

## ORIGINAL ARTICLE

# The Relationship between Health Literacy and Health Promoting Behaviors in Patients with Type 2 Diabetes

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**Received:** 19 August 2017    **Revised:** 23 October 2017    **Accepted:** 25 October 2017

### ABSTRACT

**Background:** Health promoting behaviors are known to be a key factor in managing type 2 diabetes and improving the quality of life in diabetic patients. However, there is little known about the factors influencing these behaviors in diabetic patients. This study aimed to find the relationship between the health literacy and health promoting behaviors in patients with type II diabetes.

**Methods:** This correlational study was conducted from August to September 2016 on 175 eligible diabetic patients (20 to 65 year-old) who referred to the selected centers of diabetes control in Ahvaz City. Patients were chosen using convenience non-probable sampling. Data were collected by diabetic patients' health promoting behaviors' questionnaire and health literacy questionnaire. Data were analyzed using SPSS 22, descriptive statistics and Pearson's correlation coefficient.

**Result:** The mean scores for health promoting behaviors and health literacy were determined 100.45±19.82 and 76.14±15.26, respectively. The highest and lowest scores in health promoting behaviors belonged to nutrition (26.11±6.85) and physical activity (6.70±2.75), respectively. There was a significant relationship between all dimensions of health promoting behaviors and health literacy ( $P<0.05$ ).

**Conclusion:** Since health literacy has a positive relationship with health promoting behaviors in diabetic patients, health care providers need to concentrate on increasing the health literacy of their patients rather than solely concentrating on increasing their knowledge, thereby facilitating the development of health promoting behaviors in patients.

**KEYWORDS:** Health behaviors, Health literacy, Type 2 diabetes mellitus

**Please cite this article as:** Chahardah-Cherik Sh, Gheibizadeh M, Jahani S, Cheraghian B. The Relationship between Health Literacy and Health Promoting Behaviors in Patients with Type 2 Diabetes. *IJCBNM*. 2018;6(1):65-75.

## INTRODUCTION

Diabetes is a metabolic disorder which is either diagnosed with chronic hyperglycemia or with disturbance of carbohydrate, protein and lipids metabolism caused by failure in secretion or function of insulin or both.<sup>1</sup> Diabetes is spread very quickly among the public.<sup>2</sup> The most common type of diabetes is type II diabetes that covers about 90% of diabetic patients.<sup>3</sup> It is predicted that the number of patients with type II diabetes across the world will increase from 415 million people in 2015 to 642 million people in 2040.<sup>4</sup> On the other hand, it is estimated that the prevalence of type II diabetes in Iran will increase from 8.4% in 2013 to 12.3% in 2035.<sup>5</sup> Accordingly, regarding the increasing trend of diabetes, the disease is considered as a serious challenge for the healthcare system of countries.<sup>2</sup>

Diabetes is incurable; however, at least 80 percent of chronic diseases including diabetes can be controlled through changing lifestyle and following health promoting behaviors.<sup>6</sup> Following such behaviors and changing the lifestyle will result in the reduction of healthcare costs, stress and side effects caused by the disease.<sup>7</sup>

The health promoting behaviors include six dimensions: spiritual growth, health responsibility, interpersonal relationships, stress management, physical activity, and nutrition. They strengthen and maintain the health level and self-actualization.<sup>8,9</sup> Recognized as the basic element in preventing and managing diseases, such behaviors can help diabetic people to have a healthier and longer life.<sup>10,11</sup>

