

# The use of online health related information by medical students and their trust in the retrieved information

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## Research article

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## Abstract

**Background** The Internet plays an important role in attaining health related information and its importance is growing worldwide. The majority of Internet users are university students. However, their use of the Internet for health information has not been well studied. The objective of this study was to examine the use of the Internet by medical students to search for health information.

**Methods** This cross-sectional survey was performed on a sample of 400 Medicine, Dentistry and Pharmacology students selected from three faculties. The data were collected using a valid and reliable questionnaire designed based on the review of the published literature and advice of a panel of experts. Data were analyzed by SPSS 20 using Chi-square and Logistic regression.

**Results** In this study 261 (65.2%) students used the Internet to search for health information. Most of them (n=175, 67%) somewhat trusted the reliability of information on the Internet. Women used the Internet to search for health information 1.74 times than men ( $p=0.016$ ) and Medicine students 1.7 times than Pharmacology students ( $p=0.04$ ). The majority of 20-30 years old students believed that using Internet had no effect on their visits to physicians ( $p<0.0001$ ). It reduced the number of visits in all students older than 30.

**Conclusions** The content of online resources needs to be monitored in terms of its credibility for using by students especially those involved in health care domain. Based on our findings most students somewhat trusted the online health information. This is promising for the universities to plan for investment on online education and materials.

## Background

The Internet is considered as an efficient and useful tool for spreading information globally [1,2]. Since 1999 onward, the number of Internet users has exponentially increased [3]. The Internet penetration rate has reached from 7% in 2000 to the highest level (46%) in 2016 among the world's population. Also, the number of internet users worldwide was 3.9 billion in 2018 [4]. Easier access to computers, the modernization of countries around the world and an increased utilization of smartphones has given people the opportunity to use the internet more frequently and with more convenience [4]. Research in the United States has shown ninety-seven percent of college graduates have Internet access in 2018 [5]. Statistical analysis showed that education is one of the strongest predictors of Internet access [6].

The Internet plays an important role in attaining health related information and its importance is growing [2,7,8]. It is used as a complementary tool for understanding health problems or improving healthcare interventions [9]. A study in Japan showed that people tend to use the Internet to obtain health information and felt confident with the collected information [10]. A similar study in the United States in 2012, found that 81% of adults in the U.S use the Internet and 72% search online for health information [11]. Over 60% of Spanish Internet users searched on health information in 2015 [12]. Researches estimated a strong prevalence of Internet use from 40 to 80 percent among users to seek health information [13].

The majority of Internet users are university students compared to general population [14]. The Internet is an indivisible part of the academic community that dependence to it is growing for different educational purposes. It enhances the academic excellence of the university students and lecturers via access to the most updated information in a broad context [15]. Previous studies have shown that more than fifty percent of the young adults use the Internet to search for health information [16–20]. Beck et al. study in France showed that almost all 15 to 30 year old people use the Internet and half of them obtain health information from the Internet. Young people trust the Internet information and use it as a source for health information [21]. In Japan, people from a lower levels of education are less likely to have access to the Internet [22].

Based on these studies, it is evident that the Internet is becoming a valuable source for students to obtain health information. Therefore, the Internet is a communication mode and source of information for students. It is suggested that the difference in using the Internet for health information depends on a variety of socio-demographic and socioeconomic factors [23]. To our knowledge a few studies has focused on the searching behavior of young people seeking health information [21,24]. No research has been performed concerning the use of the Internet by Iranian university students to search for health information. The objective of this study was to examine the use of the Internet by Medicine, Dentistry and Pharmacology students to search for health information.

## Methods

This is a cross sectional and practical survey of the behavior of Medicine, Dentistry and Pharmacology University students to search health related information from the Internet. The study population consisted of 1972 students studying in three faculties (faculty of Medicine, faculty of Pharmacology and faculty of Dentistry). Of this population a sample of 400 university students were selected by proportionate stratified random sampling (205, 125 and 70 respectively) and were invited to participate in the study. The data were collected by a researcher-made questionnaire. The questionnaire was designed based on the review of the published literature in this field [17,18,25] and advice of a panel of experts. The questionnaire is composed of two parts. The first part consists of three demographic questions and the second part is composed of multiple choice questions addressing the following five topics: time and language to search the Internet, searched health topics, searching sources, students experience and trustworthiness of the information on the Internet. Content validity of the questionnaire was confirmed by 3 specialists in Medical Informatics. The reliability of the questionnaire was measured by a test-retest ( $p = 0.67$ ). For this, we distributed the questionnaires twice, among a random sample of 20 students, with an interval of two weeks. One of the authors distributed the questionnaires among the sample population. If a student refused to complete the questionnaire s/he was replaced randomly by another student from the same stratum.

