

Dietary Knowledge, Attitudes and Practices of Female School Teachers with Diabetes: A Cross-Sectional Study in Jeddah

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Abstract: Background: Affluent diseases are now a health focus in high-income countries with minimal awareness of the disease; as a result, planning effective education programs requires assessment of patients' attitudes about the disease. The objective of this study is to assess the dietary knowledge, attitudes and practices of female school teachers with type 2 diabetes in Jeddah. Methods: A total of 107 female school teachers with diabetes, 23-59 years old, were interviewed at their schools about issues related to their knowledge of diabetes and their attitudes and practices regarding the disease, using a structured questionnaire to guide the interview. Results: The participants had had diabetes for an average of 7.51±6.87 years. Approximately 74% of the participants were diagnosed with type 2 diabetes. Most of the female teachers were overweight (38.3%) or obese (46.7%). The daily food intake of the participants was adequate for 60% of the participants and inadequate for 37% of the participants. Moreover, the results showed that (84.1%) of the teachers in this study had adequate knowledge about the disease, and 57.9% of them maintained good practices; however, they have inadequate knowledge about food eating habits and macronutrients content. In this study, we found that 42% of the female teachers with diabetes were inactive, and almost 60% were active; however, they did not spend enough time exercising each week. Conclusion: Female teachers with diabetes require education to improve their dietary knowledge and increased physical activity to reach a normal weight.

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1. Introduction

Diabetes mellitus is a clinical disorder characterized by elevated blood glucose level. It presents a high burden for individuals as they have to live with it. Diabetes can be found in every country in the world, and without effective prevention and management programs, the burden will continue to increase globally [1]. Type 2 diabetes (T2D) comprises approximately 85% to 95% of all cases of diabetes in high-income countries and could account for an even higher percentage in low- and middle-income countries [1]. T2D is currently a common and serious global health problem; in most countries, this problem has developed alongside rapid cultural and social changes, the aging of the population, increasing urbanization, dietary changes, reduced physical activity and other unhealthy behaviors [1,2]. A total of 366 million people worldwide, or 8.3% of adults, were estimated to have diabetes in 2011. Approximately 80% of these individuals live in low- and middle-income countries. If these trends continue, 552 million people, or one adult in 10, will have diabetes by 2030 [2]. In the Middle East and North Africa (MENA), the percentage of people with diabetes was very high,

approximately 10.8% in 2011, and this rate is projected to increase to 11.5% by 2030 [2].

The significant transition to economic affluence in Saudi Arabia has been associated with changes in dietary patterns and nutritional status. Affluence-related health problems, such as obesity, diabetes, cancer and cardiovascular disease, have increased and are now considered the main public health problems in the Kingdom [3-8]. The most recent estimate indicated that the prevalence of disease was as high as 23.7% among adult citizens [9].

Diabetes being a chronic disease requires lifelong dietary management, regular physical exercise and medication. The success of diabetes management depends largely upon people's compliance with the prescribed management plan. Therefore, the people's behavior is crucial to the successful management of the disease(10).Nevertheless, patient's education is an important element in the management of DM. developing a proper education and awareness program according to the need of the patients group can improve the knowledge of patients and change their attitude.

Knowledge about diabetes mellitus (DM) is limited among those with diabetes throughout the world, as different studies from Iran [11], Karachi [12] and Lahore [13] have shown. In addition, in Saudi Arabia, a variety of studies have shown that diabetic patients have poor knowledge regarding this disease [9, 14-17]. Knowledge about DM can increase early detection and reduce the incidence of complications [18]; thus, educating the patient is essential for preventing complications [19]. Education is likely to be effective if patients' knowledge, attitudes and practices regarding diabetes are assessed in advance [20]. Identifying vulnerable groups and the characteristics of diabetes patients provides useful information for planning effective education program.

Previous studies have found that diabetic patients in Saudi Arabia do not take precautions with regard to diet and exercise [21,22], even though this advice is given routinely by their physicians.

Teachers and students who suffer from chronic diseases and who require intensive care to manage and control their health status need health care facilities at their schools and they are currently not available in public schools in Jeddah. While, primary health care centers in Saudi Arabia provide free education programs for all age groups of DM patients. Therefore, this study focuses on the characteristics, attitudes, practices and dietary knowledge regarding diabetes among female school teachers and seeks to support the health education of this group by allowing them to participate in health care programs directed towards diabetes patients.

