

Dietary knowledge and practice and its associated factors among type 2 diabetes patients on follow-up at public hospitals of Dire Dawa, Eastern Ethiopia

SAGE Open Medicine

Volume 10: 1–10

© The Author(s) 2022

Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/20503121221107478

journals.sagepub.com/home/smo

Anneleye Fantahun Gebeyehu¹, Fitsum Berhane¹
and Robel Mekonnen Yimer² 

Abstract

Objectives: This study tried to assess the level of dietary knowledge and practice and associated factors among type 2 diabetes mellitus patients in public hospitals of Dire Dawa, Ethiopia.

Methods: A facility-based cross-sectional study was conducted among 253 type 2 diabetes mellitus patients visiting follow-up clinic in public hospitals selected by systematic random sampling. Primary data were collected by face-to-face interview and checklist. The collected data were entered into SPSS version 22 and analyzed using proportion, percentage, and mean and standard deviation. Bivariate logistic regression analysis was used to identify candidate variables affecting dietary practice. Finally, all candidate independent variables were further adjusted on multivariate regression analysis with adjusted odds ratio and 95% confidence interval to identify factors independently associated with dietary practice. p -value ≤ 0.05 declared as level of significance.

Results: The level of poor dietary practice among type 2 diabetes mellitus patients was found to be 53.8%. Around 78.8% of participants had fasting blood sugar level ≥ 130 mg/dL, and 52.8% found to have poor dietary knowledge. Moreover, there was no up-to-date nutritional guideline in follow-up clinic. Not getting nutrition advice from doctors/nurses, low duration of follow-up, lack of family support, and despondency were significantly associated with poor dietary practice (p -value < 0.05).

Conclusion: More than half of diabetes patients had poor dietary practice, which is in contrary with international recommendations of diabetic self-care. Habit of eating fruits and vegetables was poorly practiced and also patients' knowledge of recommended nutrition was poor. Therefore, provision of robust nutritional education and counseling service, a system to strengthen family support as well as psychosocial support, is highly recommended.

Keywords

Type 2 diabetes mellitus, patient's dietary practice, Dire Dawa

Date received: 30 January 2022; accepted: 30 May 2022

Introduction

Diabetes is one of the health emergencies of the 21st century. The term diabetes refers to a group of metabolic diseases characterized by high blood glucose level in the absence of treatment. The various aetio-pathologies include abnormal insulin secretion, insulin action, or both, as well as disorders of carbohydrate, fat, and protein metabolism.¹ Diabetes mellitus (DM) can be classified as: type 1 diabetes mellitus (T1DM) attributable to autoimmune B-cell destruction and type 2 diabetes mellitus (T2DM) caused by advanced loss of B-cell insulin secretion.² The presence of

thirst, polyuria, blurring of vision, and weight loss are characteristic symptoms of DM. The patients are at higher risk

¹Department of Public Health, College of Medicine and Health Sciences, Dire Dawa University, Dire Dawa, Ethiopia

²Department of Medical Laboratory Science, College of Medicine and Health Sciences, Dire Dawa University, Dire Dawa, Ethiopia

Corresponding author:

Robel Mekonnen Yimer, Department of Medical Laboratory Science, College of Medicine and Health Sciences, Dire Dawa University, P.O. Box 1362, Dire Dawa, 3000, Ethiopia.

Emails: robelmekonnen@gmail.com; rebel.mekonnen@ddu.edu.et



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons

Attribution-NonCommercial 4.0 License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

of complications such as cardiovascular, peripheral vascular, and cerebrovascular diseases.³

According to World Health Organization (WHO) estimate, worldwide, DM is ranked as third highest risk factor for early mortality, after hypertension and tobacco use. It is responsible for 5 million (14.5%) of all-cause mortality among people aged 20–79 years.⁴ The global diabetes prevalence in 2019 is estimated to be 9.3% (463 million people) increasing to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045. Moreover, the magnitude is bigger in urban (10.8%) than rural (7.2%) areas and in developed (10.4%) than developing countries (40%).³ T2DM accounts for most (around 90%) of diabetes worldwide.

