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Dietary and Nutritional Practices among Jordanian Patients with Type 1 and Type 2 Diabetes

Besher A. Gharaibeh, RN, PhD^{1*}

¹ Faculty of Nursing, Jordan University of Science and Technology, Irbid, Jordan. * Corresponding Author:
Email: bagharaibeh@just.edu.jo

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ABSTRACT

Background: Assessment of dietary practices for patients with diabetes is essential and should be conducted in an iterative process. **Purpose:** The aim of this study is to assess the dietary practices of Jordanian patients with type 1 and type 2 diabetes and to assess the effect of socio-demographic characteristics on these practices. **Methods:** A cross-sectional descriptive study was done using a sample of 310 participants. Data regarding the dietary practices was collected using items that were selected based on literature consensus and empirical works. Eligible patients were screened for inclusion criteria, then invited to participate in the study during their clinic's visit. Participants were instructed to complete and return filled questionnaires to the RAs. Descriptive statistics and regression analysis were done to assess for relationships between the study variables. **Results:** The majority of the sample did not receive sufficient training (n=181; 60%). 40.6%(n=126) reported following an unhealthy diet more often than a healthy diet. Regression analysis showed that the level of education significantly ((F=33.4; p<0.001) and positively impacted those practices (B=2.2; p<0.01). Females, younger patients and those using traditional therapy tend to do the wrong dietary practices more frequently than their counterparts (B= -7.322; -0.2; -7.8; p <0.01, respectively). **Conclusion:** Patients should be encouraged to seek proper diabetes training, as this training may boost their adherence to do the right dietary practices. Addressing dietary and nutritional behaviors might be beneficial over measuring a global adherence score, because patient's practices may vary over time. **Implications for Nursing:** Nurses should repetitively assess dietary practices, as these practices might not be consistent over time. Further research is needed to explore self-care agency governing decisions and actions that predispose unhealthy dietary practices.

Keywords: Diabetes, Diet, Medical nutrition therapy, Practices.

What does this paper add?

1. This paper explored dietary practices of diabetic patients and exposed the tendency of the patients to not to commit to the healthy diet.
2. Seeking proper nutritional training is lacking among patients with diabetes.
3. More effort needs to be invested in diabetic patient education and support to promote better adherence.
4. Addressing individual dietary behaviors might be beneficial over measuring a global adherence score.

5. Seeking traditional therapy seems to worsen patients' self-care agency and further research in this regard is needed.

Introduction

Diabetes mellitus is a chronic condition that is prevalent around the world and is considered a leading cause of mortality, morbidity and health expenditure (Khan et al., 2020). In Jordan, the overall age-standardized prevalence rate of diabetes is increasing

and, in 2017, had reached about 23.7% of the population (Ajloni et al., 2017). *Diabetes mellitus* is characterized by hyperglycemia due to insulin deficiency, impaired insulin secretion or insulin resistance. Patients with diabetes may develop acute or chronic complications that can lead to substantial suffering and health costs (ADA, 2022).

Nutrition is considered an essential factor in both diabetes risk and management. Nutrition plays a significant role in the development of the metabolic syndrome that may cause insulin resistance and impairment in glucose metabolism (Regufe et al., 2020). On the other hand, medical nutritional therapy for diabetes is an integral part of diabetes management and glycemic control that can significantly reduce the risk of diabetes complications and improve health outcomes for patients (ADA, 2022).

American Diabetes Association (2019) formulated a consensus report that aimed at providing evidence-based guidelines for nutrition therapy for patients with diabetes. In this report, they stated that the quality of diabetes care is a direct product of efficient and effective nutrition therapy and that nutrition therapy helps in maintaining proper glycemic control, achieving weight control goals and reducing the risks of diabetes complications. Thus, nutrition assessment is fundamental in the overall diabetes management plan. In addition, frequent nutrition assessment is needed, especially, as diabetes affects a broad spectrum of people varying in cultural backgrounds, personal preferences, socio-demographic characteristics and co-morbid conditions (Evert et al., 2019).

