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Research Paper

The Impact of Nutritional Education Program on Knowledge, Attitudes and Practices among Sample of Type 2 Diabetes Patients

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ABSTRACT:

BACKGROUND:

Type 2 diabetes mellitus is a chronic metabolic disorder, characterized by poor glycemic control. Nutritional education enhances knowledge, attitudes, and practices leading to better glycemic control.

OBJECTIVE:

To find out the impact of nutritional education program on knowledge, attitudes and practices of participants regarding the glycemic control in type 2 diabetes mellitus.

METHODOLOGY:

A quasi-experimental study was conducted at Baghdad medical city on 45 patients with Type 2 diabetes mellitus and recruited by non-probability convenience sampling method over three months' duration. Patients were assessed for knowledge, attitudes and practices with structured questionnaire that was derived from previous literatures and validated by expert panel at baseline and after three months during which a five nutritional educational lectures were done.

RESULTS:

After three months of nutritional education there were a significant increase in the mean of knowledge score from 18.25 to 21.63 (P<0.001), attitudes from 13.65 to 17.28 (P<0.001) and practices from 14.15 to 20.13 (P<0.001).

CONCLUSION:

Nutritional education program is effective to enhance the knowledge, attitudes and practices toward diabetes.

KEY WORDS: *type 2 diabetes mellitus, Nutritional education, Knowledge, Attitudes, Practices.*

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INTRODUCTION:

Type 2 diabetes mellitus is a chronic metabolic disorder, characterized by poor glycemic control due to inadequate insulin production and insulin resistance[(1)]. The onset of T2DM is preceded by a decline in insulin secretion, followed by a metabolic disorder due to a rise in insulin resistance[(2)]. Previously referred to as non-insulin-dependent diabetes, and also identified as adult-onset diabetes and make up 90–95% of all diabetes[(3)]. According to the finding of the 9th International Diabetes Federation (IDF) there will be a rise of two folds in the number of diabetic patients in the Middle East and North Africa (MENA) region by the next 20 years[(4)]. According to World Health Organization (WHO); Iraq witnessed epidemiological shift towards increasing non-communicable diseases.

Diabetes is one of these Non-Communicable Diseases with two million diabetes and 14,000 new cases of diabetes screened yearly and the prevalence of 13.9% for both male and female age 18 and above[(5)]. Initial studies suggested a growing prevalence of diabetes, the true extent remains imprecise. Regardless of this shortage, there's strong evidence suggesting a substantial rise in T2DM in latest decades, with estimates extending from 5% in 1978 to almost 19.7% in 2012[(6)]. This is also observed in areas like Kurdistan (North of Iraq) which documented this epidemic of T2DM also[(7)].

The etiology of diabetes is complex. Risk factors like age, genetic, background, insulin resistance, dietary factors, obesity and physical inactivity increase risk[(8)]; also the metabolic syndrome looks related to type 2 diabetes [(9)].

Nutrition and Diabetes: Effective diabetes management, individualized nutrition therapy is crucial. This approach creates a personalized eating plan for each person[10]. Various dietary patterns including the Dietary approach to stop hypertension (DASH) diet, high-fiber diet, Mediterranean diet, very low calorie diet, low-fat diet, and low carbohydrate diet are acceptable for the management of T2DM. Studies have shown that these dietary patterns can significantly improve cardiovascular risk factors and glycemic control in patients with T2DM[11].

Reducing overall carbohydrate consumption for individuals with diabetes has proved evidence for improving glycaemia and may be applied in a variety of eating patterns that meet individual needs and preferences[10]. Irrespective of quantity of carbohydrate in the meal plan, attention must be placed on high-quality, nutrient dense carbohydrate sources that are high in fiber and minimally processed. The consumption of sugar-sweetened beverages and processed food products with huge amounts of refined grains and added sugars should be discouraged as these have the capacity to dislocate healthy food choices[12].

Dietary suggestions for people with T2DM can be summarized by eating a diet rich in whole grains, fruits, vegetables, lean proteins, and healthy fats. Also, calorie counting and portion control can help diabetics in adjusting their blood glucose levels[13]. Generally, the management of T2DM needs an individual nutritional and dietetics plan through guidance of a qualified dietitian or nutritionist, diabetics can make a personalized meal plan, learn about portion control and carbohydrate counting, and continuous support to reach the health objectives[14]. Learning about nutrition is a key part of diabetes education, and it helps people with diabetes eat better and manage their health[15].