Dietary practice denotes patients' preferences in food consumption based on diabetes nutrition education, emphasizing to take foods with lesser fat, higher fiber, and lower sodium.⁵ It is recommended that carbohydrate, protein, and fiber should be taken on a daily basis with proportion of 45%–50%, 10%–20%, and 12% of energy, respectively, for fat minimum 0.5 g per meal.⁶ Nutrition plays an important role in controlling or preventing diabetes. The risk of T2DM is associated with both under and over nutrition.⁷ Balanced food intake with endogenous and/or exogenous insulin levels is most important for diabetes care in improving glycaemic control.⁸ However, for many DM patients, determining what to eat and lack of adherence on food plan are the most challenging part of the treatment plan. There is not a one-size-fits-all eating pattern for individuals with diabetes.²

The purpose of dietary management or care is to supply adequate caloric intake, to monitor blood glucose, and to obtain optimal serum lipid levels for all so as to keep or attain the required body mass and avert other non-communicable diseases such as cardiovascular disease and dyslipidemia hypertension.⁶ However, it is a challenge that most DM patients have difficulty of pinpointing the suggested quality and quantity of food that they have to eat in order to control their blood glucose level.⁹ They also fail to decide how much to eat whenever necessary. At the same time, their diabetes care and education specialists also fail to identify food items to be included in the diabetic meal and how to prepare those.¹⁰ For instance, a study conducted among T2DM patients at Tikur Anbessa Specialized Hospital, Ethiopia, reported that most DM patients had poor adherence to self-care practices.

Despite the growing number of programs promoting healthier food choices, there is no dietary guideline adapted yet on Ethiopian context. Moreover, inadequate health information system and absence of data regarding dietary practice of diabetes patients affect the long-term management of diabetes in Ethiopia. This has substantially deterred current efforts to promote adequate, healthy diets.⁵ This study has assessed level of dietary knowledge and practice of T2DM patients on follow-up clinic and factors influencing their dietary practice on the recommended diet in public hospitals, Dire Dawa, Ethiopia. Interventions targeting identified factors of poor dietary practice will help DM patients in averting complication,

co-morbidity, and mortality through improving their quality of life. This will have a great contribution for the public on having healthy and productive individuals.

Method and materials

Study area

This study was conducted in Dire Dawa administration located at Eastern part of Ethiopia, which is 515 km away from capital Addis Ababa. Dire Dawa comprises a population of 453,000, of whom 227,406 (50.2%) are males and 225,594 (49.8) females.¹¹ There are six hospitals: two public hospitals, three private hospitals, and one military hospital under its administration. The two public hospitals, namely Dilchora referral hospital (DRH) and Sabian general hospital (SGH), provide pediatric and adult follow-up service including diabetes and other chronic follow-up services. Generally, there are around 466 and 196 DM patient flow per month in DRH and SGH, respectively. The service is rendered by physician and nurses, 5 days a week.

Study design and period

A hospital-based cross-sectional study was conducted among T2DM patients on follow-up clinic in two public hospitals from 1 to 30 December 2020.

Population

Source population. All T2DM patients who came for follow-up clinic of Public hospitals in Dire Dawa.

Study population. Systematically selected T2DM patients who fulfilled eligible criteria and who came to follow-up clinic at the time of data collection period.

Inclusion and exclusion criteria

Adult diabetes patients above 18 years and who followed up at least once in advance of actual data collection period were included. Whereas patients below 18 years and newly enrolled patients were excluded.

Sample size determination

A single population proportion formula was used to estimate sample size using Epi info 7.2 statcal. Since the source population was less than 10,000 (i.e. $N=662$ for both hospitals), finite population correction formula employed is as follows

$$\text{Sample size, } n = N \times \frac{\frac{Z^2 \times p \times (1-p)}{e^2}}{\left[N - 1 + \frac{Z^2 \times p \times (1-p)}{e^2} \right]}$$

$$n=230$$

where $z = 1.96$, the standard score corresponding 95% confidence level; $p = 64.1\%$, proportion of poor dietary practice of T2DM patients taken from a study done in Bahir Dar, Ethiopia;¹² $e = 0.05$, margin of error; $N = 662$, source population of both hospitals; n = final sample size.

When 10% non-response rate was added, the final sample size became 253.

Sampling technique and procedure

Systematic sampling technique was employed to select study participants. First, the final sample size ($n = 253$) allocated to each hospital was proportional to their source population using the formula

$$ni = n \times \left(\frac{Ni}{N} \right)$$

where ni = allocated sample size for each hospital; n = final sample size; Ni = source population of each hospitals (466 and 196 for DRH and SGH); and N = total source population (662).

Accordingly, sample size of 178 and 75 were allocated for DRH and SGH, respectively. Then, the sampling interval (k -value) is calculated by dividing the source population of each hospital (Ni) by allocated sample size (ni), which is $K = 466/178 = 2.617$ for DRH and $K = 196/75 = 2.613$ for SGH, and both decimal numbers rounded up to 3. Finally, every third patients who came to follow-up clinic during the study period were systematically selected and included until the final sample size reached with the first sample chosen randomly between 1 and 3.