According to some evidence, one of the factors that can be related to lifestyle behaviors is health literacy.<sup>12</sup> Health literacy is defined as the capacity and ability to obtain, process, and understand healthcare information to make proper decisions about health.<sup>13</sup> In fact, people with diabetes need some advanced skills of health literacy to protect themselves.<sup>14</sup> The evidence shows that the health literacy in patients with diabetes is in direct relation with our understanding about self-care and

self-efficiency in disease management,<sup>15</sup> disease acceptance, adherence to treatment,<sup>16</sup> self-management<sup>17</sup> and outcomes of more ideal health.<sup>18</sup> Other studies have suggested that low health literacy is associated with deteriorated blood sugar control, more severe side effects, weaker self-management of diabetes, more self-reported side-effects, weak patient-doctor relationship, longer period of hospitalization, more referrals to emergency care ward, reduced cases of proper consumption of medicines, and higher occurrence of various disease and morbidity rate.<sup>15,17,19</sup>

Health literacy of patients with diabetes has been reported differently across various parts of Iran. In a study conducted in 2007 in five provinces of Iran including Bushehr, Mazandaran, Kermanshah, Qazvin and Tehran, people over 18 years old and over showed that 56.6% of the subjects had inadequate health literacy and only 28.1% of people had a high level of health literacy.<sup>20</sup> In addition, in some studies in Iranian cities such as Shiraz<sup>17</sup> and Saez,<sup>21</sup> the health literacy of diabetic patients has been reported at borderline levels and very low, respectively. However, in a study on diabetic patients in Tehran, the health literacy status in these patients was reported to be desirable.<sup>22</sup>

Both health promoting behaviors and health literacy are considered as a key factor in health promotion and quality of life.<sup>23,24</sup> Likewise, they play a significant role in preventing or postponing the side effects of diabetes in patients, and reducing healthcare costs in diabetes which is spreading very quickly. However, there is not enough evidence on the relationship between these two important variables, and there is a lack of knowledge in this regard. While determining the relationship between health literacy and health promoting behaviors, as well as determining the aspects of health promoting behaviors in diabetic patients that health literacy affects, can provide rich information to the health team. This information will help healthcare providers to promote their patients' health condition. Therefore, considering

the importance of the subject and lack of knowledge in this regard, the researchers aimed to determine the relationship between the health literacy and health promoting behaviors in patients with type II diabetes in Ahvaz City.

## MATERIALS AND METHODS

This correlational study was conducted from August to September of 2016 in diabetes clinics of Golestan Hospital and Imam Khomeini Hospital as well as two community health centers in Ahvaz. These settings were selected because of the large number of diabetic patients who referred to these centers. The sample size was set to be 175 using the following formula:

$$n = \left[ \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})}{0.5 * \ln[(1+r)/(1-r)]} \right]^2 + 3$$

Where  $\alpha=0.01$ ,  $\beta=0.1$ , and  $r=0.29$ , according to similar previous studies.<sup>25</sup> The sample consisted of 175 eligible diabetic patients who were enrolled in the study using convenience non-probable sampling. The inclusion criteria were diagnosis and verification of type II diabetes by the specialist, suffering from the disease for at least 6 months, being 20 to 65 years old, being able to read and write, being willing to participate in the study, and being free from mental and cognitive diseases. In the case of incomplete completion of questionnaires, the samples were excluded from the study and sampling continued until the sample size was achieved. Data were collected after taking permission from officials of the selected centers, informing the participants about the purpose of the study and the confidentiality of their information, and asking them to sign the written consent form.

In this study, the self-report method was used for data collection. Data collection tools consisted of two questionnaires: a researcher-made questionnaire for assessing diabetic patients' health-promoting behaviors and the questionnaire of Health Literacy for

