Assessing Dietary Knowledge of Adults with Type 2 Diabetes Mellitus in Different Rural Regions of Irbid. Northwestern Jordan.

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Abstract- Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder that has become a major global health concern, with its prevalence reaching pandemic proportions. Effective dietary management plays a crucial role in controlling blood glucose levels and preventing complications associated with the disease. However, adequate dietary knowledge (DK) among individuals with T2DM is essential to ensure adherence to appropriate dietary practices. This study aimed to assess the level of dietary knowledge among adults diagnosed with T2DM who receive medical care at a primary healthcare center in a rural region of Irbid, Jordan. A total of 500 adults were recruited using a convenience sampling method. A validated DK questionnaire consisting of 21 multiple-choice questions was used to evaluate participants' knowledge of macronutrients, specifically carbohydrates, lipids, and proteins, with only one correct answer per question. The findings revealed that participants demonstrated a moderate level of dietary knowledge, with an overall DK score of 54.25% regarding general dietary recommendations for diabetes management. Specifically, knowledge levels for macronutrient categories were 59% for carbohydrates, 55% for lipids, and 63% for proteins. These results suggest that while participants had a fair understanding of dietary guidelines, there remains room for improvement. In conclusion, the study highlights that DK among adults with T2DM receiving care at a rural primary healthcare center in Irbid, Jordan, is moderate. This underscores the necessity of implementing targeted awareness campaigns, educational programs, and routine training sessions led by healthcare providers to enhance dietary knowledge and promote better diabetes self-management.

Index Terms- dietary knowledge, dietary practice, rural region, type 2 diabetes

I. INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder in which prevalence is reaching pandemic proportions worldwide (1). In this context, currently 1 in 11 people globally is diagnosed with diabetes mellitus (DM), ~90% of whom have T2DM (2). In Jordan, according to the National Center for Diabetes, Endocrinology, and Genetics, the prevalence of DM and pre-DM among the population equals 45% (3). Thus,

DM management and prevention have become major public health priorities worldwide.

Despite evidence of the effectiveness of drug therapy for the management of T2DM, interventions targeting lifestyle changes such as medical nutrition therapy (MNT) and diabetes self-management education (DSME) remain the cornerstones for the management of T2DM (4,5). One of the main MNT and DSME goals is to improve diabetes-related dietary knowledge (DK) to facilitate positive dietary practices and augment diet quality, which consequently improves diabetes outcomes (4).

DK refers to understanding the knowledge of the process and concepts related to health and diet, disease and diet, the nutritional value of the foods that explain the nutrients within them, and the recommendations that should be followed (6). Inadequate DK leads to uncontrolled hyperglycemia, complications, comorbidity, poor quality of life, and death (7). This study aimed to assess DK among adults with T2DM who receive care from a primary health care center in the rural regions of Irbid, Jordan.

II. MATERIAL AND METHODS

A descriptive, exploratory cross-sectional design was used to assess dietary knowledge among adults with T2DM patients in various rural regions in Irbid. Jordan. A convenience sample of 500 adults diagnosed with T2DM, who received care from a primary health care center in the rural regions in Irbid, Jordan were recruited to participate in this study. Inclusion criteria were adult patients known to have T2DM; aged more than 40 years; either gender, and patients having no co-morbidities. The 24-hour recall was used to evaluate the food consumption pattern of carbohydrates, proteins, fats, and fiber. The evaluation of the daily food intake was made by using the ESHA Food Processor.

The Dietary Knowledge questionnaire used in this study was developed and validated by Sami et al. (2020) (6). It comprised 21 multiple-choice questions about carbohydrates, lipids, proteins, food type, and food choices with only one correct answer. Each correct answer was given one point, whereas wrong or "I do not know" answers were given zero points. For each participant, correct answers were summed to obtain the score ranges from 0–21. A higher level of DK was indicated by a higher score. DK was also converted into percentage levels of nutritional knowledge and classified into 3 categories: A score < 50% was considered poor DK, whereas, a score between 50%–75% was considered as having good DK, and a score of 75% was considered as having adequate DK (6,8).

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 16. Descriptive statistics, including absolute means and standard deviations, were used to summarize the data. Frequency distributions and percentages were calculated to assess the levels of dietary knowledge among participants. Additionally, inferential statistical tests, such as independent t-tests and one-way ANOVA, were conducted to examine potential differences in dietary knowledge across demographic and clinical variables. A significance level of $p < 0.05$ was considered statistically significant.

