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Assessing the e-health literacy level and its predictors in heart patients: A Case Study in a Heart Hospital Center in Iran

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Abstract:

BACKGROUND: eHealth literacy has many benefits for patients and community members, including the direct impact on improving the quality of patient education and reducing direct and indirect healthcare costs. Benefiting from eHealth literacy in patients with cardiovascular diseases can effectively provide healthcare services and manage these patients. This study aimed to evaluate eHealth literacy level and its factors affecting patients with cardiovascular diseases in a Heart Center Hospital.

MATERIALS AND METHODS: This cross-sectional study was conducted in 2022. A valid and reliable questionnaire has been used for data gathering. From 147 distributed questionnaires among patients with cardiovascular diseases at Madani Heart Center Hospital in Khorramabad city, finally, 86 questionnaires have been collected completely. Data analyses were done using IBM Statistical Package for the Social Sciences (SPSS) software version 22 descriptive and analytical tests such as one-way ANOVA, independent sample *t*-test, and Spearman correlation coefficient based on the study objectives.

RESULTS: The study showed that heart patients' eHealth literacy status is moderate (3.38 out of 5). The awareness of the availability of resources on the Internet had the highest score (3.79). The importance of using the Internet to obtain health information ($r = 0.62$, $P < 0.001$) and the ability to use the Internet ($r = 0.62$, $P < 0.001$) had the most significant relationship with eHealth literacy among patients with cardiovascular diseases.

CONCLUSION: It is suggested that by increasing the level of Internet skills, expanding the use of the Internet for health-related services, using the Internet to make accurate health decisions among patients, extending the use of the Internet to access health resources, and reducing the patient's level of concern about their health status to improve the level of eHealth literacy of cardiovascular patients.

Keywords:

Cardiovascular diseases, health literacy, internet

Introduction

The Internet is one of the main sources of multidisciplinary information that enables users to access information in different areas, especially health-related information.[1-3] The Internet can influence management and clinical practice and can be used for public health education and healthcare services. A wide range of health-related information resources such as information about diseases, self-care of patients, self-management of patients, drug introduction, information about physicians, and consultation is available on the Internet to help those accessing it.[4]

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Acquiring information on the Internet differs from traditional resources such as books, journals, and other publications. Due to the complexities of the web environment, people without enough ability to search the Internet to access health-related information will encounter many difficulties in obtaining and using this information.[5,6] Therefore, people who need health information should be able to search for online health information and where and how to access it. Skills are required to use online health information and participate in healthcare decision-making consciously. It is essential to have these skills, due to the poor quality, inaccurate and confusing information on the Internet that can harm patients with health issues.[7,8]

The Internet contains various information resources that can be true or false. Also, to properly use health information from the Internet, users need minimal knowledge of the relevant sciences and tools for identifying and using scientific documents and reliable resources. In addition to the inability of users to search for help, some Internet users do not correct understanding of the retrieved information from Internet searches. In addition, to find health information electronically and use it for self-care and self-management purposes, people need appropriate techniques for finding information, so they need eHealth literacy to use health-related information correctly.[9] eHealth literacy is suggested in response to Internet users' needs regarding health problems.

The term eHealth refers to transmitting and distributing information about healthcare through the Internet and other information technologies. The most important cause for the tendency to use the Internet for providing healthcare services is to increase traditional services' direct and indirect health fees. Thus, eHealth penetrated different parts of healthcare information technology with important objectives, including patient health records, online health interventions, education and learning in health, mobile technologies, and research.[10,11]

The American Medical Institute emphasizes health literacy as how individuals can obtain, process, and understand the basic health information and services needed to make an appropriate health decision.[12] As a result of the health literacy and eHealth definitions and their combination, eHealth literacy is created. Therefore, based on health literacy, eHealth literacy emphasizes the pivotal role of information and communication technology in health information so that eHealth literacy can be considered a result of health, knowledge, media, computer, and Internet literacy.[13] Therefore, with the quick advancement of these technologies, the skills and knowledge that form eHealth literacy are developing.[14] eHealth literacy is the ability to find, understand, and evaluate health-related information from electronic resources and use this information to identify or resolve a health problem,[15] which can be a valuable tool to improve health outcomes and reduce health injustices.[16]

eHealth literacy has many benefits for patients and people in the community, including the direct effect of improving the quality of patient education in eHealth tools and reducing direct and indirect healthcare costs. Also, not paying attention to eHealth literacy will lead to people's inadequacy in using eHealth services, wasting governmental budgets, patient and healthcare providers' energy, and time.[14,15] It seems necessary to pay more attention to eHealth literacy skills in society, which increasingly leads to using electronic tools.

