Awareness and Dietary Adherence of Patients with Type 2 Diabetes Mellitus in the City of Mosul: A Cross-Sectional Study

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The current study is a cross-sectional observational review utilizing qualitative and quantitative methods to examine compliance with suggested dietary habits among patients with type 2 diabetes mellitus (T2DM) and associated compliance-influencing factors. The sample population consisted of adult's males and females who were diagnosed with T2DM at specified clinics in Mosul province. Probability and non-probability sampling methods were used. Simple random sampling was used to pick four primary healthcare centers (PHC) out of the 28 PHCs in Mosul province. Systematic random sampling methodology was used to identify individual patients who participated in the research, choosing each 4th patient to engage in the analysis. Researcher-issued questionnaires were distributed to patients with T2DM. A total of 210 patients out of the target 300 were reached. Using the Statistical Package for Social Sciences (SPSS) computer program version 25, the quantitative data obtained using the researcher-administered questionnaire was organized, coded, and analyzed. Patients demonstrated relatively high awareness (76.16%) of nutritional guidelines for T2DM management. Older people were found to have little information regarding prescribed eating habits and awareness of the need to use sugar as first aid when one is down in hypoglycemia. Extensive education on T2DM management at health facilities is required, including specific topics that are sometimes ignored, such as the need to maintain regular meal times, the need to bring sweets at all times, and snacks between main meals for improved blood glucose regulation.

Keywords: Awareness; Adherence Diabetes Mellitus; Mosul; Iraq.

In patients with type 2 diabetes mellitus, the primary ultimate objectives of treatment are to improve the quality of life and minimize severe long-term metabolic problems by reducing premature morbidity and mortality.[1-5] The 21st century has seen further modernization and industrialization, longer life expectancy, and shifts in habits around the globe. These developments may lead to increased adjustments in disease trends, with chronic diseases such as diabetes rapidly becoming prevalent.[6-8] Nutritional intervention is an essential part of diabetes treatment, and self-care education is needed to obtain and sustain optimum metabolic outcomes, avoid and cure medical problems, and enhance general well-being by meeting patient nutritional needs.[9-13] Earlier compliance/adherence studies have found that neither the compliance/adherence features of a condition, nor the treatment procedure, nor the clinical environment, nor the medication protocol seems to have an influence.[14] No compliance/ adherence assessments or non-compliance/non-

adherence figures may be extended owing to difficulties in calculating. Deficient compliance/ adherence is required in 30% to 50% of all patients, regardless of diagnosis, prognosis, or treatment.[15,][16] In diagnosing severe conditions, the patients themselves and not the healthcare providers make the most significant decisions impacting the safety and well-being of individuals with DM. The purpose of this study was to evaluate diet in T2DM patients in the city of Mosul, Iraq.

METHODS

The current cross-sectional study was conducted between November 2019- January 2020 to review the use of qualitative and quantitative methods to examine compliance with suggested dietary habits among patients with T2DM and associated compliance-influencing factors. The sample population consisted of adult's males and females who were diagnosed with T2DM at specified clinics in Mosul province. Healthcare programs for patients with T2DM were provided at the clinics, such as counseling on prescribed eating habits for diabetes mellitus treatment. The study did not involve T2DM patients who were pregnant or too exhausted to answer the questions. Probability and non-probability sampling methods were used. Simple random sampling was used to pick four PHC from among the 28 PHCs in Mosul province. Systematic random sampling methodology was used to identify individual patients participating in the research, choosing each 4th patient to engage in the analysis. Systematic random sampling assisted in eliminating bias in choices. Preliminary testing was carried out in the PHCs. The researchers undertook adjusting the tools, checking the accuracy, and also determining whether patients were having trouble answering the queries. Information was obtained using different methods, including questionnaires provided by the researcher (with a 24-hour dietary recall), central

Table 1. Association of Social Demographic Characteristics, Health Status, and Level of Compliance with Recommended Dietary Practices in the Management of T2DM

Variable	Classification	Percentage	Mean of Compliance Level	Significant *p*-value
Gender	Male	58%	56	0.938
	Female	42%	57.3	
Age	<20 years	10%	58.3	0.914
	20-44.9 years	15%	66.7	
	45-64.9 years	46%	57.8	
	>65 years	29%	57.8	
Educational Level	Illiterate	16	55.3	0.779
	Low level	34	56.5	
	Middle level	23	60.6	
	High level	27	69.7	
(BMI)	"Underweight (<18.5%)	14	60.3	0.613
	Normal Weight (18.5-24.9)	10	57.8	
	Overweight (25-29.9)	29	53.8	
	Obese Class I (30-34.9)	21	58.3	
	Obese Class II (35-39.9)	16	66.7	
	Obese Class III (e"40)"	10	57.5	
Fasting blood Glucose (RBG)	Low FBG less than 100mg/dl		0	0.121
	Normal FBG 100-110 mg/dl		33.3	
	High FBG d"126 mg/dl		50	
Random Blood Glucose (RBG)	Low RBG less than 100		83.3	0.221
	Normal RBGe"140		57.4	
	High RBG<140		59.3	
Level of Knowledge	0.762			