Data collection procedure and tool

A face-to-face interview using pre-tested, structured questionnaire and standard checklist was used to collect data by two trained nurses. The questionnaire was adapted from previous studies and revised based on the objectives of the current study.^{4,13} It contains sociodemographic, clinical history, and data on dietary knowledge and practice. During an interview session, strict COVID-19 prevention measures have been followed including well-ventilated room and maintaining 2 m distance. The data collectors and each interviewee used face mask prior to interview. Additionally, sanitizer and clean glove were used whenever needed.

Study variables

Dependent variable

- Level of dietary practice.

Independent variable

- Sociodemographic factors: age, sex, educational level, place of residence, marital status, income, occupation, religion, ethnicity.

- Health-related factors: duration of illness, family history of DM, type of treatment, nutritional knowledge, FBS.
- Organizational factors: member of DMAssociation, diabetic nutritional education.
- Behavioral factors: exercise/physical activity, self-efficacy, attitude, despondency.

Operational and standard definitions

Dietary practice: an observable action or behavior of dietary habit and can be classified as good dietary practice and poor dietary practice.⁴

Good dietary practice: study participants who are high consumers of vegetables, fruits, and legumes with answered average or above of questions asked.¹³

Poor dietary practice: study participants who are low consumers of vegetables, fruits, and legumes with answered below average of questions asked.

Type 2 diabetes mellitus: group of syndromes identified by variable degrees of insulin resistance, defective insulin secretion, β -cell dysfunction, and dysregulated hepatic glucose production.¹

Nutritional knowledge: knowledge of concepts and processes related to nutrition and health including knowledge of diet and health, diet and disease, foods representing major source of nutrients, and dietary guidelines and recommendations.

Good dietary knowledge: participants who scored >5 of the 11 knowledge questions asked.

Poor dietary knowledge: participants who scored ≤ 5 of the 11 knowledge questions asked.¹³

Fasting blood sugar (FBS): a test to determine the level of glucose (sugar) is in a blood sample after an overnight fast and the normal value is 70–100 mg/dL.²

Statistical analysis

The collected data were entered into SPSS version 22 and analyzed using proportion, percentage, and mean and standard deviation. To assess the level of dietary knowledge, 11 questions and bloom's cut-off point were used for sorting the knowledge score. Moreover, bivariate logistic regression analysis was employed to identify candidate variables affecting dietary practice. Finally, all candidate independent variables further adjusted on multivariate regression analysis with adjusted odds ratio (AOR) and 95% confidence interval (CI) to identify factors independently associated with dietary practice. p -value ≤ 0.05 declared as level of significance.

Data quality management

Before actual data collection, the questionnaire was first prepared in English and then translated into three local

languages (Amharic, Oromifa, and Somali) by language expert and again translated back to English to check for its consistency. One day training was given for data collectors and supervisors about the objectives of the study, the content of the tool, and how to carry out the interview. Then the questionnaire was pre-tested on 5% of total sample size in Hiwot-fana public hospital and checked for clarity, wording, length, and also appropriateness of the questionnaire and the degree with which it fully assesses the variable of interest was tested by content and face validity approaches.

Moreover, the questionnaire was tested for internal consistency using reliability statistics of Cronbach's alpha test=0.675. During actual data collection, on-site follow-up and re-check of completed data were made regularly by supervisors and investigators on daily bases.

Ethical consideration

Ethical approval letter was obtained from Research Ethics Review Committee (now changed to "Institutional Review Board"), Dire Dawa University. Permission letters also obtained from Dire Dawa University and Dire Dawa administration health bureau. The ethical clearance obtained from university and permission letters submitted to each participating hospitals.

Written informed consent was obtained from the participants, after explaining about the aim of the study, their benefits, and risk of participating in the study. All the interviews made with strict privacy and confidentiality were highly assured. Their rights to declare to participate or not in this study, or to withdraw from the study at any time, or to refuse to answer any question was also respected. At the end of the interview, health information on recommended dietary practice is provided for the respondents.

Results

Sociodemographic characteristics

Out of 253 total sample size, 230 diabetes patients completed the interview, making response rate of 91%. Among these 102 (44.3%) were males and 128 (55.7%) were females. Their ages ranged from 19 to 80 years, with mean age of 52.17 (\pm 30.5 SD). Majority of the participants, 130 (56.5%), were Christians followed by Muslims 100 (43.5%); 155 (67.4%) were married, whereas 38 (15.6%) were single. Around 196 (85.2%) study participants has attended school, of which 46 (20.0%) and 50 (21.7%) have attended secondary school and college and above, respectively. Income of the participants ranged from 750 to 14,000 birr, of which 151 (65.7%) of the participants classified as having average income. Around 59 (25.7%) of the subjects were employed and 33 (14.7%) were merchants while 73 (31.7%) were housewives (Table 1).

