

## An Investigation of the Relationship between Food Literacy and Adherence to a Healthy Diet: Consumption of Food Groups in People with Type 2 Diabetes

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### ABSTRACT

**Background and Objectives:** Diet adjustment is an important factor in the management of all types of diabetes. One of the factors that influences diet adherence is food literacy. The present study was conducted with the aim of investigating the relationships among food literacy, following a healthy diet, and consumption of a variety of food groups in people with type 2 diabetes.

**Material and Methods:** The present research was a descriptive-analytical study that was conducted on 288 people with type 2 diabetes referred to comprehensive health service centers in Khorramabad from May 2021 to April 2022. The simple random sampling method was used to select the participants. The data collection instruments included the food literacy questionnaire, diet adherence behavior survey, and a three-day food record. The data were analyzed using the independent t-test, the Pearson correlation coefficient, one-way anova, and univariate and multivariate linear regression models.

**Results:** The mean healthy diet and food literacy scores were  $28.55 \pm 6.03$  and  $16.21 \pm 5.73$ , respectively. The mean consumption of food groups during the three recorded days was less than the recommended levels in the food pyramid. Education ( $\beta:0.30$ ) and food literacy ( $\beta:0.23$ ) had the highest predictive power for adherence to a healthy diet. The relationships among food literacy, with the consumption of the meat group ( $r=0.346$ ,  $p<0.001$ ), fruits ( $r = 0.178$ ,  $p = 0.002$ ), vegetables ( $r = 0.225$ ,  $p < 0.001$ ), and fats and oils ( $r = -0.157$ ,  $p = 0.008$ ) were significant.

**Conclusion:** The mean healthy diet adherence and food literacy scores were low in the participants. Significant relationships among food literacy, the consumption of a variety of food groups, and following a healthy diet demonstrate the key role of promoting food literacy in the adherence to a healthy diet. Therefore, it is crucial to implement educational interventions to improve food literacy in diabetic patients.

**Paper Type:** Research Article

**Keywords:** Food literacy, healthy diet, food groups, type 2 diabetes.

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## Introduction

Diabetes is a group of metabolic diseases with different causes. Diabetic people suffer from high sugar levels in the blood (1). The prevalence of diabetes has been determined for all types (type 1, type 2, gestational diabetes), with type 2 diabetes alone accounting for 90-95% of all diabetes cases. People with type 2 diabetes are more susceptible to cardiovascular diseases in comparison with non-diabetic people (2). Diabetes leads to a decline in physical performance, deterioration of quality of life, and an increase in the number of years of life with disability, and premature death. About 60-70% of people with diabetes suffer from one or more complications caused by diabetes (3, 4).

Due to the high prevalence of diabetes, today the World Health Organization has named it a silent epidemic (5). Diabetes currently affects 246 million people worldwide. This number is expected to reach 380 million by 2025. On the other hand, by 2025, diabetes will mostly affect the developing countries (6). It is predicted that there will be about 2.5 million diabetic patients in Iran by 2025 (7).

Self-care in diabetes is a series of complicated and laborious behaviors that often require a fundamental change in lifestyle and are under the influence of several factors. The dimensions of self-care in patients with diabetes include a wide range of self-care behaviors, such as monitoring and controlling blood glucose levels, insulin therapy and the use of anti-diabetic pills, exercise and physical activities, nutrition and diet, the prevention of acute complications, including hypoglycemia and hyperglycemia, prevention of chronic complications of diabetes, foot care, smoking cessation, and other health-related behaviors (8).

Nutrition and diet are the most important of the behaviors influencing diabetes outcome

(8). Diet adjustment is an important factor in the management of all types of diabetes. Diabetic people can even control their disease by modifying the diet along with doing physical exercise. Nevertheless, adherence to the diabetic diet is one of the most important challenges in diabetes control (9). Understanding the benefits of a healthy diet by diabetic patients has a positive and significant relationship with their adherence to relevant behaviors (10).

