiality. Respondents can withdraw at any time from the interview.

## Results

### Socio-demographic characteristics of the respondents

A total of 385 Type 2 diabetes (T2DM) patients participated in the study a response rate of 95%. From the total of respondents, 202 (52.5%) were males and 164 (42.6%) were unable to read and write. The mean  $\pm$  SD age of the respondents was  $52.28 \pm 12.45$  years, and 182 (47.3%) were in the age group of 41–59 years. Most of (70.4%) the study participants have no family history of T2DM and majority (58.7%) of the respondents were urban in residence (Table 1).

**Table 1** Socio-demographic characteristics of patients with Type 2 Diabetes Mellitus attending diabetes clinic follow up at Debre Tabor General Hospital North West, Ethiopia, 2018. ( $n = 385$ )

Variables		Frequency	Percent (%)
Sex	Male	202	52.5
	Female	183	47.5
Age in years	18–40	90	23.4
	41–59	182	47.3
	>60	113	29.4
Marital Status	Single	46	11.9
	Married	255	66.2
	Divorced	69	17.9
	Separated	15	3.9
Religion	Orthodox	342	88.8
	Protestant	6	1.6
	Muslim	37	9.6
Residence	Urban	226	58.7
	Rural	159	41.3
Educational Status	Unable to read and write	164	42.6
	Able to read and write	74	19.2
	Primary education	36	9.4
	Secondary education	42	10.9
	Higher education and above	69	17.9
Occupational Status	Government employee	85	22.1
	Merchant	74	19.2
	Farmer	137	35.6
	NGO	36	9.4
	Housewife	53	13.8
Family history of DM	No	271	70.4
	Yes	114	29.6
Total		385	100

### Self-care practice adherence and clinical characteristics of the study participants

Overall, 243 (63.1%) study participants had good self-care practice among type 2 diabetes patients. The self-care practice was different among different recommendations. The highest mean score was found “On how many of the last SEVEN DAYS, did you take your recommended diabetes medication?” and the lowest mean score found “On how many of the last SEVEN DAYS did you test your blood sugar? And On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?”, which is on self-monitoring blood glucose domain (Table 2). The mean  $\pm$  SD duration of diagnosed for diabetes mellitus was  $5.09 \pm 3.80$  years. The mean  $\pm$  SD Fasting Blood Sugar (FBS) was  $173.31 \pm 69.97$  mg/dl. Most of 326 (84.7%) of study participants got a diabetes education during their follow from the health professionals, and 81 (21%) of study participants had a glucometer at home for self-monitoring blood

glucose level. Only 121 (31.4%) of type 2 diabetes patients had good glycemic control, and 128 (33.2%) of patients had good diabetes-related knowledge (Table 3).

### Factors associated with self-care practice among type 2 diabetes patients

In bivariate logistic regression residence, educational status, occupation, having their own glucometer at home for self-monitoring blood glucose, having diabetes education, having social support, glycemic control level, and diabetes-related knowledge was significantly associated with type 2 diabetes patient self-care practice.

In multivariable logistic regression type 2 diabetes patients who had a glucometer at home for self-monitor blood glucose, having diabetes education, and having social support were significantly associated with diabetes self-care practice among type 2 diabetes patients. Type 2 diabetes patients who were having their own glucometer at home for self-monitoring blood glucose 7.82 times more likely had good self-care

**Table 2** The revised scale of Summary of Diabetes Self-Care Activities Measure (SDSCA) scores for T2DM patients. (n = 385)