Table 1. Sociodemographic characteristics of type 2 diabetes patients on follow-up at public hospitals of Dire Dawa, Eastern Ethiopia, 2020 ($n=230$).

Variables	Frequency	Percent
Sex		
Male	102	44.3
Female	128	55.7
Age category		
<40	50	21.7
40–60	99	43
>60	81	35.2
Median	49.5	
Religion		
Muslim	100	43.5
Orthodox	108	47.0
Protestant	20	8.7
Catholic	2	0.9
Marital status		
Married	155	67.4
Single	38	16.5
Widowed	28	12.2
Divorced	9	3.9
Ethnicity		
Oromo	82	35.7
Somali	25	10.9
Amhara	81	35.2
Tigre	21	9.1
Gurage	18	7.8
Other	3	1.3
Educational status		
Never attend	34	14.8
Can read and write	63	27.4
Primary school	37	16.1
Secondary school	46	20.0
College Graduate and above	50	21.7
Occupation		
Farmer	9	3.9
Employed	59	25.7
Merchant	33	14.3
Daily laborers	12	5.2
House wife	73	31.7
Other	44	19.1
Monthly income ^a		
Low	64	27.8
Average	151	65.7
Above average	15	6.5

^aIncome: low < 2250; average 2251–8900; above average > 8900 (based on the Ethiopian Civil service monthly salary for civil servants).

Health-related data of type 2 DM patients

Less than half of the patients, 92 (40%), were on follow-up between 5 and 10 years and the mean years since started follow-up was 6.42 (SD=4.87), with a range from less than 5 years (41.3%) to more than 10 years (18.7%). Around 91 (39.6%) and 77 (33.5%) patients had family history of DM and

Table 2. Health-related data of type 2 diabetic patients on follow-up at public hospitals of Dire Dawa, Eastern Ethiopia, 2020 (n=230).

Variables	Frequency	Percent
Follow-up duration		
1–5	95	41.3
5–10	92	40.0
>10	43	18.7
Way of treatment modalities		
Insulin injection	67	29.1
Oral hypoglycemic agent	48	20.9
Physical exercise and medication	32	13.9
Controlled diet with medication	54	23.5
Both insulin injection and oral hypoglycemic	29	12.6
Co-morbidity		
Yes	77	33.5
No	153	61.5
Type of co-morbidity		
Hypertension	62	27.4
Hyperlipidemia	5	2.2
CVD	10	4.3
Family history of DM		
Yes	91	39.6
No	139	60.4
Get family support on your DM		
Yes	162	70.5
No	68	29.5
Get nutritional education and advice		
Yes	157	68.3
No	73	31.7
Despondency		
Yes, always	23	10
Yes, occasionally	73	31.7
No, never	134	58.3
Barrier to follow your dietary plan		
Family support	34	14.8
Cost of healthy foods	130	56.5
Unavailability of fruits and vegetables	38	16.4
Poor dietary knowledge	28	12.3
Member of DM association		
No	225	97.8
Yes	5	2.2
The last fasting blood glucose level		
Good controlled glycemia	50	21.7
Poorly controlled glycemia	180	78.3

CVD: cardiovascular disease; DM: diabetes mellitus.

co-morbidity, respectively. Hypertension accounts for higher portion, 63 (27.4%), of all co-morbidity disease reported. Among ways of treatment modalities, 67 (29.1%) used insulin injection, 48 (20.9%) used oral hypoglycemic agent, and 54 (23.5%) of the subjects used diet to control blood glucose level. Moreover, 213 (92.6%) of patients changed their dietary plan after knowing their DM status (Table 2).

Doctors, nurses, and medias were mentioned as a source of information about diabetes diet, each accounting 93

(40.4%), 77 (33.5%), and 49 (21.3%), respectively; most of the participants, 157 (68.3%), had nutritional advise from the doctor during their follow-up. More than half, 130 (56.5%), of the study subjects thought that the cost of healthy foods is a challenge while few 28 (12.3%) assume poor dietary knowledge as a barrier for following the recommended diet. Only 50 (21.7%) of patients had good control of glycemia, but majority, 180 (78.3%), had poor control of glycemia (Figure 1).

