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Original Article

The effect of educational intervention on improving nutritional literacy of patients with Type 2 Diabetes

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Abstract

The lack or inadequacy of nutrition literacy is known as a major problem and an obstacle to the health of patients with diabetes. This study aims to determine the effect of educational intervention on promoting nutritional literacy in patients with type 2 diabetes. The educational intervention was implemented in 3 sessions (each 90 minutes) for patients in the intervention group. Both groups were followed up 16 weeks after the intervention and completed the Evaluation Instrument of Nutrition Literacy on Adults (EINLA). Data was analyzed by SPSS-21 using a chi-square test, paired t-test, and independent t-test. A statistically significant difference was found between the mean scores of all subsections of EINLA in the intervention and control groups after the educational program, so in all cases, the intervention group was better than the control group ($P<0.05$). There was a significant difference between the mean scores of all subsections of EINLA in the intervention group before and after the education program ($P<0.05$). In contrast, no significant difference was seen between the mean scores of all subsections in the control group before and after the educational program ($P>0.05$). The present study's findings showed that by holding regular and practical training sessions and following up on the status of patients with diabetes, it is possible to improve their nutritional literacy.

Keywords: nutritional literacy, diabetes, education, intervention.

Introduction

Diabetes is an essential public health problem all around the world. Diabetic patients must make decisions about their daily healthcare and manage their disease by taking self-management measures [1]. Therefore, these patients' health literacy (HL) plays a crucial role in controlling their disease [2]. HL generally refers to the individuals' ability to access health information and use it to make proper decisions regarding health maintenance and promotion [3]. Increased health behaviors and promoting access to healthcare are among the outcomes of using HL [4].

Studies have revealed that low HL levels are linked to inadequate glycemic control, insufficient understanding of diabetes, reduced self-management behaviors, and higher healthcare expenses in patients with diabetes [5].

Individuals with type 2 diabetes with low HL levels usually have less knowledge about the disease, lower quality of life, and poorer health-related outcomes. They may also have problems reading prescriptions, following medical instructions, and interacting with the healthcare system [6]. Due to this problem, the inability to perform self-care will result in more use of emergency care, increased hospitalizations, and more severe complications of diabetes [7]. On the other hand, individuals with high HL can show appropriate functioning by using acquired socio-cognitive skills in a new situation via health-related components [8].

Nutritional literacy (NL) is one of the fundamental components of HL, which can be defined as the individuals' ability to obtain, process, and perceive nutritional information and the skills required to make proper nutritional decisions [3]. Understanding the importance of nutrition and healthy dietary behavior is important to prevent and manage many chronic diseases, such as diabetes. NL is a significant and effective factor in dietary habits and is directly related to promoting healthy dietary habits [9]. For patients with diabetes, one of the most crucial steps in controlling their disease is to increase their NL level [10]. One way to achieve this is through training [11]. A recent study examined the effects of training interventions on improving NL in people with type 2 diabetes.

Material and methods

This study evaluated the effectiveness of a training intervention for promoting NL in patients with type 2 diabetes in Andimeshk City, Iran, in 2019. The participants in this research consisted of 90 type 2 diabetic patients under the coverage of two primary healthcare centers, who were divided into two equal groups (intervention and control) by random allocation method using a random number table. The inclusion criteria included age between 30–60 years, disease length for more than 1 year, no history of attending a similar training course, and the ability to participate in training sessions. The exclusion criterion included unwillingness to participate in the study. All patients were informed of the study aims and details, and participation was voluntary. The training program was implemented in the intervention group, which included three 90-minute sessions.

The content provided in these sessions consisted of acquaintance with the concept and basic information of nutrition, NL, the food pyramid and the required amount of each food group, calculation and measurement of portion sizes, reading and perceiving the content of food labels, which were conducted in the form of lectures, group discussion, question and answer, educational video, and posters by nutritionists and health education experts. In this study, the control group received only routine training and care. Data collection tools include (i) a Demographic and Anthropometric Questionnaire and (ii) an Evaluation Instrument of Nutrition Literacy on Adults (EINLA) [12]. EINLA consists of 5 subsections and 35 items. The first subsection included questions on General Nutritional Knowledge (GNK; 10 questions); for example, which of the following is essential for dental health? In the second subsection on Reading Comprehension and Interpretation (RCI; 6 questions), in this part, a short text is presented first, and the person answers the questions related to that text. In the third subsection on Food Groups (FG; 10 questions), in this part, ten pictures related to food are presented, and the person places them in the relevant food group. For example, the fourth subsection on the Portion Sizes (PS; 3 questions) asks how many servings of milk and dairy products should be consumed daily. The fifth subsection on Food Label and Numerical Literacy (FLNL; 6 questions), in part the ability to calculate and evaluate body mass index (BMI) and the ability to calculate the number of calories and other items on a food label, are examined. Each correct answer was given 1 point, and unanswered or wrong response items were given 0 scores. The range of achievable scores was 0–35. The cut-off point in this tool is 24; a score of ≤24 indicates insufficient nutrition literacy, and a score of >25 means sufficient nutrition literacy. Both groups completed the questionnaires before and 16 weeks after the training. Data were analyzed by SPSS-21 using a chi-square test, paired t-test, and independent t-test. The statistically significant level was $\alpha<0.05$.

Results

Ninety individuals were initially included in the study. However, after the training program was implemented, two individuals from the intervention group and one from the control group were excluded from the study. The results revealed no significant difference between the intervention and control groups in terms of age, gender, marital status, type of treatment, education, and diabetes duration, as demonstrated in Table 1.

