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RESEARCH ARTICLE

Utilization of internet by undergraduate medical students

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ABSTRACT

Background: The technological advances and the internet contributed to the development of the e-learning resources. Internet applications do the distribution of digital content to its end users learners simultaneously over wide area. **Aims and Objectives:** The present study was carried out to find the use and purpose of using internet among the medical students. **Material and Methods:** A cross-sectional study was done committee in 200 undergraduate medical students and 50 interns after the permission of Institutional Ethics. Questionnaire was validated by experts and administered after receiving due consent. **Results:** Out of 250, 61.6% were female and 38.4% were male. The average age was 22.01 ± 1.37 years. Nearly 93.6% have access to internet and 79.49% had access at home or hostel. Nearly 48.29% used internet on smartphone. Nearly 97.6% have email address. Students from urban area used internet more frequently than from rural area. About 44.4% rely on internet for medical information. About 90.40% feel the need to use internet during medical studies. The reason for using internet was 92.4% for time-saving and 92.8% for latest knowledge. Females depended more on their friends for internet use than males. In first year, students searched maximally for anatomy and in second year for pharmacology subject. Most common website for searching nonmedical information was Google (56%) and for medical was Wikipedia (51.2%). Nearly 68.40% feel need to use internet in medical curriculum. About 92.8% feel that internet training is necessary and 94.8% feel internet will have positive impact on academic performance. **Conclusion:** There is urgent need to undertake training for improvement of internet skills in medical undergraduates. This will be helpful to enhance e-learning skills and easy assimilation in medical education.

KEY WORDS: Internet; Google; Wikipedia; Medical Students; Medical Education

INTRODUCTION

The use of internet technologies to extradite solutions that heighten the performance and knowledge is called as E-learning.[1] Over the past 2 decades, the global internet-using population has grown to almost 2.5 billion.[2] The students in medical school are the millennial generation, having lived in the omnipresence of online technology their whole lives. They prefer new media technologies and online learning.[3]

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The internet is cost-effective and fast. Any information can be accessed from any source with an internet connection and with no time limitation. Medical sites on Internet contain cutting edge information of laboratory, clinical, radiographic, treatment, and other medical information. These create an environment for medical students to study at their own pace.[4] Internet is now one of the most important sources of information for medical students in different institutions throughout the world. It has

also become a popular medium for delivering educational materials. The Internet has been used for medical education in diverse ways such as videos, images, and animations in the diagnosis of diseases and conduct of medical examinations. It is also being used as an important source of information for medical research.[5-7] It is an undeniable fact that internet brings many benefits to our lives.[2]

The internet in mobile technology is changing the way we live, and it is beginning to change the way we learn. An increasing number of physicians, residents, and medical students currently use mobile devices such as Smartphones, iPads, and Tablets for education and use in clinical environments in the form of webinars for diagnosis and treatment. Medical students are in need to keep themselves updated with new information along with their medical curriculum with focus on evidence-based practice.[5]

Internet has become the world's biggest library where the retrieval of scientific resources can be done within minutes.[6] It is one of the important scientific developments in the medical field that provides a wealth of information related to different health issues on diseases, therapeutic procedures, and pharmaceutical products. It also provides interactive sessions in the form of webinars and different online courses. With the fast development of the network construction in universities, the number of internet using university students is increasing. Thus, internet-based training has become a vital part of the Medical Education.[5,6]

India is the third largest in the world with network of about 120 million internet users and is rapidly catching with the developed countries.[7] In India, Internet use is rapidly increasing, especially in students and there are very few studies that focus on the internet use among undergraduate medical students. Therefore, the current study was carried out to find out the use and purpose of using internet among the medical students.

MATERIAL AND METHODS

A cross-sectional questionnaire-based study of 200 medical students that included 50 from the first year (I and II Semester), 50 from the second year (III, IV and V Semester), 50 from the third year (VI and VII Semester), 50 from the fourth year (VII and XI Semester), and 50 interns in a tertiary care hospital. Institutional Ethics Committee permission (importer exporter code number [IEC]: Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj Hospital/ IEC/2015/13) was taken before starting the study. Informed consent was administered before enrollment. Study duration was from October 01, 2015 to November 31, 2016. The study site was the department of pharmacology and physiology.

The validity (content and criterion) and reliability (test-retest reliability) of the questionnaire were tested by three teachers from medical education unit of the college. Those not willing to participate or did not return the questionnaire within the stipulated time were excluded.

