Poor dietary practice and its associated factors among patients with type 2 diabetes mellitus on follow up in Nigist Elleni Mohammed Memorial Comprehensive Specialized Hospital, Ethiopia

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Abstract

Background

Despite the importance of dietary practice on self care of patients with type 2 diabetes mellitus, poor dietary practice results in long term complications. Therefore this study was conducted to identify the level of poor dietary practice among type 2 diabetic patients on follow up in Nigist Elleni Mohammed Memorial comprehensive specialized Hospital, Southern Ethiopia.

Methods

Facility based cross-sectional study design was employed to assess the level of poor dietary practice among type II diabetes mellitus adult patients. The study was conducted from March to April 2020 G.C. Systematic random sampling method was used to select the study respondent. Both bivariate and multivariable logistic regressions were carried out to assess independent predictors of poor practice to diet. Odds ratios and their 95% confidence intervals together with value ≤ 0.05 were used to identify independent predictors of poor dietary practice.

Result

The overall proportion of poor dietary adherence among type diabetes patients was 53.7% (n = 168). Having large family size, occupations, being low wealth status, lack of family support and not being member of diabetic association were the factors associated with poor adherence of dietary practice among type 2 diabetes mellitus patients.

Conclusion

The overall magnitude of the poor adherence to dietary practice among type 2 diabetes mellitus adult patients was 53.7% which is not going in line with international recommendations of diabetic self care. Every concerned body should strive to address those factors associated with poor dietary practice among type 2 diabetes mellitus patients.

Background

Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin. It is clinically categorized DM as Type I diabetes, Type II diabetes, Gestational diabetes mellitus and other specific types of diabetes due to other causes such as genetic defects in b-cell function, genetic defects in insulin action and diseases of the exocrine pancreas [1].

The international diabetes federation estimates that 463 million adults are living with diabetes worldwide with 1 in 11 people are living with diabetes. Worldwide Diabetes Mellitus (DM) is one of the most challenging health problems. Ongoing patient self-management, education, and support are critical to prevent acute complications and to reduce the risk of long-term complications from the disease. Also adherence to recommended meal plans/dietary schemes and being active can keep blood glucose level, blood pressure, and cholesterol levels within optimum ranges. It follows that non-adherence to recommended diet would lead to life-threatening complications in individuals with diabetes [2].

Recommended dietary practices or dietary adherence include consuming more fruits and vegetables, nuts and whole grains, and choosing unsaturated vegetable oil as opposed to saturated animal based fats. It also includes limiting consumption of snacks that are high in fat, sugar, or salt [3].

Patients need to achieve and maintain a healthy body weight, perform a regular physical activity for at least 30min and moderate-intensity activity on most days, eat a healthy diet, and avoid sugar and saturated fats intake and tobacco use in order to prevent type2 DM and its complication [2].

Even though dietary modification is one of the corner stone in T2 DM management and is usually recommended as the first step, it is considered as one of the most challenging aspects of diabetes management. Implementation of recommended dietary practice for individual's with T2 DM requires collaboration between the patient and the healthcare provider [4].

Non adherence to dietary recommendation in people with T2 DM has been identified as high in both developed and developing countries [5]. None adherence to recommended dietary recommendation in diabetes mellitus patients may results in long term complications [6]. Some of the factors associated with poor adherence to dietary recommendations are socioeconomic status, duration of illness, duration of follow up, educational level, coo morbidity, family support, lack of diabetes knowledge, cost of healthy diet and poor communication with healthcare providers are among the most common factors [7]. But there is, limited information regarding the level of adherence and factors associated with poor dietary recommendations in individuals with T2DM in Africa including Ethiopia. A few reports in Ethiopia and other parts of Africa suggest that adherence to dietary recommendation in DM patients are generally low [8].

In Ethiopia, lack of information on adherence to dietary recommendation and absence of dietary practice guideline for people withT2DM is still challenging. Moreover, due to little evidence-based researches were done, the health policy of Ethiopia is still unable to give evidence based decision. Therefore conducting and documenting such research would have a positive impact on designing and implementation of dietary practice programs for people with T2DM in Ethiopia.