Item	Mean ± SD
On how many of the last SEVEN DAYS have you followed a healthful eating plan?	5.69 ± 1.79
On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?	3.91 ± 1.96
On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?	1.94 ± 1.95
On how many of the last SEVEN DAYS did you eat high-fat foods such as red meat or full-fat dairy products? *	5.53 ± 1.68
On how many of the last SEVEN DAYS did you space carbohydrates evenly throughout the day?	1.83 ± 2.03
On how many of the last SEVEN DAYS did you participate in at least 30 min of physical activity?	4.40 ± 2.65
On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work?	4.36 ± 2.65
On how many of the last SEVEN DAYS did you test your blood sugar?	0.78 ± 1.78
On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?	0.76 ± 1.73
On how many of the last SEVEN DAYS, did you take your recommended diabetes medication?	6.87 ± 0.53
On how many of the last SEVEN DAYS did you check your feet?	4.68 ± 1.92
On how many of the last SEVEN DAYS did you inspect the inside of your shoes?	4.59 ± 1.99
On how many of the last SEVEN DAYS did you wash your feet?	4.68 1.92
On how many of the last SEVEN DAYS did you soak your feet?	2.41 ± 1.99
On how many of the last SEVEN DAYS did you dry between your toes after washing?	4.59 ± 2.03
Overall self-care practice adherence – (n, %)	
Good	243 (63.1)
Poor	142 (36.9)

NB \* = The item was reversely coded

practice than type 2 diabetes patients who had not their own glucometer at home (AOR = 7.82 CI (3.24, 18.87)). Type 2 diabetes patients who had a diabetes education from health

professionals during their follow up 2.65 times more likely to had good self-care practice than type 2 diabetes patients who had not diabetes education (AOR = 2.65 CI (1.44,

**Table 3** Clinical characteristics of the study participants, patients with T2DM attending diabetic clinic follow up of Debre Tabor General Hospital, Northwest, Ethiopia, 2018. (n = 385)

Variables		Frequency(n)	Percent (%)
Duration since DM Diagnosis	≤ 5 years	247	64.2
	> 5 years	138	35.8
Duration of DM Treatment	≤ 5 years	253	65.7
	> 5 years	132	34.3
Number of medications taken per day	One	120	31.2
	≥ Two	265	68.8
Having glucometer at home	No	304	79.0
	Yes	81	21.0
Having chronic illness	No	233	60.5
	Yes	152	39.5
Having diabetes education	No	59	15.3
	Yes	326	84.7
Got all the prescribed drugs from the hospital	Sometimes	126	32.7
	Always	259	67.3
Having other chronic illness	No	233	60.5
	Yes	152	39.5
Social support	No	229	59.5
	Yes	156	40.5
Glycemic control status	Poor control	264	68.6
	Good control	121	31.4
Diabetes-Related Knowledge status	Poor Knowledge	257	66.8
	Good Knowledge	128	33.2
Self-care practice	Poor practice	142	36.9
	Good practice	243	63.1

**Table 4** Logistic regression analysis of factors influencing type 2 diabetes patients self-care practice attending diabetes clinic follow up at Debre Tabor General Hospital, Northwest, Ethiopia, 2018. (*n* = 385)

Variables		Self-care practice status		COR (95% CI)	AOR (95% CI)
		Poor	Good		
Residence	Urban	67	159	1	
	Rural	75	84	<b>0.47 (0.31, 0.72)</b>	
Educational status	Unable to read and write	84	80	1	
	Able to read and write	20	54	<b>2.84 (1.56, 5.15)</b>	
	Primary education	12	24	2.10 (0.98, 4.48)	
	Secondary education	13	29	<b>2.34 (1.14, 4.82)</b>	
Occupation	Higher education and above	13	56	<b>4.52 (2.30, 8.80)</b>	
	Government employ	26	59	1	
	Merchant	19	55	1.28 (0.64, 2.56)	
	Farmer	68	69	<b>0.45 (0.25, 0.79)</b>	
Having glucometer	NGO worker	8	28	1.54 (0.62, 3.84)	
	House wife	21	32	0.68 (0.33, 1.34)	
Getting DM education	No	136	168	1	1
	Yes	6	75	<b>10.11 (4.28, 23.96)</b>	<b>7.82 (3.24, 18.87)</b>
Glycemic control level	No	36	23	1	1
	Yes	106	220	<b>3.25 (1.83, 5.76)</b>	<b>2.65 (1.44, 4.89)</b>
Social support	Poor control	108	156	1	
	Good control	34	87	<b>1.77 (1.11, 2.82)</b>	
DM related knowledge	No	110	119	1	1
	Yes	32	124	<b>3.58 (2.25, 5.71)</b>	<b>2.72 (1.66, 4.47)</b>
	Poor knowledge	109	148	1	
	Good knowledge	33	95	<b>2.12 (1.33, 3.39)</b>	

NB: COR and AOR written in boldface is significance at 95% CI

COR Crude Odds Ratio, AOR Adjusted Odds Ratio, CI Confidence Interval

4.89)). Type 2 diabetes patients who had social support 2.72 times more likely had good self-care practice than those who had no social support (AOR = 2.72 CI (1.66, 4.47)) (Table 4).