Data were analyzed by SPSS version 20. Descriptive statistics were used to present demographic information of the participants. We used Chi-square test for analyzing categorical data and to determine the relationship between demographic information and other factors. Logistic regression was employed to determine associations between demographics and the use of the Internet to search for health information. Multiple responses were analyzed by Marginal Independence using R version

## Results

### Participants' information

Information of the 400 university students participated in our study is shown in Table1. In this study, 50 out of 400 students (12.5%) refused to fill out the questionnaire and were replaced by other random students yielding a response rate of 100%. Fifty-nine percent (n = 236) of respondents were female and 79.5 percent (n = 303) aged between 21 and 25 years. Of the total participants, 205 students were Medicine and the rest students were Dentistry and Pharmacology.

### Internet use as a source of health information

In this study 261 (65.2%) students used the Internet to search for health information of which 163 students were female (69.1% of female participants) and 97 students were male (59.1% of male participants). Majority of the students searched health-related information sources by Persian language (n = 128, 49.1%). In connection with the reliability of the information obtained from the Internet, most respondents (n = 175, 67%) somewhat trusted the information on the Internet. Seventy nine percent of these students (n = 205) believed the Internet is a useful source to obtain health information. (Table1).

#### **Table 1. Participants information and their Internet use for health information**

[Please, insert Table 1 about here]

### Health related topics searched by students

Topics searched by the students are shown in Table 2 in terms of their demographic information. There was a significant association between age groups and topics searched on the Internet (p = 0.019). Students younger than 20 years old searched "mental health issues" more than other topics. "Health related exercises" was the major topic searched by age groups 21–25 and 26–30. All students older than 30 searched three topics; "Consulting a physician, Insurance information and Health related exercises". The results showed that "Health related exercises" was the most frequently searched topic by both gender with a significant difference between male (99%) and female (64%) students (p = <0.0001).

#### **Table 2. Association between demographic information of students and different health related topics**

[Please, insert Table 2 about here]

### Sources used for obtaining health information

Most students selected physicians as the first (n = 103, 25.8%) and second (n = 66, 16.5%), the Internet as the third (n = 61, 15.3%), media as the fourth (n = 80, 20%), and family and friends as the fifth resource (n = 105, 26.3%) to obtain health information (Table 3).

#### **Table 3. Priority of sources used to obtain health information**

[Please, insert Table 3 about here]

The results of the logistic regression model showed that odds of using the Internet to search for health information in women was 1.74 times than that in men (p = 0.016). Odds of using the Internet to search for health information in Medicine students was 1.7 times than that in Pharmacology students (p = 0.04) (Table 4).

#### **Table 4. The relationship between demographic information of participants and their use of Internet to search for online health information**

[Please, insert Table 4 about here]

There was a significant association between age groups of students and the number of visits to physicians. Based on the results, less than 26% of the students in each of the age groups younger than 30 years and all students older than 30 mentioned that use of online health information has reduced the number of their visits to physicians. The majority of students between 20 and 30 years believed that use of online health information had no effect on their visits to physicians ( $p < 0.0001$ ).

There was a significant association between Experience of using online health information and the number of visits to physicians ( $p = 0.001$ ). However, the majority of students having any experience with online health information believed that use of online health information had no effect on their visits to physicians.

### **Table 5. Effect of using online health information on the number of visits to physicians**

**[Please, insert Table 5 about here]**

There was a significant association between experience of using online health information and trust in online health information ( $p = 0.026$ ). Most students with different experiences of using health information on the Internet somewhat trusted in the retrieved information (Table 6).

### **Table 6. Association between experience of using online health information and trust in the information**

**[Please, insert Table 5 about here]**

**One third of the students who did not use the Internet for searching health information (36.7%) mentioned lack of interest as their reason (Fig. 1).**

### **Fig. 1. Reasons for not using the Internet to search for health information**

**[Please, insert Fig 1 about here]**

## **Discussion And Conclusions**

The results of the study showed that more than half of the university students obtained health information from the Internet. Medicine and Dentistry students used the Internet to search for health information more than Pharmacology students. Use of the Internet by younger, especially educated community, is indicative of its importance in people's life [26]. Similar to the results of Hesse et al. [27] in our study female and younger students obtained more health information from the Internet than male and older students. It is surprising that women used the Internet to search for health information more than men. Moretti's study indicates that women use the Internet as the main source of health information [28]. Similar to our results, Andreassen et al. found that in public population, women are more active than men for using online health information [16]. The findings of the studies in the United States suggest that female Internet users are more interested in health-related issues than men [29–30]. In general, previous studies have also shown that the use of the Internet for information is more common among the youth and females [31–33]. Other studies reported that gender, occupation, socioeconomic status are major factors of using the Internet for health information [34,35].

