The association between Electronic Health Literacy and Self-care Management in Adults with Type-2 Diabetes

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ABSTRACT

Purpose: **E**-health illiteracy has disadvantages including misevaluation of medical information displayed on the internet. Both effective self care management and e-health literacy are important terms in order to control of the chronic diseases. The aim of this study is to determine the relationship between e-health literacy and the self-care management of patients with Type-2 diabetes.

Materials and Methods: The type of the study is descriptive. A questionnaire was applied to individuals who have been diagnosed with Type-2 diabetes in the endocrine policlinic of the internal medicine clinic of a tertiary state hospital in Istanbul, Turkey. The sample size was calculated as 384 by accepting the adequate e-health literacy rate among Type-2 diabetes patients as 50%, the margin of error 5%, and the confidence level as 95%. In addition to sociodemographical questions; our questionnaire contains two scales: Self-Care Management Protection scale and the E-health Literacy Scale. Number (n) and percentage (%) values were used in the expression of descriptive data. Mean, standard deviation, median and minimum, maximum values were given. For data comparison; Mann-Whitney U test was used for non-normally distributed variables. The Spearman correlation used to measure the linear relation between two numeric variables. Significance level has been accepted as $p<0.05$.

Results: Totally 330 patients were included our study by a participation rate of 85.9 %. The mean age of the participants was 57.74±13.83 and 52.4% were female. A positive correlation was observed between scores of e-health literacy scale and self-care management scale ($r=0.235$, $p<0.001$) and self-protection subscale of self-care management scale ($r= 0.345$, $p<0.001$). A negative correlation exists between age and e-health literacy ($r= -0.419$, $p<0.001$).

Conclusions: The results support the claim that individuals with a higher e-health literacy can better able to control their disease through self-management.

Keywords: Type-2 diabetes, E-health-literacy, self-care management

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INTRODUCTION

Diabetes is the one of the most common chronic diseases, with an estimated prevalence of 9.3% (463 million people), worldwide. The prevalance is predicted to rise up to 10.2% and 10.9% in 2030 and 2045, respectively [1]. High majority of the patients with diabetes suffers from Type 2 diabetes. It affects nearly 90–95% of the patients with diabetes mellitus [2].

Chronic diseases cause a slow and progressive deviation in normal physiological functions of patients, cover a long period of life, and require continuous medical care and treatment. For this reason, it is of great importance for patients to take responsibility for their own treatment and medical care throughout their lives [3]. Nowadays, it is accepted that effective management of chronic diseases can be achieved with an active patient who participates in his/her disease care [4]. For a successful participation of own disease care and management, some factors like adequate health literacy self care and self care management are required.

Health literacy is a term defined as the cognitive and social abilities that affect the personal skills to use and understand information in order to support and maintain good health status which is important for public health [5]. Insufficient health literacy causes individuals to lack information about health services, not to understand medical information and their poor health status, to use preventive health services less, which causes tend to treatment-based services more, to increase health demand with unnecessary hospital admissions, to experience communication problems with health professionals. It causes also poor self-care management, increase in health costs, and increase in morbidity and mortality rates [6, 7].

Nowadays, the internet is a tool for persons to obtain information about health, as it is used in almost every issue, and apply it when dealing with diseases and disease-related conditions [8]. This way, it allows individuals to educate themselves [9]. This situation has caused e-health literacy, which is a different type of health literacy, to gain importance. E-health literacy is a term described as the ability to access, find, understand and use health related information in electronic sources. The use of this information can help to solve individuals' health problems [10]. To be informed about patients's own disease and it's management ways is very important issues in order to maintain the well-being of the patient. Its significance was highlighted in a study conducted by Cajita et al., where it was found that patients with chronic heart failure do not have enough information about their disease and the drugs used in the treatment, which leads to repeated hospitalization [11]. For this reason, getting the information about their diseases and management ways from electronic resources practically highlights the importance of adequate e-health literacy and it's potential effect on disease management.