There is a limited literature regarding dietary adherence among type II diabetes patients who are on follow up in public health care in Ethiopia, particularly in the study area, therefore this study was conducted to identify the level of adherence to dietary recommendation among type 2 diabetic patients on follow up in Nigist Elleni Mohammed Memorial comprehensive specialized Hospital, southern Ethiopia.

Objectives

General objective

- To assess adherence to dietary recommendation and associated factors among type 2 diabetes mellitus patients on follow up in Nigist Eleni Mohammed Memorial Referral and Teaching Hospital, Southern Ethiopia, 2020

Specific objective

- To verify the level of adherence to dietary recommendation among type 2 diabetic patients on follow up
- To identify factors associated with adherence to dietary recommendation among type 2 DM patients on follow up

Methods And Materials

Study setting

The study was conducted Nigist Eleni Mohammed Memorial Referral and teaching Hospital which is located in Hadiya zone in South Nation's Nationalities and Peoples Region found in 232 kms south of Addis Ababa, Ethiopia. Currently it provides preventive, curative and rehabilitative clinical services organized in four case teams as outpatient, inpatient, emergency and critical care, maternal, child health and obstetrics and operation theatre. The out patients services are given in OPD clinics (internal medicine, surgery, pediatrics and child health, Gynecologic), specialty clinics (psychiatry, dermatology, ophthalmology, Dentistry and Orthopedic), referral and consultation clinics, Maternal and child health care follow up clinics.

The study was carried out in Nigist Eleni Mohammed Memorial Referral and Teaching Hospital, Southern Ethiopia, from March to April 2020 G.C [9].

Study design

Facility based cross-sectional study was employed to assess the level of adherence to dietary recommendations among type II diabetes mellitus adult patients.

Source population

The study source population was all patients with type 2 diabetes aged 18 years and above who were on diabetic follow up at Nigist Eleni Mohammed Memorial Teaching and Referral Hospital.

Study Population

The study population was Type 2 diabetic patients aged 18 years and above who were visiting Nigist Eleni Mohammed Memorial Teaching and Referral Hospital diabetes clinic and randomly selected for the study

Inclusion Criteria

Patients those who were diagnosed with type 2 diabetes and on clinical care for at least one year were included.

Exclusion Criteria

A patient who was critically ill and need immediate treatment during data collection period was excluded from the study

Sample size determination

The sample size for the study was determined using the single population proportion formula for sample size determination [10].

$$\frac{(Z_{\alpha/2})^2 * P * (1 - p)}{(d)^2}$$

$$= \frac{(1.96)^2 * 0.743 * (1 - 0.743)}{(0.05)^2}$$

$$= \frac{3.8416 * 0.743 * (0.257)}{(0.0025)} = \frac{0.73356}{(0.0025)} = 293$$

By considering non-response rate of 10 % the final sample size was 322.

Sampling techniques

Nigist Eleni Referral Hospital is selected purposively since it is the only hospital in the town. Systematic random sampling method was used to select the study respondent. There were 862 type II diabetes mellitus patients on follow up age of 18 and greater at the time. Each patient visits the facility on monthly basis. To run systematic sampling the K-value (the interval) was calculated by dividing total number of type 2 DM patients (862) from diabetes referral clinic registration log book to the calculated sample size (322). Therefore $K = N/nf$, where nf = final sample size = 322 and N = total Number of type 2 diabetes patients who are attending the hospital for follow up , which is equal to 862 patients. Accordingly, every 2nd patients were selected until the sample size fills with the first sample chosen randomly between 1 and k .

Study Variables

Dependent variable

Adherence to dietary recommendation

Independent variable

Socio demographic characteristics: Age, Sex, religion, marital status, type of work, income, educational status.

Disease related: duration of illness, duration of follow up, other co morbidity, family support, attending dietary education.

Food related: cost of the food, availability of the food, type of food that should be consumed, frequency and meal timings, member of diabetic association.