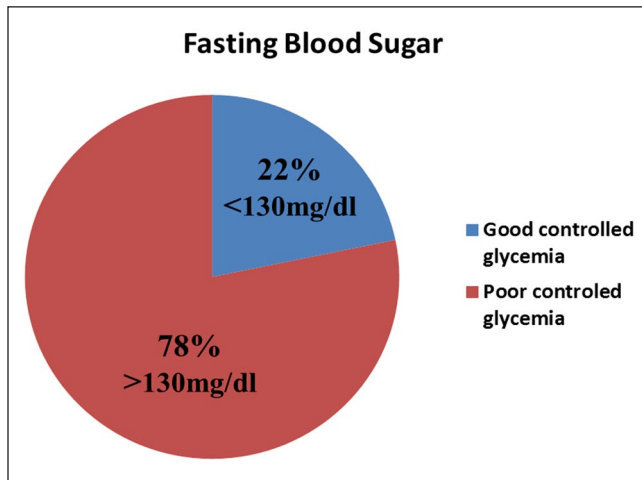


Figure 1. The status of glycemic control of type 2 diabetes patients on follow-up clients at public hospitals of Dire Dawa, Ethiopia, 2020 ($n = 230$).

Dietary knowledge of type 2 DM patients

Regarding knowledge on recommended diet, most patients (52.8%) found to have poor knowledge and the mean knowledge score was 7.0 (± 2 SD). Considering life style modification to control blood glucose, more than half of the participants, 124 (53.9%), responded dietary modification as a means to control their blood glucose level. About 156 (67.8%) patients knew instantaneous effect of consuming carbohydrates on blood glucose level. Only 137 (59.6%) of the patients discerned foods that are source of carbohydrate (Table 3).

About foods for maintaining blood sugar level, 95 (41.3%) answered whole grain properly. More than half, 144 (62.6%), of the participants responded “Eating the whole fruits is better than juice.” Majority, 223 (97%), of the subjects knew that skipping meal time would not help for controlling blood sugar level.

Dietary practice of type 2 diabetes patients

When it comes to patient’s dietary practice (Table 4), majority of patients, 71.3%, had a meal frequency of three and more times a day. Almost quarter, 56 (24.3%), of T2DM did not follow regular meal time (not eat at appropriate time). Only below half, 113 (49.6%) and 97 (42.8%), of T2DM patients eat fruits and vegetables more than 3 days a week. Around 133 (57.8%) patients used unsaturated oil for cooking. Majority of T2DM patients, 158 (68.7%), eat fruits without processing while 72 (31.3%) used fruit juice. About 228 (99.1%) and 223 (97%) of T2DM patients cut down sweet/soft drink and fat/butter intakes, respectively.

Considering the recommended diet for T2DM patients, only 46.2% of participants responded that they eat fruits and vegetables 3 days a week, that is, the level or measurement of the upright dietary practice (Figure 2).

Factors affecting dietary practice of type 2 diabetic patients

In this study, binary logistic regression analysis was computed to investigate an association between independent variables and dietary practice. The bivariate regression analysis showed that age, educational status, income level, duration of follow-up, family support, nutrition education on type 2 diabetes diet, despondency, and fasting blood glucose level were statistically associated with poor dietary practice (p -value < 0.2). When these candidate variables further adjusted using multivariate logistic regression analysis, only diabetic nutrition advice, duration of disease follow-up, family support, and despondency showed statistically significant association with dietary practice (p -value < 0.05) (Table 5).

Accordingly, patients who did not get diabetes nutrition advice were 4.5 times more likely to have poor dietary practice than their counterparts (AOR=4.47; 95% CI: 1.92, 10.40). Likewise, patients who had less duration of follow-up were almost three times more likely to have poor dietary practice than those who had longer duration of follow-up (AOR=2.79; 95% CI: 1.03, 7.54). Moreover, patients without family support and those with despondency were 2.4 and 2.2 times more likely to have poor dietary practice than their counterparts (AOR=2.36, 95% CI: 1.56, 4.62 and AOR=2.15; 95% CI: 1.14, 4.02).

Discussion

In this cross-sectional study, the level of dietary practice among T2DM patients was measured and found to be poor (53.8%), which is close to findings from study done at Addis Ababa which was 51.4%.¹⁴ This finding is also similar to another study done at University of Gondar Specialized Hospital which indicated a 53.2% of poor practice.¹⁵ On the contrary, the result of this study is better than the study findings in Botswana, which was 62.8%.¹⁴ Variation in study area and difference in population as well as gap of study period might be reasons for such difference. In addition, availability of better media coverage also contributes to enhanced knowledge on diabetes diet.

Not getting nutritional advice in hospitals, lower follow-up duration, not having family support, and having despondency were the variables identified for having significant associations with poor dietary practice.

In this study, not getting diabetic nutritional advice was one factor for poor dietary practice, and this was supported by the study in Gondar and Dilla University Referral Hospital.^{15,16} This may be due to the fact that those who get nutritional advice from clinicians and nurses might have better knowledge and understanding about the food–disease association, food guides, and prescriptions than those who do not get nutrition advice.

