E-Health Literacy among Healthcare Students: The Effect of Demographic Variables

ABSTRACT

Background and Objectives: Electronic health (E-Health) literacy, especially among health students, is a significant challenge in promoting health in society. The present study aims to investigate healthcare students' E-Health literacy level and the factors affecting it.

Materials and Methods: In this correlational survey, the study population included all students of Shahid Beheshti University of Medical Sciences, Iran in 2019. Sample size was 228 students. Sampling method was convenience sampling and eHEALS questionnaire was used as research tool. The questionnaires were completed from June to July 2019. The level of e-Health literacy was reported using frequency distribution tables and mean, median, and mean percentage indicators. The relationship between demographic variables and e-Health literacy was analyzed using the Pearson correlation coefficient test, one-way ANOVA, and Student's t-test.

Results: Most respondents (67.5%+13.2%) believed that the Internet is essential and very important in accessing health information. Students' e-Health literacy score was 29.22±5 out of 40 (73%). The highest score (3.82±0.71) is related to the item of "I know how to find helpful health resources on the Internet". E-Health literacy among age groups, disciplines, and different educational levels were significantly different (p <0.001). With increasing age and educational level, e-Health literacy of students also increased (p-value <0.05). The students of Medical Genetics discipline had a higher average health literacy score than other groups.

Conclusion: the level of e-Health literacy skills of students was at a good level, but it is suggested that educators and programmers, and medical librarians pay attention to formal and informal e-Health literacy training to strengthen students' e-Health literacy and eliminate their weaknesses to reach its ideal level.

Paper Type: Research Article

Keywords: eHEALS, Electronic Health Literacy, Health-Care, Students, Online Health Information

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38

Introduction

Access to health information is one of the most critical issues and needs appropriate communication (1). Health literacy is a fundamental challenge in health educational program and improving health care quality (2). Comprehensive Internet access has facilitated access to health information through health professionals. It has also increased people's knowledge of medical and health issues, and helped individuals become more involved in their health care by making informed decisions (3,4). However, due to the complexities of the web and concerns about the quality of health information in this environment (5), people who have no experience searching for health information have difficulty locating information (6). In such an environment, having e-Health literacy skills helps people find valid and high-quality health information on the web and use electronic health information resources correctly and effectively (7). E-Health Literacy is a set of skills and knowledge necessary to interact with technology-based health tools (8). It refers to individuals' ability to search, find, understand, and evaluate health information from electronic sources and use acquired knowledge to address health problems (9). E-Health literacy is an influential factor in the efficiency of searching for health information, the type of desirable information required, and people's satisfaction with the information that obtained in the web environment (7).

Health literacy is essential among health students because they are an appropriate and reference model for promoting public health in the community. As future health professionals, health students must have an appropriate level of e-Health literacy skills to manage their health, support individuals with low literacy skills, educate them how to access and identify valid e-Health resources, transfer valid information to patients, and prevent misinterpretation of the information on the web (10–12).

Research on e-Health literacy in various groups has been conducted so far. Hong et al. Examined the level of e-health literacy and infection preventive behaviors to COVID-19 among healthcare students. They noted the need to promote e-Health literacy for undergraduate healthcare students to strengthen infection prevention behaviors and protect patients from infectious diseases (13). Kim and Oh studied the association between e-health literacy and health-promoting behaviors among nursing students in Korea. The results show that e-health literacy had a significant direct effect on health-promoting behaviors. It is necessary to the interventions and programs to improve e-health literacy competency in nursing students. (14). Park and Min studied e-health literacy of pharmacy students in British Columbia, Canada. The results showed that although students' overall e-health literacy score was high (31.07 out of 40), they had difficulty evaluating and applying online health information (15). Tubaishat and Habiballah, in a study of e-Health literacy of nursing students in Jordan, concluded that students have some skills in search, location, and resources use, but lack resources appraise skills(11). Park & Park surveyed e-Health literacy skills of undergraduate nursing students in the United States and South Korea. They found that US students excelled in all e-Health literacy items than South Korean students (16). In the study of Park and Lee, nursing students in the upper semesters obtained higher scores in e-Health literacy than students in the first and second semesters (17). Robb and Shellenbarger in their study of e-Health literacy of undergraduate students concluded that their e-Health literacy