Around one third of students did not use the Internet for health information, mostly due to lack of interest. Low interest of some students to online health information while there are many sources available needs further investigation. Horgan et al. [18] showed that 34.3% of participants did not use the Internet to search online health information since they had no need. In Beck16 study, 51.5% of web users did not use the Internet for health information and 75% of them stated that due to sufficient information provided by other sources, they do not search in the Internet for health information.

The results of this study suggest that students who said that the Internet is a useful medium to obtain health information, their trust in health information obtained from the Internet was low. Students who said that the Internet is harmful to obtain health information, their untrusted to online health information was high. Most students with any experiences of online health information somewhat trusted the information. A study in the United States [31] showed that people trust their physician over the health information in the Internet. It should be noted that the quality of health information among health websites varies and this is worrisome [21]. Based on our results there was a significant association between students age groups and the number of their visits to physicians.

The majority of students between 20 and 30 years believed that use of online health information had no effect on their visits to physicians. Also the majority of students either who had positive or negative experience with online health information believed that use of online health information had no effect on their visits to physicians. This result is similar to study of Takahashi in Japan [22]. Unlike this, Horgan et al. [18] reported that the Internet was used to replace visit to health care practitioners when students have concerns about the confidentiality of their information.

The most frequently searched health-related topic by the students in the Internet was "Health related exercises". The least frequently searched topic was "Disease prevention and treatment". We speculate that because our study population were young they were highly interested in "Health related exercises". Similar to our results, most college students participating in the Escoffery14 study searched fitness and exercise. Inconsistent with this result, Beck et al. [21] study showed that majority of students searched for general health and illnesses. The result of a systematic review [36] showed that male students tended to

highly use the Internet for obtaining health products (such as drugs, dietary supplements/ sports, vitamins) and Services (Web-based medical advice) via the Internet and they less likely obtained health and disease prevention information. Female students were more likely to search general health and medical information from the Internet [36]. Therefore, based on these results, we recommend future studies address all online health search features required by students of both genders.

Students in this study rated physicians as the first and second source of health information and the Internet was their third preference. This result suggests that although students are using the Internet, but still they prominently prefer to visit a physician for health problems. A study conducted in the United States showed that a few number of Internet users use it to communicate with doctors. It is concluded that people still prefer face to face advice over online consultation [10,37–39]. Despite the widespread use of the Internet throughout the world, studies conducted in Japan, the United States and Europe [40–42] indicated that use of traditional sources of health information such as audio visual media, published materials, family, friends and colleagues, pharmacies, and importantly face to face contact with their healthcare providers is still very common. However, the use of online health information before visiting a doctor can increase awareness about the nature of a disease its treatment and effect on the patient's life. Moreover, it can reduce the time and even the cost required for a visit.

We found that the majority of students who used the Internet to seek health information aged between 21 and 25 years. Other studies [18,43], found that active Internet users aged between 18 and 24 years. The Pew Research Center's Internet & American Life Project showed that in 2012, 76% of Internet users who look online for health information were 18–29 age [11]. A study conducted in seven countries (Denmark, Germany, Greece, Latvia, Norway, Poland, and Portugal) showed that 63 % of Internet users that obtained online health information were between 15–29 years of age [13]. Studies have pointed out that young people have greater access to the Internet and have further skills to search websites [44,45] It can be concluded that young people are active Internet users and they often use the Internet to obtain health information [18].

This study has two limitations. First, this study was carried out on Medicine, Pharmacology and Dentistry students in one university. The results may not be completely generalizable to the same population of students in other universities due to the factors such as different scores in entrance exam of some universities. However, no established relationship has been reported between entrance scores and Internet using behavior of students. As well, the educational program and distribution of students are almost identical in all medical sciences universities. Second, few students did not fully answer all the questions and we lost some data. This study specifically focused on the behavior of a specific group of students (Medicine, Pharmacology and Dentistry) for obtaining online health information, future studies can further address this and in comparison with other groups of students.