Because many factors affect the efficiency of medical nutrition therapy in patients with diabetes, current recommendations address the need to conduct a frequent and individualized nutritional assessment within the different populations. For example, there has been an ongoing effort in Japan to address the nutritional practices and therapy for patients with diabetes. This effort resulted in publishing an individualized report regarding clinical practices' guidelines for the Japanese people (Araki et al., 2020). Similar efforts were also seen in the United Kingdom (Dyson et al., 2018) and China (Jia et al., 2019).

Assessment of population nutritional and dietary practices was addressed by Hill-Briggs et al. (2021) in their scientific review. They stated that the assessment of diet relevant to population warrants rigorous

evaluation. They also indicated that food environment (which is defined as the environmental factors that affect the patients' diet, such as the presence of food and food services) can affect food and dietary choices. Such nutritional assessment studies are still needed, especially that precision nutrition and nutrigenomics studies still face serious challenges because of lack of evidence regarding their efficacy and because of high cost.

In summary, dietary practices and nutritional therapy for patients with diabetes are a complex matter. Also, the assessment of dietary practices among different populations in an iterative process is very essential to provide a comprehensive understanding about these practices. This can lead to improving strategies that promote adherence and reduce risks of complications and costs of management. So, this study aimed at assessing the dietary and nutritional practices among Jordanian patients with type 1 and type 2 diabetes and to assess the factors that can influence these practices.

Methods

Design

A cross-sectional descriptive design was used to assess the dietary and nutritional practices and to assess the factors that can influence these practices.

Setting

The participants were recruited from different main and central governmental hospitals (1 hospital) and university/educational hospitals (2 hospitals) in two key cities in Jordan. All these hospitals are regulated and governed by the Ministry of Health (MOH) in Jordan. Those selected hospitals provide health care services to hundreds of patients per day. Participant recruitment and data collection were done during the scheduled visits to the outpatient clinics in the corresponding hospitals. Those clinics included endocrine, internal medicine, diabetes, vascular surgery (e.g. cathlab) and cardiovascular clinics. These clinics provide health care for patients with diabetes or patients with diabetes complications. Approximately, those clinics receive between 100 and 150 patients per day, most of whom have diabetes.

Sample and Sampling Technique

A convenience sampling technique was used to recruit patients with diabetes for this study. Participants from the targeted population of those with diabetes were

approached during their clinical visits to their corresponding governmental hospitals in Jordan. Eligibility criteria included: being of Jordanian nationality, being adult diabetic patients (age ≥ 18 years), having no diagnosis of cognitive impairment and being able to understand Arabic. Exclusion criteria included being dependent on enteral or parenteral feeding.

G* power software was used to calculate the total sample size needed for this study. Parameters used were as follows: an alpha level of 0.05, a power level of 0.95 and an effect size of 0.15 for multiple regression analysis. The needed sample size was estimated at 290 participants. 20 extra cases were added to the sample size to overcome the problems of attrition or incomplete questionnaires. Thus, the final sample recruited consisted of 310 participants.

Data Collection Procedure

The process of data collection began after receiving the approval from the research ethics committee and from the Institution Review Board (IRB) at Jordan University of Science and Technology. The required permissions and approval from the Ministry of Health were also obtained. Because the instrument was a translated version, pilot testing was done to check for difficulties in reading or understanding the questionnaire and its items. This piloting was done using ten completed questionnaires. Pilot testing revealed the presence of no issues regarding the understandability of the questions, data collection process, coding and data analysis. No edits were needed after pilot testing. Those ten questionnaires were not included in the final sample that was used to conduct the study.

Research assistants were recruited for data collection. RAs received a training regarding data collection strategy and maintaining participants' rights. Also, RAs were instructed to clarify any ambiguity regarding the items if expressed by the participants. The RAs approached the patients during their visits to their aforementioned outpatient clinics. Participants were initially screened for meeting the inclusion criteria, then they were asked to participate in the study. Those who agreed to participate received a brief description about the study and then were given a questionnaire package that included the questionnaire and the cover letter. Participants were encouraged to complete the questionnaire and return it directly to the waiting

research assistant (RA). The estimated time to complete the questionnaire and return it was between 10 and 15 minutes.

