

Role of eHealth Literacy in Exploring Attitude Towards the Covid-19 Vaccine

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Received: 22 June 2023

Accepted: 5 September 2023

Doi: 10.22038/jhl.2023.73262.1442

ABSTRACT

Background and Objectives: Searching for health information online no longer attracts scientific attention, and eHealth literacy skills can influence health behaviors in the general population. This study aimed to assess the role of eHealth literacy on attitude towards Covid-19 Vaccine during the pandemic period.

Materials and Methods: Between 1 April 2021 and 1 July 2021, a single-center descriptive cross-sectional study including 422 participants was conducted face-to-face in the vaccine clinics of a pandemic hospital in İstanbul. The eHealth Literacy Scale (eHEALS) was used to determine the health promotion skills of the participants and to use the resources to protect their health. Attitudes towards the Covid-19 vaccine scale score, approaches and biases towards the Covid-19 vaccine were evaluated. Data were analyzed with the NCSS 10 (2015 Kaysville, USA) program.

Results: The eHealth literacy level of participants aged 30.89 ± 8.54 years was positively related to the attitude towards Covid-19 Vaccine ($r=0.151$, $p=0.002$). The averages of eHEALS and attitude toward Covid-19 Vaccine scale scores were 3.65 ± 0.81 out of 5 (73.0%) and 2.99 ± 0.82 points, respectively. An eHealth literacy of about twice as high as men was observed in women (OR: 1,663, 95% CI = 1,088-2,540; $P=0.019$). University graduation was observed to be 7.7 times more effective in providing a better level of eHealth literacy (OR: 7.736, 95% CI = 3.284-18.224; $p<0.001$). Participants with higher eHealth literacy demonstrated a 2.2-fold better attitude score towards the Covid-19 Vaccine (OR: 2,222, 95% CI = 1,270-3,887; $p=0.005$).

Conclusion: An increase in the level of an individual's eHealth literacy translates to a more positive attitude toward vaccines.

Paper Type: Research Article

Keywords: Covid-19 vaccines, Health literacy, EHealth literacy, COVID-19 Attitudes

► **Citation:** Şen M, Mercan Başpınar M, Basat O. Role of eHealth Literacy in Exploring Attitude Towards the Covid-19 Vaccine. *Journal of Health Literacy*. Autumn 2023; 8(3): 34-42.

Introduction

EHealth literacy is the ability to gather and appropriately process health information retrieved online that is influenced by using the Internet as a source of information (1). Technology has changed how people improve their health, enabling individuals to make decisions towards healthier lifestyles (2, 3). Vaccination is a powerful public health intervention that saves lives by preventing and reducing infectious diseases. It has been recognized as a public health achievement because it is still the first and only cost-effective primary health care of the 20th century (4, 5). A review of 30 articles by Sallam M. et al. revealed that the acceptance rate of the vaccine in Middle Eastern countries is low. At the same time, Turkey was among the countries with a low acceptance rate of 66% (6). The study found that the gender effect was significant in 15 countries, with different attitudes towards vaccination emerging in 11 countries, and sociodemographic data may differ by country (6). However, evidence suggests an increase in the number of antivaccination social media accounts during COVID-19 aimed to influence and even reduce individual intentions of getting vaccinated (7). Conflicting information from multiple online sources have led to an increase in a more vaccine hesitancy environment of uncertainty (8). Relationships amplified by the infodemic represent a novelty in the vaccine hesitancy scenario, thus suggesting an urgent need to plan effective strategies to address fake news and conspiracy theories to achieve successful vaccination campaigns (9).

E-health use and issues can be checked by analysis of websites. Correct information on vaccination recommendations has been provided on 85% of the websites (10). However, the main reported obstacle to the implementation of digital-based programs is the lack of resources

and shared standards (11). Therefore, it has become even more critical to know the sources of digital resource use and how to search in a way that verifies the level of awareness, i.e. "eHealth literacy".

This study aims to determine how e-health literacy affects attitudes toward the Covid-19 vaccination among outpatients of a pandemic vaccine clinic in Istanbul, Turkey.

