Perceived Dietary Adherence and its Barriers to Dietary Recommendations among Type 2 Diabetes Mellitus Patients

R. Regi Bai[1], Ramesh Kumari[2]

[1]Department of Medical Surgical Nursing, Himalayan University, Itanagar, Arunachal Pradesh, India, [2]Department of Medical Surgical Nursing, Mai Bhago College of Nursing, Tarn Taran, Punjab, India

Abstract

Aim: This study aimed at assessing the level of dietary adherence and its barriers among patients with type 2 diabetes mellitus (T2DM).

Methods: A cross-sectional study was conducted on 120 patients with T2DM. The Perceived Dietary Adherence Questionnaire (PDAQ) was used for dietary adherence measurement and perceived barriers were also identified.

Results: The majority of the samples were male with more than 10 years duration of diabetes mellitus, with hemoglobin A1c of more than 7, raised postprandial blood sugar and raised fasting blood sugar. In this study, 72% of the study participants had poor adherence based on PDAQ. The highest mean score was obtained for the question regarding consuming foods high in sugar with a mean 5.73 ± 0.98 times a week. On the other hand, our participants had a low consumption fish and foods high in omega-3 fats with a mean of 1.05 ± 0.68 times a week, respectively. About 91% of the participants expressed difficulty of adhering to the recommended diet during social or work events as the main barriers that hinder adherence to recommended diets.

Conclusion: The rate of non-adherence to dietary recommendation among patients with T2DM was found to be high. Hence, providing customized health education about the potential benefit of proper dietary recommendations in controlling blood glucose is recommended.

Keywords: Perceived dietary adherence, barriers, type 2 diabetes mellitus

INTRODUCTION

The World Health Organization (WHO) describes the term diabetes mellitus as a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Type 2 diabetes mellitus (T2DM) is the common type of diabetes that accounts for about 90% of all diabetes cases in the world.[1] According to the latest data from the WHO in 2014, about 422 million adults (8.5% of the world's population) had DM compared to 108 million (4.7%) in 1980 and this would rise to 642 million by 2040.[2] In 2013, the International Diabetes Federation estimated that 381 million people having diabetes which is expected to be almost double by 2030.[3]

To prevent type 2 diabetes and its complications, the WHO recommends that patients achieve and maintain a healthy body weight, perform a regular physical activity for at least 30 min, eat a healthy diet, and avoid sugar and saturated fats intake and tobacco use.[3] Lifestyle changes like diet are an important factor in achieving good controlling on T2DM and avoiding its long-term complications.[4] Adherence has been defined as the extent to which a person's behavior-taking medication, following a diet and/or executing lifestyle changes – corresponds with agreed recommendations from a health-care provider.[5]

The American Diabetes Association recommends eating fruits, legumes, whole grains, vegetables, minimizing highly sucrose-containing foods, and fiber-containing foods which are beneficial for secondary prevention of T2DM.[6] Regular implementation of recommended dietary practice for all

Address for Correspondence:
R. Regi Bai, Department of Medical Surgical Nursing, Himalayan University, Itanagar, Arunachal Pradesh, India. E-mail: godwin_4u@rediffmail.com

individuals with T2DM is advised. Dietary non-adherence in individuals with T2DM has been identified as high.[7,8]

Dietary modification has been anticipated as the keystone of T2DM management and is usually recommended as the first step, it is considered one of the most challenging aspects of diabetes management. Factors identified as reasons for poor adherence to dietary recommendations are socioeconomic status, duration of disease, lack of diabetes knowledge, cost of healthy diet, and poor communication with health-care providers which are among the most cited barriers in most of the existing data.[9-12] There are, however, limited data regarding the level of adherence and barriers to dietary recommendations in individuals with T2DM. Therefore, this study aimed at assessing the level of dietary adherence and its barriers to dietary recommendations among people with T2DM.

METHOD

A cross-sectional study was conducted on patients with T2DM aged >18 years. Patients who were critically ill and unable to participate in the interview and also those who were recently diagnosed and had a follow-up of fewer than 6 months were excluded. Informed verbal consent was obtained from each respondent after explaining the purpose of the study. Participant's confidentiality was guaranteed by not recording their personal identifiers on the data collection format.