Instrument

To measure the study variables, a structured questionnaire was prepared. A package was prepared containing questions that assess the socio-demographic characteristics of the participant as well as questions to assess the dietary and nutritional practices of the participant. Those questions were selected based on their relevance to the aspect of medical nutritional therapy of diabetes. Those items were based on the American Diabetes Association (ADA) recommendations for dietary practices, the American Association of Diabetes Educators (AADE) current recommendations for diabetic diet and nutritional behaviors and other empirical works. The items that were selected to represent and assess dietary and nutritional practices included 16 items that cover the aspects of dietary choices, nutritional behaviors, measurements and follow-up and nutritional therapy training.

The items that were adopted from the literature were translated into Arabic. The translation technique followed the recommendations of the World Health Organization (WHO) for translation and adaptation of instruments to produce a different version in a new language. The translation and back-translation processes were performed by a team of two PhD prepared nurses, a physician and two Arabic/English experts. Those experts expressed face validity of the resulting items. Then, the resulting translated items were pilot tested and administered to 10 patients with diabetes to evaluate how well the questionnaire meets the expectations and whether there were instances of confusion. Those 10 subjects were not included in the final analyses for the study. The items were presented in the questionnaire according to a Likert-type scale that ranges from 0 to 5, where 0 = strongly disagree, 1= disagree, 2= somehow disagree, 3 = somehow agree 4 = agree and 5=strongly agree. Cronbach's alpha for the developed questionnaire was (0.949). the mean of the inter-item correlations was (0.61), supporting the reliability and validity of the scale.

The 16 items that consisted the questionnaire contained 4 questions regarding attending dietary and nutritional training and 12 items that addressed

behaviors related to dietary and nutritional practices. The four questions regarding attending a training were answered using yes-no answers. Those 4 questions were included in the questionnaire, because responses on those questions would indicate the patient's practice of seeking a training and his/her interest to learn the right practices. Also, those 4 items represent complex skills and thus, having no training would necessarily mean not performing/correctly performing that corresponding skill and practice.

Meanwhile, the remaining 12 items to assess the practices were positively stated, so that understanding those items is easier for the patients with no possibility

for confusion and miscoding. Higher responses on those items indicated higher frequencies of doing that practice. A score of 3 or more indicates more likelihood to adhere to the corresponding proper dietary or nutritional practice. The scale had a range of possible scores between 0 and 60.

Demographic data was collected using socio-demographic questions that were added to a sheet that was attached to the main questionnaire. In addition, other questions were added regarding family, presence of comorbid conditions or complications and seeking and attending diabetes training workshops (See Table 1 for the measured demographics).

Table 1. The socio-demographic characteristics of the sample

Variables	Range	M (SD)	N	%
Age (years)	28.00-78.00	55.85 (12.12)	310	100.00
Duration of disease	1-43 years	08.85 (4.85.12)	310	100.00
Number of complications	0-7	2.53(1.70)	310	100
No complications			33	10.6
Complications present			277	89.4
Heart complications			232	74.8
HTN/ vascular complications			202	65.2
Kidney diseases			50	16.1
Neurological complications			26	8.4
Eye complications			28	9.0
Dental complications			21	6.8
Diabetic foot			26	8.4
Gender				
<i>Male</i>			176	56.80
<i>Female</i>			134	43.20
Marital status				
<i>Married</i>			243	78.4
<i>Not married</i>			67	21.6
Using herbal/ traditional therapy				
<i>No</i>			243	87.4
<i>Yes</i>			67	21.6
Type of diabetes				
<i>Type 1</i>			150	48.3
<i>Type 2</i>			160	51.7
Level of education				
High school or lower			140	45.1
Diploma			60	19.4
Bachelor degree			105	33.9
Higher degrees			5	1.6