In Iraq a non-randomized clinical trial in Erbil, Kurdistan Region revealed that nutritional education programs can help Iraqi patients with type 2 diabetes manage their condition by lowering HbA1c and BMI[16].

Diabetes mellitus can be controlled through improvement in patient's dietary knowledge, attitudes, and practices. Lifestyle adjustments including diet change and physical activity are the first lines of diabetic managements. Awareness about diabetes complications and following improvement in dietary knowledge, attitudes, and practices may lead to better control of the disease. Although progresses in medications and diabetes treatment devices and the importance placed on treatment adherence over the last decade, National Health and Nutrition Examination Survey (NHANES) data showed that 43-45% of patients with diabetes did not reach glycemic targets of HbA1C <7[7]. To improve self-care and quality of life for diabetic patients, healthcare providers should strengthen diabetes education, including dietary management. This will empower patients to better understand their disease and make informed decisions.

Iraq is facing a rise in non-communicating diseases like diabetes and others. While dietitians are ideal for managing diabetes, access to them might be limited and to address this gap, healthcare professionals and community health workers can be trained to provide basic nutrition education as part of non-pharmacological management of this disease.

OBJECTIVES OF THE STUDY:

- To find out the impact of nutritional education program on knowledge, attitudes and practices of participants regarding the glycemic control in T2DM.

PATIENTS AND METHOD:

Study design: A quasi-experimental study design that was carried out from February 2023 to February 2024. The participants were recruited during their daily clinic attendance over a period of two months from at Baghdad Medical city/Internal medicine outpatient clinic.

Sample size and Sampling technique: 45 adult patients with T2DM were approached by a non-probability convenience sampling method to each patient attending the clinic. Participating in the study was completely voluntary. Among these patients, five participants did not finish the study and loss the follow-up and were therefore excluded from the analysis; finally, 40 patients were included in the study .

Inclusion criteria: Patients with T2DM aged between 20 and 70 years willing to participate and available during the study period at least three months, and patients are not pregnant.

Exclusion criteria: T2DM patients with complications or comorbidity (neuropathy, nephropathy, retinopathy, cardio vascular system) and mentally handicapped.

Data Collection: A direct interview was conducted with participants using a structured questionnaire that was derived from previous literatures([17,18]), and validated by three expert panel (Nutritionist, Endocrinologist, Community medicine specialists).

The questionnaire consists of:

1. *Socio-demographics data consist of:*

Age, Gender, Marital status, Education level, Socio-economic status is measured according to this equation :

SES = Education + Occupation + House ownership * 0.5 + Car ownership *0.1 + (age-20)/100 – Retired/unemployed/ deceased[19].

Duration of diabetes per years, if any other family member had diabetes, Participation in formal diabetic education program in the past

2. *Dietary habits and behaviors data consist of: 3 parts*

- (14 knowledge questions)
- (12 attitude questions)
- (12 practice questions). with six questions assessed for knowledge about the nutrition and diabetes, three question about obesity and diabetes, two questions about exercise and diabetes, two questions about diabetes complications, 10 questions about carbohydrate, starch and sugars in diet, eight question about fat and protein, and two question about calories allowed per day.

Scoring: The knowledge, attitude, and practice parts of the questionnaire had three levels of Likert's scores, 0, 1, & 2 (0 for the incorrect answer, 1 for the neutral answer, and 2 for the correct answer).

Calculating and analyzing the scores of the scale

To calculate the score of each participant by application of the following equation[20]:

Overall knowledge score for each participant = the highest possible score is 28 points.

$$\frac{\text{total score (sumation of the scores of all knoweledge questions)}}{\text{highest possible score}} \times 100$$

After that, the level of knowledge for each participant will be divided into 3 levels:

a) Poor knowledge: those who achieved < 50% score.
b) Average knowledge: those who achieved 50-75% score.
c) Good knowledge: those who achieved > 75% score.

Overall attitude score for each participant *= the highest possible score is 24 points.*

$$\frac{\textit{total score (sumation of the scores of all attitude questions)}}{\textit{highest possible score}} \times 100$$

After that, the level of attitude for each participant will be divided into 3 levels:

a) Negative attitude: those who achieved < 50% score.
b) Neutral attitude: those who achieved 50-75% score.
c) Positive attitude: those who achieved > 75% score.