Due to the importance of eHealth literacy levels among people in implementing public health programs, many studies have investigated the status of eHealth literacy and its predictors in society. The most important model used to examine electronic health literacy is the model presented by Norman and Skinner in 2006.[14,15] Also, some other models have been provided based on this model, which does not have the comprehensiveness of it. Still, the Norman and Skinner model is the most widely used model for examining eHealth literacy, and no model could replace it.[17-19] In their study, Benny *et al*. reviewed the eHealth literacy models. They concluded that the Norman Skinner model is the basis of other models. Also, it is still the most widely used model for studying eHealth literacy.[17] In addition to reviewing the status of eHealth literacy, this model also deals with factors affecting it.[14] The main specification of this model is assessing the essential skills of health consumers in a networked world.[15] A study in 2017 of patients with moderate-to-high risk of cardiovascular disease found that education level affected people's access to the Internet and subsequent online search for medical information.[20] Another study emphasizes the usefulness of the information available on the Internet for patients with oral diseases from physicians' perspectives.[21] In this study, the eHealth literacy of heart patients is examined as patients who need continuous care and self-care, and remote care is an issue that has been less addressed in the past, especially in Iran.

Considering the necessity of using electronic tools to improve heart patients' conditions and that limited studies have investigated their level of eHealth literacy, this study aimed to determine the level of eHealth literacy and its affecting factors in a Heart Center Hospital in Iran. It can be said that so far no study has specifically investigated the eHealth literacy status of cardiac patients in Iran. In this study, by modifying and revising the famous Norman model to measure eHealth

literacy, we provided a tool to examine this component for heart patients.

Materials and Methods

Study design and setting

This case study was a cross-sectional analytical study conducted in 2022 at Shahid Madani Heart Center Hospital in Khorramabad, Iran.

Study population and sampling

The study population included patients with heart diseases including coronary artery disease (CAD), acute coronary syndrome (ACS), heart failure (HF), and congenital heart failure (CHF) in a Heart Center Hospital (Madani Heart Hospital) from 1.3.2022 up to 1.7.2022. Sampling was done by the convenient sampling method, as a method to collect research data from a conveniently available pool of respondents, it is the most commonly used sampling technique as it is an incredibly prompt, and uncomplicated population. Therefore, after receiving the necessary permits and coordinating with hospital officials, we distributed the questionnaires among the patients referred to the hospital (hospitalized patients). Due to the limited number of patients admitted to the hospital, 147 questionnaires were distributed among patients within four months, and finally, 86 questionnaires were gathered completely (response rate = 58.50%). Questionnaires were distributed among people with at least a diploma. Also, people were selected who could search the Internet using various tools such as smartphones, tablets, and personal computers.

Data collections and tools

The questionnaire used was related to Norman's eHealth literacy assessment model, [14,15] validated in previous studies,[22,23] and showed its high validity and reliability. In addition to six questions related to the user's habits, which are predictors of eHealth literacy, Norman's questionnaire has eight main questions that focus on the ability to correct searches on the Internet, how to use the Internet, and identify the correct resources [Figure 1].

Data analysis

It used descriptive and analytical statistics to analyze the data. To analyze the data, IBM Statistical Package for the Social Sciences (SPSS) software version 22 was used. To determine the level of eHealth literacy, we divided the obtained score into three parts, from 0 to 20, weak, from 20 to 30, intermediate, and above 30 at the optimal level. Independent sample t-tests to compare the average eHealth literacy score between two groups of gender (male and female) and smoking were used. Also, it uses the one-way ANOVA to investigate the relationship between demographic data (such as age and education level) and eHealth literacy. The Spearman correlation coefficient test, to summarize the strength and direction of a relationship between two variables, was used to find which variables can predict high eHealth literacy scores.

Ethical consideration

The present study is part of a research project approved at Lorestan University of Medical Sciences (LUMS) with code No. 1397-1-99-2233 and the ethics code IR.LUMS.REC.1400.223.