The data collection tool used in this study has two major parts. Part one assessed the sociodemographic characteristics of respondents. Part two included queries about dietary adherence. The Perceived Dietary Adherence Questionnaire (PDAQ) was used for dietary adherence measurement. PDAQ is a 9-item questioner which is developed in 2015 by Asaad *et al*. to measure patient perceptions of their dietary adherence.[13] The response is based on a 7-point Likert scale to answer the question phrased as "On how many of the last 7 days did you ....?" [Table 1]. Higher scores reflect higher adherence except for items 4 and 9, which reflect unhealthy choices (foods high in sugar or fat). For these items, higher scores reflect lower adherence, therefore, for computing a total PDAQ score, the scores for these items were inverted. Patients were classified as having good dietary adherence if they eat a healthy diet for at least 4 days in the week.

RESULTS

A summary of the percentage calculation of demographic characteristics are as follows. The majority of the sample 60.8% were male and 38.3% belongs to the age group of above 66 years. In this study, 28.3% of the samples have undergone educational qualification of degree and 44.2% of the samples with full-time job. The majority of the samples 68.3% were married and 70% of the samples belong to joint family. Majority of the samples 39.2% of the sample earn Rs. 5001/–Rs. 15,000/- and 69.2% of the samples were from rural area. The duration of diabetes mellitus in 51.7% of the samples was more than 10 years and 65.8% of the samples were treated with

Table 1: Perceived dietary adherence questionnaire score for DM patients

Item	Mean±SD
On how many of the last 7 days have you followed a healthful eating plan?	2.57±1.96
On how many of the last 7 days did you eat the number of fruit and vegetables?	2.20±1.62
On how many of the last 7 days did you eat carbohydrate-containing foods with a low glycemic index? (Example: Dried beans, lentils, barley, pasta, and low-fat dairy products)	3.26±1.79
On how many of the last 7 days did you eat foods high in sugar, such as rice, potatoes, etc.?	5.73±0.98
On how many of the last 7 days did you eat foods high in fiber such as oatmeal, high fiber cereals, and whole-grain breads?	2.40±1.12
On how many of the last 7 days did you space carbohydrates evenly throughout the day?	2.45±0.81
On how many of the last 7 days did you eat fish or other foods high in omega-3 fats?	1.05±0.68
On how many of the last 7 days did you eat foods that contained or was prepared with canola, walnut, olive, rice bran oil, or flax oils?	2.35±2.00
On how many of the last 7 days did you eat foods high in fat (such as high fat dairy products, fatty meat, fried foods, or deep-fried foods)?	2.18±1.26
Over all adherence	**(*n*, %)**
Poor	86 (72%)
Good	34 (28%)

only oral hypoglycemic agents. About 42.5% of the samples were obese, 67.5% of the samples were with hemoglobin A1c of more than 7, 60.8% of the samples were with raised fasting blood sugar, and 74.2% with raised postprandial blood sugar, and 55% of the samples did not experience hypoglycemic episode during the last month [Table 2].

The mean scores of each item of PDAQ score are given below. The highest mean score was 5.73 ± 0.98 which was obtained for the question "On how many of the last 7 days did you eat foods high in sugar, such as rice and potatoes?" The second highest mean score was 3.26 ± 1.79 which was obtained for the question "On how many of the last 7 days did you eat carbohydrate-containing foods with a low glycemic index?" Participants obtained the lowest mean score of 1.05 ± 0.68 for the question "On how many of the last 7 days did you eat fish or other foods high in omega-3 fats?" and "On how many of the last 7 days did you eat foods high in fat?" A significant percentage (72%) of the study participants had poor adherence based on PDAQ while only 28% of the participants had good adherence toward dietary recommendations [Table 1].

A large number of study participants 91% cited the difficulty of adhering to the recommended diet during social or work events as the main barriers that hinder adherence to recommended diets. In addition to this, 82% of the participants expressed lack of knowledge/lack of diet education as the barrier. Moreover, 76% of the participants were unable to afford cost of the recommended diet was one of the reason for non-adherence. The difficulty of remembering recommended diet was cited as a reason for non-adherence by 62% of the study participants.

Table 2: Frequency and percentage distribution of demographic variables of type 2 diabetes mellitus patients without restless legs syndrome (*n*=120)