There have been many studies (mentioned above) conducted in Saudi Arabia to assess awareness and knowledge about DM and its complications, but there are few studies concerning dietary knowledge and dietary intake and physical activity of female teachers. Therefore, the objective of this paper was to assess the dietary knowledge, attitudes and practices of female school teachers with diabetes in Jeddah, Saudi Arabia.

2. Methods

A cross-sectional descriptive study was conducted over a period of 6 months from December 1, 2011 to May 31, 2012. The study population included female school teachers with diabetes (FDTs) working in the girls education sector in Jeddah, a western province of Saudi Arabia. In total, there were 14,931 female teachers in Jeddah in 2011-2012. All of the required permissions were obtained before the study began from the ministry of education. A total of 121 female teachers personally received a questionnaire and completed all of the questions correctly. Fourteen questionnaires were excluded because of missing data. All of the teachers who were selected for this survey were known to have diabetes

and had been receiving treatment (diet, insulin or oral hyperglycemic drugs (OHD)) for at least three months prior to the study, according to their treatment plan from their physician.

A self-reported paper questionnaire was used to collect data from the participants; this questionnaire included six main sections:

- General characteristics and socioeconomic factors (age, marital status, educational level and monthly income)
- Anthropometric measurements (height in cm, weight in kg), and body mass index (BMI) (weight in kg/height in m²), which was used to verify body weight status. The BMI categories were defined as follows: < 20: underweight; 20-24.9: desirable weight; 25 – 29.9: overweight; 30-40: obesity; and > 40: severe obesity [23].
- A medical history was taken (type of DM, time since diagnosis, family history, type of treatment, complications from DM).
- To assess dietary knowledge, the patients were asked to evaluate seven statements of general nutritional knowledge: three of them were correct, and the remaining items were incorrect. While knowledge total score where computed for each subject by summing up their total score, scores were grouped as poor, fair or good. Moreover, their use of common herbs that traditionally used for the treatment of DM in KSA.
- To determine food intake frequency, the participants were asked to report the quantity and frequency of their daily or weekly food intake. (A full guide to the food measurements used to evaluate food intake was attached to the questionnaire, and food intake was divided into food groups.) Only 61 participants provided full data for this part of the questionnaire, and the remaining participants were excluded. We used the recommended daily allowance of the standard food pyramid to determine whether the participants' daily intake units were approximately adequate less or more, or whether participants' daily intake amounts were consistent with food pyramid goals.. If they met the ranging number of serving units for each of food groups they consider as adequate [24, 25].
- The participants were asked to record the type and duration of their daily or weekly physical activity, and they consider active if they met the requirement of ADA(2002)[26] 30 minutes of moderate physical activity most days / week. The coded data were entered into a personal computer and analyzed using the Statistical Package for Social Science (SPSS) version 19.0.

3. Results

A total of 107 FDTs were included in this study. Their ages ranged from 23 to 59 years (mean 45.3 ± 6.8 years). The participants' general and socioeconomic characteristics are presented in table 1. The patients had diabetes for an average of 7.51 ± 6.87 years; 73.8% of the participants had type 2 diabetes, and 26.2% had type 1 diabetes. Most of the FDTs were overweight (38.3%) or obese (46.7%).

Table 2 shows the types of treatment that were used by the participants: 60.7% of them were using OHD, 16.8% were using insulin and OHD, 9.3% were using insulin and 13.1% were using dietary monitoring alone.

There was a positive family history of diabetes in 85% of the participants, and 63.6% had a positive family history for hypertension. Of the participants, 39.3% suffered from hypertension and 11.2% suffered from cardiovascular diseases. The family histories of diabetes and complications are shown in table 3.

Approximately half of the participants (43.0%) consumed only one snack per day. Table 4 shows the number of meals that were consumed by the FDTs daily. A total of 45.8% of them consumed three meals per day, and 31.8% consumed two meals per day.

The eating practices of the FDTs are shown in table 5. The results show that most of the participants tended to follow good eating practices, with 87.9% limiting fat, 85.0% limiting sugar and 86.0% consuming vegetables and fruits.

Table 6 shows the participants' dietary knowledge about foods that help reduce blood sugar levels. They knew that vegetables, grains, legumes and protein can help to reduce hyperglycemia (85.5%, 70.1%, 27.1%, and 10.3%, respectively). At the same time, a high percentage of the participants (85%) thought that sugary foods help to reduce blood sugar levels. The score of the participants dietary knowledge were as follow: poor 15%, fair 84.1% and good 0.90%.