Food literacy is an important factor in diet adherence. Food literacy involves a set of knowledge, skills, and behaviors necessary to planning, managing, choosing, preparing, and eating food (11). A systematic review showed that food literacy is considered a special form of health literacy (12). The literature review indicated that improvement in food literacy has a positive effect on nutritional behavior and well-being (13, 14).

Food literacy is very closely related to the concept of health literacy (15). According to some studies, diabetic patients with insufficient health literacy have less knowledge about their disease, and they, consequently, cannot control their blood sugar adequately (16, 17). Seyed Al-Shohadai and et al. reported a significant statistical relationship between health literacy and the self-care dimension of diet adherence (18). Previous studies have not paid attention to the relationship between food literacy and adherence to a healthy diet and have examined general health literacy in diabetic people. The association between food literacy and adherence to a healthy diet remain unclear in diabetic people (18-22). The present study was conducted to investigate the relationship between food literacy and the behavior of adherence to a healthy diet and consumption of various food groups in people with diabetes.

## Materials and Methods

### Study design and Participants

This descriptive-analytical cross-sectional study was conducted on people with type 2 diabetes referring to comprehensive health service centers in Khorramabad from April 2021 to March 2022.

In the present study, the inclusion criteria were an age of between 18 and 60, living in Khorramabad, and having been diagnosed with type 2 diabetes by a specialist at least three months before the research. Other inclusion criteria were willingness to participate in the study, giving informed consent, active patient records in comprehensive health centers, history of 2-hour blood sugar equal to or more than 200 mg/dl after a meal or a fasting plasma glucose level more than 126 mg/dl measured on two separate occasions, glycosylated hemoglobin  $\geq 6.5\%$ , being under treatment with oral hypoglycemic drugs, not suffering from advanced diseases such as liver and kidney failure, and lack of known mental disorders. The exclusion criteria were patient's unwillingness to continue participating in the study and incompletely filled questionnaires.

### Sampling Method and Sample Size

The simple random sampling method was used in this study to select the participants. To this end, first, a list of all diabetic patients, referring to the comprehensive health centers of Khorramabad was prepared. Then, the simple random method was used to select the participants based on the desired sample size.

The sample size was calculated based on a study by Fallah et al (23). The standard deviation of the self-care score of adherence to a healthy diet was considered equal to  $\sigma = 17.3$ , the significance level was 95% ( $\alpha = 0.05$ ), and the accuracy was  $d = 2$ . In addition, the following formula was used to calculate the sample size:

$$n = \frac{\sigma^2 Z_{1-\frac{\alpha}{2}}^2}{d^2}$$

$$Z_{1-\alpha/2} = 1.96$$

$$\sigma = 17.3$$

$$d = 2$$

### Validity and Reliability of Food Literacy Questionnaire

In order to ensure content validity, both quantitative and qualitative methods were used. In the qualitative method of content validation, 10 experts in the fields of health education (2 people), nutrition (5 people), statistics (2 people), and epidemiology (1 person) were interviewed and they were asked to carefully study the instrument, regarding grammaticality, the use of appropriate and understandable words, appropriate scoring, the completion time of the designed instrument, the appropriateness of the selected dimensions, and the placement of items in the appropriate way and to provide their corrective views. Experts' opinions were used in preparing the final version of the instrument.

To check content validity quantitatively, first, 10 experts were asked to review each item on a three-point Likert scale ("necessary", "useful but not necessary", and "not necessary"). Then, based on this index, the content validity ratio (CVR) was calculated. Based on the Lawsche table, statements with CVR values higher than 0.62 ( $p < 0.05$ ) were retained (24). Next, the ten experts were asked to specify their opinions on three features of the questionnaire, including relevance, simplicity, and clarity, on a four-point Likert scale (for example, the following options were used to measure clarity: 1 = not clear, 2 = fairly clear, 3 = clear, 4 = quite clear). Then, the content validity index (CVI) for each item was calculated by dividing the number of experts who scored the statements 3 and 4 by the total number of experts (25). Therefore, items CVI values greater than 0.79 were acceptable (26). Based on CVI calculations, 4 items out of the

54 items examined were removed due to not meeting the minimum score of 0.79 and a total of 50 items remained in the questionnaire. Finally, based on CVR values obtained and according to the Lawsche table, 10 items were removed and 40 items remained and entered the next stage of the psychometric process.