was high, and the lowest score was related to the use of the Internet in health decision making (18). Tsukahara et al., who examined the relationship between Japanese students' e-Health literacy, concluded that graduate students have a higher level of e-literacy than other students (19). Hanik and Stellefson obtained e-Health literacy scores for undergraduate students at 75.3 -78.5%. They suggested that e-Health literacy training courses be developed as vocational courses for undergraduate health students (20). The Brown and Dickson's study results showed that students reported confidence in their abilities in critically appraising Internet information, but without the advice of health care providers, they lacked sufficient confidence in using health information in decisions-making. Students still seemed to lack the ability to play the role of healthcare providers (21) altogether. The results of Valizadeh-Haghi and Rahmatizadeh indicated that most patients with dental diseases had high e-Health literacy. There was a significant correlation between e-Health literacy and age (6). Shiferaw et al. found that the e-Health literacy level of patients is relatively low which indicated that there is a need to help them to find and evaluate electronic resources and fill the gap in e-Health literacy skills (22). Dashti et al. showed a significant difference in eHEALS score between genders, departments, education level, health status, and monthly income. Male students scored significantly higher in eHEALS scores. The results also showed that the e-Health literacy of Mashhad University of Medical Sciences students was low and more studies are needed to appraise this group's e-Health literacy (7). According to Ghazi-Mirsaeed and Ghaemizade, the health literacy score among graduate students of Tehran University of Medical Sciences is higher than average. There was no significant difference between the e-Health literacy of men and women;

however, e-Health literacy was higher in PhD students than in master's students (23).

The studies mentioned above showed different results in the level of e-Health literacy of the studied groups and its relationship with other variables, which justifies the need for further studies in different communities. Given the importance of promoting e-Health literacy in Healthcare students as future health professional, it is necessary to first identify and evaluate the current situation and strengths of e-health literacy among this student. After that, managers and stakeholders can take steps to improve the level of e-health literacy in students and future health professionals with proper planning, policy-making and training. Nevertheless, there is no study about the e-Health literacy of Shahid Beheshti University of Medical Sciences (SBMU), as one of the most important universities of medical sciences in Iran. Therefore, the present study aimed to investigate the e-Health literacy of students in this university, and determine the effect of demographic variables including age, gender, field of study, and degrees on their e-Health literacy. This study's findings can identify the strengths and weaknesses of students of SBMU in accessing and appraising e-Health information resources. Besides, health care providers are aware of the current situation and help plan to increase students' e-Health literacy and reduce treatment costs.

Materials and Methods
This a correlational survey that was conducted to investigate the level of e-Health literacy among students of SBMU, Iran.

The data collection tool is the Persian version of the eHEALS standard scale. This scale is an 8-item scale based on perceiving the skills or knowledge of individuals in each of the areas being measured. The questionnaire also includes 5-point

Likert scale answers with a range of "strongly disagree" to "strongly agree." The researchers calculated this tool's total score from 8 to 40 scores, which higher scores representing a higher level of e-Health literacy. This scale contains two additional questions designed to appraise the study population's interest in the use of e-Health information. Using these questions, the importance of access to health information available on the Internet and the usefulness of the Internet in health-related decisions is asked, and based on a 5-point Likert scale (from "completely useless" = 1 to "completely useful" = 5), with a total score between 2 and 10. This scale was first designed in 2006 by Norman and Skinner (24) and has been used in several studies (6,7,11,16–18,20,25,26). In an Iranian study conducted by Bazm et al. (27), the Persian version's validity and reliability have also been confirmed.

The research population was all students of SBMU (10910 people) studying in 2019 in different faculties, fields, and degrees. Ten questionnaires were first distributed among students in a pilot study to estimate the sample size. After collecting and analyzing the data, the mean and standard deviation of the questionnaire was calculated (M=2.78, SD=0.77). Using the following Cochran sample size formula with 95% confidence and accuracy of 0.1, the sample size was assigned to be 228 students:

$$N= \frac{(Z_{1-\frac{\alpha}{2}})^2 . \delta^2}{d^2} \qquad N= \frac{(1.96)^2 * (0.77)^2}{(0.1)^2} = 228$$

The number of samples in different faculties was proportional to the number of students in each faculty and was determined by stratified sampling. Research samples were selected as available samples (convenience sampling).

Questionnaires were distributed in person between students who agreed to participate in this research in different faculties of SBMU from June to July 2019.

E-Health literacy and appropriate skills level, using descriptive statistical indicators such as mean, mean percentage, and standard deviation were reported. According to the percentage, obtained scores were classified in four levels as low (zero to 25%), medium (25 to 50%), good (50 to 75%), and very good (75 to 100%). Pearson correlation coefficient test and one-way analysis of variance were used to investigate the relationship between age and e-Health literacy. Also, for the relationship between gender and e-Health literacy, the student's t-test was used, and for the relationship between degree and field of study and e-Health literacy from the one-way analysis of variance test was used.