The questionnaire was distributed to 10 students for pilot study; the questionnaire was prepared from previous studies by Taher, Almarabeh, Ayatollahi and Bello.[4,8-10] Test-retest reliability was estimated with 15 students by taking two interviews seven days apart, and this was not included in the final analysis. Internal consistency reliability by Cronbach's alpha coefficient was 0.83. The participation was voluntary and students willing to give informed consent were enrolled in study. The objectives of the study were explained to the participants. Demographic information statement and questionnaire were administered and collected after 20-40 min. The students were selected randomly. Written informed consent was obtained from each participant and confidentiality of participants was maintained throughout the study. Those students not willing to participate or returning incompletely filled forms were excluded from the study. Totally 310 questionnaires were distributed, 286 were collected out of which 250 were selected. The identity and data in the present study were kept confidential. The questionnaire consisted of information regarding internet use frequency, source, and other questions related to the use of internet.

Statistical Analysis

Data were expressed as mean ± standard deviation, frequency, and percentage. Chi-square test was used to test the association of different variables of the participants. GraphPad Prism version 5.0 Software for Windows was used for statistical analysis. $P < 0.05$ was considered to be statistically significant.

RESULTS

The average age in our study was 22.01 ± 1.37 years (range 19-28 years). There were 154 (61.6%) females and 96 (38.4%) males. A total of 207 (82.8%) were from urban area and 43 (17.2%) were from rural area. Out of 250, 234 (93.6%) have access to internet and 16 (6.4%) do not have access to internet. Frequency of use of internet is given in Table 1. There was no difference in use of internet by females and males ($P = 0.606$). Urban students used internet more frequently than rural students ($P < 0.0001$).

Out of 234, 197 (84.19%) had access to internet before joining medical college and 37 (15.81%) after joining the medical college. A total of 186 (79.49%) had access to internet at home and hostel while 20 (8.55%) used at medical college, 28 (11.97%) used at internet cafe. A total of 120 (51.28%) students had to depend on the use of internet on friends, 56 take help of parents and siblings, 41 used independently,

10 on internet café, and 7 had done information technology course. Within 234 students, 113 (48.29%) students used internet on smartphone while 97 (41.45%) used on laptop, 40 (17.09%) use internet on desktop. Out of 16 that do not have access to internet 11 were from the first year to 5 from the second year. All the 16 students were from rural area of residence and included 11 females and 5 males. Females depended more on their friends for internet use than males ($P < 0.0470$). The source of learning internet by students is given in Table 2.

Out of 250, 244 (97.6%) have email address, 57 (22.8%) access their email daily, 63 (25.2%) access it twice a week, 61 (24.4%) access it once a week and 52 (20.8%) once a month, and 11 (4.4%) do not access email at all. On using internet, 60 (24%) feel very confident, 102 (40.8%) fairly confident, 71 (29.58%) average, and 11 (4.4%) are not confident of using internet. For using internet, the first preference is given by 89 (35.6%) for medical literature, and for searching medical information, 65 (26%) students used for playing online games, movies, and songs, 47 (18.8%) for social networking, and 43 (17.2%) for using mail. In social websites, Facebook is the most commonly used by 200 (80%) students, 181 (72.4%) use WhatsApp, Telegram by 16 people while 7 used Instagram, 4 used Hike, and 2 used Pinterest, LinkedIn, and Google Plus. Regarding safety 172 (68.8%) feel safe while using internet while 72 (28.8%) do not feel safe while using internet, they feel their information might get hacked.

A total of 104 (41.6%) students search medical information on internet after lecture, 65 (26%) after demonstration, and 40 (16%) after attending clinical rounds and 35 (14%) after practicals. A total of 113 (44.2%) rely on internet for most of the medical information while 61 (24.4%) use standard textbooks, 52 (20.8%) use dictionary, 11 (4.4%) use research journals, and 7 (2.8%) depend on newspaper. The reasons for using internet were, out of 234, 231 (92.4%) used for time-saving, 232 (92.8%) for latest knowledge, 211 (84.4%) for easy accessibility.