Table 7 shows the attitudes of the FDTs towards using herbs to treat diabetes. Ginger was used most often by the participants; 49.5% of the participants reported using this herb. Furthermore, 20.6% used *Nigella sativa* (habbasawda), 18.7% used *Mordeumvulgare* (shaer; barley), 15.9% used fenugreek (hulba), and 15% used *Salvia officinalis* (Muramieah).

The data shown in table 8 indicate that nearly two-thirds (or more, in some cases) of the selected group consumed amounts of food that met the daily requirements for each food group: 59.0%, 63.9%, and 72.1% consumed enough foods in meat group,

vegetable group, and fats group, respectively. However, 24.6%-44.3% of the participants consumed less than their recommended daily intake of certain foods, and some (1.6%-4.9%) consumed more than their daily requirements for the food groups.

Tables 9 and 10 show the types of physical activity and the duration of activity per week for the FDTs. Approximately half (42%) of the participants tended to live a sedentary lifestyle, while 43.9% walked, 12.1% used a treadmill and 3.7% performed aerobic exercise. The duration of physical activity for these FDTs was less than 1 hour per week (33.6%).

Table 1. General characteristics of the female teachers with diabetes (n=107)

Characteristics	No.	%
Age group (in years)		
20-29	2	1.9
30-39	14	13.1
40-49	59	55.1
50-59	32	29.9
Marital status		
Single	6	5.6
Married	83	77.6
Divorced	13	12.1
Widowed	5	4.7
Educational level		
Secondary school	16	15
High school	11	10.7
Higher education (graduate and postgraduate)	80	74.7
Total monthly income		
Less than 5.000 SR	1	0.9
5.000 – 9.900 SR	35	32.7
10.000-15.000 SR	44	41.1
15.100-20.000 SR	19	17.8
20.000 and above	8	7.5
BMI		
> 20 (underweight)	-	-
20.1-24.9 (desirable weight)	16	15
25-29.9 (overweight)	41	38.3
30-40 (obesity)	60	46.7
< 40 (severe obesity)	-	-

Table 2. Type of treatment used by female teachers with diabetes (n=107)

Type of treatment	No.	%
Oral hypoglycemic medicine (OHD)	65	60.7
Insulin	10	9.3
Insulin & OHD	18	16.8
Diet only	14	13.1

Table 3. Family history of female teachers with diabetes

Family history	Yes		No	
	no.	%	no.	%
Did any of your family members suffer from diabetes?	91	85	16	15
Did any of your family members suffer from hypertension?	68	63.6	39	36.4
Do you suffer from hypertension?	42	39.3	65	60.7
Do you have any cardiovascular diseases?	12	11.2	95	88.8

Table 4. Number of meals consumed daily by female teachers with diabetes (n=107)

Number of meals consumed per day	Main meals		Snacks	
	no.	%	no.	%
none	-	-	13	12.1
One	20	18.7	46	43.0
Two	34	31.8	40	37.4
Three	49	45.8	4	3.7
Four	4	3.7	4	3.7

Table 5. Eating practices of female teachers with diabetes (n=107)

Practices	Yes		No	
	no.	%	no.	%
Consume whole wheat bread	80	74.8	27	25.2
Consume whole grains only	26	24.3	81	75.7
Consume vegetables and fruits	92	86.0	15	14
Consume low-fat products	70	65.4	37	34.6
Limit sugar	91	85.0	16	15
Limit salt	71	66.4	36	33.6
Limit fat	94	87.9	13	12.1
Limit starchy food	76	71.0	31	29

Table 6. Dietary knowledge of female teachers with diabetes (n=107)

Dietary knowledge	Yes		No	
	no.	%	no.	%
Grains and legumes are rich in fiber.	75	70.1	32	29.9
Vegetables and fruits are rich in fiber.	91	85.5	16	15
Legumes help to reduce hyperglycemia.	29	27.1	78	72.9
Carbohydrates help to reduce hyperglycemia.	3	2.8	104	97.2
Sugary food helps to reduce hyperglycemia.	91	85.0	16	15
Protein helps to reduce hyperglycemia.	11	10.3	96	89.7
Fiber helps to reduce hyperglycemia.	71	66.4	36	33.6

Table 7. Attitudes of female teachers with diabetes toward using herbs (n=107)