III. RESULTS

A. Patient's socio-demographic characteristics

(Tables 1) summarize the sociodemographic factors of the study population. The study sample was composed of 500 adult patients with T2DM. The majority of the patients were more than 60 years old (38.0%). Most of the patients were female (54.0%). More than (55.4%) of the patients had diabetes for more than 10 years. The majority of patients were distributed under secondary education levels (43.4%), and the majority with monthly family income under 300 Jordanian Dinar (44.0%) (JD) (1 US\$ = 0.71 JD). The majority of patients were married (63.4%). The patients who smoked were uniformly distributed. The majority of patients were overweight (43.4%). Most patients didn't have physical activities (32.0%).

Table 1: Patient's socio-demographic characteristics (N=500)

Variables	N (%)
Age	
<40 years	80 (16%)
40-50 years	117 (23.4%)
50-60 years	113 (22.6%)
>60 years	190 (38.0%)
Gender	
Male	230 (46%)
Female	270 (54.0%)
Education	
Primary school	115 (23.0%)
Secondary school	217 (43.4%)
University	168 (33.6%)
Occupation	
Working	210 (42.0%)
Not working (unemployed and retired)	290 (58%)
Marital status	
Married	117 (23.4%)
Single and others	383 (76.6%)
Income	
<300 JD	220 (44.0%)
300-500 JD	133 (26.6%)
>500 JD	147 (29.4%)
BMI	
Normal weight	93 (18.6%)
Overweight	217 (43.4%)
Obese	190 (38.0%)
Physical activity	
No	146 (29.2%)
1-2 times a week	77 (15.4%)
3-4 times a week	117 (23.4%)
>5 times a week	146 (29.2%)
Duration of DM	
<5	68 (13.6%)
5-10	155 (31.0%)
>10	277 (55.4%)
SMOKING	
Yes	254 (50.8%)
No	246 (49.2%)

B. Dietary knowledge of participants

(Table 2) shows DK among T2DM patients. 44% of them are aware of the definition of a diabetes diet. Most of the participants were aware the food is high in carbohydrates and fat which equal 60% and 64% respectively. 39.8% of patients are aware of food that they can eat freely. Among the participants, 51.8% were aware about sugar increased blood glucose levels. Of the participants, 26.6%, 43·3 %, and 19.8% respectively, were aware that foods have amounts of sugar, fat, and proteins in them respectively. In terms of percentage, the participant had good DK (54.25%) about the general diabetes diet.

Table 2: Dietary knowledge of participants (n = 500).

Item	Stem	N (%) Correct Answers
1	The diabetics' diet is?	220 (44%)
2	Which of the following is highest in carbohydrates?	300 (60%)
3	Which of the following is highest in fat?	320 (64%)
4	Which of the following is a food which you can eat freely?	199 (39.8%)
5	What is the effect of unsweetened fruit juice on blood glucose?	293 (58.6%)
6	Which should be used to treat low blood sugar?	259 (51.8%)
7	A well-balanced diet includes?	140 (28%)
8	Which of these foods has an amount of sugar in them?	133 (26.6%)
9	Which of these foods has the highest amount of fat in them?	217 (43.4%)
10	HbA1c test has some relationship with your diet?	195 (39%)
11	Which of the following contains the highest amount of proteins?	99 (19.8%)
12	Food that contains fats and oils gives us a lot of?	323 (64.6%)
13	Eating too much sugary food may cause?	234 (46.8%)
14	Which of the following foods contains the most cholesterol?	301 (60.2%)
15	Breads, cereals, rice, and pasta are high in?	360 (72%)

16	Whole-grain foods like brown rice and whole wheat bread are better choices than white rice and white bread because whole-grains contain?	245 (49%)
17	Which of the following foods is a complete source of protein?	266 (53.2%)
18	Most of the excess sodium in our diet comes from?	313 (62.6%)
19	Which of the following has the highest glycemic index?	215 (43%)
20	Which of the following contains a vitamin that is needed for good vision?	326 (65.2%)
21	Do you think that justified consumption of vitamins, minerals, carbohydrates, fat, and protein has a direct effect on outcomes of diabetes mellitus?	406 (81.2%)

C. Sub-groups of Dietary Knowledge (DK).

(Table 3) shows Sub-groups of Dietary Knowledge. The sub-groups are carbohydrates (six items), lipids and fats (four items), and proteins (two items). In percentages, it showed that Participants had good DK in about 59%, 55%, and 63% regarding carbohydrates, lipids, and proteins respectively.

Table 3: Sub-groups of Dietary Knowledge (DK).