Materials and Methods

A single-centered cross-sectional study was conducted between April 01, 2021, and July 1, 2021, enrolled 422 patients who received Covid-19 vaccination in a vaccine clinic at the Gaziosmanpaşa Training and Research Hospital in Istanbul, Turkey. All volunteers were included in the study, except those who did not use or could not use the Internet. In the study sample calculation, type 1 error was calculated as 5% (bidirectional), type 2 error as 5% (power 95%) and minimum sample size as 384. By the end of the study, 422 patients were reached and the patient intake has been suspended.

We reviewed each participant's sociodemographic data and health status through a face-to-face interview using the Demographic Information Form, and then obtained their written consent. The eHealth literacy scale was used to determine the health promotion skills and motivation levels of the participants in the acquisition and use of resources to protect and improve their health. Attitudes towards the score of Covid-19 vaccine scales, approach to Covid-19 vaccine and bias were evaluated. The study was approved (Number 231) by the Clinical Research Ethics Committee of Gaziosmanpaşa Training and Research Hospital accepted the study protocol on 17/03/2021.

The outcome variable is the relationship between the eHealth literacy score and attitudes towards the Covid-19 vaccine scale

score. Secondly, in our study, Cronbach's alpha values of the scales were recalculated and the reliability of the scales was corrected.

The eHealth literacy Scale (eHEALS): The 2006 EHealth literacy Scale by Norman and Skinner was adapted to Turkish by Tamer et al., as 8 items with a rating of a five-point Likert structure and Cronbach's alpha value as 0.915. The score range is from a minimum of 1 point to a maximum of 5 points. A high score on the scale is considered a high level of eHealth literacy. Except for the scale questions, there are 2 more questions that are not included in the scoring. One is "How useful do you feel the Internet is in helping you in making decisions about your health?" and the other question is "How important is it for you to be able to access health resources on the Internet?" (12, 13).

Attitude towards the Covid-19 vaccine scale: The Attitude towards the Covid-19 vaccine scale of 9 items with a five-point Likert structure. It included two sub-dimensions of positive attitudes (items 1-4) and negative attitudes (items 5-9). The items in the negative attitude sub-dimensions (5, 6, 7, 8 and 9th items) were scored inversely. A value between 1-5 is obtained by dividing the total score obtained by the number of items by the number of items in the scale sub-dimension divided by the number of items. Rising overall scores suggest a better attitude towards the Covid-19 vaccine (14).

Statistical analysis

Data were analyzed with the NCSS 10 (2015 Kaysville, USA) program. Descriptive statistics were used to measure the frequency, mean, and standard deviation of variables. Mean scores between the groups were analyzed using T-test, Anova test for normal distribution, Mann-Whitney U test for abnormal distribution, and Kruskal Wallis test. A dual logistic regression test was performed to determine factors related to high eHealth literacy. $p < 0.05$ was statistically

significant. The analyses were performed using the E-Picos (MediCRES) software program.

Results

422 participants were included in the study (age 30.89 ± 8.54 , female/male ratio 237/185). Of the participants, 99 (23.46%) had a positive history of Covid-19. The marriage rate was 49.05% ($n=207$). The participants were divided into two age groups (18-30, >30 years). The frequency of volunteers under the age of 30 was 58.77%. University, high school and primary school graduation rates were 70.62%, 15.88% and 13.50%, respectively.

As shown in Figure 1, to be able to access health resources on the Internet is "important" and "very important" of 54.8% and 20.4% among participants in our study. 50.5% and 9.9% of all feel the Internet is "useful" and "very useful" in helping them in making decisions about their health as indicated in Figure 2.

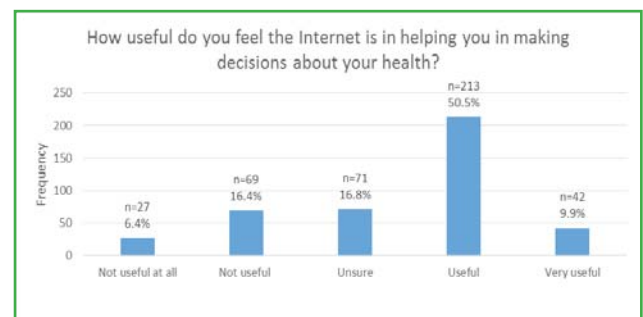


Figure 1. eHealth literacy question' "How useful do you feel the Internet is in helping you in making decisions about your health?" responds distribution