Knowledge about the recommended diet

Data collection instrument and personnel

Data was collected using a structured interviewer administered questionnaire. The questionnaire was initially prepared in English then translated in to local language (Amharic) by professionals who were fluent two languages and then translated back to English to ensure consistency. In order to ensure reliability and consistency, enumerators were trained for 1 day. Pretest was undertaken by considering 5% of the sample size in Homacho hospital located outside the study area. Findings of the pretest were incorporated to modify and clarify the collection tool before the actual data collection. Data were collected by four trained nurses and two supervisors for five consecutive weeks from March to April 2020 G.C. The data collection tool used in this study was adapted and modified from previous studies on similar topics.

To determine the dietary non-adherence of individuals with DM, we used a modified form of the eight items Morisky medication adherence scale (MMAS-8) which was modified by Worku *et al.* [7]. This scale has 11 components and was computed by taking the mean value to classify the respondents' poor dietary practice as "dietary non-adherence" and good practice as "dietary adherence". The Perceived Dietary Adherence Questionnaire (PDAQ) was used for dietary adherence measurement. Each of the items contain two response options (Yes = 1 and No= 0 , here yes was used for those responses which are negatively answered or far true answer from what science is talking about). The questionnaire was tested for internal consistency (reliability) with Cronbach's Alpha test (0.7). The completeness, consistency, and accuracy of the collected data were examined by principal investigators every day.

Data processing and analysis

Data coding was done at the end of each day of data collection and recoded later where necessary. Data were entered and analyzed by using SPSS version-20 statistical package. House hold wealth index was determined from asset data using principal component analysis (PCA). First, variables were coded between 0 and 1, and then the variables entered and analyzed using PCA and those variables which have

commonality values greater than 0.5 were used to produce factor scores. Frequency distributions, percentages, tables and charts were used to show results of univariate analysis. Bivariate and multivariable logistic regressions were carried out to assess independent predictors of non adherence to diet. Bivariate logistic regression was performed to identify candidate variables for multivariable logistic regression. Variables with value ≤ 0.25 in bivariate regression were considered as candidates for multivariable regression. Odds ratios and their 95% confidence intervals together with value ≤ 0.05 were used to identify independent predictors of non adherence to diet. Goodness of fitness of the final model was checked using Hosmer and Lemeshow adequacy of model test.

Operational definitions

Poor dietary adherence: respondents who answered incorrectly on 10 items of perceived dietary adherence questions and those who scored above the mean value were classified as poor adherence to dietary recommendation [10].

Good dietary adherence: respondents who answered correctly on 10 items of perceived dietary adherence questions and those who scored equal or below the mean value were classified as good adherence to dietary recommendation [10].

Good Dietary Knowledge: respondents who answered correctly to knowledge related questions and those who scored greater than the overall mean value.

Poor Dietary Knowledge: respondents who answered in-correctly to knowledge related questions and those who scored less than or equal to overall mean value.

Ethical consideration

Ethical clearance was obtained from ethical review board of wachemo university department of public health research ethical committee. Official letter of permissions was obtained from Nigist Eleni Mohammed Memorial hospital medical director office and respondents were well informed about the purpose of the study, then data was collected after written consent from each participant obtained. Information was recorded anonymously and confidentiality and beneficence was assured throughout the study period.

Results

Socio demographic characteristics of the respondents

A total of 313 respondents agreed to participate in the study and 97.2% of the participants gave complete response. More than half of the participants (56.9%) were males. The mean age ($\pm$ S.D) of type 2 DM patients was 48.12 ($\pm$ 11.348) years with the age ranges between 20 – 90 years. The majority of the participants 187 (59.7%) were between 41 and 60 years. Among the respondents, majority of them 214 and 240 (68.4% and 76.7%) were from protestant Christian followers and from Hadiya ethnic group

respectively. Regarding to educational status, 51(16.3%) and 99(31.6%) of the patients attended higher education and had no formal education respectively. Of the total study participants, 116(37.1%) of the respondents were rural residents .Nearly half of respondents 148(47.3%) had 4-6 family size and 83(26.5%) of the respondents were government employees. More than one third (34.8%) of the study participants were from low or poor economic status (Table 1).