The validity and reliability of this questionnaire has been evaluated in a previous study by researchers (27).

The Cronbach's alpha coefficient was used to measure the reliability of the questionnaire by internal consistency (28). The reliability coefficient for the whole instrument was calculated as 0.83 and for five factors between 0.951 and 0.610.

### Data Collection

Diabetic people meeting the inclusion criteria were randomly selected and called by the health care provider to the comprehensive health service center. Questionnaires were completed by health care workers in the form of interviews for both illiterate and literate people. The data collection instrument was a questionnaire containing 4 parts.

The first part collected information on demographic characteristics, including age, sex, height, weight, marital status, education level, household income, and duration of suffering from diabetes.

The second part was designed to measure food literacy, including identification of food groups (ability to operationally classify foods), nutrition and health (ability to understand the impact of food on health), measurement of foods (ability to calculate portions), food labels (ability to read food facts), and food preparation skills. The questionnaire was designed with multiple choice options. The correct option was given a score of one and the rest of the options were given a score of zero. (Supplementary file)

The third part of the questionnaire focused on

nutritional behaviors. The behavior of adherence to a healthy diet during the last week was measured in this section. This questionnaire has been validated in a previous study (29).

The fourth part of the questionnaire focused on a three-day food consumption record. The foods and drinks consumed by the person in the last 3 days were recorded. Their servings were calculated and compared with the servings of the pyramid of food groups. If the person had consumed less or more than the recommended amount of the serving of the food group, a score of 1 was given. In addition, if the person had consumed the recommended amount of the serving of the food group, a score of 2 was given. If the person had not consumed any of the recommended food groups during the previous three days, a score of zero was given. The information obtained from the 3-day food consumption questionnaire was analyzed by the Nutritionist IV diet analysis software and reported as an average of three days.

### Data Analysis

After collecting the required information, descriptive statistics were used to describe the data, calculating measures of central tendency and dispersion indices for quantitative variables and frequency and percentage for qualitative variables. The Kolmogorov-Smirnov test was used to analyze the normality of the data. In addition, independent t-tests, the Pearson correlation coefficient, ANOVA, and univariate and multivariate linear regression models were used to analyze the data.  $P < 0.05$  was considered as the significance level.

### Results

The average age of 288 diabetic participants in the study was  $54.38 \pm 11.52$ , 58.3% of whom were women (average age:  $54 \pm 55$ ) and 41.7% were men (average age:  $54 \pm 13$ ). The average

duration of suffering from type 2 diabetes in participants was  $1.50 \pm 0.50$  years. Table 1 shows the demographic characteristics of the participants.

**Table 1: Frequency distribution of demographic characteristics of the participants**

Variable	Status	Number	Percentage
Sex	Male	120	41.7
	Female	168	58.3
Ethnicity	Lor	265	92
	Persian	13	4.5
	Lak	10	3.5
Marital Status	Single	21	7.3
	Married	263	91.3
	Divorced or widowed	4	1.4
Education	Illiterate	72	25
	Diploma or Lower	110	38.2
	Academic Education	106	36.8
Occupation	Employed	85	29.5
	Housewife	151	52.4
	Unemployed	52	18.1
Life Network Type	Living alone	13	4.5
	Living in a family	275	95.5
Family History of Diabetes	Yes	168	58.3
	No	120	41.7
Monthly Income	Low	109	37.8
	Average	146	50.7
	Good	28	9.7
	Excellent	5	1.7
Body Mass Index	Underweight	8	2.8
	Normal	96	33.3
	Overweight	125	43.4
	Fat	59	20.5

The average score of adherence to a healthy diet and food literacy were found to be  $28.55 \pm 6.03$  and  $16.21 \pm 5.73$ , respectively. The average consumption of food groups during the last three days is shown in Table 2. Their average consumption was less than the recommended amount in the food pyramid.

