

Factors Influencing Dietary Practice Among Type 2 Diabetic Patients in Bahrain

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Factors Influencing Dietary Practice Among Type 2 Diabetic Patients in Bahrain

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Abstract

Background: Appropriate dietary practice is a basic and an integral part in treating type 2 diabetes mellitus and reducing the development of its complications. It is well documented that improving dietary practice alone without the adherence to other diabetic self-management elements can improve glycemic control and may reduce glycosylated hemoglobin (HbA1c) by 1.0% to 2.0%. However, diabetic patients usually have poor adherence to follow appropriate and long-term dietary practice.

Objectives: To describe factors influencing dietary practice, sources of dietary advice among type 2 diabetic patients in Bahrain and to study the relationship between patients' dietary practice and level of HbA1c.

Methods: A cross-sectional study was carried out in Bahrain during 2011; it included 400 type 2 diabetic patients whom were selected using convenient sample from the diabetic clinics of the primary health care centers. Only the adult patients who attended the clinic at least twice were consented verbally and included in the study.

Results: The majority of the sample was 50 years old with low educational level. Most of them were overweight and obese and had poor HbA1c level (>7%). However, patients had good family support and high motivation to see a dietician and to follow diet regimen if one given. Despite all previous indications to reinforce diabetic self-management education, specifically dietary advices, 21.4% of them denied receiving any dietary advices from any source. For the majority the main source of dietary advice was doctors and only 16.3% received advice from the diabetic nurses. Most of the patients never been referred neither to a dietician nor to a health educator (77.4%, 82.2% respectively). Although, patients had mainly average and good dietary practice; , it may not indicate the actual dietary habits of the studied patients due to some limitations in the study. The two main barriers to dietary regimen as reported; it takes efforts (47%) or being busy (45.8%).

Conclusion: Although the majority of the diabetic patients were poorly controlled, most had average and good dietary practice score. There was positive relationship between the dietary practice and the HbA1c level. The lack of proper professional dietary assessment, follow up and advices by the health care providers are the main influence on dietary practice of type 2 diabetic patients in Bahrain.

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Introduction

Diabetes mellitus is the most common serious metabolic chronic disease. In 2003, 194 million people aged 20 to 79 years worldwide had diabetes, but it is expected to increase to 333 million by 2025, a 72% increase. In 2006, the developing countries accounted for 141 million people with diabetes (72.5%) of the total world.¹ According to the International Diabetes Federation, it is expected that the number of people with diabetes will double in three of the six developing regions: the Middle East and North Africa, South Asia and Sub-Saharan Africa. Type 2 diabetes mellitus accounts for approximately 85 to 95 percent of all diagnosed cases of diabetes and Bahrain is rated one of the six countries of the Middle East and North Africa (MENA) region with the highest prevalence of diabetes. With a prevalence of 14.4%.² According to the 2007 national non-communicable diseases risk factors survey in the Kingdom of Bahrain, the prevalence of hyperglycemia was 13.5% and the impaired glucose tolerance was 12.0%.³

The World Health Organization after studying diabetes-related mortality, disability and the economic burden on the health care system found that diabetes reduces both quality of life and life expectancy and imposes large economic burdens on individuals and on national health care systems. Direct medical costs include resources used to treat the disease and the indirect are those related to loss of productivity caused by morbidity, disability, and premature mortality.¹

Evidence revealed that interventions to achieve good glycemic control in diabetic patients are cost effective method in reducing the morbidity and mortality; however, glycemic control is poor in both developed and developing countries.¹ A Swedish survey in 2005 found that only 34% of the studied type 2 diabetic patients had good glycemic control (HbA1c <7%).⁴ In India the mean level of HbA1c in diabetic patients was 8.9%.⁵ In UAE only 38% of patients had good glycemic control.⁶ While, there are limited data available in the Kingdom of Bahrain regarding reliable figures about the prevalence of uncontrolled type 2 diabetics. A study was done in 2006 showed that only 11.2% of type 2 diabetic patients had controlled HbA1c.⁷ Another study showed comparable data (13.5%).⁸