Internet has an increasingly important role in the lives of its educated young users specially those studying in the medical domain. Overall, more than half of the students in this study used the internet for health information. Since many of Medical, Pharmacology and Dentistry students are interested in online health information and prefer topic such as health related exercise. It seems that providing training and educational materials electronically can improve their health care knowledge. For this reason, it is essential to help young people to find credible information by improving their Internet skills and providing up-to-date health care information. Judging the quality of health information on the Internet is very difficult. Hence, the content of online resources needs to be monitored in terms of its credibility for use by students especially those involved in health care domain. Based on our findings most students somewhat trusted the online health information. This is promising for the universities plan to invest on online education and materials.

## **Declarations**

## **Ethics approval and consent to participate**

**The study was approved by the Research Ethics Committee of Kerman University of Medical Sciences.**

## **Consent for publication**

Participants were given an Information and Consent form to read and sign if they wished to continue to participate in the study, which when signed gave their permission for the research data gathered to be published provided that the participant could not be identified as a subject.

## **Availability of data and material**

**Not applicable**

## **Competing Interests**

**The authors declare that they have no conflict of interest.**

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## Authors' contributions

R. Khajouei, Z. Karbasi, A. Ameri, and L. Ahmadian contributed to the conception and design of the study, acquisition and interpretation of the data, and drafting the paper. M. Mirzaee was primarily responsible for the statistical analysis of the data. All 5 authors read and approved the final version of the manuscript submitted.

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## Tables

**Table 1.** Participants information and their Internet use for health information

Characteristic	n (%)
<b>Age (years)</b>	
<=20	48(12.6)
21-25	303(79.5)
26-30	24(6.3)
>30	6(1.6)
<b>Gender</b>	
Male	164(41)
Female	236(59)
<b>Field of study</b>	
Pharmacology	111(21.0)
Medicine	205(51.2)
Dentistry	84(27.8)
<b>Searching for health information in the Internet</b>	
Yes	261(65.2)
No	139(34.8)
<b>Language of searched sources</b>	
Persian	128(49.1)
English	35(13.4)
Both of them	98(37.5)
<b>Trust in online health information</b>	
Too much	9(3.5)
A lot	65(24.9)
Somewhat	175(67)
A little	12(4.6)
<b>Experience of using online health information</b>	
Useful	205(79.5)
Harmful	5(1.9)
None	48(18.6)

**Table 2.** Association between demographic information of students and different health related topics

Demographic information		Health topics*									
		Medical equipment	Consulting a physician	Insurance information	Health related exercises	Mental health	Diet & nutrition	Medication Information	Disease prevention and treatment	Disease diagnoses	Self or family health status
Age	<=20	8 33.3%	7 29.2%	13 54.2%	11 45.8%	14 58.3%	7 29.2%	3 12.5%	2 8.3%	3 12.5%	2 8.3%
	21-25	53 26.6%	110 55.3%	107 53.8%	130 65.3%	106 53.3%	42 21.1%	50 25.1%	8 4.0%	23 11.6%	59 29.6%
	26-30	6 27.3%	13 59.1%	10 45.5%	14 63.6%	11 50.0%	7 31.8%	3 13.6%	4 18.2%	4 18.2%	8 36.4%
	>30	2 50.0%	4 100.0%	4 100.0%	4 100.0%	1 25.0%	2 50.0%	2 50.0%	1 25.0%	1 25.0%	1 25.0%
	Female	59 36.4%	89 54.9%	90 55.6%	99 61.1%	93 57.4%	36 22.2%	39 24.1%	8 4.9%	19 11.7%	32 19.8%
Male	12 12.4%	48 49.5%	47 48.5%	64 66.0%	44 45.4%	23 23.7%	21 21.6%	7 7.2%	13 13.4%	40 41.2%	
Field of Study	Dentistry	12 20.3%	35 59.3%	30 50.8%	41 69.5%	31 52.5%	12 20.3%	13 22.0%	3 5.1%	9 15.3%	24 40.7%
	Medicine	41 29.7%	76 55.1%	77 55.8%	81 58.7%	74 53.6%	32 23.2%	30 21.7%	6 4.3%	18 13.0%	33 23.9%
	Pharmacology	18 29.0%	26 41.9%	30 48.4%	41 66.1%	32 51.6%	15 24.2%	17 27.4%	6 9.7%	5 8.1%	15 24.2%