Based on the findings, prior to the training program, there was no notable distinction between the

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Table 1: Socio-demographic characteristics of the experimental group and control group.

Variables		Experimental group Number (%)	Control group Number (%)	Chi-square
Age (years)	40–44	8 (18.6)	10 (22.7)	0.285
	45–49	12 (27.9)	9 (20.5)	
	50–54	8 (18.6)	11 (25)	
	55–59	15 (34.9)	14 (31.8)	
Gender	Male	22 (51.2)	24 (54.5)	0.338
	Female	21 (48.8)	20 (45.5)	
Marital status	Single	3 (7)	1 (2)	0.781
	Married	40 (93)	43 (98)	
Employment	Yes	22 (51.2)	24 (54.5)	0.163
	No	21 (48.8)	20 (45.5)	
Education	Primary school	24 (55.8)	28 (63.6)	0.851
	High school	15 (34.9)	14 (31.8)	
	Academic	4 (9.3)	2 (4.6)	
Income	Low	16 (37.2)	19 (43)	0.535
	Medium	20 (46.5)	18 (41)	
	High	7 (16.3)	7 (16)	
Duration of diabetes (years)	1–5	23 (53.5)	26 (59)	0.614
	>5	20 (46.5)	18 (41)	

intervention and control groups and the NL average score and its corresponding subcategories. However, significant differences were observed in all variables mentioned between the two groups following the training program. Additionally, there was a significant increase in the NL score for the intervention group after the training program implementation compared to before (Table 2).

Discussion

The present research aimed to determine the effect of training intervention on NL in patients with type 2 diabetes. The present study's results revealed the training program's effectiveness in promoting the NL level in patients with type 2 diabetes in the intervention group. In this study, the total NL scores of both groups

Table 2: Comparisons of the study variables in the experimental group and control group before and after the intervention.

Variable	Group	Baseline	After	Paired t-test
GNK	Intervention group	6.52±1.68	8.86±0.82	p<0.001
	Control group	6.63±1.50	6.70±1.29	0.622
	t-test	0.531	p<0.001	
RCI	Intervention group	3.75±0.98	5.52±0.71	p<0.001
	Control group	3.66±1.03	3.79±1.14	0.248
	t-test	0.196	p<0.001	
FG	Intervention group	6.61±1.32	9.24±1.59	p<0.001
	Control group	6.39±1.43	6.43±1.55	0.353
	t-test	0.072	p<0.001	

Table 2: Continued.

Variable	Group	Baseline	After	Paired t-test
	Intervention group	1.23±0.74	2.31±0.68	p<0.001
PS	Control group	1.25±0.69	1.39±0.71	0.411
	t-test	0.371	p<0.001	
	Intervention group	1.23±0.74	2.31±0.68	p<0.001
FLNL	Control group	2.41±0.99	2.51±1.77	0.529
	t-test	0.771	p<0.001	
	Intervention group	20.64±3.42	30.83±5.86	p<0.001
NL	Control group	20.34±4.15	20.85±4.03	0.187
	t-test	0.652	p<0.001	

before the training intervention were insufficient, but after the training, the NL score significantly increased in the intervention group.

Also, the comparison of the mean score changes of different NL dimensions in the 2 groups indicated a significantly higher NL score in the intervention group than in the control group. Previous studies' findings indicate the effectiveness of NL in diabetes management and control. Gibbs *et al.*'s study reported increased NL scores [13].

GNK, RCI, and FG scores in the intervention group were significantly higher than in the control group. One study showed a considerable increase in NL after 8 weeks of intervention [14]. Another study indicated that the training intervention increased NL and improved dietary behaviors [15]. The results of Balance's study investigating the NL status of teachers also indicated an increase in individuals' understanding of nutritional issues after implementing the training program compared to before the program [16].

Another finding of our study was the improved portion size in the participants of the intervention group. Portion size is the amount of food an individual chooses to eat in a dietary situation, such as a meal out, at home, or a prepackaged snack. Gopika *et al.*'s study, evaluating the effectiveness of a portion-size training program in increasing knowledge among employees, demonstrated that implementing the training program using pamphlets considerably helped improve individuals' knowledge about portion size [17]. Other studies also confirm our results [18, 19].

Another dimension of NL in this study was FLNL. According to the World Health Organization's recommendation, food labeling is one of the most important and influential strategies for helping individuals make healthy dietary choices [20]. The food label is today a tool for providing appropriate information regarding the nutritional value of various products, such as calories, amount and type of fat etc. [21], which the ability to read, perceive, and use it correctly can affect individuals' dietary habits [22].

In a study, face-to-face training along with pamphlets significantly affected the awareness, attitude, and functioning of choosing the right food based on nutritional color indicators [23]. Other studies also obtained findings consistent with our study [24, 25].

Conclusion

Our study indicates that a consistent and feasible training program can significantly improve the nutrition and lifestyle (NL) of people with diabetes. Managing diabetes necessitates attention to nutrition, which is a crucial and modifiable factor. Effective management and control of the disease require adequate NL. To enhance NL levels, providing guided and tailored education and training and practical and patient-centered advice is vital. Therefore, it is recommended that health service providers plan and implement more interventions to promote NL in individuals with diabetes.

Conflict of interest

The authors declare no conflict of interest.

Ethics approval

This study was approved by the Ethics Committee of the Shoushtar Faculty of Medical Sciences (IR.SHOUSHTAR.REC.1399.012).

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Consent to participate

Written informed consent was obtained from all the participants.

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