

## The Relationship Between Health Literacy and Self-Care Behaviors in Diabetic Type 2 Elderly People

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### ABSTRACT

**Background and Objective:** One of the most important goals of diabetes control is to empower patients to perform self-care. The purpose of this study was to investigate the relationship between health literacy and self-care behaviors in type 2 diabetic in elderly.

**Materials and Methods:** All diabetic elderly referring to health centers of the city of Fariman in 2019 were enrolled in the study. The interviewer referred to elderly 's home and if they were satisfied, the questionnaire completed. Data were collected by demographic questionnaires, health literacy questionnaire and self-care questionnaire. Data were analyzed using SPSS software and statistical tests regression analysis, Pearson correlation coefficient and one-way ANOVA, Chi-square test were used.

**Result:** Mean age was 67.7 years and mean FBS was 122.8. Over 60% were female, 80% had primary and lower education, 81% had a spouse, and 26% had no job.). The mean and standard deviation of health literacy score was 76.4  $\pm$ 7.5 and self-care was 63.00 $\pm$ 7.4. Health literacy had significantly correlation with gender ( $p < 0.000$ ) and FBS ( $p < 0.000$ ). Self-care had significantly correlation with gender ( $p < 0.000$ ). Health literacy was significantly correlated with self-care behaviors ( $p = 0.00$ ,  $r = -0.35$ ) and HbA1C ( $p < 0.001$ ,  $r = -0.34$ ). Health literacy was significantly correlated with diet ( $p = 0.00$ ,  $r = 0.25$ ) and medication use ( $p = 0.00$ ,  $r = 0.43$ ) and foot care ( $p = 0.004$ ,  $r = 0.21$ ).

**Conclusion:** According to the findings, Elderly women and people with lower education have lower health literacy. As a result, in the plans taken to promote health literacy more attention should be paid to these people.

**Paper Type:** Research Article

**Keyword:** Elderly, Health literacy, Self-care Behaviors, Diabetic type 2

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## Introduction

Aging is a critical period of human life during which individuals are exposed to potential threats such as chronic diseases, loneliness, isolation, and lack of social support, and their individual independence is threatened due to physical and mental disabilities (1). In most societies, the elderly people are at greatest risk of diminishing physical, mental, and cognitive abilities and are more likely to rely on formal or informal support to maintain health, function, and self-sufficiency. Moreover, these people need more attention and care than other citizens of the society due to the increased prevalence of chronic diseases such as diabetes and vascular disease. Poverty, loneliness, and isolation are also common social harms among the elderly people (2). On the other hand, according to reports, elderly people aged over 60 years of age make up approximately 9.9% of the total population of Iran, which is equivalent to 8231000 people. Although the population of the country reached about 83 million people in 2019 (1.24% growth rate), there was 3.62% growth rate in the elderly population (3).

Type 2 diabetes is a major public health problem affecting more than 285 million people worldwide. According to the World Health Organization (WHO), approximately 2 million Iranians had diabetes in 2000 and the number of people with type 2 diabetes is projected to increase to 4.6 million by 2030 (4). Diabetes is not curable but it can be controlled. Many experts consider the diabetes control and care to be the main duty of the individuals and their family and believe that clients should take responsibility for controlling their disease. One of the important goals in diabetes control is to empower patients to perform self-care. Self-care improves the quality of life and is also effective in reducing treatment costs (5). Studies show that despite educational programs, wrong perception

of the disease and its control are common among people with diabetes in recent years. Studies also revealed that the most important underlying cause of death in diabetic patients is lack of self-care (6). Self-care in diabetes refers to proper and timely insulin injection, adherence to proper diet, regular exercises, identification of symptoms of hyperglycemia or hypoglycemia, regular medication, foot care, and improvement of quality of life (7).

Health literacy refers to the capacity to perform duties, process, and understand the basic information, and services needed to make appropriate health decisions. Health literacy is a term that was introduced in 1970 and its increasing importance has been demonstrated at the general literacy and care literacy levels, therefore, it is needed to empower individuals to meet the complex health needs of a modern society (8). Low health literacy levels are more commonly seen among the elderly, immigrants, illiterate people, low-income people, people with low mental health, and people with chronic illnesses such as type 2 diabetes and hypertension. Consequently, these individuals are at risk for the adverse effects of low health literacy levels (9).

Low health literacy level makes it difficult to understand and apply health-related information. Studies have shown that people with low health literacy level have lower understanding of written and oral information provided by health professionals as compared to those who have higher health literacy levels and implement the instructions correctly (10).