Type of medical therapy		
Insulin injection only	110	35.5
Insulin injection and tablets	200	64.5
Whether or not the participant has a high blood cholesterol level (hypercholesterolemia)		
Yes	133	42.9
No	177	57.1
Whether or not the participant drinks alcohol		
Yes	5	1.6
No	305	98.4

Ethical Considerations

This study was reviewed and approved by the ethical committees both in Jordan University of Science and Technology (JUST) and the Ministry of Health (MOH). Those who agreed to take part in the study received and signed a consent form. Data collection process and data analysis were done using a coding technique that protected patients' confidentiality. All participants were informed about their rights during and after conducting this research study. Participation in this study was completely voluntary and held no harm or penalties to those who participated or those who withdrew. The completed questionnaires and data were handled based on the Human Subject Committee's regulations.

Data Analysis

Statistical Package for Social Sciences (SPSS), version 22 was used to analyze the data. Descriptive statistics, such as means and standard deviations (SDs), frequencies and percent ages, were used to describe the sample characteristics. Furthermore, linear multiple regression analysis was done to identify the socio-demographic factors that significantly influenced patients' practices regarding the dietary and nutritional therapy. P-value was set at (0.05).

Results

Sample Characteristics

A total of 310 participants were recruited for this study using convenience sampling technique. The socio-demographic characteristics are shown in Table 1. The sample consisted of approximately equal numbers of males and females (n= 176 (56.8%) and n= 134 (43.2%), respectively). About one third of the sample used insulin

injection only (n= 110 (35.5%)) as their medical management strategy. The majority of the sample had at least one diabetic complication (n=277 (89.4%)) and about one fifth of the participants reported using traditional therapy in conjunction with their formal medical management plan (n=67 (21.6%)). The participants were asked questions regarding alcohol consumption and regarding the results of their blood cholesterol levels, because these two conditions have direct relationships with healthy dietary and nutritional practices. Very few reported consuming alcohol. Meanwhile, about a half of the sample reported detecting high levels of cholesterol in their blood (n= 133 (42.9%)).

The Dietary and Nutritional Practices of the Jordanian Patients with Diabetes

Several questions were used to assess the participants' dietary and nutritional practices and behaviors. Some of those questions were regarding patients' involvement and attending educational sessions regarding proper diabetic diet and medical nutrition therapy. About a quarter of the sample reported attending no training programs regarding dietary and nutritional therapy for diabetes (i.e., those who answered "no" for all the 4 questions examining involvement and attending educational sessions) dietary training (n=80). Only one sixth of the sample reported attending a dietary and nutritional training (i.e., those who answered "yes" for all the 4 aforementioned questions) (n=49; 15.8%). More than a half of the sample reported attending some training regarding diabetic diet (n=181; 60%) (See Table 2).

Table 2. Participants' responses about attending training programs regarding proper dietary and nutritional practices and behaviors

Item	Response		Frequency	Percent	Valid percent	Cumulative percent
Do you have training for meal planning?	Valid	No	142	45.8	45.8	45.8
		Yes	168	54.2	54.2	100.0
		Total	310	100.0	100.0	
Do you have training for reading food labels?	Valid	No	173	55.8	55.8	55.8
		Yes	137	44.2	44.2	100.0
		Total	310	100.0	100.0	
Do you have training for selecting healthy foods?	Valid	No	174	56.1	56.1	56.1
		Yes	136	43.9	43.9	100.0
		Total	310	100.0	100.0	
Do you have training for preparing and setting food serving sizes?	Valid	No	192	61.9	61.9	61.9
		Yes	118	38.1	38.1	100.0
		Total	310	100.0	100.0	

Meanwhile, 12 items were used to assess the dietary and nutritional practices. Each one of those items represented a distinctive practice. The average for the total scores of those 12 items was (35.16; SD=14.67). The analyses showed that all participants scored at least one "zero" (the lowest possible score on the item) on those 12 items. Also, the analyses showed the presence of a negative trend among the study sample, where a substantial percent reported not doing the correct dietary and nutritional practices all the time regarding the given

practice in the questions. For example, 40.6 % (n=126) selected either strongly disagree, disagree or somehow disagree for their answers. The practice of "reading the food labels" was the least performed practice, where 43.5% (n=135) reported not doing this practice or less frequently doing it. No participant reported doing all the right practices all the time. Table (3) shows the participants' responses on each of the corresponding dietary and nutritional practices.