Glycemic control is achieved by undertaking and sustaining a complex array of self-care behaviours, including four main domains: taking medications, sustaining appropriate dietary practice, engaging in regular exercise and self-monitoring of blood glucose levels.^{9,10} Few studies added other components such as foot care and attending diabetic clinic regularly.¹¹ However, appropriate dietary practice is a basic and integral part in treating diabetes mellitus and can reduce the development of disease complications by improving risk profiles.⁶ It is well known that improving dietary practice alone can improve glycemic control through reducing glycosylated hemoglobin (HbA1c) by an absolute 1.0 to 2.0% with the greatest impact at the initial stages of diabetes; and its effects are apparent after 6 to 12 weeks of initiation. In fact, when dietary practice and other self-care behaviours are improved together, clinical and metabolic outcomes improve significantly.¹²

Dietary practice refers to patients' choices in food consumption based on diabetes nutrition education that emphasizes on intake of; lower fat, higher fibre, lower sodium and food that have health-promoting properties such as omega-3 fatty acid rich fish, soy products, fresh or frozen fruits and vegetable.¹³

Dietary practice assessment in type 2 diabetic patients should involve a thorough evaluation of the following: the usual eating pattern i.e. type and amount of food and beverages consumed, times of eating including meal and snack distribution throughout the day, current energy, macronutrient and micronutrient intake. It also includes, weight history, Body Mass Index (BMI)

and target weight, food, nutrition and diabetes knowledge, history of diets followed in the past and success attained, food preparation and handling skills, food preparation facilities, food allergies, intolerances, and personal food preferences, food insecurity, cultural, ethnic, socioeconomic considerations, current method of coordinating eating and glycemic control, review the results of self monitoring of blood glucose and client readiness for change and client's personal priorities.¹⁴

Numerous studies, worldwide, were done to assess the adherence to diet regimen as part of diabetes self-management. Most of these studies found that there is difficulty in adherence to diabetic diet regimen.¹⁵ As part of large scale research project, personal and interpersonal factors potentially related to adherence to diabetic diet regimen were explored, it was found that diabetics' dietary practice is influenced by psycho-socioeconomic factors, ranging from proximal factors such as perceived barriers and personal challenges from family and friends, to more distal factors including health care team, work site, organizational and community barriers.^{15,16} In the Arab countries, the changes in lifestyle and dietary habits as well as insufficient and ineffective programs to prevent and control nutrition-related diseases are associated with non-communicable diseases and their complications.¹⁷

The aim of this study is to describe factors influencing dietary practice among type 2 diabetic patients attending the diabetic clinics in Bahrain's primary health care centers. It is also aimed to assess the dietary practice of such patients and the association between patients' dietary practice and their HbA1c level.

Methods

This descriptive cross-sectional study was conducted in five local health centres in the five health regions of Bahrain. Type 2 diabetic patients attending Diabetic/Non Communicable Diseases (NCD) clinic that are available in every primary health care centre in Bahrain were included. These clinics are operated by diabetic nurses with or without family physicians who follow structured guidelines for diabetes care.¹⁸ One health centre was chosen from each health region according to the highest attendance rate of type 2 diabetic patients based on previous Bahrain health statistics and those with opened diabetic/NCD clinic during the period of the study.¹⁹ A convenient sample consisting of Type 2 diabetic patients attended the diabetic/NCD clinics at least two times in 2010 and have the disease for at least one-year duration was taken from all five-health regions in the country.

The study was done during the first two weeks of June 2011. Each patient completed an interviewer-administered questionnaire. The basic demographic and clinical data were collected from the patients' medical records. A total of 400 type 2 diabetic patients representing the five regions were selected.