No	Stem	N (%) Correct Answers
	Carbohydrate	
1	Which of the following is highest in carbohydrates?	285 (57%)
2	What is the effect of unsweetened fruit juice on blood glucose?	217 (43.4%)
3	Which of these foods has an amount of sugar in them?	199 (39.8%)
4	Eating too much sugary food may cause?	401 (80.2%)
5	Breads, cereals, rice, and pasta are high in?	377 (75.4%)
6	Whole-grain foods like brown rice and whole wheat bread are better choices than white rice and white bread because whole-grains contain?	416 (83.2%) 288 (57.6%)
	Lipids	
1	Which of the following is highest in fat?	301 (60.2%)
2	Which of these foods has the highest amount of fat in them?	266 (53.2%)
3	Food that contains fats and oils gives us a lot of?	313 (62.6%)
4	Which of the following foods contains the most cholesterol?	389 (77.8%)
	Proteins	
1	Which of the following contains the highest amount of proteins?	285 (57%)
2	Which of the following foods is a complete source of protein?	297 (59.4%)

D. Daily food intake of diabetic patients

(Table 4) shows the daily food intake of diabetic patients. It showed that the mean total energy intake was 2277 ± 25.85 kcal, the percentage of total calories from carbohydrates 45.6%, protein 8.9 %, and fat 45.5%. The mean dietary fiber intake was 36.8 ± 29.33 (gm).

Table 4: Daily food intake of diabetic patients (N=500)

	Energy (kcal)	Carbohydrates)	Protein (gm)	Fat (gm)	Fiber (gm)
Mean+ SD	2277 ± 25.85	260 ± 19.8	50.5 ± 20.22	115 ± 80.55	32.9 ± 9.33
Percentage from total calorie %	-	45.6%	8.9%	45.5%	-

IV. DISCUSSION

A rural area was defined as a sparsely settled place located away from the influence of large cities and having an agricultural character (9). To our knowledge, this study is the first to assess the DK of patients with T2D in rural areas in Jordan.

A review of the literature in Jordan revealed that the majority of the patients with diabetes did not follow a healthy, balanced diet as recommended by the dietitian, and being reluctant to follow the diet was associated with poor diabetes outcomes (10). This is in line with our study, the participant with T2DM had good DK (54.25%). However, less than half of patients (Table 2) gave correct answers about the identification diabetic diet (44.0%), food that can be eaten freely by patients with T2DM (39.8%), a balanced diet (28%), food that has sugar of them (26.6%), and foods with highest amount of proteins (19.8%).

Additionally, in regards to DK about sub-groups of macronutrients it showed that Participants had good knowledge 59%, 55%, and 63% regarding carbohydrates, lipids, and proteins respectively. This is consistent with previous literature (11,12). This is attributed to a lack of national dietary guidelines for patients with diabetes in Jordan especially in rural areas, and patients with T2DM may be unaware of what role and constitutes a healthy diet (10).

In our study, table 4 shows the daily food intake of diabetic patients. It showed that the mean total energy intake was 2277 ± 25.85 kcal, the percentage of total calories from carbohydrates 45.6%, protein 8.9 %, and fat 45.5%. The percentage of total calories from fat was more than the American Diabetic Association guidelines (ADA) which recommended intake of fat in 20% to 35% of total energy intake, while the percentage of total calories from protein was less than the ADA recommendations (15-20%) (13). On the other hand, the percentage of total calories from carbohydrates was more than the ADA guidelines (45% to 60% carbohydrate).

In this study, high daily fat intake and low protein intake could be related to low knowledge about the effect of fat on insulin resistance and diabetic outcomes. Dietary fat is not only a source of energy and nutrients, but also bioactive fatty acids have an important role in cell metabolism (14,15). High-fat diets may cause diabetic complications, the more fat there is in the diet, the more difficult it is going to be for insulin to get the glucose into the cell (16,12).

Our results showed high dietary fiber intake was 36.8 ± 29.33 (gm). This may be attributed to the agricultural character of rural regions. Dietary fiber helps to slow the glucose release into the bloodstream and subsequently maintains the blood sugar at normal levels (12).

V. CONCLUSION

DK among T2DM patients in rural regions in Irbid, Jordan was moderate suggesting the need for awareness campaigns, orientation programs, and routine training sessions by health care providers. The results cannot be generalized to Jordan as a whole because this study was conducted only in the northern part of Jordan. Further studies with a wider scope are needed to explore DK in rural regions in Jordan.

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ETHICAL CONSIDERATIONS

Informed consent was taken from all participants. All participants were informed about full disclosure of the nature and purpose of the study, that their participation was voluntary, and that their anonymity was assured.

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