Table 3. Dietary and nutritional practices of Jordanian patients with diabetes

Item	Response	Frequency	Percent	Cumulative percent
I always select the right food choices for me. Mean (SD)= 2.69 (0.072)	Strongly disagree	22	7.1	7.1
	disagree	28	9.0	16.1
	Somehow disagree	76	24.5	40.6
	Somehow agree	102	32.9	73.5
	agree	64	20.6	94.2
	Strongly agree	18	5.8	100.0
	Total	310		
I adhere on my dietary plan even when the people around me do not know I am diabetic. Mean (SD)=2.96 (0.74)	Strongly disagree	15	4.8	4.8
	disagree	30	9.7	14.5
	Somehow disagree	63	20.3	34.8
	Somehow agree	71	22.9	57.7
	agree	108	34.8	92.6
	Strongly agree	23	7.4	100.0
	Total	310		
	Strongly disagree	14	4.5	4.5

I adhere to my dietary plan even when I am attending a party. Mean (SD)= 3.03 (0.076)	disagree	30	9.7	14.2
	Somehow disagree	58	18.7	32.9
	Somehow agree	81	26.1	59.0
	agree	87	28.1	87.1
	Strongly agree	40	12.9	100.0
	Total	310		
I continue to limit my intake of carbohydrates all the times. Mean (SD)= 3.04 (0.076)	Strongly disagree	12	3.8	3.5
	disagree	36	11.6	14.9
	Somehow disagree	61	19.7	34.6
	Somehow agree	68	21.9	56.6
	agree	95	30.6	87.4
	Strongly agree	39	12.6	100.0
	Total	310		
I always eat foods that are low in fats and cholesterol. Mean (SD)= 3.07 (0.082)	Strongly disagree	18	5.8	5.8
	disagree	32	10.3	16.1
	Somehow disagree	56	18.1	34.2
	Somehow agree	62	20.0	54.2
	agree	89	28.7	82.9
	Strongly agree	53	17.1	100.0
	Total	310		
I adhere to my allowed food portion sizes at every meal. Mean (SD)= 3.04 (0.084)	Strongly disagree	21	6.8	6.8
	disagree	33	10.6	17.4
	Somehow disagree	53	17.1	34.5
	Somehow agree	64	20.6	55.2
	agree	86	27.7	82.9
	Strongly agree	53	17.1	100.0
	Total	310		
I adjust my food choices and portion sizes depending on the results of my blood sugar tests. Mean (SD)= 3.03 (0.089)	Strongly disagree	23	7.4	7.4
	disagree	46	14.8	21.7
	Somehow disagree	45	14.5	36.2
	Somehow agree	53	17.1	53.4
	agree	82	26.5	79.9
	Strongly agree	62	20.0	100.0
	Total	310		
I stop eating when I feel full. Mean (SD)= 3.05 (0.091)	Strongly disagree	23	7.4	7.4
	disagree	49	15.8	23.2
	Somehow disagree	35	11.3	34.5
	Somehow agree	54	17.4	51.9
	agree	82	26.5	78.4
	Strongly agree	67	21.6	100.0
	Total	310		
I drink a lot of sugar-free fluids every day. Mean (SD)= 3.03 (0.096)	Strongly disagree	26	8.4	8.4
	disagree	55	17.7	26.1
	Somehow disagree	36	11.6	37.7
	Somehow agree	40	12.9	50.6