The study questionnaire was adapted from a previous research after obtaining author's permission.¹⁰ An Arabic version of the instrument was developed. There were nine domains in the questionnaire; the socio-demographic characteristics; clinical characteristics; the sources of dietary advice; dietary practice assessment; psychosocial factors (family support, motivation, confidence & satisfaction); and barriers to follow diet regimen. The questionnaire was pilot-tested on twenty-five type 2 diabetic patients; the results of the pilot study were not included in the main study. To improve the accuracy of dietary assessment section, the answer of each question was given a score from 0-2 and the total sum given a score from 0-34. The dietary practice was divided into five categories according to the results (0-6 = very poor, 7-13 = poor, 14-20 = average, 21-27 = good, 28-34 = very good). Family support was assessed using 6 questions each was given a score from 0-2 and the total rating was 0-12 (0-3 = poor, 4-8 = average, 9-12 = good). Motivation was assessed using two questions with a score each of 0-2 (willingness to see a dietician/health educator and readiness to follow a diet regimen if given one). For the confidence in controlling the blood sugar, the patients were divided into three groups (not confident, confident to some degree, highly confident). Satisfaction with following diet regimen was also assessed by dividing the patients into three groups (not satisfied, satisfied to some degree, highly satisfied). Barriers to follow diet regimen (the patients are busy which limit their time to improve the dietary practice by following healthy diet regimen, following healthy diet regimen takes effort and difficult to accomplish, the patient forgets how to follow healthy diet regimen, the patient doesn't know if following a healthy diet regimen will help in controlling his/her blood sugar, the patient doesn't understand what to do to improve his/her dietary practice, improving dietary practice by following a healthy diet regimen costs extra money, the patient can not follow a healthy diet regimen because he/she feels depressed/sad/anxious which affects his/her dietary habits and the patient doesn't like to change his/her usual dietary practice). The data were analysed using SPSS v.17. Statistical significance was set at p-value <0.05.

Ethical considerations: Approval of the Technical Research Committee of Primary Health Care of Ministry of Health in Bahrain was granted. Verbal informed consents were taken from all the patients prior to the interview. All the information was dealt with highest level of confidentiality and the questionnaires were destroyed after transferring the information into the software.

Results

Out of the 400 selected type 2 diabetic patients with ages ranging from 27 to 80 years (mean 54.7 + 9.95), 208 (52%) were females. The majority were Bahrainis 340 (85%) and 359 (90%) were married. Most of the participants were not working (housewives 41.3% is this out of the total sample or only out of the females????) and many were illiterate 84 (21%) (Table-1). Their body mass index (BMI) ranged from 19.00 to 65.84 Kg/m² (mean 30.94 + 6.47 Kg/m²) Is this BMI true: please find out how many were having BMI 65.84 if very few then you can take the median and not the mean?????

The majority of the studied patients 313 (78.6%) confirmed receiving dietary advice of whom 41.9% from their doctors. Dieticians, diabetic nurses, health educators and other sources (family, relatives and mass media) were not the main source of the dietary advice. About 21.4% denied receiving any dietary advice from any source and large number were never seen by a dietician [308 (77.4%)] or by a health educator [327 (82.2%)].

The mean duration since the diagnosis of diabetes was reported to be 10.51 + 7.73 years and 72.2% of the sample were on oral hypoglycemic agents with life style modification therapy (Table-2).

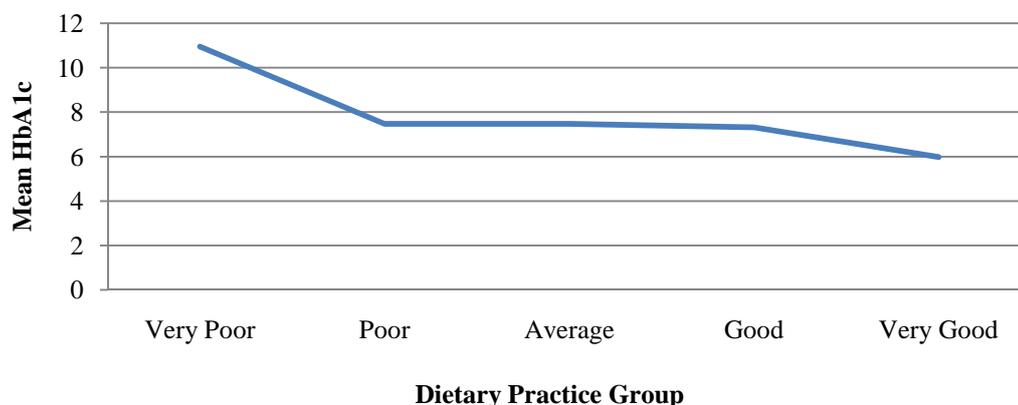
Over half of the Patients who reported good family support (56.5%). The majority of the studied patients were highly motivated 336 (84%) toward following a meal plan and to be seen by a dietician, 169 (42.3%) were highly confident in controlling their blood sugar and 175 (43.8%) of them were satisfied to some degree with following dietary regimen (Table-3).