Iranian Adults (HELIA). This questionnaire was prepared using the published books and articles with the aim of evaluating health promoting behaviors in type 2 diabetic patients. The first part of it includes questions related to demographic factors such as age, gender, marital status, education level and family history of diabetes. The second part includes 46 questions assessing health-promoting behaviors in eight dimensions: Spiritual growth (6 questions about self-satisfaction and feelings of peace, hope for the future, belief in the purposefulness of life, efforts to achieve long-term goals of life, awareness of important life issues, readiness to learn new experiences), Responsibility for health (7 questions about requesting information about self-care, participating in health care training programs, talking with health professionals about health concerns, reporting unusual symptoms of a disease to a therapist, paying attention to food labels, asking a doctor and nurse about their concerns about recommendations, requesting counseling and guidance on illness), Stress management (4 questions about sufficiency of sleep, time spent for relaxing muscles, walking to reduce stress, accepting issues that one does not have the power to change), Interpersonal relationships (5 questions about spending time with friends, communicating satisfactorily with others, expressing concerns and intimacy with others, trying to develop intimate relationships with others, resolving problems through dialogue and agreeing with others), Physical activity (4 questions about regular exercise program, light and heavy sports activities, adjusting exercise activity to fit blood glucose levels), Nutrition (12 questions about using snacks to prevent blood glucose loss during daily activities, adherence to the recommended diet, eating different groups of foods appropriately, eating breakfast), Blood sugar control (3 questions about performing a blood glucose test according to the instructions, self-checking of blood glucose, taking prescribed medications for blood glucose control), and Foot control (5

questions about regular examination of the feet and shoes, daily washing of feet, appropriate drying of the toes, use of appropriate shoes and socks, cutting of toenails correctly).

For scoring this part of the questionnaire, a four-point Likert scale (never=zero, sometimes=one, most of the time=two, always=3) was used, with the total score ranging between 0 and 138. Achieving scores from zero to 23 represents weak level; from 24 to 70 represents medium level; from 71 to 116 represents good level; and from 117 to 138 represents very good level in health-promoting behaviors.

For spiritual growth dimension, scores less than four indicate improper status and scores higher than 12 indicate ideal status. For Health Responsibility dimension, scores less than five indicate improper status and those higher than 15 indicate ideal status. For stress management dimension, scores less than three indicate improper status and those higher than eight indicate ideal status. For interpersonal relationships dimension, scores less than four indicate improper status and those higher than 10 indicate ideal status. For physical activity dimension, scores less than three indicate improper status and those higher than eight indicate ideal status. For nutrition dimension, scores less than nine indicate improper status and those higher than 20 indicate ideal status. For blood sugar control dimension, scores less than three indicate improper status and those higher than seven indicate ideal status. For foot control dimension, scores less than four indicate improper status and those higher than 12 indicate ideal status.

Health Literacy for Iranian Adults (HELIA) questionnaire was used to assess the health literacy of the participants. The questionnaire was developed by Montazeri et al. with the aim of assessing health literacy level of Iranian urban community (18-65 year-old), which is consistent with cultural and social characteristics of Iran.<sup>26</sup> HELIA includes 33 questions assessing health literacy in five dimensions: reading includes 4 questions, accessing 6 questions, understanding 7

questions, evaluating 4 questions, decision making and behavior 12 questions.

For scoring this the questionnaire, a five-option Likert scale was used that in reading dimension scored through very difficult=1, difficult=2, not easy and not difficult=3, easy=4, and very easy=5. Dimensions of accessing, understanding, evaluating and decision-making and behavior were scored through not at all=1, rarely=2, sometimes=3, most of the time=4, and always=5. The total range of scores in this questionnaire varied from 33 to 165. Likewise, scores for each dimension ranged from 4 to 20 for reading; 6 to 30 for accessing, 7 to 35 for understanding, 4 to 20 for evaluating and 12 to 60 for decision-making and behavior. In each dimension, gaining scores equal and lower than 66 were considered improper and scores 66.1 and above were considered ideal in that dimension. The total scores of 0 to 50 indicate insufficient, scores of 50.1 to 66 semi-sufficient, scores of 66.1 to 84 sufficient, and scores of 84.1 to 100 represent excellent health literacy.

In order to determine the face and content validity of the researcher-made health promotion behaviors questionnaire, 10 faculty members of Ahvaz Jundishapur University of Medical Sciences evaluated the questionnaire and their comments were applied in the questionnaire. For the researcher-made questionnaire, the content validity rate (CVR) was 0.62 and the content validity index (CVI) was 0.79. The first version of the questionnaire contained 62 questions, but after applying the experts' opinions, 46 questions were confirmed and 16 were deleted. Construct validity and factor analysis were not performed for this questionnaire.