Results

Details of participants

Out of 147 questionnaires distributed in this study, 86 completed questionnaires were collected. The

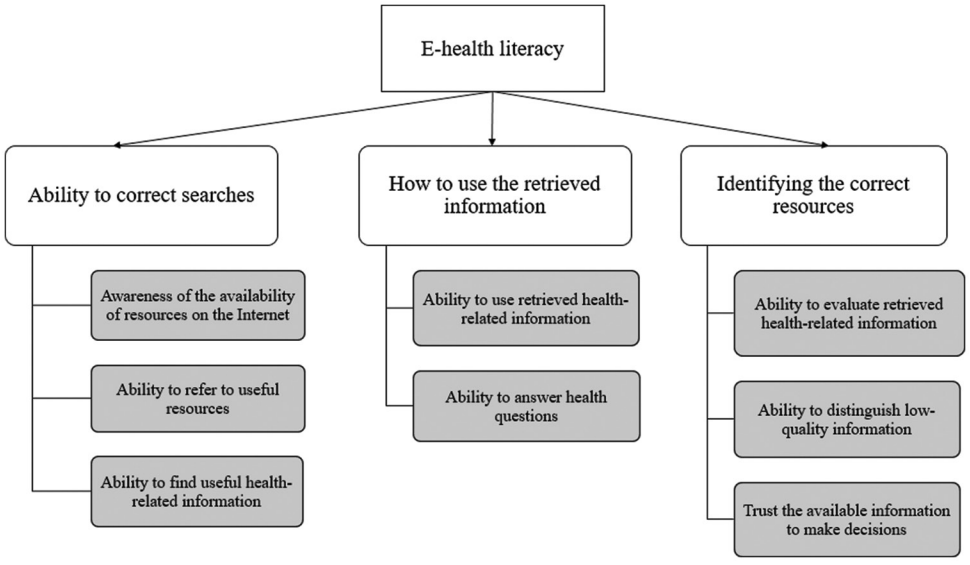

Figure 1: eHealth literacy model derived from Norman model [14,15]

identity information of the study participants is shown in Table 1. According to this table, the mean age of patients was 47.38+_10.57 (Min = 18, Max = 47.38), and most of the participants in the study were men and had undergraduate education.

Descriptive statistics about the patient's eHealth literacy and effective factors

Table 2 shows the descriptive statistics related to the factors affecting eHealth literacy. According to this table, effective factors have five sections.

According to Table 2, the effectiveness of Internet use in decision-making was the most extensive dimension among the dimensions affecting eHealth literacy among heart patients. Another considerable result of this table is that 71% of the participants in the study use the Internet daily.

Table 3 shows the frequency and standard deviation of the eight dimensions of eHealth literacy (based on the Norman model).

According to Table 3, the eHealth literacy diagram of the study has been shown in Figure 2. According to Figure 2, patients' knowledge of the required health resources on the Internet received the highest score. However, the ability to distinguish low-quality information has the lowest score from the heart patient's point of view.

Investigating the state of eHealth literacy based on demographic information

Other results showed there was not a significant relationship between age (P = 0.08), gender (P = 0.077), smoking condition (P = 0.06), and academic level (P = 0.11) with the electronic literacy of patients.

The level of eHealth literacy was not different between smokers and non-smokers. It seems that considering the availability of smart mobile phones for people in society, variables such as smoking cannot be considered confounding variables in people's eHealth literacy. In some cases, such as the ability to evaluate the health resources received on the Internet, a significant difference was observed between the two groups (P = 0.02).

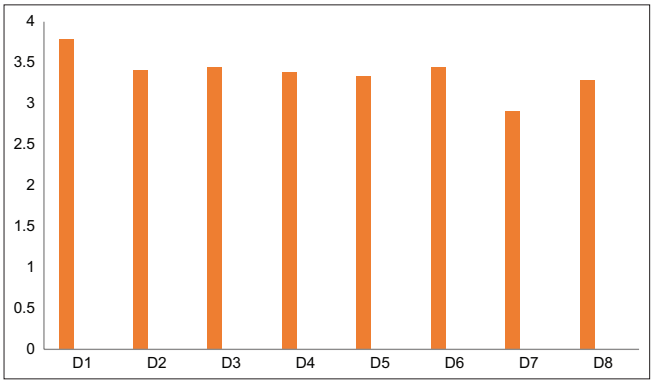

Figure 2: eHealth literacy diagram of the study

Investigating factors affecting eHealth literacy

According to Table 4, there is a positive and significant relationship between affective factors and eHealth literacy ($P < 0.001$).

According to Table 4, the importance of using the Internet to obtain health information (r = 0.62, $P < 0.001$) and the ability to use the Internet (r = 0.62, $P < 0.001$) had the most significant relationship with eHealth literacy.