Type of herbs	Positive		Negative	
	no.	(%)	no.	(%)
<i>Commiphora myrrha</i> (Murr)	15	14.0	92	86
<i>Aloe vera</i> (Alsaber)	10	9.3	97	90.7
Lupinus (Terminus)	15	14.0	92	86
<i>Mordeumvulgare</i> (Sh'eer) or barley	20	18.7	87	81.3
Fenugreek (Holba)	17	15.9	90	84.1
<i>Nigella sativa</i> (HabbaSawda)	22	20.6	85	79.4
<i>Salvia officinalis</i> (Meramicah)	16	15.0	91	85
<i>BoswelliaCarterii</i> (Leban Dakar)	5	7.5	99	92.5
Baker's Yeast (Kameratalbera)	2	1.9	105	98.1
<i>Securigerasecridaca</i> (Holbatalkael)	2	1.9	105	98.1
Absinthium (Zahratalsheeh)	1	0.9	106	99.11

<i>Broussontiapapyrifera</i> (Waraqaltot)	8	7.5	99	92.5
Grape leaves (Waraqalonab)	3	2.8	104	97.2
<i>Apliniaofficinarum</i> (Zahratakolang)	0	-	107	100
Triticum (Kamh)	9	8.4	98	91.6
Ginger (Zangabiel)	53	49.5	54	50.4

Table 8. Intake frequency of various food groups by female teachers with diabetes (n=61)

Food groups	consumes less than the daily requirement		meets the daily requirement		consumes more than the daily requirement	
	No.	%	No.	%	No.	%
Bread, cereal, rice, pasta group	25	41	35	57.4	1	1.6
Vegetable group	21	34.4	39	63.9	1	1.6
Fruit group	23	37.7	35	57.4	3	4.9
Milk, yogurt, cheese group	27	44.3	32	52.5	2	3.3
Meat, poultry, fish, legumes group	23	37.7	36	59.0	2	3.3
Fats, oils, sweets group	15	24.6	44	72.1	2	3.3
Nuts, chips, etc.	24	39.3	35	57.4	2	3.3

Table 9. Types of physical activity for female teachers with diabetes (n=107).

Type of exercise	no.	%
Walking	44	41.2
Treadmill	13	12.2
Aerobic	4	3.7
Swimming	1	0.93
No activity	45	42.0

Note: The participants were allowed to make more than one selection.

Table 10. Duration of physical activity per week (n=107)

Duration of physical activity per week	no.	%
Less than an hour	36	33.6
One hour	19	17.8
1-2 hours	6	5.6
3-4 hours	1	0.93
No activity	45	42.1

4. Discussion

Despite the importance of diet in the management of DM, diabetic patients are often unaware of its role in ensuring good glycemic control [26]. This study was conducted to determine Dietary knowledge, attitudes and practices of female school teachers with diabetes and to investigate some of the dietary risk factors contributing to type 2 diabetes mellitus.

Based on age group, their ages ranged from 23 till 59 years (mean 45.3±6.8 years). General and socioeconomic characteristics for the participants' are listed in table(1) showing that 73.8% of the participants were type II diabetes, and 26.2% were type I diabetes. According to BMI 38.3% of the FDTs were overweight and 46.7% were obese.

Medication of diabetes varied for FDTs according to the type of treatment which was 60.7%, 16.8%, 9.3% and 13.1% for utilization of OHD, insulin & OHD, insulin only and dietary monitoring only, respectively. Perhaps this particular group has higher severity of disease requiring medication and insulin therapy. These findings were different of those reported by Abahussain and El-Zubier [17], who reported that 41.7% of FDT in Al-Khobar used only OHD, 26.4% used dietary monitoring only and 5.5% used insulin and remainder used both OHD & diet or insulin & diet, which reflect that FDTs in the eastern Al-Khobar Province of Saudi Arabia are more aware of the effectiveness of DM treatment using diet than who in Jeddah.

Regarding family history, it could be noticed that 85% of FDTs had a positive family history for DM and 63.6% for hypertension. These findings were in agreement with Abahussain and El-Zubier [17], who found positive family history in 86% of studied participants. In addition, the same researchers stated that, "Providing education to this sample will certainly be beneficial for all family members suffering from the same disease".