Demographic variables	Frequency	Percentage	Mean±Standard deviation
Age			60.15±14.00
a) 18–34 years	12	10	
b) 35–50 years	21	17.5	
c) 51–65 years	41	34.2	
d) Above 66 years	46	38.3	
Sex			
a) Male	73	60.8	
b) Female	47	39.2	
Religion			
a) Hindu	67	55.8	
b) Christian	37	30.8	
c) Muslim	16	13.4	
Education			
a) Illiterate	25	20.8	
b) Primary school	32	26.7	
c) Higher secondary	29	24.2	
d) Degree	34	28.3	
Occupation			
a) Full time	53	44.2	
b) Retired	14	11.7	
c) Unemployment	33	27.5	
d) Others	20	16.8	
Type of family			
a) Nuclear family	36	30	
b) Joint family	84	70	
Marital status			
a) Married	82	68.3	
b) Unmarried	10	8.3	
c) Separated	12	10	
d) Widow	16	13.4	
Income			
a) <Rs. 5000	20	16.7	
b) Rs. 5001–Rs. 15,000	47	39.2	
c) Rs. 15,001–Rs. 25,000	29	24.1	
d) > Rs. 25,000	24	20	
Area of living			
a) Rural	83	69.2	
b) Urban	37	30.8	
Duration of diabetes mellitus			14.65±8.24
b) <5 years	19	15.8	
c) 6–10 years	39	32.5	
d) >10 years	62	51.7	
Mode of treatment			
a) Oral hypoglycemic agents	79	65.8	
b) Insulin	15	12.5	
c) OHA and insulin	26	21.7	
BMI			28.53±6.42
a) Underweight	14	11.6	
b) Optimal	20	16.7	
c) Overweight	35	29.2	
d) Obese	51	42.5	
Hemoglobin A1c			7.67±1.35
a) <7	39	32.5	
b) ≥7	81	67.5	
Fasting blood sugar			148.92±36.56
a) Normal	47	39.2	
b) Raised	73	60.8	
Postprandial blood sugar			191.87±37.72
a) Normal	31	25.8	
b) Raised	89	74.2	
Experienced a hypoglycemic episode during the last month			
a) Yes	54	45	
b) No	66	55	

Only 32% of the participants do not believe that diet can control blood glucose and 38% of the participants expressed that it takes too long to cook recommended diet [Table 3].

Discussion

This study aimed at assessing the level of dietary adherence and its barriers to dietary recommendations among people with T2DM. In the present study, only 34% of patients adhered to the recommended diet. This percentage is consistent with the findings of similar studies.[14,15]

In our present study, carbohydrate intake is higher compared to another source of foods. The average level of carbohydrate intake for the present study participants was more than 5 days a week because rice is the primary dietary source of carbohydrates in South India which is the study area. A meta-analysis concluded that low-carbohydrate diets in T2DM results in the improvements of triglyceride levels and glycemic control.[16,17] On the other hand, our participants had a low consumption of fish or other foods high in omega-3 fats which are also consistent with the eating habits, availability, and cost could be the reason for low adherence. Similar finding was seen in a study done in Ethiopia with low consumption of omega-3 fats.[17] In another study, only 10% of the participants met the guidelines for omega-3 fats consumption.[18]

In the present study, 91% of the study participants have cited that the difficulty of adhering to the recommended diet during social or work events as the main barriers that hinder adherence to the recommended diet. Findings of the previous study participants also identified having a busy work schedule as a barrier toward adherence to dietary recommendations.[19] In addition to this, 82% of the participants reported lack of knowledge/lack of diet education as the barrier. This meant that they did not know what or how much to eat, or which foods are recommended for T2DM. Therefore, improving the knowledge of diabetic patients regarding dietary recommendations with a special focus on patients with low educational level is highly important. While patients can be motivated through a sense of responsibility toward diabetes mellitus and recognition of importance of diet in diabetes self-care, the lack of it was identified as a barrier to improving eating habits.[20]

Table 3: Perceived barriers influencing adherence to the recommended diet

Barriers	%
Lack of knowledge/lack of diet education	82
Unable to afford cost of the recommended diet	76
Do not believe diet can control blood glucose	32
Lack of appetite for recommended diet	42
Unable to remember the recommended diet	62
It takes too long to cook recommended diet	38
The difficulty of adhering to the recommended diet during social or work events	91
Stress	49
Others	29

NB: More than 1 answer is possible for the above questions

The third most important reason reported by study participants as a reason for non-adherence to diet recommendations was the cost of the recommended diet. About 76% of the participants reported that they were unable to afford the cost of the recommended diet as the reason for non-adherence. Findings of the previous study also have been identified the cost of food as a barrier in non-adherence to dietary recommendation among diabetes patients.[9,21] The annual increase in the cost of healthy foods might have a negative impact on patients who were from low socioeconomic levels. Providing information regarding the low cost healthy foods and foods that can be easily cooked at home may be beneficial for patients to overcome the cost barrier for dietary adherence especially in low-income patients. Only 32% of the participants do not believe that diet can control blood glucose and 38% of the participants expressed that it takes too long to cook recommended diet.