## Discussion

Worldwide, the prevalence of chronic, non-communicable diseases is increasing at an alarming rate, and diabetes mellitus is becoming a major public health chronic, non-communicable diseases [26]. The global prevalence and impact of diabetes mellitus had increased dramatically, particularly in sub-Saharan Africa due to the most rapid urbanization and lifestyle changes [4, 27]. Achieving good self-care recommendations such as dietary practice, pharmacotherapy, physical activity, blood glucose monitoring, and foot care is the central part to decrease morbidity and mortality related to diabetes and its complications [19, 28, 29].

This study revealed that 63.1% of type 2 diabetes patients adhered to good self-care recommendations practice which is consistent with the study done at India (52–70%),

and Addis Ababa (60.3%) [11, 30–32], whereas it is higher than the study done Tigray region (39.3%), Nekemte, West Ethiopia (45%), Bahir Dar, Ethiopia (28.4%), and Iran (36.4%) [24, 33–35]. The possible justification of this variation might be socio-economic status and time of the study. In contrast to the finding of our study, higher good self-care practice was reported from Dilla University Referral Hospital, South Ethiopia (76.8%) [36]. The possible variation of this result might socio-demographic characteristics which is most of the respondents come from a rural area in our study, lack of self-glucose monitoring machine, and level of information education, and communications from the health professionals.

This study evidenced that having a glucometer at home for self-monitoring blood glucose was significantly associated with good self-care practice. Type 2 diabetes patients who had a glucometer at home 7.82 times more likely adhere to good self-care practice than type 2 diabetes patients who had not glucometer for self-monitoring blood glucose. This finding was similar to the study done at Tigray region [24], Iran [35], but this finding is not similar to the study done at Jimma, Southwest Ethiopia [9]. This

might be type 2 diabetes patients having a glucometer at home could know the update of their blood glucose level this may be led to patients to had good self-care practice accordingly their blood glucose level.

Having diabetes education was significantly associated with good diabetes self-care practice. Type 2 diabetes patients those who got a diabetes education from health professionals 2.65 times more likely had good self-care practice than those who did not get a diabetes education from health professionals, which is similarly finding a study done at Addis Ababa Public Hospitals [11], and Tigray region [24]. The possible reason may be got a diabetes education from health professionals enhance self-care related knowledge and self-care management.

Furthermore, this study evidenced that having social support from their relatives/peers were significantly associated with self-care practice. Type 2 diabetes patients who had social support were 2.72 times more likely had good self-care practice than those who had no social support. This is similar with the evidence from Addis Ababa Public Hospitals [11], a report from the role of self-care [37], Bahir Dar, Northwest Ethiopia [34], a review of self-management in Africa [38], and Filipino Americans [39]. This determinant factor may enhance a potential impact on medication adherence, dietary adherence, and other self-care recommendations due to social advice and other supports.

### Strength and limitation of the study

Since there are no similar studies in the study area it will be baseline information for health planners and further studies. As far as a self-reported interview question and the data collector were nurses it may prone to social desirability bias. As well, the study was a cross-sectional study the temporal relationship cannot always determined.

**Conclusion and recommendations** Even though, adhering to good self-care practice recommendations were an invaluable issue to prevent type 2 diabetes morbidity and mortality, the result of this study evidenced that a significant number of type 2 diabetes patients had poor self-care practice. Therefore, strategies like having a glucometer at home, getting diabetes education, and social support could improve diabetes self-care practice among type 2 diabetes patients. So, health care professionals should encourage diabetes education and promote counseling on self-monitoring blood glucose during their follow up emphasized on diabetes self-care practice recommendations.

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**Data availability** We, all the authors do have the data of this study and we can provide as per the request.

### Compliance with ethical standards

**Consent for publication** Not applicable.

**Competing interests** We, authors, declare that we had no competing interests.

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