The treatment approach in chronic diseases is to provide treatment and care management. The success of treatment and care management in chronic diseases can only be possible if the individual's self-management and self-care are sufficient [12]. Self management is the process of a person's observing, making decisions, giving realistic reactions for properly manage a task [13]. Self care is described as the activities which are necessary for maintaining of life, health and well being of the individual. It's continuous involvement in their own health [13]. Self-care management describes the individual's response to some signs and symptoms when they appear. It contains the evaluation process of physical and emotional changes and deciding to need of dealing with these changes. All the preventive, treatment based and rehabilitative services require a common approach and coordination of treatment and care management for the fight against chronic diseases [13]. Adapting to their disease outcomes and lifestyle changes is very important for patients with chronic diseases in order to solve existing or future problems related to their diseases. Patients not being able to adapt to these changes are frequently hospitalized for their treatment [14]. This condition of adaptation can only be achieved by increasing the self-care of the patients. Increase in their self-care is possible with management ability of their self-care [13]. With good disease management, an important decrease is observed in disease related symptoms, admissions to emergency services and hospitalization rates [15]. With higher disease management, negative physical and mental outcomes and need for care are also diminishing [15]. In addition, patients with high disease management ability have higher life quality [16]. The American Diabetes Association states that individuals with diabetes should be educated for some behaviors supporting self-management like healthy eating, physical activity, monitoring of blood glucose, taking of medications, monitoring for complications [17, 18]. All these behaviors have positive effects on the glycemic control of patients, quality of life and reduction of disease complications [19]. The results of a study shows the importance of self-management skills for type-2 diabetes patients. Self-management education for patients with type-2 diabetes made improvement in their glycemic control [20].

Both effective self care management and e-health literacy are important terms in order to control of the chronic diseases. For this reason we aim to determine the association between electronic health literacy and self-care management in adults with type-2 diabetes. Also sociodemographical factors are evaluated which can be related to this terms.

MATERIALS AND METHODS

Study design and participants

This study is a descriptive study. A questionnaire was applied to patients with Type-2 diabetes, diagnosed for at least 6 months and aged 18 and above. Participants were included from the endocrine policlinic of the internal medicine clinic of a tertiary state hospital in Istanbul, Turkey. The information about the study was explained to patients and after their consent study questionnaire was filled by participants in the waiting room of the policlinic.

The sample size was calculated as 384by accepting the adequate e-health literacy rate of Type-2 diabetes patients as 50%, the margin of error 5%, and the confidence level as 95%. Totally 330 patients were included in our study by a participation rate of 85.9 %.

Instruments

The first part of the questionnaire consists of socio-demographic questions (18 questions). In the second part, E-health Literacy Scale and the Self-Care Management Scale (SCMP-G) are used.

The Self- Care Management Scale for Chronic Diseases (SCMP-G) was developed by Jones LC [21]. The scale contains 35 questions; that are developed as a 5-point likert type. Point 5 is Completely Agree and 1 is Completely Disagree. The SCMP-G scale has two sub- dimension defined as self-protection and social protection. Self-protection sub-dimension involves the items 2, 6, 8, 11, 15, 18, 19, 20, 22, 23 and 25-34. The protection sub-dimension contains the items 1, 3-5, 7, 9, 10, 12-14, 16, 17, 21, 24 and 35. Higher SCMP-G scale scores indicates higher self-care management. The Turkish validity and reliability of the scale was done [13].

The E-health Literacy Scale was developed by Norman and Skinner [10]. The Turkish validity and reliability of the scale was done by Gencer [22]. This scale contains 2 items about internet use and 8 items measuring internet attitude. It was arranged as "1=strongly disagree, 5= strongly agree" with a 5-point Likert-type scaling method. The lowest and highest points can be obtained from the scale are 8 and 40 points, respectively. A high score from the scale indicates a high level of e-health literacy [10, 22].

Statistical methods

The obtained data was evaluated using the SPSS-17 program. Number (n) and percentage (%) values were used in the expression of descriptive data. Mean, standard deviation, median and minimum, maximum values were given. For data comparison;Mann-Whitney U test was used for non-normally distributed variables. The Spearman correlation test used to measure the linear relation between two numeric variables. Significance level has been accepted as $p<0.05$.

Ethics

Ethics committee approval was obtained from the ethics committee of the studied university (Date: 03.12.2021, decision number=09.2021. 1418). Institutional permission was obtained from the hospital where the study was conducted. Informed consent was obtained from the patients after explanation about the study.

RESULTS

Totally 330 participants were reached. Mean age of the participants was 57.74±13.83; with the participant ages ranging from 18 to 92.

The demographic characteristics of the study sample are represented in Table 1. Of the total participants 52.4% were female, 70.0% reported access to the internet. Of the participants 49% have 1st and 2nd degree relatives that have diabetes. The majority of the participants were graduated from primary school (34.2%), and 10.3% of them were illiterate.