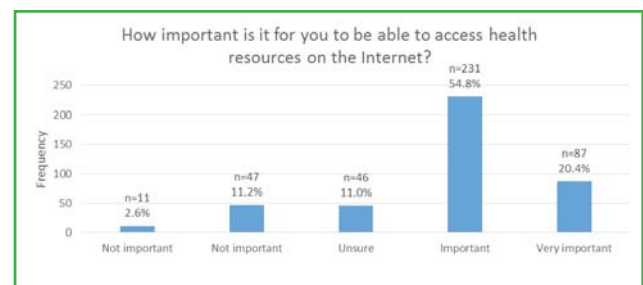


Figure 2. eHealth literacy question' "How important is it for you to be able to access health resources on the Internet?" responds distribution

Cronbach alpha values and EHealth literacy scale associated with attitudes towards the Covid-19 Vaccine scale were 0.899 and 0.939, respectively. All scales in this study were found to be statistically reliable, reflecting a acceptable value of Cronbach alpha above 0.70 (15).

The averages of eHEALS and attitude toward Covid-19 Vaccine scale scores were 3.65 ± 0.81 out of 5 (73.0%) and 2.99 ± 0.82 , respectively. Table

1 indicates the eHEALS items and responds of participants. The highest score (3.73 ± 0.95) was related to the item of "I have the skills I need to evaluate the health resources I find on the Internet". The lowest score was related to the item of "I know where to find helpful health resources on the Internet" with a score of 3.49 (69.8%).

Table 1. The score of eHealth literacy items (eHEALS) in the participants

eHealth literacy items	Mean	%	SD
I know what health resources are available on the Internet	3.53	70.6	0.93
I know where to find helpful health resources on the Internet	3.49	69.8	0.98
I know how to find helpful health resources on the Internet	3.52	70.4	0.99
I know how to use the Internet to answer my questions about health	3.66	73.2	0.95
I know how to use the health information I find on the Internet to help me	3.62	72.4	0.96
I have the skills I need to evaluate the health resources I find on the Internet	3.73	74.6	0.95
I can tell high-quality health resources from low-quality health resources on the Internet	3.67	73.4	0.96
I feel confident in using information from the Internet to make health decisions	3.68	73.6	0.99

Although not statistically significant, participants whose source of information were health care providers were more likely than others to have a better attitude toward vaccine scores. The eHealth literacy score was significantly higher between \leq over 30 years of age > over 30 years of age ($p=0.005$), university and high school graduates compared to primary school ($p<0.001$), no chronic disease ($p<0.001$) and no history of Covid-19 ($p=0.007$) as Table 2 indicates.

The rate of the participants who said "the internet is useful when making decisions about health" was 50.47% ($n=213$) and 75.36% ($n=318$) of the participants thought that it was necessary to access health resources via the internet. It was shown that there was a positive relationship between eHealth literacy score and attitudes

towards Covid-19 vaccine scale score ($r=0.151$, $p=0.002$).

The median value of the e-healthy literacy scale was 3.88 points. According to this value, the participants were divided into two groups below and above the average; a higher literacy and a lower literacy among participants (Table 3). Table 3 evaluates the logistic regression test results of the independent variable assessment for the presence of high eHealth literacy. Variables with a P value of 0.20 or less were included in the model. An eHealth literacy of about twice as high as men was observed in women (OR: 1,663, 95% CI = 1,088-2,540; $P=0.019$) and scored 2.2 times higher on better attitude towards the Covid-19 vaccine than participants with low eHealth literacy (OR: 2,222, 95% CI = 1,270-3,887; $P=0.005$). The health literacy of university graduates is 7.7

Table 2. Evaluation of the difference between groups based on positive and negative attitudes towards COVID-19 Vaccine Scales and EHealth literacy Scale scores.