Conclusion

The adherence of participants to the diabetic diet was poor. The barriers responsible for non-adherence are difficulty of adhering to the recommended diet during social or work events, lack of knowledge/lack of diet education, and unable to afford cost of the recommended diet. Therefore, health professionals must become proactive in identifying and addressing these barriers and health-care decision and policy-makers should design effective dietary practice guideline for people with T2DM in areas where these are not available.

References

1. Ranasinghe P, Pigera AS, Ishara MH, Jayasekara LM, Jayawardena R, Katulanda P. Knowledge and perceptions about diet and physical activity among Sri Lankan adults with diabetes mellitus: A qualitative study. BMC Public Health 2015;15:1160.
2. Alhariri A, Daud F, Saghi SA. Factors associated with adherence to diet and exercise among Type 2 diabetes patients in Yemen. J Diabet Manage 2017;7:264-71.
3. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. Diabetes Care 2004;27:1047-53.
4. Shrivastava S, Shrivastava PS, Ramasamy J. Role of self-care in management of diabetes mellitus. J Diabetes Metab Disord 2013;12:14.
5. Garcia-Perez LE, Alvarez M, Dilla T, Gil-Guillen V, Orozco-Beltran D. Adherence to therapies in patients with Type 2 diabetes. Diabetes Ther 2013;4:175-94.
6. Association AD. Nutrition recommendations and interventions for diabetes: A position statement of the American diabetes association. Diabetes Care 2008;31:S61-78.
7. Broadbent E, Donkin L, Stroh JC. Illness and treatment perceptions are associated with adherence to medications, diet, and exercise in diabetic patients. Diabetes Care 2011;34:338-40.
8. Resnick HE, Foster GL, Bardsley J, Ratner RE. Achievement of American diabetes association clinical practice recommendations among US adults with diabetes, 1999-2002 the national health and nutrition examination survey. Diabetes Care 2006;29:531-7.
9. Vijan S, Stuart NS, Fitzgerald JT, Ronis DL, Hayward RA, Slater S, et al. Barriers to following dietary recommendations in Type 2 diabetes. Diabetes Med 2005;22:32-8.
10. Nagelkerk J, Reick K, Meengs L. Perceived barriers and effective strategies to diabetes self-management. J Adv Nurs 2006;54:151-8.
11. Cox DJ, Gonder-Frederick L. Major developments in behavioral diabetes research. J Consult Clin Psychol 1992;60:628.

12. Ayele K, Tesfa B, Abebe L, Tilahun T, Girma E. Self care behavior among patients with diabetes in Harari, Eastern Ethiopia: The health belief model perspective. PLoS One 2012;7:e35515.
13. Asaad G, Sadegian M, Lau R, Xu Y, Soria-Contreras DC, Bell RC, et al. The reliability and validity of the perceived dietary adherence questionnaire for people with Type 2 diabetes. Nutrients 2015;7:5484-96.
14. Alrahbi H. Diabetes self-management (DSM) in Omani with Type-2 diabetes. Int J Nurs Sci 2014;1:352-9.
15. Ali AT, Yousif MA, Elbur AI. Is knowledge of diabetes and its management influence to exercise, healthy diet and medication? A survey among Sudanese patients in Khartoum state; Sudan. EJPMR 2015;2:437-49.
16. Santos FL, Esteves SS, da Costa Pereira A, Yancy WS Jr., Nunes JP. Systematic review and meta-analysis of clinical trials of the effects of low carbohydrate diets on cardiovascular risk factors. Obes Rev 2012;13:1048-66.
17. Ayele AA, Emiru YK, Tiruneh SA, Ayele BA, Gebremariam AD, Tegegn HG. Level of adherence to dietary recommendations and barriers among Type 2 diabetic patients: A cross-sectional study in an Ethiopian hospital. Clin Diabetes Endocrinol 2018;4:70-7.
18. Birkinshaw A, Nel R, Walsh C. Adherence of patients with Type 2 diabetes mellitus with the SEMDSA lifestyle guidelines J Endocrinol Metab Diabetes South Afr 2018;23:39-45.
19. Satter E. Hierarchy of food needs. J Nutr Educ Behav 2007;39:187-8.
20. Booth AO, Lowis C, Dean M, Hunter SJ, McKinley MC. Diet and physical activity in the self-management of Type 2 diabetes: Barriers and facilitators identified by patients and health professionals. Prim Health Care Res 2013;14:293-306.
21. Kirk JK, Graves DE, Craven TE, Lipkin EW, Austin M, Margolis KL. Restricted-carbohydrate diets in patients with Type 2 diabetes: A meta-analysis. J Am Diet Assoc 2008;108:91-100.