When the relations between gender and scales are examined, it can be observed that males scored higher than females on e-health literacy, self-care management and the self-protection scales, but no significant association was found between gender and e-health literacy ($p= 0.080$) gender and self-care management (p-value= 0.061), gender and self-protection ($p= 0.600$). When it comes to social-protection scores, although women have a higher median value than men, a significant relationship was observed between gender and social-protection. ($p<0,001$). These findings are shown in Table 2. Adults with a minimum of a high school degree scored significantly higher in e-health literacy (median scores of 8.5 vs 23.0), self-care management subscale (median scores of 118.0 vs 120.0) and the self-protection subscale (median scores of 71.0 vs 78.0), with $p<0.001$, $p= 0.043$ and $p<0.001$ respectively. However, individuals who did not graduate high school scored significantly higher in the social-protection with $p= 0.029$. When the relationship between internet access and scale scoring was examined, it was noted that patients having internet access had significantly higher e-health literacy scores ($p< 0.001$), and self-protection scores (p 0.003). These findings are shown in Table 2.

Upon the comparison between the age of the participants and the scores they got from the scales, it can be seen that the scores they get from the e-health literacy scale are inversely proportional to their age ($r= -0.419$), and the scores they get from the self-protection scale are inversely proportional to the age as well ($r= -0.132$). In addition, a significant correlation was found between the age of the

participants and their e-health literacy (p<0.001), and between the age of the participants and self-protection (p= 0.016). A significant negative correlation was found between the year after diagnosis and e-health literacy (p<0.001 and r= -0.248) meaning that the patients with less number of years past their diagnosis had a higher e-health literacy. However, no significant relationship was found between the year after the diagnosis and self-care management or any of its subscales. These findings are presented in Table 3.

Table 1. Sociodemographical characteristics of the participants

	N	*%*
Gender		
Male	157	47.6
Female	173	52.4
Family history of type 2 diabetes		
Distant relatives	65	19.9
1st & 2nd degree relatives	162	49.5
None	100	30.6
Access to internet		
Yes	231	70.0
No	99	30.0
Educational status		
Illiterate	34	10.3
Literate	16	4.8
Primary school	113	34.2
Secondary school	43	13.0
High school	69	20.9
University degree	48	14.5
Masters or PhD	7	2.1

Table 2. The relationship between gender and e-health literacy and self care management

	E-healthliteracy	**Self-care management**	**Self- protection**	**Social-protection**
	Median (Min.-Max.)	Median (Min.-Max.)	Median (Min.-Max.)	Median (Min.-Max.)
Gender				
Male	16.0 (8.0-40.0)	116.0 (84.0-157.0)	74.0 (45.0-94.0)	45.0 (18.0-71.0)
Female	11.0 (8.0-40.0)	121.0 (84.0-151.09	73.0 (45.0-96.0)	49.0 (20.0-73.0)
P value	*0.080*	*0.061*	*0.600*	***<0.001***
Education level				
Less than high school	8.5 (8.0-40)	118.0 (84.0-157.0)	71.0 (45.0-96.0)	48.0 (20.0-73.0)
More than high school	23.0 (8.0-40.0)	120.0 (84.0-156.0)	78.0 (52.0-94.0)	45.0 (18.0-67.0)
P value	***<0.001***	***0.043***	***<0.001***	***0.029***
Internet access				
No	8.0 (8.0-40.0)	117.0 (87.0-154.0)	69.0 (48.0-94.0)	48.0 (23.0-68.0)
Yes	20.0 (8.0-40.0)	119.0 (84.0-157.0)	75.0 (45.0-96.0)	46.0 (18.0-73.0)
P value	***<0.001***	*0.320*	***0.003***	*0.096*

The relationship between the e-health literacy, self-care management, self-protection and social-protection subscales is presented in Table 4. The self care management scale and e-health literacy have a significant positive correlation ($p<0.001$, $r= 0.235$). The self-protection subscale and e-health literacy have a significant positive correlation ($p<0.001$, $r= 0.345$). No significant correlation is found between social-protection subscale and e-health literacy ($p= 0.677$, $r= 0.023$).