Overall practice score for each participant *= the highest possible score is 24 points.*

$$\frac{\textit{total score (sumation of the scores of all practice questions)}}{\textit{highest possible score}} \times 100$$

After that the level of practice for each participant will be divided into 3 levels:

a) Poor practice: those who achieved < 50% score.
b) Average practice: those who achieved 50-75% score.
c) Good practice: those who achieved > 75% score.

The education program*:* The nutritional education program was developed after reviewing related literatures on nutritional management of T2DM[10,21], and divided into five lectures: Introduction about diabetes and its acute and chronic complications, two lectures on major food component, diet and obesity and their relationship with T2DM, and last lecture identify the modifications of unhealthy food choices for diabetes. All participants were requested to fill the questionnaire to assess their knowledge, attitudes and practices regarding T2DM. All the studied participants were invited to attend the nutritional education lectures and continued the follow-up monitoring for three months. At the end of the nutritional education program all participants were requested refill the same sheet of post-test questionnaire to assess their nutrition education with the program.

Pilot study*:* A pilot study was done on five participants with T2DM, and then those participants were included in the final study. The final outcome of the pilot study showed positive results regarding knowledge, attitude and practices. The purpose for that was to find out the time required to conduct the questionnaire and to test the extent to which the participants understood or comprehended the questions.

Ethical Consideration: Approval of the scientific committee of Family and community medicine department /Al-Kindy College of Medicine, approval of Research and development Center / Ministry of Health/ Iraq and the preliminary approval from the setting of the study (Baghdad
Medical city) were obtained. Written Informed consent was obtained from all individual participants included in the study and all the information obtained from the patients was kept confidential.

Statistical analysis: Data was introduced to SPSS (Statistical Package for Social Sciences) version (24). Parametric data was presented as mean and standard deviation. Categorical data was presented as numbers and percentages. Fisher exact tests were used to analyze qualitative variables, paired T test were used to analyze quantitative variables, and a P-value < 0.05 was considered as discrimination of significance.

RESULTS:

The total study participants were 40 diabetic patients. The highest proportion 37.5% (15) was within the age group (51- 60 years). 30 (75%) were female and overwhelming majority were married 39 (97.5%). The highest proportion of the study participants was with primary education 70.0% (28) and more than two third were housewife 27 (67.5%). The highest proportion 77.5% (31) was with low socio-economic status (SES). As shown in **Table (1)**.

Table 1: Sociodemographic characteristics of the study sample.

Sociodemographic characteristics		N=40	100.0%
Age group	30 - 40 years	7	17.5
	41 - 50 years	13	32.5
	51 - 60 years	15	37.5
	61 - 70 years	5	12.5
Gender	Male	10	25.0
	Female	30	75.0
Marital status	Married	39	97.5
	Divorced	1	2.5
Education	Illiterate	3	7.5
	Primary	28	70.0
	Bachelor	8	20.0
	Higher education	1	2.5
Occupation	Housewife	27	67.5
	Employed	9	22.5
	Retired	4	10.0
SES	Low (SEI < 6)	31	77.5
	Intermediate (SEI 6-10)	8	20.0
	High (SEI > 10)	1	2.5

About half of the study participants 19 (47.5%) were with a diabetes duration between 5-10 years. A positive history of diabetes among other family members was 35 (87.5%). None of the study diabetic patients participated in formal diabetic education programs in the past. As shown in the **Table (2)**.

Table 2: Distribution of study sample according to clinical characteristic

clinical characteristic		N=40	100.0%
Duration of diabetes	< 5 years	14	35.0
	5 - 10 years	19	47.5
	> 10 years	7	17.5
Any other family member with diabetes	Yes	35	87.5
	No	5	12.5
Participation in formal diabetic education programs in the past	Yes	0	0.0
	No	40	100.0

Before nutritional education the highest proportion of the study participants had an average knowledge level of 75% (30), while 18% (7) had a good knowledge level, and 7% (3) had a poor knowledge level. After nutritional education the highest proportion of the study participants had a good knowledge level of 60% (24), while 40% (16) had an average knowledge level, and none had a poor knowledge level. As illustrated in the **Figure (1)**.