People with low health literacy, incur more medical costs, have poor health status, have frequent hospital admissions, and use emergency services more frequently. These people exercise preventive care less frequently. Since low health literacy leads to a huge waste of health budget,

it is necessary to address the health literacy and employ relevant promotion strategies (11). Also, considering that there have been many studies on the effect of adequate awareness on the consequences of diabetes, there is no doubt that the consequences of diabetes are directly related to diabetes control, which can improve the health index. Moreover, considering the importance of diabetes in Iran and the effect of health literacy on quality of life and diabetes control on the one hand, and considering that this issue has not been addressed in Iran and statistics and evidence are not still available on the other hand, the aim of the present study was to determine the relationship between health literacy and self-care among the elderly people with Type 2 diabetes in the city of Fariman.

### Method

This was a descriptive-analytical study that was performed on 191 the elderly people with diabetes covered by health centers in Fariman in 2018. Inclusion criteria included patients aged 60 years and older, type 2 diabetes, having physical and mental ability, patients with confirmed type 2 diabetes for at least 6 months, and no history of drug treatment, and no Alzheimer's disease, and forgetfulness. Exclusion criteria also included the unwillingness to participate in the study. First, the necessary approval was obtained from the Ethics Committee of Mashhad University of Medical Sciences. Then, the researcher extracted the addresses of all identified diabetic elderly from the Sina system and referred to the homes of diabetic elderly in Fariman after obtaining the permission from the head of the health center of the city. After receiving informed written consent from eligible patients, the questionnaires, which included demographic questionnaire, test of functional health literacy in adults (TOFHLA) and summary of diabetes self-care activities

(SDSCA) measure, were completed with the help of the researcher.

TOFHLA was used to collect health literacy data among diabetic elderly. This questionnaire is one of the most important and valid questionnaires for measuring health literacy level in the world and has been translated and validated in several languages so far. The above questionnaire was also validated for use among the elderly people in Isfahan by Raeisi et al. The reliability of the questionnaire was 0.79 for the numeracy section and 0.88 for the reading section (12). This questionnaire consists of 2 parts, including numeracy and reading comprehension. The numeracy section assessed the individual's ability to understand and act based on the recommendations given by physicians and health educators. This section contained 10 explanations or health instructions on prescribed medications, time to visit see a doctor, the steps to use financial aid, and an example of the results of a medical examination. These explanations were given to the subjects in the form of cards and the relevant questions were asked from the individual. The possible score range in this section was 0 and 50. The reading comprehension section assessed participants' ability to read and understand the three texts with the following titles: instructions for preparing for upper gastrointestinal imaging, the patient's rights and responsibilities in the insurance forms, and the standard hospital consent form. The possible score range in this section was also 0 and 50. The total health literacy score, which ranges between 0 and 100, was calculated by adding up scores of these two sections. Finally, the subjects' functional health literacy score was divided into three levels: inadequate (0-59), borderline (60-74), and adequate (75-100).

The SDSCA measure was used to assess self-

care behaviors among the diabetic elderly people. This questionnaire investigated the self-care behaviors of diabetic patients, which included 15 questions in the following domains: diet, exercise, blood-glucose testing, foot care, and medication use. Each question was assigned a score ranging from 0-7 based on the number of days a person performed self-care behavior in the past week. There were 8 questions on nutritional behaviors. The possible score range is 0-56, with scores 0-16, 17-32, and 33-56 indicating non-optimal, somewhat optimal, and optimal nutritional behaviors, respectively. Other parts of self-care behaviors related to physical activity and blood sugar control. The possible score range is 0-7, with scores 0-2, 3-4, 5-7 indicating non-optimal, somewhat optimal, optimal score ranges, respectively. The other section measured foot care behaviors, which included three questions. The possible score range is 0-21, which was divided into three parts: non-optimal (0-6), somewhat optimal (7-12), optimal (13-21). Finally, two questions assessed the degree of medication adherence of patients. The possible score range is 0-14, with scores 0-4, 5-8, and 9-14 indicating non-optimal, somewhat optimal, and optimal medication adherence rates, respectively.

Finally, the collected data were analyzed in SPSS software using descriptive and analytical statistical tests, including Pearson correlation coefficient, and one-way ANOVA, and Chi-square test.