informant interview guides, and centered group conversation guides. The questionnaires gathered data on the participants' sociodemographic characteristics, including age, gender, region of residence, diabetes family history, and educational level which was defined as illiterate, low level (less than eight years of education), moderate level (completed high school), and high level (having a university degree). Researcher-issued questionnaires were distributed to T2DM patients. A total of 210 patients out of the target of 300 were reached, and information concerning their demographic profiles, the magnitude of nutritional awareness, the extent of adherence, and variables affecting adherence with dietary guidelines was gathered. Knowledge and adherence details were gathered via a set of questions where respondents themselves commented about their activities (self-reporting). Every time the patients attended

hospitals, their weight, height, and blood glucose were measured; such criteria were derived from the patient's records on the same day as the data collection. The questionnaire was tested for comprehensiveness and accuracy of information. The quantitative data obtained from the sample and managed by a researcher was arranged, coded, and statistic analyzed using SPSS software, version 25. Statistical significance was determined as p-value < 0.05.

RESULTS

The mean age of the respondents was (58.2 ± 10.5 years), 58% of whom were male and 42% of whom were female, had educational levels considered as illiterate (10%), low level (40%), middle level (25%), or high level (25%). The respondents' BMIs were classified based on

Table 2. Compliance with Approved Dieting Habits; Awareness of Food Intake

Nutrient	Ranges	%	Mean Intake
Calories	Below (<1650Kcals)	55	1243.2 Kcals
	Normal (2000-2500Kcals)	35	
	Above e•2500Kcals)	10	
Carbohydrates	Below (130<g)	35	131.5 g
	Normal intake	65	
Protein	Normal (50-80g)	12	44.2 g
	Above (>80g)	88	
Fat	Below (<28g)	7	87.6 g
	Normal (29-70g)	60	
	Above normal (>70g)	33	
Fiber	Below (>25g)	11	22.3 g
	Normal (25-50g)	71	
	Above (>50g)	12	

Table 3. Compliance with Approved Nutritional Habits in T2DM (self-reported) Management, Stratified by Age Compliance Level

Age group	≥50%	≤50%
<30 years	0%	100%
30-34 years	49%	51%
35-39 years	53%	47%
40-44 years	46%	54%
45-50 years	48%	52%
≥51 years	50%	50%

WHO categories. The level of knowledge was determined to be 0.762 (Table 1) when compliance with approved dieting habits and awareness of food intake were assessed. The mean intake of calories was 1243.2 Kcals. Mean intakes of carbohydrates, protein, fat, and fiber were also assessed (Table 2). Compliance with approved nutritional habits for self-reported T2DM management was stratified according to age group (Table 3). Reasons for the prevention and facilitation of compliance with recommended dietary practices in the management of T2DM are shown in Table 4.

DISCUSSION

The present study was designed to determine the compliance with suggested dietary habits among patients with type 2 diabetes mellitus (T2DM) and associated compliance-influencing factors. Diabetes patients with advanced ages are most likely to develop medical conditions such as elevated blood pressure, hyperlipidemia, and cardiovascular problems that may influence their nutritional needs.[17-20-21-23] The current study found that the respondents' level of compliance. Those in the age group of 30-39 years had a compliance level of 53%, which is a good level of compliance (more than 50%). Furthermore, the current study shows the level of compliance in woman was more than men. Evidence shows similar result, the compliance to drugs is typically increased with age and was higher in women versus men.[24, 25] However, another finding with a study done in Nigeria was found no association between age, gender, family history, or duration of diabetes and categorical adherence was notice.[26] In French adults hospitalized with asthma, diabetes, hyperlipidemia, or cardiovascular illness, the proportions of the patients and healthy controls adhering to the French dietary guidelines were similar to other research and in accordance with guidelines for food intake and lifestyle. Patients had a reduced level of compliance with recommended diet, and pharmacological treatment in the current study was in patients older than 30 years. In this subject, the percentage of adherents in the age group was only 50% > 50, with less than 50% of non-adherents missing less than half of the dose needed, a further barrier in other age groups (Table 3). When these findings were compared with those of other studies done in Sweden, the results indicate that middle-aged and elderly people living in Switzerland need additional dietary advice to assist in meeting food guidelines.[28] As the use and comprehension of food guidelines in the population community seem to be minimal, new methods for moving recommendations to specific applications must be explored. Another research aimed to determine commitment to the level of prescribing drugs by patients' healthcare providers. The percentages of adherence among T2DM patients were 39.6% who answered that they had a sense of well-being, the cost of medications, and adverse effects prevented their compliance. Bad patient awareness and recovery education have played a role in decreasing compliance with medication[29,]

Table 4. Reasons for Avoidance and Compliance with Approved Dietary Guidelines in Regulating T2DM