For determining the reliability of the questionnaire, the test-retest reliability method with two-week interval was applied. To do so, 30 qualified patients with type II diabetes were enrolled. Then, the Cronbach's alpha was used to determine the tool's reliability. The mentioned questionnaire verified with the total reliability of 0.96.

The Cronbach's alpha was 0.93 for spiritual growth, 0.74 for responsiveness to health, 0.74 for interpersonal relations, 0.80 for stress management, 0.84 for physical activity, 0.93 for nutrition, 0.87 blood sugar control, and 0.90 for foot control subscales.

Regarding the health literacy questionnaire, content validity was performed in Iran (2014). Fifteen specialists from various medical disciplines analyzed the questionnaire. Then Exploratory Factor Analysis showed that the questionnaire with 33 items in five dimensions (reading, accessing, understanding, evaluating, decision-making and behavior) enjoys a proper validity. The reliability of HELIA and its dimensions using Cronbach's alpha was verified from 0.72 to 0.89.<sup>23</sup>

The collected data in this study were analyzed through SPSS 22 software, using descriptive statistics and Pearson's correlation coefficient. The descriptive statistics including absolute and relative frequency distribution, central indicators and dispersion including mean value and SD were used to describe demographic variables, health promoting behaviors status and health literacy. Pearson's correlation coefficient was used to determine the relationship between health literacy and health promoting behaviors variables.

The Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (IR.AJUMS.REC.1395.217) confirmed this study. The researchers considered certain

research ethics principles including respecting voluntary participation right, obtaining informed consent from the participants, and informing the participants of the purpose of the study.

## RESULTS

In this study, 175 patients with type II diabetes, with a mean age of  $47.71 \pm 11.68$  years old, participated. The results obtained from analyzing data indicated that the majority of the subjects were 51-65 years old (44.6%), married (69.7%), women (52%), with under diploma education (43.4%), and had family history of diabetes (71.4%) (Table 1).

The mean scores of health literacy and health promoting behaviors of the participants were  $76.14 \pm 15.26$  and  $100.45 \pm 19.82$ , respectively. The highest score of health promoting behaviors was observed in nutrition dimension ( $26.11 \pm 6.85$ ) and the lowest score belonged to physical activity dimension ( $6.70 \pm 2.75$ ) (Table 2).

There was a significant relationship between health literacy and all dimensions of the health promoting behaviors, using Pearson's correlation coefficient ( $P < 0.05$ ) (Table 3). Correlation between health literacy and health promoting behavior and its domains was also determined by Partial Correlation Coefficient analysis in order to control the possible confounding variables of age, sex, marital status, occupation and family history

**Table 1:** The participants' demographic variables (N=175)

Demographic data		N (%)
Age (year)	20-35	30 (17.1)
	36-50	67 (38.3)
	51-65	78 (44.6)
Gender	Male	84 (48)
	Female	91 (52)
Marital status	Single	29 (16.6)
	Married	122 (69.7)
	Divorced	8 (4.6)
	Death of spouse	16 (9.1)
Education level	Under-diploma	76 (43.4)
	Diploma	64 (36.6)
	Academic degree	35 (20)
Family history of diabetes	Yes	125 (71.4)
	No	50 (28.6)

**Table 2:** Mean and SD of health literacy, health promoting behaviors and their aspects in the studied units

Variable	Mean±SD
Total health literacy	76.14±15.26
Total health promoting behaviors	100.45±19.82
Dimensions of health-promoting behaviors	
Spiritual growth	14.02±2.91
Health responsibility	13.69±3.17
Interpersonal relationship	10.44±2.92
Stress management	8.10±2.70
Physical activity	6.70±2.75
Nutrition	26.11±6.85
Blood sugar control	7.22±2.15
Foot control	11.87±2.90