## Results

The data showed that the mean age of participants was  $67.7 \pm 7.2$  (60-91 years). A total of 52.4% of participants were female and 47.6% were male. Participants were married and single in 84.3% and 0.5% of cases, respectively, and the remaining participants were divorced

or widowed. With regard to education level, 40.3% were illiterate, 39.8% had primary education, and only 2.6% had degree higher than diploma. Moreover, a total of 21.6% of them were housewives, 31.6% were unemployed, 5.7% were employees, and 30.5% were retired. Concerning household size, participants lived in a two-person family, a three-person family, a four-person family and above in 70.1%, 16.2%, and 13.7% of cases, respectively.

According to the information obtained, fasting blood sugar (FBS) <100, 100-125,  $126 \geq$  mg/dL in 13.82%, 23.4%, and 62.76% of cases, respectively. The mean FBS value was also  $122.8 \pm 48.2$  mg/dL (73-425 mg/dL). Also, the mean HgA1c level among diabetic elderly was  $5.8 \pm 1.6$  mg/dL (4 - 11.7 mg/dL). The results of TOFHLA test showed that the mean health literacy and self-care score scores were  $76.4 \pm 7.5$  and  $63 \pm 7.4$ , respectively (Table 1).

**Table 1: Frequency distribution of health literacy and self-care of diabetic elderly**

Mean±SD	%	N	Health Literacy
76.40± 7.50	18.84	36	Insufficient (0-59)
	30.89	59	Borderline (60-74)
	50.26	96	Sufficient (75-100)
	100	191	Total
Mean±SD	%	N	Self-Care
63.00 ± 7.40	7.85	15	Insufficient (0-50)
	89	170	Borderline (51-75)
	3.15	6	Sufficient (76-105)
	100	191	Total

There was a positive significant relationship between health literacy d with sex and FBS ( $P < 0.05$ ) and negative significant relationship with self-care behaviors and HbA1C. There was also a significant relationship between self-care with sex ( $P < 0.05$ ) (Table 2).

**Table 2: Relationship between health literacy and self-care with demographic variables in diabetic elderly**

Test	Self-Care	Health Literacy	Variable
t test	p<0.000	p<0.000	Gender
Chi-square	P=0.99	P=0.61	Education
Chi-square	P=0.98	P=0.13	Job
Chi-square	P=0.95	P=0.90	Marital status
Pearson	P=0.14	P=0.13	FBS
Pearson	P=0.34	p<0.000	HGA1C
Pearson	P=0.039	P=0.003	Age

There was a positive significant relationship between health literacy with three dimensions of self-care behaviors, including diet ( $p = 0.00$ ,  $r = 0.25$ ), medication use ( $p = 0.00$ ,  $r = 0.43$ ), and foot care ( $p = 0.004$ ,  $r = 0.21$ ) (Table 3).

**Table 3: Relationship between health literacy and self-care dimensions in diabetic elderly**

P –value	Pearson coefficient	Self-Care	Variable
p<0.001	r =0/25	Diet	Health Literacy
p<0.001	r = -0/46	physical activity	
p<0.001	r =- 0/68	FBS	
p<0.05	r = 0/21	Foot care	
p<0.001	r = 0/43	Taking medicine	
p<0.001	r = - 0/34	Total Self-Care	

## Discussion

The aim of the present study was to investigate the relationship between health literacy and self-care behaviors among the elderly people with type 2 diabetes in Fariman. The results showed that diabetic elderly had inadequate and borderline health literacy in about half of cases (18.84% with inadequate literacy and 30.89% with borderline literacy). However, health literacy in this group of people is of paramount importance considering the high prevalence of

chronic diseases and the subsequent need for self-care skills, and special requirements such as the need for screening tests in the elderly; because many studies have demonstrated that health literacy has a direct impact on these factors. Therefore, a higher health literacy rate among elderly population is a warning for health administrators, policy makers, and authorities.

These findings are consistent with the results of the studies carried out by Rafiei Zadeh et al. (14) and Seyed Al-Shohadaei et al. on diabetic patients referred to the Diabetes Research Center of Tehran University of Medical Sciences. Seyed Al-Shohadaei et al. showed that 58% of people had inadequate and borderline health literacy (13). However, the results of current study were consistent with the results of studies by Mahmoudi et al. (15), Javadzadeh et al. (16), Rezaei Esfahroudi et al. (10).