Although the mean HbA1c level was 7.37 + 2 % (range 3.15% to 13.90%), 53% were poorly controlled. The mean dietary practice score was 19.69 + 4.65 and the majority were having either average or good dietary practice. Statistical analysis showed significant positive relationship between dietary practice and the level of HbA1c (p-value .001) (Figure-1, Table-4) which indicates that as the dietary practice improves so is the HbA1c level.

Many factors such as age, marital status & level of education had a significant relationship with the dietary practice score (p-value .000) (Table-1). This was also, true for BMI (p-value .010). (Table-2), family support (p-value .003), motivation (p-value .008), confidence (p-value .000) and satisfaction (p-value .000) (Table-1,2,3).

Among the other barriers studied, "following diet regimen takes effort" (47%) and "being busy" (45.8%) were the main two perceived obstacles preventing the diabetic patients from following diet regimen" (Table-5).

(Figure-1): The relation between Dietary practice group and HbA1c level



(Table-1) Population demography and their dietary practice score:

		n(%)	Mean dietary practice score \pm SD	95% CI ^a	p-value ^b
Age groups	Less than 40 year old	24(6.0%)	17.54 \pm 6.55	14.68-20.31	.000
	40-49 year old	83(20.8%)	18.51 \pm 4.83	17.45-19.56	
	50-59 year old	174(43.5%)	19.65 \pm 4.37	19.00-20.31	
	60-69 year old	90(22.5%)	20.72 \pm 4.32	19.82-21.63	
	70 year old and above	29(7.3%)	21.86 \pm 3.32	20.60-23.13	
Gender	Male	192(48.0%)	19.69 \pm 4.24	19.09-20.30	.989
	Female	208(52.0%)	19.69 \pm 5.01	19.00-20.37	
Nationality	Bahraini	340(85.0%)	19.50 \pm 4.77	18.99-20.01	0.590
	Non-Bahraini	60(15.0%)	20.73 \pm 3.76	19.76-21.71	
Marital status	Single	11(2.8%)	14.73 \pm 7.21	9.88-19.57	.000
	Married	359(90.0%)	19.78 \pm 4.54	19.31-20.25	
	Separated/Divorced	9(2.3%)	17.78 \pm 3.42	15.15-20.41	
	Widowed	19(4.8%)	21.68 \pm 3.68	19.91-23.46	
Employment status	Employed full-time	126(31.5%)	19.29 \pm 4.78	18.44-20.13	.200
	Employed part-time	9(2.3%)	16.11 \pm 3.37	13.52-18.70	
	Self-employed	5(1.3%)	18.20 \pm 4.49	12.62-23.78	
	Unemployed	5(1.3%)	18.80 \pm 8.41	8.36-29.24	
	Housewife	165(41.3%)	20.26 \pm 4.62	19.54-20.97	
	Retired	78(19.5%)	19.72 \pm 4.29	18.75-20.69	
	Disabled, not able to work	2(0.5%)	21.50 \pm 3.54	-10.27-53.27	
Other	10(2.5%)	19.30 \pm 4.27	16.25-22.35		
Level of education	Illiterate	84(21.0%)	21.54 \pm 3.67	20.74-22.33	.000
	Didn't finish secondary school but able to read and write	126(31.5%)	19.02 \pm 4.55	18.22-19.83	
	Secondary school graduate	123(30.8%)	18.64 \pm 4.68	17.81-19.48	
	College graduate	63(15.8%)	20.57 \pm 5.11	19.29-21.86	
	Post-graduate	3(0.8%)	22.00 \pm 5.20	9.09-34.91	