**Table 2: The average scores of adherence to a healthy diet, food literacy, and consumption of various food groups during the last three days.**

Variables		Mean $\pm$ SD	Min	Max
Adherence to a Healthy Diet		$6.03 \pm 28.55$	10	51
Food Literacy		$5.73 \pm 16.21$	4	29
Food Groups	Milk and Dairy	$1.09 \pm 0.88$	0.00	4
	Bread and Cereals	$5.33 \pm 2.055$	0.00	14
	Meat	$4.34 \pm 3.25$	0.00	17
	Fruit	$1.38 \pm 1.63$	0.00	8
	Vegetables	$1.49 \pm 1.58$	0.00	8
	Saturated Oils	$0.43 \pm 0.68$	0.00	4

The Pearson correlation coefficient showed that there is a significant correlation between food literacy and nutritional behavior ( $r=0.358$ ,  $p<0.001$ ), the consumption of the meat group ( $r=0.346$ ,  $p<0.001$ ), fruits ( $r=0.178$ ,  $p=0.002$ ), vegetables ( $r=0.225$ ,  $p<0.001$ ), and oils ( $r=-0.157$ ,  $p=0.008$ ). However, no significant correlation was found between food literacy and the consumption of dairy products ( $r=0.016$ ,  $p=0.783$ ) and cereals and legumes ( $r=0.001$ ,  $p=0.988$ ).

The results showed that there was a significant relationship between the behavior of adherence to a healthy diet with education, occupation, and monthly income. In case of people with higher education, the behavior of adherence to a healthy diet was more prominent ( $p < 0.05$ ). Additionally, in people with higher education, food literacy was higher ( $p < 0.05$ ). Among employed individuals and housewives, the behavior of adherence to a healthy diet was higher ( $p < 0.05$ ) compared to unemployed individuals. In people with a low and medium monthly income, the behavior of adherence to a healthy diet was higher ( $p < 0.05$ ), compared to people with good and high monthly income. Food literacy was found to be higher in people over 55 years old ( $p < 0.05$ ). In addition, food literacy was higher in people who had a family history of diabetes ( $p < 0.05$ ).



**Table 3: Relationships among demographic characteristics with food literacy and adherence to a healthy diet in people with type 2 diabetes**

Demographical characteristics	Status	Food Literacy	Adherence to a Healthy Diet
		Mean (SD)	Mean (SD)
Sex	Male	16.59 (5.47)	29.40 (5.50)
	Female	15.94 ( 5.91)	27.95 (6.34)
P-value		0.311	0.057
Age	≤ 55	15.32 (5.81)	28.56 (5.62)
	> 55	17.01 (5.56)	28.54 (6.48)
P-value		0.014	0.708
Marital Status	Single	16.04 (6.16)	26.38 (5.38)
	Married	16.19 (5.74)	28.77 (6.02)
	Divorced or widowed	18.00 (3.36)	25.50 (8.85)
P-value		0.817	0.132
Education	Illiterate	12.29 (4.88)	25.43 (6.42)
	diploma or lower	15.44 (5.16)	27.87 (5.83)
	Academic education	19.66 (4.78)	31.39 (4.59)
P value		< 0.001	< 0.001
Occupation	Employed	17.29(5.03)	29.90(5.55)
	Housewife	15.72(5.96)	29.42(5.18)
	Unemployed	15.86(6.00)	27.50(6.39)
P-value		0.099	0.006
Life Network Type	Living alone	16.23 (6.24)	30.30 (5.36)
	Living in a Family	16.21 (5.72)	28.47 (6.06)
P-value		0.985	0.255
Family History of Diabetes	Yes	17.59 (5.93)	28.39 (6.22)
	No	15.22 (5.39)	28.79 (5.79)
P-value		0.001	0.479
Monthly Income	Low	15.85 (6.14)	27.38 (5.61)
	Average	16.83 (5.51)	29.88 (5.87)
	Good	14.82 (5.29)	26.85 (6.88)
	Excellent	13.60 (3.36)	25.00 (7.58)
P-value		0.164	0.001
Body Mass Index	Underweight	15.37 (6.47)	25.87 (7.07)
	Normal	15.51 (5.82)	28.38 (6.61)
	Overweight	6.74 (5.58)	28.61 (5.80)
	Fat	16.33 (5.83)	29.08 (5.41)
P-value		0.470	0.360
Duration of Diabetes	< 6 Years	16.81(5.63)	28.43 (5.46)
	> 6 Years	15.58 (5.79)	28.68 (6.60)
P-value		0.078	0.931