Table 1: Socio-demographic characteristics of type 2 diabetic adult patients at Nigist Elleni Mohammed Memorial Referral and Teaching Hospital, Southern Ethiopia, 2020 (n=313).

Variable	Categories	Frequency(n)	Percentage
Sex	Female	135	43.1
	Male	178	56.9
	Less than 40years	87	27.8
Age in years	41-60 years	187	59.7
	>60 years	39	12.5
	Less than 3	49	15.7
Family size	4-6	148	47.3
	Greater than 6	116	37
Religion	Protestant	214	68.4
	Orthodox	57	18.2
	Muslim	30	9.6
	Catholic	11	3.5
Marital status	Married	297	94.9
	Single	16	5.1
	Urban	197	62.9
Residence	Rural	116	37.1
	Hadiya	240	76.7
Ethnicity	Kembata	25	8
	Gurage	13	4.2
	Amahara	22	7
	Silitie	13	4.2
	Unable to read and write	99	31.6
Educational status	Able to read and write	48	15.3
	Primary school	51	16.3
	Secondary school	64	20.4
	Higher education	51	16.3
	Farmer	69	22

Variable	Categories	Frequency(n)	Percentage
Occupation	Government employee	83	26.5
	Merchant	71	22.7
	Private organization employee	6	1.9
	Daily laborer	5	1.6
Wealth	House wife	73	23.3
	Other	6	2
	Low	109	34.8
	Medium	104	33.2
	High	100	32

Health related characteristics

The mean duration of patients follow up was 6.12(SD±4.575) years, which is ranging from 1 to 5 years (51.1%) to greater than 10 years (11.8%). More than one third of participants (35.8%) had chronic disease other than DM, mainly hypertension 83(26.5%) followed by heart disease 15(4.8%). One in four patients (21.7%) had family history of DM. Only 11.2%&1.3% of patients control their DM condition by diet and exercise respectively. A large number of participants (93.9%) made change in dietary habit when they knew that they were diabetic. Significant percentage (41.9%) of the study participants had participated in regular physical exercise for less than 3 times per a week for more than 30 minutes. More than one in three of the study participants (36.1%) indicated that family support affects their dietary habits. A large number of study participants (97.1%) attended education on dietary recommendation necessary for management of DM by doctors (61.3%) as well as by nurses (30.7%).

From the total study participants more than half of the study participants 171(54.6%) had poor dietary knowledge. Among those who had poor dietary knowledge male accounts 30.6%. More than half of the study participants (53%) were practicing dietary modification to control DM complication while 32.9% of them were using exercise as life style modification to control DM complication. Majority of the study participants (82.1%) responded fruit and vegetables as food groups which they used to control their blood glucose level.

Level of dietary adherence among Type II adult patients

The overall proportion of poor dietary adherence among type diabetes patients was 168(53.7%) [95% CI (48.2, 58.8)]. The proportion of poor dietary adherence among male respondents was 55.4% [95% CI (52,

62.9)] .According to this study the proportion of poor dietary adherence practice among age groups of less than 40 years was 28.6% [95%CI, (22, 32.6)] and it was 10.7% [95%CI, (8.9, 16.3)]among the age groups of 60 years and above.

More than half of the respondents (57.8%) reported that they were an unable to follow dietary recommendation due to unavailability of food items, cost of foods, lack of supports from their families and friends and lack of information. A significant number of the study participants (45%) didn't continue with dietary plan when they felt that their DM is under control. A large number of the study participants (81.5%) forgot to consume fruits 3 times or more a day or 6 times or more a week. A large number of patients (80.5% & 78.3%) responded that they forgot to include fruits and vegetables in their daily foods respectively. More than 3 in 4 patients (76%) failed to cut down fat intake from their daily foods

Factors associated with poor dietary adherence among type II diabetes mellitus adult patients

Family size, residence, educational status, occupation, wealth status ,knowledge status of the respondents ,duration of follow up , co- morbidity, fasting blood sugar level, physical exercise ,being member of diabetic association, missed dietary planning, cost of foods, access to fruits and vegetables and family and friends support were selected as candidate for multivariable logistic regression. However in multivariable analysis family size, occupation, wealth status, family and friends support, not being member of diabetic association and missed dietary planning were independently associated with poor dietary adherence among type II DM adult patients (Table 2).