^a95% Confidence Interval for the mean of dietary practice score

^bp-value between groups significant at the .05 level

(Table-2) Population clinical characteristics and their dietary practice score:

		n(%)	Mean dietary practice score \pm SD	95% CI ^a	p-value ^b
BMI	Normal weight	46(11.7%)	20.28 \pm 5.71	18.59-21.98	.010
	Overweight	153(39.0%)	20.24 \pm 4.31	19.55-20.92	
	Obese Class I	111(28.3%)	19.74 \pm 4.41	18.90-20.57	
	Obese class II	44(11.2%)	18.89 \pm 4.46	17.53-20.24	
	Obese class III	38(9.7%)	17.42 \pm 5.16	15.72-19.12	
Duration of disease	1-5 years	139(34.8%)	19.50 \pm 4.95	18.67-20.33	.154
	6-10 years	99(24.8%)	20.15 \pm 4.60	19.23-21.07	
	11-15 years	67(16.8%)	18.65 \pm 4.41	17.57-19.74	
	16-20 years	50(12.5%)	19.74 \pm 4.85	18.36-21.12	
	More than 20 years	45(11.3%)	20.71 \pm 3.65	19.62-21.81	
Type of treatment	LSM only	14(3.5%)	21.43 \pm 5.26	18.39-24.46	.110
	LSM & OHA	288(72.2%)	19.60 \pm 4.56	19.08-20.13	
	LSM & Insulin injection	20(5.0%)	17.85 \pm 5.60	15.23-20.47	
	LSM & both OHA & Insulin injection	77(19.3%)	20.18 \pm 4.55	19.14-21.22	

^a95% Confidence Interval for the mean of dietary practice score

^bp-value between groups significant at the .05 level

(Table-3) Psycho-social factors and their dietary practice score:

		n(%)	Mean dietary practice score \pm SD	95% CI ^a	p-value ^b
Family support	Poor	11(2.8%)	17.82 \pm 4.49	14.80-20.83	.003
	Average	163(40.8%)	18.87 \pm 5.09	18.08-19.66	
	Good	226(56.5%)	20.37 \pm 4.20	19.82-20.92	
Motivation	Not motivated	13(3.3%)	21.00 \pm 4.64	18.20-23.80	.008
	Motivated to some degree	51(12.8%)	17.82 \pm 4.69	16.54-19.18	
	Highly motivated	336(84.0%)	19.92 \pm 4.59	19.42-20.41	
Confidence	Not confident	81(20.3%)	18.49 \pm 4.80	17.43-19.54	.000
	Confident to some degree	149(37.3%)	18.83 \pm 4.22	18.14-19.51	
	Highly confident	169(42.3%)	21.04 \pm 4.62	20.34-21.75	
Satisfaction	Not satisfied	68(17.0%)	18.13 \pm 4.69	16.99-19.25	.000
	Satisfied to some degree	175(43.8%)	18.96 \pm 4.25	18.33-19.59	
	Highly satisfied	156(39.0%)	21.23 \pm 4.62	20.50-21.96	

^a95% Confidence Interval for the mean of dietary practice score

^bp-value between groups significant at the .05 level

(Table-4) Dietary practice and HbA1c level:

		n(%)	Mean dietary practice score* \pm SD	95% CI ^a	p-value ^b
Dietary practice			19.69 \pm 4.65	19.23-20.15	
		n(%)	Mean HbA1c \pm SD	95% CI ^a	p-value ^b
HbA1c level			7.37 \pm 2	7.17-7.56	
Dietary practice	Very poor	2(0.5%)	10.95 \pm 1.56	-3.03-24.93	.006
	Poor	40(10.0%)	7.46 \pm 1.74	6.90-8.01	
	Average	185(46.4%)	7.46 \pm 1.97	7.17-7.43	
	Good	157(39.3%)	7.31 \pm 2.07	6.98-7.64	
	Very good	15(3.8%)	5.97 \pm 1.36	5.22-6.73	
HbA1c level	Excellent	69(17.3%)			
	Good	42(10.6%)			
	Fair	76(19.1%)			
	Poor	211(53.0%)			