Discussion

This study aimed to investigate eHealth literacy in patients with heart disease referred to the Heart Center Hospital and the associated factors. Understanding patients' health literacy levels and related factors are essential for health policymakers, healthcare providers, health information technology developers, and other stakeholders to provide better services. This study provides pivotal information for patients and helps decision-makers figure out their strategies for the sector, which have been discussed during the discussion.

The study results showed that the average score of eHealth literacy of patients with cardiovascular diseases was 27.02 out of 40, which indicates an intermediate level of eHealth literacy status. However, the present study results show a better situation of patients' eHealth literacy than the study of Rasouli *et al*. in 2018 (25.35 out of 40).[23] Due to the increasing penetration of technology, the increase in the amount of correct and incorrect

Table 1: Descriptive statistics of participants

Variables	Frequency	Percentage
Age		
15-30	5	5.81
30-45	29	33.73
45-60	45	52.32
60<	7	8.14
Gender		
Man	47	54.7%
Woman	39	45.3%
Academic Level		
Diploma	38	44.2%
BSc	40	46.5%
MSc and higher	8	9.3%
Occupation type		
Employee	25	29.10
Teacher	7	8.14
Farmer	14	16.28
Unemployed	6	6.97
House wife	28	32.54
Unspecified	6	6.97

Table 2: Descriptive statistics of effective factors in electronic literacy

	Factors	Frequency	Percentage
Factors affecting eHealth literacy	Ability to Internet use		
	I use the Internet very rarely	8	9.3
	I use the Internet a little	8	9.3
	I use the Internet somewhat	24	27.9
	I use the Internet a lot	29	33.7
	I use the Internet very much	17	19.8
	Internet usage rate		
	Sometime in the month	13	15.1
	Sometime in the week	12	14
	Every day	41	47.7
	Several times a day	20	23.2
	Effectiveness of internet use in decision making		
	The impact of using the Internet on my decision is very small	8	9.3
	The impact of using the Internet on my decision is small	12	14.0
	The impact of using the Internet on my decision is somewhat	33	38.4
	The impact of using the Internet on my decision is a lot	22	25.6
	The impact of using the Internet on my decisions is very much	11	12.8
	Importance of the Internet to access health-related information		
	Using the Internet has very low importance in access to health resources	5	5.8
	Using the Internet has low importance in access to health resources	8	9.3
	Using the Internet has somewhat important in access to health resources	26	30.2
	Using the Internet has high importance in access to health resources	34	39.5
	Using the Internet has very high important in access to health resources	13	15.1
	The patient's level of concern about their health status		
	I have very little concern about my health status	4	4.7
	I have little concern about my health status	5	5.8
	I have somewhat concerned about my health status	17	19.8
	I have highly concerned about my health status	31	36.0
	I have a very high concern about my health status	29	33.7

Table 3: eHealth literacy dimension's frequency

Row	Dimensions	Mean	SD
D1	Awareness of the availability of resources on the Internet	3.79	0.93
D2	Ability to refer to useful resources	3.41	1.03
D3	Ability to find useful health-related information	3.45	1.00
D4	Ability to use retrieved health-related information	3.39	1.03
D5	Ability to answer health questions	3.34	1.02
D6	Ability to evaluate retrieved health-related information	3.45	1.01
D7	Ability to distinguish low-quality information	2.91	1.13
D8	Trust the available information to make decisions	3.28	1.09

information related to health, and the need for people to access correct information related to health, more attention should be paid to the state of their eHealth literacy. It seems that the level of eHealth literacy of cardiac patients participating in the study is insufficient. Due to the need for continuous care and the benefit of up-to-date information, heart patients should be able to retrieve and use the information on the Internet as one of the primary essential information resources. This level of eHealth literacy among patients in the present study can be increased through different strategies by officials and policymakers. However, in industrial countries, the eHealth literacy of patients is higher than the results of the present study.[24] These can be rooted in various factors such as information monitoring by health managers, the quality and reliability of websites, and the development of electronic devices. Be. However, eHealth literacy in the present study was more appropriate than in low-income countries.[19] This can be due to the high number of literate people in society and the increasing use of information technology in Iran. These technologies are cheap and available to all people.