Different parameters influencing adherence to a healthy diet, including predictor variables (occupation, first-degree family history of diabetes, marital status, duration of disease, type of life network, food literacy, BMI, age, gender, monthly family income, literacy level, and the consumption of food groups) were entered into the regression model (Table 3). The regression model was able to predict the

behavior of adherence to a healthy diet by 0.252 (Table 4). This model showed that 1-unit increase in education level improved food consumption behavior during the previous week by 30% ( $p < 0.001$ ) and 1-unit increase in food literacy was able to improve food consumption behavior during the previous week by 23% ( $p = 0.001$ ) (Table 5).

**Table 4: Correlation of food literacy with adherence to a healthy diet and consumption of food groups in people with type 2 diabetes**

		Adherence to a Healthy Diet	Meat	Milk and Dairy	Bread and Cereals	Fruit	Vegetables	Saturated Oils
Food Literacy	R	0.358	0.346	0.016	-0.001	0.178	0.225	-0.157
	p	<0.001	<0.001	0.783	0.988	0.002	<0.001	0.008

**Table 5: Linear regression analysis in relation to predicting adherence to a healthy diet in people with type 2 diabetes**

Source of Change	Non-standard coefficients		Standard coefficients	t-value	p-value	R	R2	R2 Adjusted
	B	Std. Error	Bata					
Constant value	13.868	4.907	.....	2.826	0.005	0.502	0.252	0.202
Food literacy	0.239	0.072	0.227	3.336	0.001			
Milk and dairy	0.696	0.370	0.102	1.880	0.061			
Bread and cereals	0.268	0.166	0.091	1.618	0.107			
Meat	0.149	0.112	0.080	1.331	0.184			
Fruit	0.424	0.216	0.115	1.965	0.050			
Vegetables	0.012	0.222	0.003	0.052	0.958			
Saturated oils	-0.497	0.500	-0.056	-0.994	0.321			
Duration of diabetes	0.726	0.648	0.060	1.120	0.264			
Sex	-0.163	0.736	-0.013	-0.221	0.825			
Family history of diabetes	-0.667	0.684	-0.055	-0.975	0.330			
Life network type	-2.629	1.588	-0.091	-1.656	0.099			
Marital status	1.546	1.158	0.074	1.334	0.183			
Occupation	0.605	0.518	0.068	1.168	0.244			
Education	2.387	0.540	0.308	4.421	<0.001			
Monthly income	-0.147	0.499	-0.017	-0.295	0.768			
Body mass index	0.062	0.036	0.093	1.710	0.088			
Age	0.041	0.030	0.078	1.379	0.169			

## Discussion

This study showed that demographic variables, consumption of food groups, and food literacy predict the behavior of adherence to a healthy diet by 0.25%. In case of diabetic patients, there is little information on food literacy and adherence to a healthy diet and their predictors, and this issue has led the creation of hypotheses in this field.