Results

Findings show that all 228 respondents use the Internet every day and most of them (62.3%) use the Internet more than two hours a day. Asking a physician is the first priority of most respondents (61%) to obtain health information. Internet search is the first priority of 28.5% of respondents and also the second priority is 35.5% of respondents in obtaining health information. Most of the respondents reported their use of the Internet and social networks to search for health information at moderate (36.5%), high (37.7%), and very high (15.3%) levels.

Table 1 shows the majority of participants (63.6%+11%) believed that the Internet is useful and very useful for health-related decisions. Besides, most respondents (67.5%+13.2%) believed that the Internet is essential and very important in accessing health information.

Table 2 indicates the scores of various items of students' e-Health literacy. The highest score

Table 1. Students' views on the importance of the Internet in accessing health information and its usefulness in health-related decisions

How useful do you feel the Internet is in helping you in making decisions about your health?	Not useful at all F (%)	Not useful F (%)	Unsure F (%)	useful F (%)	Very useful F (%)
	1 (0.4)	11(4.8)	46(20.2)	145(63.6)	25(11)
How important is it for you to be able to access health resources on the Internet?	Not important at all	Not important F (%)	Unsure F (%)	Important F (%)	Very important F (%)
	0	15(6.6)	29(12.7)	154(67.5)	30(13.2)

F=frequency, total students' number =228

(3.82) is related to the two items of information finding: "I know where on the Internet I can find useful and helpful resources about health," and "I know how to find useful and helpful resources about health on the Internet." The lowest score is related to the item of "I feel confident in using information from the Internet to make health decisions" with a score of 3.29 (65.6%).

Table 2. The score of e-Health literacy items in the students

Items	Mean	%	SD
I know what health resources are available on the Internet	3.78	75.7	0.73
I know where to find helpful health resources on the Internet	3.82	76.4	0.72
I know how to find helpful health resources on the Internet	3.82	76.4	0.71
I know how to use the Internet to answer my questions about health	3.79	75.8	0.74
I know how to use the health information I find on the Internet to help me	3.71	74.3	0.69
I have the skills I need to evaluate the health resources I find on the Internet	3.50	70.1	0.87
I can tell high-quality health resources from low-quality health resources on the Internet	3.46	69.3	0.91
I feel confident in using information from the Internet to make health decisions	3.29	65.6	0.96

In total, the average score of e-Health literacy of the surveyed students was 29.22 out of 40 (SD=5), which indicates that the respondents were able to obtain an average of 73% of the e-Health literacy score.

Table 3 shows that the most of 228 respondents were in the age range of 23 to 27 years (51.32%). The Most respondents included female (51.8%) and master students (32.9%). Analysis of variance (ANOVA) showed a significant difference between different age groups, degrees, and different fields of study in terms of e-Health literacy (P-value<0.05). Students in the age group

of 33 to 38, doctoral degree, and the Medical Genetics discipline had a higher average health literacy score than other groups. Students in 18-22 years, bachelor's degree, and Environmental Health Engineering have a lower average score. Student's t-test was used to appraise the effect of gender on e-Health literacy. Table 3 shows no significant difference between male and female students in terms of e-Health literacy (P-value=0.6). Also, the Pearson correlation coefficient showed a positive and significant relationship between age and e-Health literacy (P-value <0.05 and r = 0.3).

Table 3. Relationship between demographic variables and e-Health literacy (total number=228)

variable		Number (%)	Score %	SD	F/t	P-value
Age	18-22	76 (33.33)	60.69	0.14	F=7.38	0.001
	23-27	117 (51.32)	67.41	0.14		
	28-32	33 (14.47)	74.81	0.16		
	33-38	2(0.88)	75.00	0		
Gender	female	118 (51.75)	65.81	0.16	t=-0.51	0.6
	male	110 (48.25)	66.88	0.15		
Degrees	B.S.	70(30.70)	57.5	0.15	F=12.34	0.001
	MS	75(32.89)	67.79	0.13		
	Doctoral	28(12.28)	77.12	0.15		
	Ph.D.	55(24.12)	70.43	0.13		
Field of study	Dentistry	24(10.52)	72.14	0.11	F=2.36	0.001
	Nursing	31(13.59)	68.21	0.14		
	Medicine	20(8.77)	70.16	0.11		
	Surgical technology	19(8.33)	64.67	0.17		
	pharmacy	15(6.57)	71.67	0.20		
	Nutrition	11(4.82)	53.69	0.10		
	Medical genetics	9(3.94)	74.65	0.09		
	Occupational health	9(3.94)	59.72	0.20		
	Medical instruments	8(3.51)	66.02	0.08		
	HSE management	8(3.51)	60.94	0.11		
	Environmental health	8(3.51)	52.73	0.09		
	Food industries	8(3.51)	68.36	0.12		