It is documented that during 40 years ago have seen a revival of the utilization of natural medicines in developed countries, and the use of medicinal herbs is still an important aspect of medical treatment in many developing and Third World countries [17, 27-32]. One of the major reasons cited for the increase in the use of natural medicines is the developing of awareness for the side effects of synthetic chemical drugs [33]. The findings in this work coincide with the results of previous studies with respect to this trend [17, 34].

The results of the current study reflected the high prevalence of T2D, which is consistently associated with the high prevalence of obesity in Arab countries [17, 35]. Overweight and obesity rates are especially high in Kuwait, Qatar and Saudi Arabia, especially in 30 to 40 years ago; the rate is between 70 to 85% for male and between 70 and 88% for female [36]. Diabetic females are more likely to be obese than males, also, overweight & obesity tend to aggregate in female diabetic patients [16, 17, 20].

According to Badruddin [20], controlling in obesity and maintaining an ideal body weight are important for glycemic control and preventing complications. Our data showed that there were no matching with the previous guidelines, especially that the evidence listed that 85% of the FDTs were overweight or obese. Our results were in agreement with the results reported by Binhemd [16], who stated that 87.7% of the FDTs in Dammam, Saudi Arabia were obese; suggesting that obesity is a most significant problem among diabetic population. The results of this study focus on the necessity to educate patients the importance of maintaining ideal body weight to assess the complications of obesity.

Skipping one or two meals daily contributes to overweight and obesity, in this concern, Kong *et al.* [37] indicated that skipping meals or fasting can cause an individual to respond more favorably to high-calorie foods and therefore consume more calories overall. The effects of skipping meals on weight gain and the other effects of skipping meals have been well discussed in many studies [38-42].

It is believed that participants in this study misunderstand sugary foods and carbohydrates role in control diabetes because they reported that carbohydrates and sugars help in reducing blood glucose levels which were 2.8% and 85%, respectively. It seems that the FDTs have poor knowledge about dietary management, especially which related to nutrients and their roles in reducing blood glucose levels, although most of them were highly educated. On the other hand, obesity among the studied FDTs could be arise from living a sedentary lifestyle and not consuming a variety of food groups (i.e., consuming foods from certain groups more than others). In addition, it is possible that the recommended daily allowances for American people exceed the daily needs of Saudis. Thus, we need recommended daily allowances for Saudis.

Several studies indicated that physical inactivity plays an important role in the development of T2D [43-46]. Saadia *et al.* [14], in their study which conducted in Al Qassim region, observed that attitudes towards exercise were negatively and exercised only by few people which reached to 35%. However, in our study, approximately 42% of the FDTs were inactive

but 60% were active, while the duration of physical activity for the FDTs was less than 1 hour per week which was 33.6%. Therefore, one recommendation for diabetic patients which related to physical activity that encouragement them to practice 30 min of moderate physical activity during some days of the week [47].

In our study it could be observed that high level of BMI and hypertension are most common in the participants. Effects of low physical activity levels can be noticed among the subjects who had other risk factors, such as high level of BMI, hypertension and diabetes [48].

However, in Saudi Arabia, the prevalence of physical inactivity is extremely occurred and could be high, especially among women, and could be considered among the highest all over the world [49]. In this regard, Al-Rafae and Al-Hazzaa [50] reported that there is a strong association between the high prevalence of physical inactivity in the Saudis and the epidemic of modern chronic diseases and risk factors in Saudi Arabia. Therefore, reducing the proportion of inactive Saudis would have a tremendous impact by lowering the prevalence of lifestyle-related diseases and risk factors, potentially reducing future health care costs in the Kingdom of Saudi Arabia.

Thus, these findings focus on the need of education about basic trends of nutrition, especially which related to the dietary of diabetic patient's needs. Even when the lack of adequate knowledge about human dietary requirements should be encouraged to provide dietary advice and a clear explanation of its role so the patients can understand the advice and follow it in a practice process. These findings also showed the need for dietitians and nutritionists in addition to consultant physicians in diabetes care centers and hospitals to educate patients what are appropriate diets and suitable life style and physical activity.

Conclusion: Female teachers with type 2 diabetes mellitus require sufficient and good dietary knowledge, attitudes and practices and more physical activity to reach a normal weight for certain disease management.

Competing interests

We have no competing interests.

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Authors' contributions

NS designed the study, administered the questionnaire and drafted the manuscript, except for

the materials and methods section. AA participated in designing the questionnaire, collected the data, performed the statistical analysis, and drafted the materials and methods section. All of the authors read and edited the final manuscript.

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