Prevention	%	Facilitation	%
Meat deficiency when away from home	2%	Supporting communities	65%
Neglecting	2%	Enough resources to get food	43%
Lost appetite	2%	Perceived/expected advantages	36%
Just feeling unwell	4%	Meals are accessible in my neighborhood	14%
Lack of high-quality food away from home	6%	Data quality	6%
Lack of knowledge.	13%	Forming and maintaining safe behaviors	2%
Quality food lacking in our area	14%	Bringing food to work	2%
Inadequate time (Busy timetable)	14%	Adequate time for consistency in planning meals	2%
Weak self-regulation	17%	Use of medicines to improve appetite	2%
Taste preferences	33%	Recalls	1%
Budget limitations	47%		

Table 5. Reasons for poor adherence and percentage of missed doses among non-adherence

		Main Reasons for Weak Adherence			
		High cost of prescription medications	"Side effects"	Ignorance	"Feelings of self-well-being"
Percentage of missed	<50%	5%	8%	21%	13%
doses per week	>50%	10%	1%	17%	18%

[30] Another factor is the level of knowledge. Patient knowledge and compliance among those with a high level of education was 69.7, while among illiterate patients it was 55.3. However, there was no significant association between the level of education and diabetes-related compliance. When compared with other studies, it was found that a comprehensive pharmacy care program led to substantial and sustained improvements in medication and nutritional recommendation adherence and clinically meaningful improvements. The mean percentage of medication adherence was less than previous percentages, concluding a 61% baseline adherence rate.[31, 32] This research focused primarily on the enforcement barriers. 33% of acceptable tastes and desires, and 17% of poor self-regulation. There is lack of awareness, food quality in our area, and insufficient time (busy schedule) were found to be the reason for poor adherence and the high percentage of missed doses among non-adherents. Other factors reduced compliance with recommended regimens, including drug costs which are ever-increasing due to poor economic conditions, the lack of funding and support for reducing medication costs to consumers, the side effects of medication, forgetfulness, and feelings of self-wellbeing. Weak compliance with medical care greatly decreases patient performance and raises patient mortality. The WHO notes that improved adherence to medical treatment in hypertension, hyperlipidemia, and diabetes disorders will produce very significant economic and health benefits.[33] Multifactorial causes of lower adherence must be considered in order to increase adherence to medication. The WHO categorizes these factors into 5 groups: demographic factors, health team and current system factors, disease-related factors, clinical factors, and patient-related factors. These factors are, in a wider context, categorized into patient-related factors, physician-related factors, and health system/team-building factors.[34-37] Dietary consumption is one of the essential diabetes-related variables. Such findings indicate a more significant correlation between BMI and the occurrence of T2DM.[38] Our research indicates that compliance with most dietary recommendations in the Mosul population is relatively low. Participants comply mainly with the excess protein consumption in terms of meat and fish (88%) and with the guidelines on fiber (71%).

Ultimately, compliance with the consumption of vegetables and dairy products greater that 10% of participants) is of concern. Another study found that patients were much more detailed on such healthy behavior (low consumption of sweetened drinks, higher intakes of fish and seafood, and better compliance with the guideline on dairy products) than tests, whereas physical activity, alcohol consumption, cigarettes, vegetables, meat and processed meats, added fat, and more importantly, sodium intestinal was observed.[39] Such findings require more analysis, however, as the design and methodology differed. Some studies have shown that patients with diabetes have greater compliance with official guidelines than population controls.[1, 40, 41] Possible explanations for this reduction in compliance include that participants might face a deficit in the number of meals when away from home, loss of appetite due to psychological issues, a lack of high-quality food away from home, knowledge deficit, inadequate time (busy timetable), weak self-regulation, and budget limits. In contrast, findings from other research show that compliance with most dietary guidelines in the population is very low. Participants primarily complied with meat and fish consumption guidelines, and only one percent followed the fruit guideline. Ultimately, while adherence is a framework that is partly understandable in terms of well-known theoretical models and specific functional principles, it is also true that the calculation of adherence and the contexts of study are essential determinants for the findings of a study. These facts, as theorized, suggest that advanced rates of adherence are accomplished with more restricted practices, particularly in circumstances with more resources (such as schooling and income), and not simply as a function of the severity of disease or the population's characteristics, which are age and gender. Such results reinforce the fact that conformity may not be a single definition.[42-46]

CONCLUSIONS

Our study population of patients with T2DM has demonstrated unsatisfactory compliance with drug therapy and glycemic self-control. An improvement with this respect though continuing patient education level. The Patients demonstrated

relatively high awareness (76.16%) of nutritional guidelines in the management of T2DM. The degree of formal education of patients with T2DM greatly affected the assimilation of the healthcare providers' knowledge. therefore, closely related to how much knowledge an individual was able to understand and recall.

Recommendation

The current study can be useful for preparing health policies and patient care programs. It would be wise to concentrate on quality improvements in regions of the world where adherence is unsatisfactory for diabetic patients. The reliability and validity of compliance measures should be addressed; for future patient adherence research, the systematic analysis of functional and methodological approaches should be recommended. Additionally, awareness of the need for patients with T2DM to maintain the periods when one eats their meals (meal timings) as well as eating snacks between main meals to avoid hypoglycemic.

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