Discussion

Given that the Internet and other new media are widely used to address health care concerns, e-Health literacy skills are essential (9). E-Health literacy skills are vital for disease prevention and can help people play an influential role in health decisions, disease management, (17) and health-promoting behaviors (13,14). The findings of the present study, showed that the level of e-Health literacy is 29.22 out of 40; therefore it was at a good level in 73% of total participants. Some previous studies have evaluated the e-Health literacy of undergraduate students. They reported that the level of nursing students' e-Health literacy was higher than the present study (16,18,20). In several studies, students'

e-Health literacy at the medium and lower levels has been reported (7,11). However, Park and Lee, in their research, reported reasonable level of the e-Health literacy among nursing students of South Korea (17), which is consistent with the findings of the current study.

Items related to information finding received the highest score and item related to confidence of using information received the lowest score. The items related to evaluation and identifying high-quality from low-quality health resources received the next lowest scores. Some previous research has also shown that most health students have difficulty appraising information resources (7,11,15–17) and using

health information (15,18,21). It means that the health care students have uncertainty about the quality of online health resources and need to more educations related to crucial skills of appraising online health information. The results revealed that the average score of e-Health literacy in students over the age of 28 years and in the Ph.D higher than other groups, and their e-Health literacy increases with age. Older students usually have a higher level of education and their knowledge and experience related to use the Internet and information resources and accessing are more than other students. Therefore, this issue affected their e-Health literacy, and consequently, these findings seem logical. However, the results of most previous studies on undergraduate students in the fields of health showed that the age variable does not affect the level of e-Health literacy (11,18,28). Also, Dashti et al.'s study, which examined students of different educational degrees, show a insignificant relationship between age and e-Health literacy in students of different age groups; however, they found a significant difference between e-Health literacy at various education degrees (7).

Nevertheless, the previous studies showed that level of health literacy in adults decreases with age (6,29). Adults are less likely than students to use the Internet and receive less e-Health literacy training. Adults are likely to be less motivated and more likely to use the Internet than students and receive less e-Health literacy training. Besides, with increasing age, individuals' educability decreases, which could be due to their lower e-Health literacy than younger people. However, the difference between the results in relation to students' e-Health literacy and age needs to be further investigated and probably refers to the training provided in this field concerning universities.

Results of most previous studies (4,6,7,11,17,19,23,30) on the difference between e-Health literacy in students or people with higher education are consistent with the present study. It's not surprising because post-graduate students and people with higher education have significantly higher levels of e-Health literacy. It should be noted that post-graduate students in Iran, in a course called medical information systems, get acquainted with health information resources, how to access and locate health information, and find reliable and quality resources and use them. Accordingly, this can lead to an increase in their e-Health literacy compared to lower-level students. Factors that play a role in the access of e-Health literacy skills, such as curricula and workshops on familiarity with databases, information literacy, and e-Health literacy, differed among students of different degrees and disciplines.

This study revealed that there is no significant difference in the level of e-Health literacy between men and women. Thus, it is similar to the findings on e-Health literacy of undergraduate students at the University of Pennsylvania (18), Japanese students (19), and studies examining adult health literacy (6,29). However, it is different from the findings related to e-Health literacy of students of Mashhad University of Medical Sciences (7). This indicates that planning to promote health literacy will vary in different communities and based on assessments made in this area.

Research Limitation: this study has some limitations. First, in the present study, the eHEALS questionnaire used to evaluate the students' e-Health literacy level. It is a self-reported questionnaire, and different results may be obtained if we evaluate e-Health literacy in actual conditions based on the performance. Also, we studied the e-Health literacy of healthcare students. These students are familiar with the

medical context and it may affect the results. **Conclusion:** The findings revealed that e-Health literacy of students was at an acceptable level. However, students need to be trained to properly evaluate the information retrieved and use it in health decisions, thereby reducing the destructive effects of their misuse of information. Increasing age and education level enhance e-Health literacy. However, there is no difference between men and women in terms of e-Health literacy.

Despite the good level of students' e-Health literacy, but to promote and strengthen e-Health literacy of them and to reach the ideal level and address their weaknesses, especially in resource appraise skills and ensuring health-related decisions, educators and planners of the Ministry of Health and universities of medical sciences need formal and informal training in the form of courses and workshops with an emphasis on e-Health literacy. Besides, medical librarians and information professionals should be more active in this regard due to their expertise in retrieving and appraising information resources. It is suggested that this training starts at an early age and at the undergraduate level to strengthen the students' ability and skills of the different degrees.

Conflict of Interest: the authors declare no conflict of interests.

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