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

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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

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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

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

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. 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%). 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. 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. Nutrition plays an important role in controlling or preventing diabetes. The risk of T2DM is associated with both under and over nutrition. Balanced food intake with endogenous and/or exogenous insulin levels is most important for diabetes care in improving glycemic control. 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.

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. 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. 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. 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 diabetesthe in Ethiopia. This has substantially deterred current efforts to promote adequate, healthy diets. 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. 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

\[
\frac{Z^2 \times p \times (1-p)}{e^2} \left[ \frac{N}{N-1} + \frac{Z^2 \times p \times (1-p)}{e^2} \right]
\]

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

\( n = 230 \)
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; \( \epsilon = 0.05 \), 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 hospital (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 DMA association, 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, \( \beta \)-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 \( \leq 5 \) 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 \( \leq 0.05 \) 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 (± 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).

| Variables               | Frequency | Percent |
|-------------------------|-----------|---------|
| Sex                     |           |         |
| Male                    | 102       | 44.3    |
| Female                  | 128       | 55.7    |
| Age category            |           |         |
| <40                     | 50        | 21.7    |
| 40–60                   | 99        | 41      |
| >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*         |           |         |
| Low                     | 64        | 27.8    |
| Average                 | 151       | 65.7    |
| Above average           | 15        | 6.5     |

*Income: 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
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%) 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).

**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.
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.

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 Addiss Ababa which was 51.4%. This finding is also similar to another study done at University of Gondar Specialized Hospital which indicated a 53.2% of poor practice. On the contrary, the result of this study is better than the study findings in Botswana, which was 62.8%. 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. 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 ± SD) 7.0 ± 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    |
had less follow-up. Other similar study had also revealed a positive association between longer duration of follow-up and good dietary practice.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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:

- 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.

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**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.

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**Supplemental material**

Supplemental material for this article is available online.

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