Duration of follow-up was an important predictor of good dietary practice. T2DM patients with more than 5-year follow-up had two times good dietary practice than those who

Table 3. Dietary knowledge of type 2 diabetes patients on follow-up at public hospitals of Dire Dawa, Eastern Ethiopia, 2020 (n=230).

No.	Question	Response	Yes		No	
			Number	%	Number	%
1	Knowledge regarding life style modification	Dietary modification	124	53.9	6	46.1
		Exercise	71	30.9	159	69.1
		Weight loss	32	13.9	198	86.1
2	Foods that raise blood glucose	Carbohydrates	156	67.8	74	32.2
3	Source of carbohydrate?	Barley, teff, bread, rice, sorghum	80	34.8	150	65.2
4	Should be eaten to control your blood glucose?	Cereal groups mixed with other food groups	102	44.3	128	55.7
		Lower sugar level	36	15.7	194	84.3
5	Lowers your blood glucose level	Whole grains	95	41.3	135	58.7
6	Helps to achieve good glycemia	Fruits daily	57	24.8	173	75.2
		Vegetables daily	152	66.1	78	33.9
		Fiber	7	3	223	96.9
7	Raises blood glucose level	Ethiopian flat bread (enjera)	12	5.2	218	94.8
8	Person with T2DM usually eats	Vegetables and fruits	197	85.7	33	14.3
9	Preferable way of eating fruits	Not juicing	144	62.6	86	37.4
10	Plate vegetable and fruit should cover?	Half	9	3.9	221	96.1
11	Skipping meal could help control blood glucose level	Yes/No	7	3	223	97
	Knowledge score (mean \pm SD)	7.0 \pm 2				

T2DM: type 2 diabetes mellitus; SD: standard deviation.

Table 4. Dietary practice of type 2 diabetes patients on follow-up at public hospitals of Dire Dawa, Eastern Ethiopia, 2020 (n=230).

Variables	Frequency	Percent
Meal frequency per day		
1 time	2	0.9
2 times	11	4.8
3 times	164	71.3
Greater than 3 times	53	23.0
Follow your regular meal time?		
Yes	175	76.1
No	55	23.9
Type of oil used for cooking food		
Saturated fatty acid	97	42.2
Unsaturated fatty acid	133	57.8
Did you cut sweet/soda drink?		
Yes	228	99.1
No	2	0.9
Did you cut fat/butter intake		
Yes	223	97.0
No	7	3.4
Eat fruits at least 3 days per week		
Yes	114	49.6
No	116	50.4
Eat vegetables at least 3 days a week		
Yes	98	42.8
No	132	57.2
How do you take fruits?		
Whole fruit (unprocessed)	158	68.7
Juiced	72	31.3

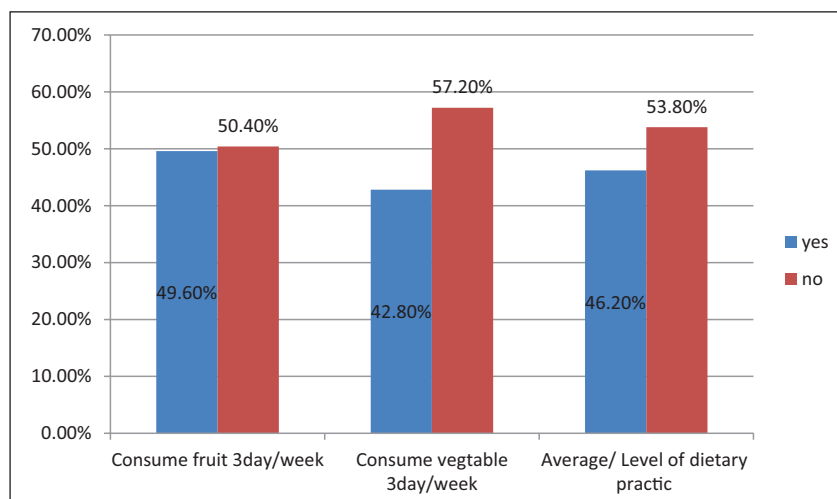


Figure 2. Level of dietary practice among type 2 diabetes patients on follow-up at public hospitals of Dire Dawa, Eastern Ethiopia, 2020 ($n=230$).

Table 5. Bivariate and multivariate logistic regression analysis of factors affecting dietary practice of type 2 diabetes patients on follow-up at public hospitals of Dire Dawa, Eastern Ethiopia, 2020 ($n=230$).