**Table 3:** The relationship between health literacy and health promoting behaviors of patients with type II diabetes

Health promoting behaviors and its dimensions	Health Literacy	
	Correlation coefficient (r)	P value*
Spiritual growth	0.52	<0.001
Health Responsibility	0.49	<0.001
Interpersonal relationship	0.43	<0.001
Stress management	0.43	<0.001
Physical activity	0.24	0.001
Nutrition	0.50	<0.001
Blood sugar control	0.42	<0.001
Foot control	0.51	<0.001
Total	0.61	<0.001

\*Pearson’s correlation coefficient

of diabetes (Table 4).

## DISCUSSION

The results of this study, which was carried out with the aim of determining the relationship between the health literacy and health promoting behaviors in patients with type II diabetes in the

selected centers of diabetes in Ahvaz, indicated that the health literacy of patients with type II diabetes is sufficient. In a study on patients with type II diabetes in Rio de Janeiro, Brazil<sup>27</sup> and a study on women with type II diabetes in Tehran,<sup>22</sup> it was found that the health literacy of the subjects is in the acceptable level; this was consistent with our results. However, the

**Table 4:** The relationship between health literacy and health promoting behaviors after controlling the potential confounding variables

Health promoting behaviors and its dimensions	Health literacy	
	Correlation coefficient (r)	P value*
Spiritual Growth	0.42	0.0001
Health Responsibility	0.42	0.0001
Interpersonal Relationships	0.40	0.0001
Stress Management	0.47	0.0001
Physical Activity	0.13	0.083
Nutrition	0.07	0.367
Blood Sugar Control	0.37	0.0001
Foot Control	0.53	0.0001
Total	0.54	0.0001

\*Partial Correlation Coefficient analysis in order to control the possible confounding variables of age, sex, marital status, occupation and family history of diabetes

results of many studies conducted in this area was inconsistent with those of this study as these studies reported inadequate health literacy level in diabetic patients who participated in their studies.<sup>13,17,28</sup> The difference would be due to the difference in the effective factors influencing health literacy in various regions, for instance, the individual factors, such as literacy skills, consciousness level, culture, experiences and factors related to the general health system, i.e. access to resources, communicative systems and information distribution channels.

In this study, the average of health promotion behaviors in diabetic patients is good. In other studies on health promoting behaviors of patients with type II diabetes in Isfahan,<sup>29</sup> women with chronic diseases such as diabetes, hypertension, heart failure and hyperlipidemia in Iranshahr<sup>30</sup> reported the health promoting behaviors' level of their participants as medium. It seems that difference in the results of health promoting behaviors would be due to the use of different tools in these studies. Although in the mentioned studies, the Health-Promoting Lifestyle Profile II (HPLPII) was used as a measuring tool, in this study due to the non-specificity of this tool for diabetic patients, we had to use a researcher-made tool to measure the health promoting behaviors of diabetic patients.

In the current study, the lowest and highest scores of health promoting behaviors belonged to physical activity and nutrition, respectively. In a study conducted on patients with type II diabetes in Isfahan,<sup>29</sup> the weakest performance belonged to physical activity, which is consistent with the current study. However, in their study the best performance belonged to spiritual growth. In our study, spiritual growth gained the second-highest score. Other studies conducted on patients with other chronic diseases indicated that physical activity level and spiritual growth were at the lowest and highest levels, respectively.<sup>31,32</sup> These studies confirmed our study in terms of the lowest score gained in the physical activity. It seems that patients with chronic diseases such as diabetes have not had accurate and