The present study revealed a significant relationship between the health literacy level and sex, so that the prevalence of inadequate health literacy is higher in women than men. Raeisi et al. (12), Khosravi et al. (17), and Lee et al., also showed higher mean health literacy score in men than women (18). In contrast to the present study, Von et al. found that health literacy level was higher in women than men (19). Other studies reported no relationship between health literacy level and sex (20, 21). In the present study, the lower health literacy level in women may be due to their low level of education. The findings also showed a significant relationship between the self-care level and sex, which is consistent with the results of the study by Firooz et al. (22) but inconsistent with the study by Parham et al. (23).

There was also a significant negative correlation between health literacy level and self-care behaviors. Although people have high health literacy information, they do not adhere to

it in practice; in other words, their health literacy is not practical, because there is a coordination between nutrition, medication use, and foot care literacy and adherence to such literacy, however, there is no such coordination regarding exercise and the need to measure blood sugar, which may be due to its non-applicability in our culture. The exercise culture is still not fostered, and it could also be due to the high cost of blood sugar testing.

There was a statistically significant relationship between health literacy had with three dimensions of self-care behaviors, including diet adherence, and medication adherence, and foot care. Zoellner et al. (2011) showed that one score increase in numerical health literacy has led to a 21% increase in the score on the food health scale (24). Huizinga et al. (25) also a positive relationship between numerical health literacy and fruit and vegetable consumption. In a review study, Ngoh et al. (2009) found a significant relationship between low health literacy level with low health status, lack of diet adherence, medication errors, increased drug costs, and frequent admissions (26). Besides, patients with low health literacy often rely on verbal medication orders (27). Adults with limited health literacy may have difficulty performing nutrition-related tasks, such as dietary recommendations made by health professionals, reading food labels, and making informed decisions on food choices. In addition, evidence indicate that people with low health literacy levels are less likely to consume the recommended daily amount of fruits and vegetables, and read food labels (28).

It should be noted that in this study, unlike many other studies carried out in other countries, to increase the accuracy and quality of health literacy assessment, full TOFHLA was used instead short TOFHLA (S-TOFHLA). The selection bias is lower in the present population-based study as

compared to some other studies. Most of these studies often investigated patients referring to medical centers to receive health care services.

Regarding self-care behaviors, 89% of diabetic elderly people had somewhat optimal self-care and only 3.15% of them had optimal self-care behaviors. Morovati Sharifabad and Rouhani Tonekaboni (29) Javadi et al. (16) also reported moderate scores for self-care behaviors, which is consistent with the results of the present study.

It seems that the differences in patients' self-care status in different studies are due to various factors such as differences in self-care education programs for diabetic patients, differences in self-care knowledge and attitudes among patients, and also different self-care measurement methods. Consequently, these differences lead to different self-care scores in different countries and even different regions of a country.

Regular blood glucose monitoring is one of the self-care dimensions that requires the availability of a blood glucose meter or easy access to health centers, which can be regarded as barriers to regular blood glucose monitoring in the present study due to the high cost of regular blood glucose control and inability to afford payment of these costs. Since self-care behaviors play a very important role in preventing early and late complications of the disease and increasing the life expectancy of patients, nurses need to identify patients' care needs when performing therapeutic interventions by examining their self-care status. They also need to collaborate with other members of the treatment team to develop and implement planned trainings to promote patients' self-care behaviors (26).

Since the present study was carried out on the elderly people aged 60 years and above, the results obtained cannot be generalized to other age groups. Besides, there is a need to

further studies to assess the impact of health literacy on various health aspects in these people. Another limitation of the present study include self-report responses and information obtained from the demographic questionnaire. In this regard, attempts were thus made to match information provided by the elderly people with those registered in Sina electronic system. The results showed that most of the self-report information was consistent with real information and existing documents. Also, considering that willingness to participate in the study was considered as one of the inclusion criteria, it is likely that the elderly people who wish to participate in the study had higher health literacy levels, which can be regarded as a limitation of the present study.

### Conclusion

Findings of the present study reveal that more than half of the participants study do not have sufficient health literacy and self-care behaviors, which indicates the need for education to improve health literacy and achieve optimal self-care level. To achieve this goal, there is a need to further efforts regarding self-care education as well as fostering self-care culture. It can be concluded that there was a significant relationship between health literacy level and three dimensions of self-care behaviors of patients with type 2 diabetes, namely diet adherence, medication adherence, and foot care. Nursing and health faculties can take steps to help improve the public health by considering health literacy and self-care as a means to improve quality and type of training provided to people. They can also introduce new dimensions regarding the importance of self-care in the case of chronic diseases such as diabetes and play a role in improving the health of people in society by teaching these two concepts and incorporating them in the curriculum.

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