\* Participants were allowed to choose multiple responses

Table 3. Priority of sources used to obtain health information

Sources	Priority	1st	2nd	3rd	4th	5th
		n(%)	n(%)	n(%)	n(%)	n(%)
Published paper materials		52(13)	47(11.8)	39(9.8)	43(10.8)	48(12)
Internet		66(16.3)	64(16)	61(15.3)	40(10)	10(2.5)
Media*		12(3)	36(9)	57(14.2)	80(20)	36(9)
Physicians		103(25.8)	66(16.5)	41(10.3)	18(4.5)	14(3.5)
Friends and family		26(6.5)	29(7.2)	31(7.8)	33(8.3)	105(26.3)

\*Media was defined as newspapers, magazines, radio and television

Table 4. The relationship between demographic information of participants and their use of Internet to search for online health information

Factors		Internet use as a health source information		Adj OR <sup>b</sup>	(95% CI) <sup>a</sup>	p-value
		Yes	No			
Gender	Female	163(61.9)	73(30.9)	1.74	1.1-2.738	0.01
	Male	97(59.1)	67(40.9)	Reference	---	---
Age	<=20	24(50)	24(50)	0.38	0.060-2.428	0.30
	21-25	200(66)	103(34)	0.89	0.153-5.229	0.90
	26-30	22(91.7)	2(8.3)	5.82	0.596-56.895	0.13
	>30	4(66.7)	2(33.3)	Reference	---	---
Field of study	Dentistry	59(70.2)	25(29.8)	1.65	0.876-3.128	0.12
	Medicine	140(68.3)	65(31.7)	1.7	1.021-2.832	0.04
	Pharmacology	61(55)	50(45)	Reference	---	---

a (95% confidence interval)

b Odds ratio

Table 5. Effect of using online health information on the number of visits to physicians

Factors		Effect on the number of visits to physicians, n (%)			
		Decreased	No effect	Increased	p-value
Age group	<=20	4(17.4)	12(52.2)	7(30.4)	<0.0001
	21-25	51(25.5)	135(67.5)	14(7.0)	
	26-30	5(25.0)	11(55.0)	4(20.0)	
	>30	4(100.0)	0 (0.0%)	0 (0.0%)	
Gender	Female	47(29.4)	99(61.9)	14(8.8)	0.24
	Male	20(20.6)	65(67)	12(12.4)	
Field of Study	Dentistry	14(23.7)	39(66.1)	6(10.2)	0.35
	Medicine	31(22.8)	92(67.6)	13(9.6)	
	Pharmacology	22(35.5)	33(53.2)	7(11.3)	
Experience of using online health information	Useful	60(29.9)	116(57.7)	25(12.4)	0.001
	Harmful	1(20.0)	4(80.0)	0(0.0)	
	None	5(10.4)	42(87.5)	1(2.1)	

Table 6. Association between experience of using online health information and trust in the information

Experience of using online health information	Trust in online health information, n (%)				p-value
	Very much	Much	Somewhat	Very low	
Useful	9(4.4)	59(28.8)	130(63.4)	7(3.4)	0.026
Harmful	0(0.0)	0(0.0)	4(80.0)	1(20.0)	
None	0(0.0)	6(12.5)	39(81.2)	3(6.2)	

## Figures

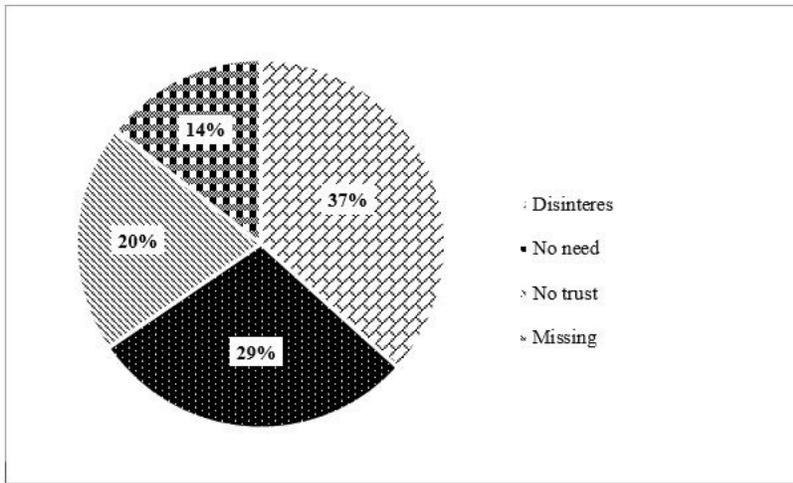


Figure 1

Reasons for not using the Internet to search for health information