Out of 250, 226 (90.40%) feel the need to use the internet during medical studies, 201 (80.40%) like to use the computer (Desktop + Laptop) and smartphone as a supplement to teaching. A total of 151 (60.40%) feel that lectures on internet can replace theoretical teaching. A total of 196 (78.40%) like to be able to use the internet for distance learning from home. A total of 69 (27.61%) feel that use of internet e-books can be used as replacement for medical textbooks while 181 (72.4%) do not feel so. The reasons for not using internet frequently are 40 (16%) persons do not have a modem and/or internet connection, 22 (4.89%) do not own a computer or smartphone. A total of 12 (4.8%) find it very expensive, 8 (3.2%) do not need and do not know how to use internet while 5 (2%) have a fear of new technology. Websites assessed by students for searching medical information is given in Table 3.

The most commonly used websites for searching non-medical information were 140 (56%) use Google, 122 (48.8%) use YouTube, 105 (42%) Wikipedia, and 57 (22.8%) use websites/apps for online shopping while 6 (2.4%) use Yahoo. A total of 171 (68.40%) feel that there is need to include how to use computer and internet in medicine curriculum. Out of

Table 1: Frequency of the use of internet by undergraduate medical students

Students	Everyday		2-3 days/week		Once a week		Once a month		Total
	Females	Males	Females	Males	Females	Males	Females	Males	
I MBBS	4	5	7	5	5	3	6	4	39
II MBBS	7	4	9	6	9	2	5	3	45
III MBBS	8	5	6	8	11	4	4	4	50
IV MBBS	7	5	8	4	8	3	9	6	50
Interns	5	8	7	3	12	5	6	4	50
Total	31	27	37	26	45	17	30	21	234

MBBS: Bachelor of medicine and bachelor of surgery

Table 2: The source of learning internet by students

Students	Self-learning		Special course		Parents		Friends	
	Females	Males	Females	Males	Females	Males	Females	Males
I MBBS	8	5	1	2	7	5	5	6
II MBBS	12	11	1	1	2	2	11	5
III MBBS	13	10	0	1	8	3	13	2
IV MBBS	18	15	0	1	5	1	8	2
Interns	21	16	0	0	4	2	6	1
Total	72	57	2	5	26	13	43	16

MBBS: Bachelor of medicine and bachelor of surgery

Table 3: Medical websites preferred by undergraduate medical students

Students	Google	Medscape	PubMed	Medline	Wikipedia	Medline
I MBBS	9	1	2	5	25	28
II MBBS	16	5	8	5	19	0
III MBBS	18	2	11	1	27	0
IV MBBS	13	5	19	3	27	13
Interns	9	3	16	0	30	13
Total	65	16	56	14	128	54

MBBS: Bachelor of medicine and bachelor of surgery

Table 4: Frequency of the subjects searched on internet by undergraduate medical students

Students	Anatomy	Physiology	Biochemistry	Pharmacology and drugs	Pathology	Microbiology	FMT	PSM	Medicine and allied	Surgery and allied
I MBBS	43	33	21	3	0	0	0	0	0	0
II MBBS	9	12	3	42	38	37	26	15	12	17
III MBBS	6	1	2	22	19	15	12	44	37	35
IV MBBS	1	2	1	27	21	18	15	34	43	45
Interns	7	2	2	35	18	23	21	37	45	47
Total	66	50	29	129	96	93	74	130	137	144

FMT: Forensic medicine and toxicology, PSM: Preventive and social medicine, MBBS: Bachelor of medicine and bachelor of surgery

250, 232 (92.8%) feel that internet training is necessary while 237 (94.8%) feel that internet will have positive impact on academic performance. A total of 194 (77.6%) feel like to convey their doubts to teachers through e-mail Table 4.

DISCUSSION

In the age of connectivity, knowledge about internet and skills to improve search on internet are very important.[11] The easy availability of computers and the accessibility to the internet have increased greatly. With the increase in the use of internet, the role and demand of internet in medical education to have increased.[12]

In our study, there were 61.6% of females and 82.8% were from urban area. As per study by Challa, 93.89% of students use computer at home or hostel and 36.11% use internet daily. The frequency of using internet is 33.89% twice or thrice in a week, 8.89% monthly, and 21.11% rarely. Nearly 8.33% of students learned internet by training while 83.34% from their friends and family members[13] According to Kumar, 72.34% used internet daily, 17.02 weekly, and 6.38% monthly.[14] According to Taher, 82.1% used internet and were maximum usage in the first year students.[8] The use of internet in our study was similar to other studies, but the trained students in computer and internet were very few.