^a95% Confidence Interval for the mean of dietary practice score

^bp-value between groups significant at the .05 level

(Table-5) Barriers to follow diet regimen:

		Mean dietary practice score \pm SD	p-value ^b
Being busy	Yes (45.75%)	18.40 \pm 4.46	.000
	No	20.74 \pm 4.51	
Don't like it	Yes (31.84%)	17.41 \pm 4.39	.000
	No	20.86 \pm 4.46	
Forget how to do it	Yes (25.05%)	18.36 \pm 4.33	.000
	No	20.34 \pm 4.61	
Don't understand what to do	Yes (26.61%)	18.27 \pm 4.44	.000
	No	20.17 \pm 4.65	
It takes efforts	Yes (48.59%)	19.15 \pm 4.62	.011
	No	20.33 \pm 4.45	
Not sure if it helps	Yes (15.32%)	18.44 \pm 4.74	.018
	No	19.99 \pm 4.59	
Sad/depressed/anxious	Yes (34.80%)	19.09 \pm 4.95	.046
	No	20.08 \pm 4.44	
Costs extra many	Yes (31.78%)	19.15 \pm 4.42	.077
	No	20.04 \pm 4.64	

^bp-value between groups significant at the .05 level

Discussion

Several article has studied factors which might influence compliance and adherence to following dietary regimen.^{6,23} These factors included; patients' demographic and psycho-socio-economic characteristics.^{24,25}

Most of the studied patients in this study were found to have either average or good dietary practice. And most, were to have poorly controlled diabetic (HbA1c >7%). This finding is despite the fact that there is a specialized diabetic/NCD clinics available in each health center in Bahrain which are run by trained diabetic nurses and/or family physicians helping in the reduction of the disease morbidity. Such observation, reflects the burden on health care system when developing and implementing new strategies to reach the national standards in diabetes care. There was also significant association between dietary practice and HbA1c level which is consistent with findings of other international and Middle East studies. It was reported in the literature that by improving the dietary practice of diabetic patients, a better control of the HbA1c levels will be achieved.^{6,12}

According to Bahrain and American Diabetes Association's guidelines for the management of diabetes mellitus, all diabetic patients at time of diagnosis, must be provided with an access to a dietitian /nutritionist or other health-care professional trained in the principles of nutrition, whom will offer an initial consultation with a two or three follow-up sessions, individually or in groups.^{22,26} However, it was found that many of the studied diabetic patients did not receive dietary regimen advice from any source since the diagnosis. But many of them had the doctors as the main source of dietary advices which was consistent with other studies.⁶

The health educator is a health care professional that is considered as another source for dietary advices to patients attending the health centers. Health educators in Bahrain are available in most health centers; nonetheless, the majority of the patients in this study denied being seen by any since their diagnosis. Also, the diabetic nurses who follow a strict diabetic guidelines, were assigned to the NCD clinics to assess, observe, monitor the patient's condition and provide intervention on regular basis.²⁵ Diabetic nurses follow a guideline to complete diabetic sheet including giving dietary advices. However, the study found that only few patients had been given dietary advices by the diabetic nurses. These findings indicate that the level of services provided are still below the recommended standards in Bahrain, even after the implementing of the diabetic/NCD clinic services within the primary health care system.

Unlike reported in the literatures, it was found that older age groups had better dietary practice score.²⁹ Possible explanation, is that older patients may have problems recalling their dietary practice hence they tend to over estimate their adherence to diet regimen. Moreover, other factors possibly contributed in improving dietary practice in older age groups such as patients' good family support. Regarding marital status, it was found that singles had the lowest dietary practice score and widowers scored the highest. No clinical relationship were established between the education level and dietary practice despite the findings from previous studies indicating that low level of education leads to inadequate knowledge about diabetes, which might lead to poor self-care practice.²⁸ The reason behind the differences between the results is unclear. Other demographic factors like gender, nationality, and employment status were not significantly associated with dietary practice.