Variable		Attitude towards the Covid-19 vaccine		p-value*	EHealth literacy		p-value**
		Average± SD	t/F value		Average± SD	U/X2	
Age	≤30 (n=248)	3.18±0.42	1.400	0.162	3,74±0,70	18118	0.005
	>30 (n=174)	3.12±0.33			3,44±0,91		
Sex	Male (n=185)	3.17±0.43	0.685	0.494	3,54±0,78	19600	0.059
	Female (n=237)	3.14±0.36			3,67±0,82		
Marriage	Single/Divorced (n=215)	3.16±0.41	0.422	0.673	3,67±0,69	21388	0.490
	Evli (n=207)	3.15±0.37			3,56±0,91		
Education level	aBasic education (n=57)	3.07±0.37	1.834	p=1.000	2,80±0,96	0.157	p<0,001 Pa-b=0.120 Pa-c<0,001 Pb-C<0,001
	bHigh school (n=67)	3.11±0.32			3,49±0,66		
	cUniversity (n=298)	3.21±0.84			3,80±0,70		
The presence of chronic disease	Positive (n=48)	3.11±0.39	-0.915	0.366	3,06±0,91	5549	s<0,001
	Negative (n=374)	3.16±0.38			3,69±0,76		
Source of health information	aHealth care providers (n=188)	3.18±0.39	2.150	0.250	3,63±0,74	1.229	0.746
	bFamily/Friends (n=51)	3.14±0.28			3,51±0,88		
	cBook, magazine, newspaper (n=39)	3.15±0.52			3,52±0,93		
	dInternet, Social Media (n=144)	3.13±0.38			3,66±0,83		
COVID-19 history	Positive (n=99)	3.18±0.41	0.655	0.513	3,37±0,90	13533.5	0.007
	Negative (n=323)	3.15±0.38			3,69±0,74		

*Student T test and Anova test

**Mann-Whitney U test and Kruskal-Wallis test

times higher (OR: 7,736, 95% CI = 3,284-18,224; P<0.001) and high school graduates have 3.07 times higher health literacy than elementary school graduates (OR: 3.071, 95% CI = 1.153-8.181; P=0.002).

Discussion

Our study revealed that a higher eHealth literacy was associated with a more positive attitude towards the Covid-19 vaccine in a pandemic clinic. Being female and a university graduate warranted an increased level of eHealth literacy,

and as the eHealth literacy advanced so did a more positive attitude towards the Covid-19 vaccination.

The Covid-19 pandemic has been accompanied by an infodemic, which includes fake news and conspiracy theories and may worsen vaccine refusal, thus hindering the control of the transmission (9). Oztora et al. demonstrated that low health literacy, advanced age, being male, low education level and not having been previously vaccinated were cited as factors leading to low vaccine knowledge (16). Qin et al. found that

Table 3. Evaluation of dual logistic regression due to the presence of a higher eHealth literacy score as a dependent variable

Variable	Subgroups	OR (95% CI)	p-value
Age	>30 years	0.956 (0.619-1.475)	0.837
	≤30 years	Ref	
Sex	Male	Ref	0.019
	Female	1.663 (1.088-2.540)	
The presence of chronic disease	Positive	0.828 (0.402-1.705)	0.609
	Negative	Ref	
Presence of a history of Covid-19	Positive	0.853 (0.520-1.1.399)	0.528
	Negative	Ref	
Education level (University)	Primary school	Ref	0.025
	Lise	3.071 (1.153-8.181)	
	University	7.736 (3.284-18.224)	
Attitude towards the Covid-19-Vaccine Scale	Points	2.222 (1.270-3.887)	0.005

OR: Ratio ratio, CI: Confidence interval

eHealth literacy, one of the predictors of the level of knowledge, attitudes, and practices regarding COVID-19 vaccination, should be emphasized (17). In a study conducted by Elmaoğlu et al., a relationship was found between the attitude of the Covid-19 vaccine and the level of education; It was found that positive attitude scores were higher as the level of education increased (18). It was found by Paul E. et al. that negative attitudes towards vaccination are higher in people with low levels of education. (19) similar to our work. Some studies in Turkey have found a relationship between low education levels and undervaccination (4). Durmuş et al. found a significant relationship between Covid-19 vaccine literacy and education status, and as the level of education increased, the level of Covid-19 vaccine literacy also increased (20). In our study, university graduation was a predictor of better eHealth literacy, and university graduates scored higher than others on attitudes toward the Covid-19 vaccine scale.