Table 4. The relationship between electronic health literacy and the SCMP-G scale and subscales

		SCMP-G Scale	Self-protection	Social-protection
E-Health Literacy Scale	*r*	0.235	0.345	0.023
	p	<0.001	<0.001	0.677

DISCUSSION

Low health literacy can cause adverse health outcomes for many chronic diseases **[**23**]**. Type-2 diabetes being one of the most crucial diseases among them. As Internet-based e-health resources are developing to facilitate patients' disease management, it becomes fundamental to understand e-health literacy and its predictors.

Health literacy indirectly affects self-care behaviors with help of self-efficacy. Higher health literacy improves self care behaviors and modifying self care behaviors causes improvement in glycemic control in diabetes patients **[**24**]**. Similar to type-2 diabetes patients, a study showed that patients with adequate literacy had higher general hearth failure knowledge, higher self-efficacy and higher prevalence of key self-care behaviors **[**23**]**. According to our findings; e-health literacy has a significant positive correlation with self-care management and self-protection parameters, all while not having a significant correlation with social-protection. The reason behind this is believed to be associated with the personal goals behind using electronic resources, their application as well as the extent to which they impact the social aspect of the individuals' lives; and all of these factors are taken into consideration with respect to the age of the participants and the level of their activity and contribution to such recent electronic platforms. Additionally, conforming to our findings, a research stated that participants with higher education status are more likely to have high e-health literacy skill similar to our study results **[**24**]**. Lower education levels may adversely affect the health of patients. Because patients with lower educational levels are significantly less likely to use electronic resources to get information about their own health **[**25**]**. Thus they do not benefit from the e-health resources. Therefore, it is necessary to assess patients' e-health literacy and identify problems with their access to e-health resources, especially in patients with lower educational levels **[**26**]**.

In our study e-health literacy levels was also decreased in older ages. Similar to our results, a study showed that older adults have less e-health literacy **[**27**]**. This may be caused by older adults can not reach and find information about health using the electronic sources due to the disability of using smartphones or similar electronic tools. Chronic diseases are mostly seen in older age groups, so interventions for this population should have the aim to increase their internet usage skills **[**28**]**. Usage of the internet can help the older adults to manage their diseases, and maintain their wellbeing such as making decisions. And they would know better in which situations hospital application is necessary for them.

The scores of self care management scale and subscales were also evaluated. Patients with higher educational level had higher self care management, and self protection as supported by the literature **[**29**]**. The effect of gender was seen only in social protection subscale. Female participants had higher social protection scores. This may be caused by women's social roles and responsibilities in society. Moreover, older patients had less self protection scores. We can attribute this situation to their less knowledge about their diseases, since older patients had also lower e-health literacy. Similar to our results, a study showed that patients with a chronic disease aged 60 or above had lower self-protection scores than early age groups **[**30**]**.

The limitations that were faced included lack of objectivity; as the data collected is subjective due to the fact that the self-care management index (SCMP-G) is based on an individual's perception of each criterion. In addition to this, time limitation is faced; since the questionnaire is quite long some patients did not have the time to answer them thoroughly. Furthermore, lack of generalization considering that we could only study a certain population at a certain hospital in a certain area of the country. This can be resolved by expanding the scope of the chosen hospitals in future studies. Furthermore, since this study was focused on type-2 diabetes patients, the number of prospective participants was quite low, therefore the total number of acceptable responses can be increased if other chronic disease patients are also included in the scope of the research. Lastly, COVID related issues, as some patients were less willing to participate due to the concerns raised by

the spread of COVID. The strength of the study is; we have evaluated both the e-health literacy and self-care management of patients together. So the study can provide a wide aspect for the disease control of type-2 diabetes patients.

CONCLUSIONS

In this study e-health literacy has significantly correlated with self-care management. This implicates the need to enhance the e-health literacy skills of type 2 diabetes patients. This may help patients to find proper and reliable electronic sources for their disease related decisions and well-being. Predominantly, accessibility to the internet and better e-resources should be provided to the patients. Because despite the fact that 70% of the diabetic patients in our population had access to the Internet, we have no proof in our hands that indicates that they have the competence to use it in an adequate and appropriate way. Thus patients with type-2 diabetes should be educated to find reliable e-health resources. Interventions should be planned to improve self care management abilities and e-health literacy especially in older patients and patients with lower educational level. With higher e-health literacy and self care management skills, patients can better cope with their disease outcomes.

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Conflicts of interest

There are no conflicts of interest to declare.

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