Obesity is a factor that can complicate diabetes management. Evidence showed that weight loss is important to overweight and obese diabetic patients because it improves glycemic control.³⁰

Achieving and maintaining this goal is done by lifestyle modification while, improving dietary practice combined with increased physical activity and behavioural therapy might give better outcomes for a long-term weight reduction. Most of the studied diabetic patients were either overweight or obese which reflects a major health risk requiring attention be given to their dietary practice. The study also, showed an inverse relation between BMI and dietary practice. The duration of disease and type of treatment showed no significant differences between the groups and their mean of dietary practice score.

Based on prior researches done in this field, general psychosocial factors that might influence self-care practice were identified.^{16,17,25} Diabetic patients, who reported good family support, had good dietary practice score. This finding is consistent with other studies as there is abundant evidence that higher levels of social support are related to better long-term self-management and better health outcomes.^{31,32}

Non-motivated patients had good dietary practice. Limited studies were done to assess the relation between the motivation and the dietary practice of diabetic patients. A study that was done to assess the relation between motivation and glycemic control in diabetic patients, found similar unpredicted direction, that is, patients at an earlier motivational stage had lower HbA1C levels than those at later stages.³³ Our patients' confidence in controlling blood sugar and their high level of satisfaction in following their own diet regimen might explain our results. The positive significant association between the confidence in controlling blood sugar and dietary practice score supports the idea. Highly confident diabetic patients have good dietary practice, unlike not-confident patients who had average dietary practice score. The satisfaction level was also found to be significantly associated with dietary practice score. Highly satisfied diabetic patients have good dietary practice score; This finding is consistent with other studies.¹⁷

The literature documented that other barriers affecting diabetes self-management were different according to patients' personal perception. These barriers were studied in different regions and found to be different according to patients' culture.^{16,20,23,34,35} Identifying those barriers in our region may help to overcome obstacles in order to improve dietary practice. Eight barriers to follow diet regimen were studied in our research. Diet regimen takes effort and patients being busy to follow it were the main obstacles reported and they were significantly associated with dietary practice score. After highlighting the main two barriers to follow diet regimen, we can suggest that more sensitive and realistic approach should be provided to improve dietary practice.

Conclusion

In conclusion, the majority of the studied patients were having poorly controlled type 2 diabetes mellitus although they obtain high dietary practice score reflecting average and good dietary practice. There was a significant relation between the dietary practice and the level of HbA1c. Lack of professional dietary assessment, follow up, advices, and motivation to type 2 diabetic patients in Kingdom of Bahrain are the main factors that might led to minimal improvement in the patients' dietary practice. Advancing age is a possible factor that might positively influence the dietary practice. Obesity was linked with lower dietary practice score, complicating diabetes self-management. None of the perceived barriers studied had major influence on the diabetic patients in Bahrain except for "diet regimen takes effort & patients being busy" are the main barriers reported and showed significant relation with dietary practice.

Recommendations

Some of the factors that influence the dietary practice and found to be significantly related to patients' dietary practice can be tackled and modified to improve the outcome such as diabetes self-management education. Since the patients' poor comprehension to dietary advices may influence self-care, health care provider should actively assess patients' understanding during education or clinic consultations especially elderly patients or those with limited education dietary workshops with small groups of patients is of great benefit. The media should be more actively involved in educational programs. Multidisciplinary practice should be implemented; tasks should be divided on all health care professionals including family physician, diabetic nurse, dietician/nutritionist and health educator. This study provide a foundation for a future interventional studies to compare patients receiving nutritional counselling in sessions with dietician and the usual diabetic management in controlling HbA1c level to improve disease outcome in the Kingdom of Bahrain.

Study limitations:

The assessment of dietary practices was based on self-reported dietary habits rather than direct observation. This may led under reporting and recall bias that could be a limitation of this study; hence, the interpretation of the results. Assessment of dietary practice was done using general dietary questions and not detailed accurate portion assessment, which may have contributed to under-estimation. Associated co-morbidities and other confounding factors were not studied which might played a role in raising the dietary practice score.

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