Variables	Dietary practice		COR (95% CI)	AOR (95% CI)
	Poor	Good		
Age				
19–50	21	66	1	
>50	52	91	1.68 (1.09, 2.58)	
Income				
Low	39	25	1.80 (1.09, 3.00)	
Average	71	80	1.01 (0.64, 1.62)	
Above average	7	8	1	
Duration of follow-up				
<5 years	29	66	5.61 (2.75, 11.46)	2.79 (1.03, 7.54)*
≥5 years	62	73	1	1
Family support				
No	52	15	2.28 (1.52, 3.43)	2.36 (1.56, 4.62)*
Yes	78	85	1	1
Advice from a doctor about DM patients diet				
No	54	19	3.08 (1.76, 5.78)	4.47 (1.92, 10.4)*
Yes	74	83	1	1
Despondency				
Yes	63	32	2.72 (1.79, 4.16)	2.15 (1.14, 4.02)*
No	57	78	1	1
Fasting blood glucose level				
<130	55	111	1	
≥130	152	85	3.60 (2.38, 5.48)	

COR: crude odds ratio; CI: confidence interval; AOR: adjusted odds ratio; DM: diabetes mellitus.

* $p < 0.05$; 1 = reference.

had less follow-up. Other similar study had also revealed a positive association between longer duration of follow-up and good dietary practice.¹⁷ The possible explanation is that patients with longer duration of diabetes will have more frequent contacts with health professionals and are more likely

to be given repetitive nutritional education and thus become aware of identifying food groups for controlling blood glucose level that eventually leads to good dietary practice.

It is repeatedly reported that lack of family support is a major barrier affecting T2DM patients to follow their dietary

plan. Several previous studies conducted in Dire Dawa, Kenya, and Bahrain showed that patients who had family support were more likely to have good self-care practices.^{18–20} This study revealed that T2DM patients who did not get family support found to have poor dietary practice. Possible reason could be having good family support is vital for promoting good dietary practice and other diabetes self-care practices since eating habit greatly involves family in majority of the society.

Despondency also had significant association with poor dietary practice. The result of this study indicated that those who were in despondency most of the time were two times more likely to have poor dietary practice. This finding is in line with previous study conducted at Addis Ababa hospitals.⁵ Such coexistence of despondency in people with diabetes is associated with poor treatment adherence, poor blood glucose control, and decreased quality of life. They also inclined of forgetting and not giving value for proper dietary practice and therefore consume whatever is edible.

On the contrary, variables such as sex, religion, marital status, ethnicity, occupation, co-morbidity, family history, and being a member of diabetic association were not significantly associated with poor dietary practice to the recommended diet. And this finding supported by several studies reported the past.^{5,7,15,16}

Some of the limitations encountered were lack of standard or clear dietary guidelines put in place for diabetes mellitus patients and recall bias may be introduced since the study participants may fail to remember their eating practice of the week.

Conclusion

More than half of diabetes patients had poor dietary practice, which is in contrary with international recommendations of diabetic self-care, and hence it is major public health problem. Habit of eating fruits and vegetables was poorly practiced and patients' knowledge on recommended nutrition was poor as well. It is alarming that diabetes clinic provides routine follow-up service in the absence of nutritional dietary guidelines. Majority of T2DM patients are in a dire situation of despondency and hence continual psychosocial support must be in place so as to halt bad health consequences at the earliest. Generally, lack of nutritional education and advice in diabetes clinic, lack of family support, low duration of follow-up, and despondency were factors significantly associated with poor dietary practice.

Recommendations

The following recommendations are forwarded:

- Robust nutritional education and counseling service should be provided for all T2DM patients so as to enhance their knowledge and dietary practice.

- A system should be in place to address psychosocial support for T2DM patients with despondency as part of follow-up service.
- A mechanism to strengthen family support and availing up-to-date nutritional guideline are highly recommended.

Acknowledgements

We acknowledge Dire Dawa University, College of Medicine and Health Science facilitating to conduct this study. We thank all study participants and health professionals in both hospitals. Our deep gratitude goes to the reviewers and editor for valuable and constructive comments and suggestions. This study of ours is also available as a pre-print in ResearchGate.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical approval

Ethical approval for this study was obtained from Research Ethics Review Committee, Dire Dawa University (now changed to "Institutional Review Board"; APPROVAL NUMBER/ID=DPH/20/0023).

Informed consent

Written informed consent was obtained from all subjects before the study. Consent was obtained after explaining about the aim of the study, their benefits and risk of participating in the study. All the interviews made with strict privacy and confidentiality was highly assured. Their rights to declare to participate or not in this study, or to withdraw from the study at any time, or to refuse to answer any question was also respected. At the end of the interview, health information on recommended dietary practice is provided for the respondents.