Table 2: Factors associated with dietary adherence in type 2 diabetic patients on follow up at Nigist Elleni Mohammed Memorial Referral and Teaching Hospital, Hossana, SNNPR, Ethiopia ,2020 (n=313)

Variable	Adherence			P-value	AOR [95%CI]	P-value
	Poor	Good	COR [95%CI]			
Educational status						
Unable to read & write	62	37	2.209 (1.111-4.393)	0.024*	1.165 (0.453-2.991)	0.872
Able to read & write	31	17	2.404 (1.069-5.406)	0.034*	1.306 (0.487-3.506)	0.725
Primary school	30	21	1.883 (0.858-4.133)	0.115*	1.003 (0.395-2.550)	0.969
Secondary school	23	41	0.739 (0.348-1.571)	0.432	0.544 (0.231-1.281)	0.283
Higher education	22	29	1		1	
Occupation						
Farmer	37	33	0.595(0.305-1.160)	0.128*	0.304(0.112-0.824)	0.019*
Government employee	38	52	0.388(0.206-0.730)	0.003*	0.757(0.224-2.561)	0.655
Mar chant	44	34	0.687(0.357-1.319)	0.259	0.578(0.215-1.558)	0.279
Others***	49	26	1		1	
Family size						
Less than 3	23	26	0.561(0.286-1.100)	0.092*	0.358 (0.159-0.806)	0.011**
4-6	74	74	0.634 (0.387-1.038)	0.070*	0.598 (0.338-1.059)	0.291
Greater than 7	71	45	1		1	1
Wealth						
Low	68	41	2.949(1.679-5.177)	0.000	1.829(0.828-4.041)	0.136
Medium	64	40	2.844 (1.612-5.020)	0.000	3.337(1.502-7.415)	0.003**
High	36	64	1		1	
Residence						
Rural	73	43	-	0.012*	1.719 (0.736-4.014)	0.211

Variable	Adherence			P-value	AOR [95%CI]	P-value
	Poor	Good	COR [95%CI]			
Urban	95	102	1.83 (1.140-2.914)		1	
Physical exercise						
3 times a week for 30 minutes	14	28	0.349 (0.169-0.721)	0.004*	0.448 (0.158-1.271)	0.131
Less than 3 times a week for 30 minutes	71	59	0.841 (0.520-1.361)	0.481	1.197(0.577-2.483)	0.630
No physical activity	83	58	1		1	
Access of fruits and vegetables						
Yes	137	96	2.256(1.341-3.794)	0.002*	1.673 (0.726-3.856)	0.227
No	31	49	1		1	
High cost of foods						
Yes	138	95	2.421 (1.436-4.083)	0.001*	0.648(0.263-1.597)	0.346
No	30	50	1		1	
Family support						
Yes	129	60	1		1	
No	39	85	4.686 (2.878-7.629)	0.000	4.842 (2.376-9.868)	0.000**
Current blood sugar level						
Less than 126mmHg	28	43	0.650 (0.405-1.042)	0.074*	0.596(0.277-1.284)	0.186
Greater than 126mmHg	127	99	1		1	
Duration of follow up						
1-5 years	44	43	1.451(0.706-2.982)	0.312	1.336 (0.547-3.261)	0.525
5-10years	89	59	1.859 (0.880-3.929)	0.104*	1.181 (0.610-3.044)	0.450
Greater than 10 years	35	43	1		1	
Member of diabetic association						

Variable	Adherence			P-value	AOR [95%CI]	P-value
	Poor	Good	COR [95%CI]			
Yes	76	52	1		1	
No	92	93	1.477(0.937-2.330)	0.093*	2.495(1.162-5.360)	0.019**
Missed dietary planning						
Yes	164	94	0.045(0.016-0.128)	0.000*	0.026(0.008-0.089)	0.000**
No	4	51	1		1	
Coo morbidity						
Yes	53	59	1.489(0.936-2.368)	0.093*	1.416(0.707-2.832)	0.326
No	115	86	1		1	

Note: * Significantly associated factors at p value =0.25, ** significantly associated at 0.05: COR: Crude odds ratio: AOR: Adjusted odds ratio; CI: Confidence interval *** private organization employee, daily laborers and house wife.