	agree	75	24.2	74.8
	Strongly agree	78	25.2	100.0
	Total	310		
I always read food labels on the packaged food. Mean (SD)= 2.85 (0.099)	Strongly disagree	35	11.3	11.3
	disagree	56	18.1	29.4
	Somehow disagree	44	14.2	43.5
	Somehow agree	30	9.7	53.2
	agree	76	24.5	77.7
	Strongly agree	69	22.3	100.0
	Total	310		
I check my body weight on a regular basis and frequently. Mean (SD)= 2.71 (0.093)	Strongly disagree	34	11.0	11.0
	disagree	65	21.0	31.9
	Somehow disagree	34	11.0	42.9
	Somehow agree	43	13.9	56.8
	agree	95	30.6	87.4
	Strongly agree	39	12.6	100.0
	Total	310		
I have my blood cholesterol level checked at least once a year. Mean (SD)= 2.76 (0.103)	Strongly disagree	47	15.2	15.2
	disagree	61	19.7	34.8
	Somehow disagree	25	8.1	42.9
	Somehow agree	33	10.6	53.5
	agree	77	24.8	78.4
	Strongly agree	67	21.6	100.0
	Total	310		

Factors That Influence Dietary and Nutritional Practices

To assess the factors that affect dietary and nutritional practices, linear multiple regression analysis was done. A global score of the practices was calculated by summing the responses on the scale for all the 12 items that represented the practices among the study participants (mean=35.16; SD=14.67). Then, linear regression test was conducted using this global score of practices as a dependent factor and entering selected socio-demographic factors as independent factors. The resulting regression model was significant ($F=33.4$; $p<0.001$) and accounted for about 44% of the variability of the global practice score ($R\text{-square} = 0.44$).

The selected socio-demographic characteristics that

were entered in the regression model included age, gender, type of diabetes, duration of having diabetes, level of education, type of medication therapy and using traditional therapy for diabetes. See Table (4) for the regression results. Results showed that younger patients tended not to adhere as often as older patients to their planned dietary and nutritional therapy ($B=-0.201$; $p<0.01$). Also, female patients ($B=-7.322$; $p<0.01$) and those who use traditional therapies ($B=-7.803$; $p<0.01$) tended not to adhere to the therapeutic practices. On the other hand, the level of education ($B=2.212$) showed a positive influence on those dietary and nutritional practices. Meanwhile, type of diabetes, duration of having diabetes and type of medication therapy did not significantly affect dietary and nutritional practices.

Table 4. The regression model representing the effect of socio-demographic factors on dietary and nutritional practices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	62.561	6.939		9.016	0.000
	Age	-0.201	0.059	-0.177	-3.444	0.001
	Gender	-7.322	1.546	-0.246	-4.735	0.000
	Type of diabetes	-0.966	1.530	-0.033	-0.631	0.528
	Duration of having diabetes	-0.077	0.140	-0.025	-0.547	0.585
	Level of education	2.212	0.638	0.201	3.464	0.001
	Type of medication therapy	-2.682	1.595	-0.087	-1.682	0.094
	Using traditional therapies	-7.803	1.719	-0.219	-4.539	0.000
a. Dependent Variable: dietary practices.						

Discussion

This study aimed at assessing the dietary and nutritional practices of Jordanian patients with diabetes and to identify the socio-demographic characteristics that affect these practices. This study showed that patients with diabetes do poor dietary practices frequently and in some cases, these poor dietary practices are part of their usual dietary behavior. Out of the 12 assessed dietary practices, the general trend in participants' answers was that around a half of the time they did not adhere to the right practices. Unfortunately, no studies were found in Jordan that addressed the dietary and nutritional practices. Studies in Jordan often addressed the adherence to a diet in a total score rather than assessing individual behaviors. Al-Sahouri et al. (2019) conducted a literature review study and reported that the adherence to dietary plans among patients with diabetes in Jordan is often sub-optimal. Their reported findings were congruent with the results of this study. In addition, one systemic review study that addressed the adherence to diabetes therapy in middle-and low-income countries was found. This study by Mogre et al. (2019) reported that the adherence to a proper diabetic diet was measured in two major ways: by calculating the mean score for the number of days the participant performed the proper dietary practices and by calculating the proportions of participants adhering to the recommended practices. Furthermore, the adherence rates were low and often varied widely among studies. These findings support the need to address the different aspects of therapeutic practices in diabetes therapy distinctly and measuring a global score for adherence

may actually represent a mistaken connotation.