In Japanese version of eHEALS, scores were significantly higher in women, the 40-and 50-

year age group, those with high income, and individuals with a high frequency of internet searching (21). A review by Wang C. et al. found that eHealth literacy is higher in young people than in older people (22). Uslu et al. could not detect any differences in eHealth literacy in terms of gender and age (23). Shekofteh et al. found that participants' eHealth 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". 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%) (24). In our study, the highest score (3.73 ± 0.95) was related to the item of "I have the skills I need to evaluate the health resources I find on the Internet". The lowest score was related to the item of "I know where to find helpful health resources on the Internet" with a score of 3.49 (69.8%). Our participants had lower percentages of responses related to idea of Internet is useful (50.5%) and important (54.8%) versus the percentage of

usefulness (63.6%) and importance (67.5%) in study of Shekofteh et al.(24). It was thought that properties such as age, gender, technological skills of study populations may led the difference.

In Murphy J. et al.'s study in Ireland and the United Kingdom, there were differences between sociodemographic data and vaccine hesitancy. They found that the female gender had a higher hesitancy rate than the male gender, and that vaccine hesitancy decreased with increasing age (25). In our study, age was not an indicator of eHealth literacy, but participants under the age of 30 had a higher eHealth literacy and attitude towards the Covid-19 vaccine scale scores. Being a woman was not statistically significant in terms of attitudes towards Covid-19 vaccination, although it predicted that eHealth literacy would be 1.7 times better.

Kaplan et al. showed that married people have more positive attitudes toward vaccination than singles and think so to "protect themselves and their families." (26). Li et al. found that married participants (30.0%) were more likely to be vaccinated than single participants (24.3%). (27). In our study, singles had higher health literacy and positive vaccination attitude scores, but they were not statistically significant compared to married people.

A vaccine study showed that 70.0% of parents named their family doctor as the source of information and 65.4% called the internet/social media (4). In a seasonal vaccination study, it was noted that the presence of recommendations of health professionals and belief in the benefits of the vaccine are determinants of vaccine acceptance (28). In our study, the attitudes of the participants whose information source was health care providers against the vaccine score were also found to be higher than the others. Therefore, the role of family health centers and family physicians in eHealth literacy awareness

and vaccination is very effective.

Limitations and Strengths: The main limitation of this study was that all participants were patients who were admitted to vaccine outpatient clinics for any adult vaccination. This can be seen as a selection bias for the study, as this is the reason for the absence of other patients who have vaccine hesitancy or who do not apply for the vaccine. Secondly, as the pandemic advanced and additional information about Covid-19 vaccination surfaced, vaccination attitudes could have changed. Lastly, eHealth literacy is related to the access to technology as well as technology literacy. Perhaps a primary or secondary level of education when compared to high school or university levels might not be sufficient to access and utilize electronic sources of health information. Thus, this study possibly included a higher-educated group of participants who were enabled to respond to the questions.

The strength of the study is that the face-to-face interview technique is applied and the questions are asked by the same person in order to standardize patient communication.

Conclusion

The increase in eHealth literacy will foster a positive attitude towards Covid-19 vaccines. The eHealth literacy may need to be expanded not only for Covid-19 vaccines, but also for fighting future outbreaks and vaccine protection.

Acknowledgement: Thanks to all participants.

Availability of data and materials: Data will be available upon request from the corresponding author

Conflict of interest: The authors declared no potential conflicts of interest with respect

Consent for publication: Not applicable, as no identifiable information is revealed in the publication

Ethical consideration: The study was approved (Number 231) by the Clinical Research Ethics Committee of Gaziosmanpaşa Training and Research Hospital accepted the study protocol on 17/03/2021. All procedures comply with the principles of the Declaration of Helsinki and written informed consent was obtained from all participants in the study.

Financial Disclosure: The authors declare that

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this study did not receive financial support.

Authors' contributions: All authors have their own responsibilities in this review manuscript. All authors read the final draft of the manuscript and confirmed it.

- PMid:33954296 PMCID:PMC7834475
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