Discussion

The overall magnitude of poor dietary adherence (non adherence) to dietary recommendation was 53.7% among type II DM adult patients on follow-up at Nigist Elleni Mohammed Memorial Referral and Teaching Hospital, southern Ethiopia. The finding is in line with studies done in Adiss Ababa city and dedre birhan teaching Hospital that showed the magnitude of the poor adherence to dietary recommendation among adult type II DM patients was 51.4% and 55.7% respectively [7, 11]. In contrary, findings of this study was lower than the study conducted in Mekelle, Felege hiwot hospital (Bhair Dar), Harari and Kenya where 69%, 64.1%, 60% and 59% of participants did not follow dietary recommendations respectively [13–16]. However the finding of this result was lower than the study done in Urban Area of Urmia, Northwest of Iran where 26.2% of participants had poor dietary adherence [17]. This might be due to difference in sample size, socioeconomic and cultural factors among different setups.

Respondents who had medium wealth status were over 3 times more likely to have poor dietary practice than those who had high wealth status. This result is in agreement with a study done in Diredawa referral hospital, Ethiopia where the study participants who had a medium monthly income were 2.33 times more likely to have poor adherence to diet [18]. It is also in line with a report from studies done in Addis Ababa Tikur Anbessa specialized hospital, Felege Hiwot Hospital, North west Ethiopia and Ayder referral

hospital, Northern Ethiopia [16, 19]. This might be because of those who have economic constraints cannot have enough money to buy different types of foods to fulfill their daily requirements.

Family and social support was another important factor affecting dietary practice of patients with type II DM. Similar results were reported from Addis Ababa, Ethiopia and Jimma medical college, south west Ethiopia [16, 20] which showed there was a positive association between social support and adherence to lifestyle recommendations. This is due to the fact that when they couldn't get help from their nearby family they may feel despondent and then they might miss their dietary meal plan, including taking the excess sweetness and alcohol. Positive family support is the means of promoting preventive measures like good dietary practice and other diabetes self-care practices [17, 18]. It is similar with studies done in Taiwan and Nekemte Referral Hospital, Ethiopia that family and social support was passively associated with good adherence of dietary practice among type II DM patients [21, 22].

Being a member of the Diabetic association was also significantly associated with adherence to dietary recommendation which was in line with the study in Felegehiwot Hospital, North west Ethiopia [19]. This might be due to the association's regular support given to the patients including support on self care in addition to securing medicine to some of the lower income members and blood glucose testing with a relatively lower price.

Assessing the level of dietary practice using self-reported dietary practice was one of the limitations of the study. Besides, using self-reported dietary adherence as a measure of the level of adherence may introduce social desirability or recall bias.

Conclusion And Recommendation

The overall magnitude of the poor adherence to dietary practice among type II diabetes mellitus adult patients was 53.7% which is not going in line with international recommendations of diabetic self care. Besides, having large family size, occupations, being low wealth status, lack of family support and not being member of diabetic association were the factors associated with poor adherence of dietary practice among type II DM patients. Ever concerned bodies should focus on addressing family planning issues, creating job opportunities and increasing household economic status of patients with type II DM. Lastly, support from the family members and expanding the diabetic association service are essential factors to promote dietary practice among type II DM adult patients.

Declarations

Acknowledgment

We would like to thank data collectors, respondents and all individuals for their contribution.

Availability of data and material

The datasets are available from the corresponding author on reasonable request.

Authors' contribution

MS Designed and supervised the study, analyzed and interpreted the data

DT Assisted the analysis and interpretation of the data

TT Prepared and submitted the final manuscript for publication

All authors read and approved the final manuscript.

Financial disclosure

There was no fund

Competing interest

The authors declare that they have no competing interests.

Abbreviations

AOR adjusted odds ratio

COR crude odds ratio

DM diabetes mellitus

NEMMTH Nigist Eleni Mohamed Memorial Teaching Hospital

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