In our study, 97.6% have email address, 54 access their email daily. The first preference was given for searching medical information, followed by playing games and for social networking. The study by Aldebasi had 75% of females that preferred the internet (14%) and textbooks (75%) while 84% of males used internet textbooks (35%) and (36%) used journals/library. Google was found to be most commonly used search engine.[15] The study done by Inamdar had 61% of the students that used internet for watching movies and playing games.[16] According to Challa, 60.55% used internet before joining medical college, 14.45% of students used for academic purpose, and 29.45% for social networking while 56.1% used for entertainment.[13] According to Taher, 75% of net users navigated the web for medically irrelevant reasons.[8] The study by Dorup revealed that 90% of students used email regularly and 80% used the internet regularly.[17] According to Kumar, 72.34% were comfortable and confident with the use of the internet. Nearly 65.95% use of internet was for literature searching, 63.82% for email, and 34.04% for chatting. Nearly 55.31% have inadequate number of personal computer and 40.42% lack of time to use. 27.65% no campus computer network, Information and communication technology was not present in the syllabus.[14] The study by Carroll students cited UpToDate, Google and Wikipedia were most cited resources by medical students for highly for their accessibility, understandability, and usefulness.[18] There is need to train students for fruitful use of internet.

In our study, the reasons for using internet in our study were 92.4% for time-saving and 92.8% for latest knowledge. For the first year, students search maximally for anatomy; for the second year, students search internet maximally for pharmacology, in the third year for Ophthalmology, and in the fourth year maximally for Medicine and allied. According to Kumar, 70.21% of students feel that information and communication technologies (ICT)-based study are necessary

for medical education. Nearly 12.76% of the students respond that ICT should be included in their present syllabus.[14]

Out of 250, 232 (92.8%) feel that internet training is necessary. According to Challa preferred medium for getting information among the students in the present study was the internet followed by textbooks. The study by Sharma had showed textbook as the most important source for undergraduate medical students[19] while study by Dorup that only 3-7% of students would prefer not to use computers in their studies.[17] This indicates that the use of internet is increasing for getting required information.

According to Taher, 94% of the included subject had positive attitude and 73% were in favor of using the computer facilitated lectures versus the traditional methods. Furthermore, females were more enthusiastic toward the application of computer and internet in the process of medical education, and they were more appreciating the role of the faculty in promoting computer use.[8] According to Challa, 96.11% of students are in favor of using computer and internet in teaching institutions. Nearly 57.22% of students wanted training on internet skills, and 96.67% of students felt internet gave boost to their academic performance.[13]

The students are using computer and internet for entertainment and social networking rather than acquiring medical knowledge. Computer and internet are playing more important roles in many aspects of medicine and will increase in future. It has a lower cost as compared to paper-based dissemination of information and also has an added advantage of being available worldwide instantly on demand. In India, ICT can overcome the current limitations of lack of resources and percolation of technology in medical education.[14]

Internet has become a medium of educational courses for medical students and resident doctors.[14] Major educational benefits can be utilized from this technology.[20] The potential of the internet and evidence-based medicine together in providing useful information to the physicians and patients cannot be denied.[6] Guidance for undergraduates in appropriate use of the Internet in academics is necessary. Although the students are experienced with the use of internet, there is not proper utilization of internet as a learning tool in medical education. Therefore, there is urgent need to equip medical students with adequate skills for fruitful use of internet.[21,22]

With the search for accurate information and good quality medical education, students need to know how to search and retrieve unbiased, comprehensive, and reliable information.[23] The optimum utilization of digital resources can be achieved only with requisite infrastructure and training in internet. It is important for the students to train in deducing required information from the Internet websites, and this will be useful in evidence-based learning and improve the quality of physician's education. Thus, there is need of training course so that the students know how to do the literature search and how to extract the right information from internet. Short training courses in computer application and internet use are recommended in medical colleges. Students should be trained to get valuable information from the websites. These skills can also increase participation in medical research.

Limitations

The study was done in single medical college, so it does not represent data from the population. As with all questionnaire-based studies, there is a recall bias by the participants. Socioeconomic factors were not taken into consideration.

CONCLUSION

There is urgent need to undertake training for improvement of the internet skills in medical undergraduates. This will be helpful to enhance e-learning skills and easy assimilation in medical education.

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