comprehensive information about advantages of regular exercise and may lack essential motivators for physical activity. Although the highest scores in studies on diabetics belonged to spiritual growth, other studies conducted on patients with other chronic diseases like studies conducted on patients with chronic renal diseases<sup>33</sup> and postmenopausal women,<sup>34</sup> in line with our results, reported that the highest score belonged to nutrition dimension of health behaviors. The reason for the high score of nutrition dimension may be related to more awareness of patients regarding the importance of adherence to the recommended diet in controlling their disease. Diet is now recognized as one of the important factors in controlling diabetes and many chronic diseases, and caregivers mainly focus on this behavioral dimension in their patient education programs. Actually, both nutrition and proper diets are inseparable parts of treatment and control of diabetes.<sup>35</sup> Given the positive effect of such interferences in controlling the side effects caused by the disease and the decreased prevalence of diabetes, it is necessary to pay attention to this issue.<sup>36</sup>

A significant relationship was seen in this study between the health literacy and eight dimensions of health promoting behaviors as people with higher health literacy are very sensitive to carrying out health promoting behaviors. This relationship was confirmed after controlling the effect of confounding factors of age, sex, marital status, occupation and family history of diabetes. In fact, the higher health literacy is associated with higher individual capability and capacity to make a proper decision about their health. Despite the lack of similar studies on the association between health literacy and health promoting behaviors in diabetic patients, some studies in other populations showed the link between these two variables. For example, the results of the studies conducted on Chinese elderly<sup>37</sup> and healthy population of Taiwanese women<sup>25</sup> demonstrated that these two variables were related to each other. Although studies

on diabetic patients, although not entirely but concisely, had aims similar to that of the present study, they reported different results. For instance, a study about the relationship between health literacy and self-care behaviors in patients with type 2 diabetes<sup>38</sup> found no significant relationship between the two variables in general and health literacy was related with just two dimensions of following the recommended diet and adherence to prescribed medications. Similarly, a study with the aim of analyzing the relationship between practical health literacy and blood sugar control in old people with type II diabetes<sup>39</sup> did not find any significant relationship between health literacy and blood sugar control. Since these studies examined the association of health literacy with self-care.<sup>38</sup> and blood glucose control<sup>39</sup> variables, which are somewhat different from the current study, these conflicting results are justifiable.

This study provides evidence that there is a link between health literacy and health promoting behaviors, which reflects the key role health literacy plays in the health promotion. Health literacy and, therefore, health promoting behaviors play key roles in promoting the people's health, life quality of diabetic patients and reduction of their medical costs. Then, the health literacy must be considered as a factor that promotes health behaviors, develops a healthy lifestyle, and finally improves the life quality.

There were some limitations in this study including the respondents' understanding of the questions, individual-cultural specifications and differences and emotional state of the respondents upon answering the questions, which were beyond the control of the researchers. In this study, willingness to participate in the study was considered as an inclusion criterion, so it is possible that people who were inclined to participate in this study enjoyed high health literacy. Failure to assess the construct validity of the health promotion behaviors questionnaire was another limitation of the study, which is recommended to be considered in future studies.

## CONCLUSION

This study showed that there was a significant positive relationship between health literacy and all dimensions of the health promoting behaviors in diabetic patients. That is, the more increase in the level of health literacy, the more adoption of health promoting behaviors in diabetic patients. Therefore, given the role of health literacy in improving health behaviors in diabetic patients, it is important that healthcare providers adopt measures to improve their diabetic patients' health literacy and motivate them. This can ultimately lead to improved quality of life in these patients and, consequently, lower health care costs imposed on the health system. However, further studies are recommended in this regard due to the lack of studies supporting the findings of this study on the relationship between health literacy and health promoting behaviors.

## ACKNOWLEDGEMENT

The article is adopted from the MSc thesis of the first author which was sponsored by the Nursing Care Research Center in Chronic Diseases of Ahvaz Jundishapur University of Medical Sciences (NCRCCD-9506). The authors appreciate the financial supporter of the study, the officials of selected diabetes centers for their cooperation to pave the way for conducting this study, and diabetic patients who participated in the study.

**Conflict of Interest:** None declared.

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