The results of the study showed that there is a significant relationship between the level of food literacy and the behavior of adherence to a healthy diet in diabetic people. One-unit increase in the food literacy of people can improve the behavior of adherence to a healthy diet during the previous week by 23%. This finding is consistent with Mahnoush Raisi and et al. who reported a significant relationship between the level of health literacy of patients with type 2 diabetes and the self-care behavior of adherence to a healthy diet. One-unit increase in the level of health literacy improved self-care behavior in people by %29 (22).

A previous study on the relationship between health literacy, blood pressure, and salt consumption in the diet of patients with hypertension showed that most studies found a significant positive relationship between health literacy and blood pressure control (30). Patients who have high health literacy are more likely to comply with medications, because they are more likely to ask medical questions and participate in decision making. A systematic review and meta-analysis indicated that the awareness of Iranian diabetic patients of their disease in terms of health literacy is not enough, but mostly insufficient in both sexes (31). However, the present findings are contrary to the results obtained in Sweden, where more than half of diabetic patients had sufficient health literacy (32). The literature review indicated that health literacy

in diabetic patients is related to self-confidence, self-management behavior, blood sugar control, and health outcomes. Better education in participants from developed countries has led to this difference (33). Education is one of the factors related to health literacy. Inadequate health literacy in diabetic patients seems to be a problem in many different societies, indicating the need to pay more attention to health literacy in diabetic patients.

In the present study, the average behavior of adherence to a healthy diet was found to be  $28.55 \pm 6.03$  and the average food literacy was  $16.21 \pm 5.73$ . The causes of poor management of chronic diseases such as hypertension and diabetes are multifaceted, including obesity (34), treatment adherence (35), diet, and other lifestyle factors (36). Nevertheless, previous studies that focused on these chronic diseases have shown patients with health literacy have better control over the disease (32, 37-46). cross-sectional online survey was conducted among a sample of Dutch adults to investigate food literacy. Participants who had a higher level of food literacy reported significant and frequent consumption of fruit, vegetables, and fish (47).

The significant relationship between food literacy and the behavior of adherence to a healthy diet indicates the key role of promoting food literacy in adherence to a healthy diet. Therefore, educational interventions to improve food literacy in diabetic patients are critical.

The results of the present study showed that there is a significant direct relationship between food literacy and adherence to a healthy diet. Diabetic people with sufficient food literacy have more adherence to a healthy diet (such as consuming more servings from the groups of vegetables, fruits, and dairy products), and as a result of their behaviors, they show better



self-care. A previous review study showed that there is a significant relationship between health literacy and self-care in type 2 diabetes patients. Health literacy has a positive effect on their self-care behaviors, especially food related behaviors, which is consistent with our results (48).

The results of the present study showed that there is a significant relationship between the age and the level of education of people with their behavior of adherence to a healthy diet. Older people and people who had a higher level of education showed better behavior in case of adherence to healthy diet and they were healthier. A study conducted in Ahvaz, Iran, with special focus on determining the level of health literacy and its relationship with some factors in patients with type 2 diabetes showed that the health literacy of diabetic patients in Ahvaz is insufficient. In addition, a significant relationship was observed between the dimensions of health literacy with age and education. Older age and higher education level was associated with improved health literacy (49).

Health professionals should pay attention to the identification of demographic variables and the needs and abilities of diabetics. A study surveyed the effects of health literacy levels on health outcomes in patients with type 2 diabetes in West Jamaica. The results showed that age and education level are significantly related to health literacy levels. As the age and education level increases, the level of health literacy improves (50). It seems logical that these people better follow diets meant to control diabetes and have the ability to plan and manage more appropriately and make better decisions about food consumption.