ORCID iD

Robel Mekonnen Yimer  <https://orcid.org/0000-0001-5832-9608>

Supplemental material

Supplemental material for this article is available online.

References

1. *Classification of diabetes mellitus*. Geneva: World Health Organization (WHO), 2019.
2. Introduction. *Diabetes Care* 2017; 40(suppl. 1): S1–S2.
3. Yuen L, Saeedi P, Riaz M, et al. Projections of the prevalence of hyperglycaemia in pregnancy in 2019 and beyond: results from the International Diabetes Federation Diabetes Atlas, 9th edition. *Diabetes Res Clin Pract* 2019; 157: 107841.

4. Nana A and Zema T. Dietary practices and associated factors during pregnancy in northwestern Ethiopia. *BMC Pregnancy Childbirth* 2018; 18: 183.
5. Worku A, Abebe SM and Wassie MM. Dietary practice and associated factors among type 2 diabetic patients: a cross sectional hospital based study, Addis Ababa, Ethiopia. *SpringerPlus* 2015; 4: 15.
6. Gray A and Threlkeld RJ. Nutritional recommendations for individuals with diabetes. In: Feingold KR, Anawalt B, Boyce A, et al. (eds) *Endotext*. South Dartmouth, MA: MDText.com, Inc., 2000, <https://www.ncbi.nlm.nih.gov/books/NBK279012/> (accessed 13 October 2019).
7. Bekele BB. The prevalence of macro and microvascular complications of DM among patients in Ethiopia 1990-2017: systematic review. *Diabetes Metab Syndr* 2019; 13(1): 672–677.
8. Abejew AA, Belay AZ and Kerie MW. Diabetic complications among adult diabetic patients of a Tertiary Hospital in northeast Ethiopia. *Adv Public Health* 2015; 2015: 290920.
9. Levitt NS. Diabetes in Africa: epidemiology, management and healthcare challenges. *Heart* 2008; 94(11): 1376–1382.
10. Ogurtsova K, Da Rocha Fernandes JD, Huang Y, et al. IDF diabetes atlas: global estimates for the prevalence of diabetes for 2015 and 2040. *Diabetes Res Clin Pract* 2017; 128: 40–50.
11. Central Statistical Agency (CSA). *Federal Democratic Republic of Ethiopia Central Statistical Agency population projection of Ethiopia for all regions at Wereda level from 2014–2017*. Addis Ababa: CSA, 2019.
12. Mulugeta Y, Alem AT and Emiru AA. Dietary practice and associated factors among type 2 diabetic patients in Felege Hiwot Regional Referral Hospital, Bahir Dar, Ethiopia. *BMC Res Notes* 2018; 11: 434.
13. Tsedey T. *Dietary pattern of type 2 diabetes mellitus patients on follow up in public hospitals Addis Ababa, Ethiopia*, vol. 12, issue no. 5. Addis Ababa: Addis Ababa University, 2016, p. 36.
14. Ganiyu AB, Mabuza LH, Maletse NH, et al. Non-adherence to diet and exercise recommendations amongst patients with type 2 diabetes mellitus attending Extension II Clinic in Botswana. *Afr J Prim Health Care Fam Med* 2013; 5(1): 457.
15. Halima MI, Fisseha Z, Tarkie AW, et al. Knowledge, practice, and its associated factors of type 2 diabetic patients towards dietary therapy at University of Gondar Specialized Hospital, Northwest, Ethiopia 2017. *J Diabetes Clin Prac* 2019; 2(1): 110.
16. Addisu Y, Eshete A and Hailu E. Assessment of diabetic patient perception on diabetic disease and self-care practice in Dilla University Referral Hospital, South Ethiopia. *J Metabolic Syndr* 2014; 3: 4.
17. Turcatto H, Fernanda F, Lucia M, et al. Factors associated with adherence to treatment of patients with diabetes mellitus. *Acta Paul Enferm* 2013; 26(3): 231–237.
18. Rathod GB, Rathod S and Parmar P. Study of knowledge, attitude and practice of general population of Waghodia towards diabetes mellitus. *Int J Curr Res Rev* 2014; 6: 63–68.
19. Getie A, Geda B, Alemayhu T, et al. Self-care practices and associated factors among adult diabetic patients in public hospitals of Dire Dawa administration, Eastern Ethiopia. *BMC Public Health* 2020; 20: 1232.
20. Lugaya WA, Mwenda CS and Affey FA. Self-care practices among Diabetes Mellitus type II patients attending the diabetes clinic of a referral hospital in Kenya. *Kenya J Nurs Midwifery* 2017; 1(2): 47–54.