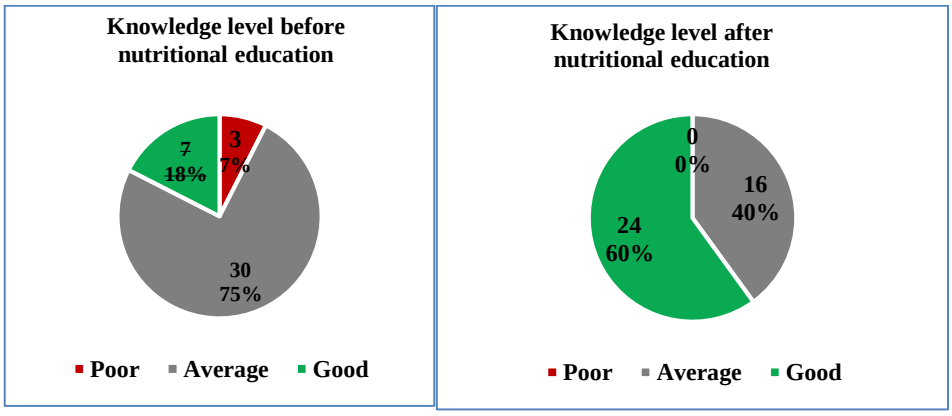

Figure 1: Distribution of the study sample according to their knowledge before and after nutritional education.

Before nutritional education the highest proportion of the study participants had a neutral attitude level of 72% (29), while only 3% (1) had a positive attitude level, and 25% (10) had a negative attitude level. After nutritional education the highest proportion of the study participants had a neutral attitude level of 63% (25), while 35% (14) had a positive attitude level, and only 2% (1) had a negative attitude level. As illustrated in the **Figure (2).**

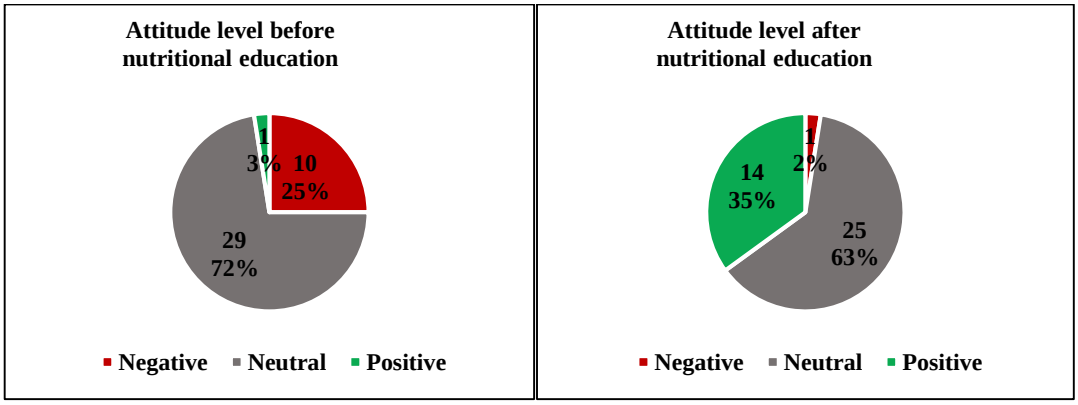

Figure 2: Distribution of the study sample according to their attitude before and after nutritional education

Before nutritional education the highest proportion of the study participants had an average practice level of 65% (26), while 15% (6) had a good practice level, and 20% (8) had a poor practice level. After nutritional education the highest proportion of the study participants had a good practice level of 78% (31), while an average practice level of 22% (9) and none had a poor practice level. As illustrated in the **Figure (3)**.

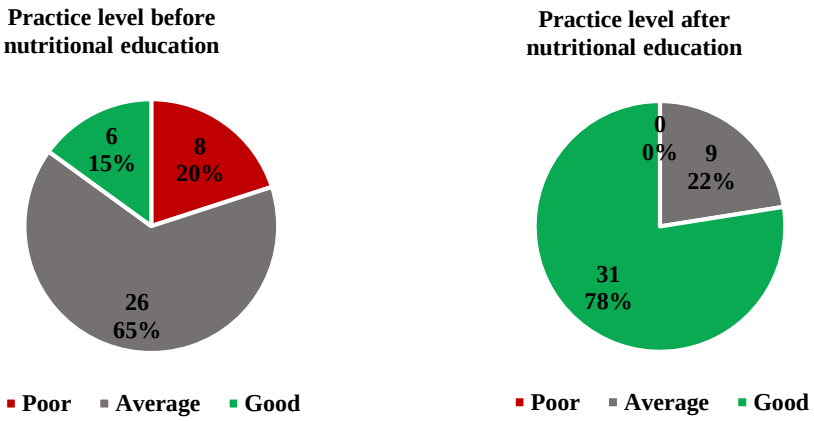

Figure 3: Distribution of the study sample according to their practice before and after nutritional education.