In addition, generally, people naturally gain more experience and general literacy as their age increases and finally improve their food literacy. In contrast, people with lower experience

and education level had a less healthy diet and compliance behavior. Naturally, these people do not adopt proper management in choosing food. As a result, they are not successful in controlling their disease. Therefore, our findings emphasize that health care providers should identify diabetic patients with low food literacy and low education level, consider the existing challenges in this field, and use effective health communication methods to efficiently manage the conditions of these people.

In the present study, the average consumption of various food groups including vegetables, fruits, and dairy products during the last three days was lower than the recommended amount in the food pyramid. In addition, the Pearson correlation coefficient showed that there was a significant direct relationship between food literacy and the consumption of food from meat, fruits, and vegetables groups. A previous study showed that the consumption of vegetables (78%), dairy products (44%), and fruits (23.3%) in 78%, 44% and 23.3% of Iranian women was less than the recommended amount in the food pyramid (51).

In most studies conducted in Iran, the average consumption of dairy products, fruits, and vegetables was reported to be lower than the recommended amount in the food pyramid (52-54). In a study in Saudi Arabia, 39% of the participants consumed milk daily, while 48% never or rarely did so (55). A research in Spain reported the amount of fruit and vegetable consumption to be less than 25% (56). A study in Nigeria also showed that only a quarter of the surveyed participants consumed vegetables regularly (57).

The noteworthy point in the present study was that the average meat consumption was higher than the recommended amount in the food pyramid. In a study conducted in Yasouj,

the consumption of meat, legumes, eggs, and grains in 50% of samples was reported to be equal to the recommended amount (54). In the western regions of the country, such as Lorestan, Kermanshah, Ilam, etc., the consumption of red meat is higher, and meat plays an important role in the food basket, indicating the influence of the cultural factor in the nutrition of the people of these regions, and of course, the fact that farmers of these areas are more involved in animal husbandry is an effective parameter for food choice.

A study conducted in Finland showed that there is a direct relationship between the pattern of consumption of vegetables and fruits with the level of literacy and social education of people in the society (58). A study conducted in Tehran reported that people with university education consume more fruits, vegetables and dairy products (59). Considering the relationship between the level of public literacy and disease care behaviors such as nutritional management, physical activity, and response to treatment, it is recommended to pay more attention to the health literacy of the society and especially chronic patients such as those with diabetes, patients with kidney and cardiovascular diseases, in order to ensure proportionate consumption of food groups, as many studies have confirmed that increasing the level of food literacy in diabetics and increasing their adherence to a healthy diet lead to improvements in their health level.

In addition, the present study showed a significant relationship between food literacy and family history. In people who had a family history of diabetes, there was higher food literacy probably due to learning from family members and relatives.

The noteworthy point of the study was that despite the quarantine conditions and traffic restrictions during the coronavirus pandemic,

the questionnaires were completed by health care workers. Therefore, all literate and illiterate people were in equal conditions to answer the questions of the questionnaire (60, 61).

**Limitations:** The main limitation of the study was that, due to the spread of the coronavirus disease, it was not possible to carry out the research in several cities due to compliance with quarantine regulations during the COVID-19 pandemic. It is suggested to conduct the study in several cities of Iran at the same time on people with diabetes in order to obtain better results. In addition, there were few studies on food literacy among diabetic people, so the results of the present study were compared with similar studies.

### Conclusion

In the present study, the prediction rate for food literacy in relation to the behavior of adherence to a healthy diet was found to be low. The most possible reason is that the management of chronic diseases such as hypertension and diabetes is multifaceted. The results of previous studies also confirm this issue (34-36).

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**Availability of data and materials:** The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Conflict of Interest:** All authors have read and approved the content of the article. The authors have no conflicts of interest to declare with respect to the research, authorship, and/or publication of this article.

**Ethical consideration:** This study was approved by the ethics committee of the Lorestan University of Medical Sciences (IR.LUMS.REC.1399.241). The objectives of the research were clearly

explained to the participants and they were assured that they could leave the study whenever they wanted and the confidentiality of their information. Generally, participation in the study was based on informed consent and voluntary.

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