Forouhi et al. (2018) discussed several factors that create difficulties in implementing dietary plans and guidelines for patients with diabetes. Those factors included rapid resorting to medical therapy, most healthcare providers are not well trained regarding medical nutritional therapy, talking to patients about diet is time-consuming and most dietary education programs depend mostly on providing printed materials. In our study, those factors might be present within the studied sample. All of the patients in our study receive medications and most of them reported insufficient training. The quality of the training programs, the accessibility to key sources of information and the source of education were not accounted for in this study and may have played a role in having these results and findings.

With regard to receiving training and attending educational programs about right dietary and nutritional practices seemed not to attract the interest of patients with diabetes in Jordan; i.e., the practice of seeking training was unsatisfactory. Momani et al. (2020) conducted a study in Jordan and reported that about three quarters of their sample of patients with diabetes reported receiving diabetes education; however, the majority of those who received education received unstructured and random education. Another study in Jordan by Gharaibeh and Tawalbeh (2018) reported that 59% received formal diabetes education. Our study focused on assessing whether or not the patients attended formal, structured and complex training programs regarding dietary practices. The findings of

our study were congruent with those of Momani et al. and Gharaibeh and Tawalbeh studies. These results regarding attending special training in this study highlight the importance of addressing individual behaviors and practices, especially those related to seeking formal training.

Various factors were found in this study that affected dietary and nutritional practices among the study sample. This study showed that gender, age, educational level and the use of traditional therapy significantly affected the dietary and nutritional practices of our study sample. Searching the available literature in Jordan yielded no studies that addressed the factors that affected dietary practices. A study was found that addressed the adherence in patients with diabetes in Egypt and reported that the main factor that influenced adherence was the level of knowledge regarding their condition (Taha et al., 2016). Also, Gharaibeh and Tawalbeh (2018) found that the educational level positively impacted self-care in diabetes. These findings are congruent with our finding regarding the effect of the level of education. Another study by El-Qudah (2016) reported an inadequate level of diabetes knowledge among women in Amman/Jordan. Our findings are not inconsistent with these findings and further exploration regarding the pathways of influence between the reported affecting factors and dietary practices is needed.

Implications for Nursing

Patient education and support are considered main responsibilities of nurses. Nurses should be involved in strategies that promote behavior modification and adherence to therapy for patients in general and for patients with diabetes in specific. So, this study highlights the need for continuous implementation of training programs to provide better opportunities for patients who seek diabetes training. Also, these training programs should address not only theoretical knowledge, but also behavior modification to promote adherence to healthy dietary and nutritional practices. Moreover, assessing adherence should consider examining individual practices, because calculating a global score of adherence may not be as comprehensive and valid as per addressing practices distinctly. Nurses should continue to encourage patients to seek special

training programs and continue to monitor patients' practices through planned follow-up or through research studies that consider the factors affecting performing these practices.

Conclusion

Assessing individual practices of patients with diabetes regarding their diet and nutrition is considered a cornerstone for improving patients' health outcomes. Patients may adhere to certain dietary and nutritional practices while skipping others. Also, doing certain dietary and nutritional practices might not be consistent all or even most of the time. Knowledge and education positively impact these dietary practices. So, patients should be encouraged to seek proper diabetes education, as this could improve their diabetic health-related outcomes. Proper diabetic education and training should consider the socio-demographic characteristics of the patients. Further exploration and research is needed to understand the process (how) of influence of those characteristics, such as gender and use of traditional therapy.

Limitations

The instrument that was used in this study was developed by the researcher for the purpose of assessing certain dietary practices. The developing process and the translation that was done may have contributed to some confusion. The study design was a cross-sectional descriptive design, which may have introduced threat to the internal and external validity of the findings. Also, convenience sampling can limit the generalizability of the findings.

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Conflict of Interest

No conflict of interest is to be declared by the author.

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