There were a significant differences in the knowledge, attitude, and practice scores of the study participants before and after the nutritional education, a higher knowledge, attitude, and practice scores were after the nutritional education, where the mean of the total knowledge scores before was 18.25 ± 3.272 and after was 21.63 ± 2.382 (P<0.001), the mean of the total attitude scores before was 13.65 ± 2.905 and after was 17.28 ± 2.873 (P<0.001), and the mean of the total practice scores before was 14.15 ± 3.662 and after was 20.13 ± 2.102 (P<0.001). As shown in the **Table (3)**

Table 3: The differences in the Knowledge, Attitude, and Practice before and after nutritional education of participants.

Variable		Mean ± SD	P- value
Total Knowledge score	Before	18.25 ± 3.272	<0.001
	After	21.63 ± 2.382	
	Difference	3.37 ± 3.402	
Total Attitude score	Before	13.65 ± 2.905	<0.001
	After	17.28 ± 2.873	
	Difference	3.62 ± 3.010	
Total Practice score	Before	14.15 ± 3.662	<0.001
	After	20.13 ± 2.102	
	Difference	5.97 ± 3.724	
Paired T test was used and considered significant at P<0.05. The difference in mean represents the (mean after – mean before) nutritional education			

The highest proportion of study participants before nutritional education was with an average knowledge level 75.0% (30), while the highest proportion of study participants after nutritional education was with a good knowledge level of 60.0% (24), P<0.001. The proportion of study participants before nutritional education with a positive attitude level was 2.5% (1), while the proportion of study participants after nutritional education with a positive attitude level was 35.0% (14), P<0.001. The highest proportion of study participants before nutritional education had an average practice level 65.0% (26), while the highest proportion of study participants after nutritional education had a good practice level of 77.5% (31), P<0.001. As shown in **Table (4)**

Table 4: The Knowledge, Attitude, and Practice levels of the study participants before and after nutritional education.

		Before test		After test		
		N.	%	N.	%	
Knowledge level	Poor < 50%	3	7.5	0	0.0	<0.001
	Average 50 - 75 %	30	75.0	16	40.0	
	Good > 75%	7	17.5	24	60.0	
Total		40	100.0	40	100.0	
Attitude level	Negative < 50%	10	25.0	1	2.5	<0.001
	Neutral 50 - 75 %	29	72.5	25	62.5	
	Positive > 75%	1	2.5	14	35.0	
Total		40	100.0	40	100.0	
Practice level	Poor < 50%	8	20.0	0	0.0	<0.001
	Average 50 - 75 %	26	65.0	9	22.5	
	Good > 75%	6	15.0	31	77.5	
Total		40	100.0	40	100.0	
Fisher-exact test was used and considered significant at P<0.05.						

DISCUSSION:

The difference in the Knowledge, Attitude, and Practice before and after nutritional education of participants: After providing five lectures of nutritional education in the current study significant differences in the knowledge, attitude, and practice was shown. The highest proportion of the study participants after health education had a good knowledge level, more than one third of the participant adapted a positive attitude level, and nearly half of the participants had a good practice. A similar studies done in Pakistan and India showed significant increase of the knowledge, attitude and practice in participants from the baseline to the final follow-up[22,23]. Also a study done in India showed that nutritional education program led to significant improvement in knowledge, attitude and practice[24]. A study done in South India showed opposing results and reported that nutritional education program improved knowledge scores but did not change practice and attitude[25]. There are several reasons to explain the different levels of change in knowledge, attitude, and practice after nutritional education. It could be due to variations in study design and the effectiveness of nutritional educational programs can influence these changes, beside that studies may use different questionnaires or assessments to measure knowledge, attitude, and practice levels making direct comparisons difficult and studies with shorter follow-up periods might miss sustained improvements in dietary habits.

CONCLUSION:

The nutritional education program had a positive impact on participants. Their knowledge increased significantly, a more positive attitude towards healthy behaviors, and they adopted healthy practices after the nutritional education compared to before.

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