Other results showed that the level of Internet skills is effective in improving eHealth literacy among heart patients, which is consistent with the results of previous studies.[23,25] eHealth literacy is well-established in people with higher Internet skills, and that eHealth literacy directly impacts patients' self-care behaviors.[2] It should identify low-skilled Internet users and provide credible information sources when providing services. It also seems that for patients with a low eHealth literacy level, involving family members with sufficient skills in using the Internet in the patient self-management process can also be a good option.

The results showed that people who use the Internet more have a significantly higher level of eHealth literacy.

Table 4: Relationship between Electronic literacy and its affecting factors

Effective factors	Electronic literacy		
	*r**	*P***	*n*
Ability to Internet use	0.61**	<0.001	86
Internet usage rate	0.57**	<0.001	86
How useful the use of the Internet is in decision making	0.47**	<0.001	86
How important it is to use the Internet to access health resources	0.62**	<0.001	86
The patient's level of concern about their health status	0.45**	<0.001	86

*Pearson correlation coefficient (*r*). **Sig. (2-tailed) (*P*)

Valizadeh-Haghi *et al*. in their study in 2018 investigated patients with oral disease eHealth literacy level and conducted that the use of the Internet increases the level of eHealth literacy of patients,[26] which is consistent with the results of the present study. People who use the Internet more have a better ability to correctly search for sources, identify the correct resources, and use the retrieved information correctly. However, more studies are suggested to achieve more accurate results. However, attention should be paid to the ability of individuals to select reliable information resources and the correct use of information acquired in health-related decisions. In the lack of the necessary skills to choose information, excessive Internet use cannot positively affect patients' self-management. However, in the present study, some results indicated that the practical use of information in health decisions positively and significantly affects patients' level of eHealth literacy. In patients who cannot use the Internet and electronic resources to manage their diseases due to their inability to use them, it is recommended that their families use these resources while constantly referring to reliable sources and providing the necessary information to the patient. Also, educating the patients to use the Internet and electronic resources can be effective. The authorities should take effective measures for patients who cannot benefit from these resources due to financial issues.

Due to the high sensitivity of self-care and self-management of heart patients and based on the study results, the importance of using the Internet in accessing some health-related information from the perspective of patients is effective in increasing their eHealth literacy. Filabadi *et al*., in their study, conducted Internet access caused increased eHealth literacy and the patient's quality of life.[27] Also, Kim and Oh reached similar results in their study.[28] Therefore, it is necessary to emphasize the importance of properly using this valuable resource to obtain the required health information.

Also, people's concern about their health status positively correlated with patients' eHealth literacy level, consistent with Rasouli *et al*.'s study.[23] Although the severity of the relationship was weak, it can be said that part of the reasons for this result could be the type and level of high risk of heart disease. It can be said that the type of heart disease, the severity of the disease, and the patient's quality of life affect their concerns about their health status. Patients with riskier health statuses can have a higher level of eHealth literacy because that can answer their questions. However, the reasons for achieving this result can be sought from the perspective of patients.

One of the most important limitations of the study was the low willingness of patients to participate in the study, which limited the sample size. To solve this issue, the researchers conducted the data collection process for four months. Other limitations of the study include the high number of cardiac patients who are unable to use smartphones and the Internet, which were excluded from the study and affected the sample size. In this study, as mentioned, in addition to determining the eHealth literacy level of patients with heart diseases and the factors affecting it for the first time in Iran, a modified tool for eHealth literacy studies in the field of heart diseases was also presented, has been done, and researchers and policymakers in the field of heart diseases can use the results of this study and the tools used in this study.

Conclusion

The results of the present study showed that the level of eHealth literacy among heart patients one of the common diseases with a high mortality rate is at an average level, which seems insufficient. Due to the high access of people to health-related content due to the increasing expansion of the Internet, it is recommended to make necessary plans to increase the level of eHealth literacy of people. Among the actions that can be taken in this field is to inform people about the use of electronic health-related resources, identify valuable resources, answer questions related to health, and the ability to identify low-quality information. The use of eHealth literacy can be a suitable tool to reduce the complications of cardiovascular diseases. E-health literacy can be used in cardiovascular disease prevention programs, treatment of these diseases, and post-treatment care, provided that its level increases among people in society, measures should also be taken to increase the level of eHealth literacy. Also, the necessary measures should be taken by the policymakers.

It is suggested that increase the level of eHealth literacy among heart patients by helping to increase the level of Internet skills, increasing the use of the Internet to use health, using the Internet to make proper health decisions among patients, increase the use the Internet to access health resources and reduce the patient's level of concern about their health status.

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Conflicts of interest

There are no conflicts of interest.

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