Computer and Internet use among Undergraduate Medical Students

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ABSTRACT

Introduction: The students in medical school have lived in presence of online technology in their whole lives. They prefer new media technologies and online learning. In the era of information and computer technology scenario of health and medical education has changed with the availability of medical literature on internet.

Material and Methods: A cross-sectional study among 200 medical students and 50 interns was undertaken after Institutional Ethics committee permission. Questionnaire was validated and administered after receiving their due consent.

Results: The average computer use by medical students was 6.58 ± 1.99 and average skill was 6.20 ± 1.88. The average hours utilized were 2.03±1.81 per day. The use and skills of computer were more in males than females, also they were more in urban students than rural students. 74.8% of medical students used internet as first preference for use on computer. 84.4% feel there is need to receive training in use of computers. 11.6% feel they do not have the opportunity to learn computers. 99.2% feel computer education is important. Students preferred Wikipedia website for academic and Google website for nonacademic use.

Conclusion: A computer teaching module is the current need for undergraduate medical students in India. They should be familiar with the computer skills for the ever changing medical field. This will be useful to enhance the use of evidence-based treatments and maintain update knowledge.

Keywords: Skills, Information technology, Teaching, Academic

INTRODUCTION

The twentieth century was a revolutionary period in the field of computer science. Today, in twenty first century information technology and computers represent an essential part of every sphere of human life, especially in process of education.[1] In past decades use of computer and internet has increased among college students[2] and in medical students it is increasing.[3]

Today's students in medical school have lived in the omnipresence of online technology in their whole lives. They prefer new media technologies and online learning. Their technology-integrated lives create new ways of learning.[4] The internet is cost-effective, fast and has the advantage of assessing information from any source.[3]

In the era of information and computer technology scenario of health and medical education has changed with the availability of medical literature on internet. All the fields of medical and allied sciences require adequate computer skills. In order to improve quality of health care, information processing and information technology is essential in this modern world. This helps the students to acquire the knowledge of medical science as well as recent advances in their respective field.[2,3,5]

The development of online databases allows medical professionals throughout the world to have immediate access to hundreds of e-journals, a striking contrast to many of their colleagues in developing countries.[5] However in developing country like India the use of Information technology has increased tremendously especially in younger generation.[6]

With the advance in medical field where most of the information is easily available on the internet, there is increase in the number of medical students using computer and internet to upgrade the knowledge and skills.[3] Also attitudes toward computer oreinted instruction is an important forf success in online learning.[7] However there are no studies in India that throw a light on the use of computer and internet in undergraduate medical students. Thus we planned to assess the use of computer and internet in undergraduate medical students and interns of medical college and tertiary care hospital.

MATERIAL AND METHODS

A cross-sectional questionnaire based study of 250 medical students which included 50 medical students from each year and 50 interns, was conducted in medical college and tertiary care hospital. Institutional Ethics Committee permission was taken before starting the study (IEC number: RGMC/CSMH/IEC/12 dated 10/1/2015). The study was conducted in department of Pharmacology and Physiology, Rajiv Gandhi Medical College from 01 February 2015 to 31 January 2016. The procedures followed in the study were in accordance with the ethical standards of Institutional Ethics committee on human experimentation and with the Declaration of Helsinki, adopted by the 18th World Medical Assembly, revised in 64th General Assembly, Fortaleza, Brazil, October 2013.

The questionnaire was designed through the review of questionnaires from previous studies, with some changes to suit local environment.[8-15] A pilot study was conducted on 10 students and based on pilot study result, modifications were made in the questionnaire. The validity (content and criterion) and reliability (test-retest reliability) of the questionnaire was tested. The content and face validity of the questionnaire was obtained by five experts in the field of medical education. Test–retest reliability was estimated with a subsample

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of 20 students by taking two interviews seven days apart, these were not included in the final analysis. Internal consistency reliability by Cronbach's-alfa coefficient was 0.72. Participation in the study was voluntary and students willing to give informed consent were enrolled in study. The objectives of the study were explained to the participants and written informed consent was taken. The demographic profile and study questionnaire were administered and collected after 20-30 minutes. Those students not willing to participate, did not return the questionnaire or returning incompletely filled forms were excluded from the study. Total 286 questionnaires were distributed, 278 collected out of which 250 were selected. Data collected during the present study was kept confidential. The questionnaire consisted of information regarding computer and internet access, computer activities, computer training, skills, place of access to computer and internet, sources of information and factors restricting students from using the computer. The use and skills related to computer were assessed on visual analog scale (VAS) scale of 0-10 where zero stands for no satisfaction and ten stands for complete satisfaction.

STATISTICAL ANALYSIS

Data was entered in MS Excel 2010 responses were coded and analyzed. Data was expressed in terms of actual number, frequency and percentage, mean ± standard deviation. P value <0.05 was considered to be statistically significant. Chi square test was used to test the association of different variables of the participants. Parametric tests (Student's unpaired t-test, one way ANOVA and Tukey's post hoc test) were used to compare the scores among medical students. The statistical analysis was done using statistics software GraphPad Prism version 5.0for Windows, GraphPad Software, San Diego California USA, www.graphpad.com" and SPSS version 20.0.

Academic year	Use	Skills	Hours
I MBBS	5.86 ± 1.85 ***	5.58± 1.73 ***	1.9 ± 1.08
II MBBS	7.55 ± 2.13	7.37± 1.69	2.24± 1.51
III MBBS	6.26 ± 2.11 #	5.66± 2.06 ###	2.12 ± 1.02
IV MBBS	6.42± 1.85	6.14± 1.90 $	1.62 ± 1.45
Interns	6.80± 2.02	6.26± 2.04 @	2.28± 1.51
Average	6.58 ± 1.99	6.20 ± 1.88	2.03 ± 1.31

*: I MBBS vs II MBBS, #: III MBBS vs II MBBS, $: IV MBBS vs II MBBS, @: Interns vs II MBBS
#, $, @: p<0.01 ***, ### p<0.0001

Table-1: Rating of computer use, skills and hours by medical students at different academic years

Academic year	Age (years)				Total
	<10 years	10-15 years	15-20 years	> 20 years	
I MBBS	22	24	4	0	50
II MBBS	24	21	5	0	50
III MBBS	14	27	9	0	50
IV MBBS	15	25	10	0	50
Interns	18	25	5	2	50
Total	93	122	33	2	250

Table-2: First time use of the computers by medical students at different academic years

RESULTS

In this study out of 250,151 (60.4%) were females and 99 (39.6%) were males, 210 (84 %) were from Urban and 40 (16 %) from rural area. The average age in our study was 21.64 ± 1.74 years (range 19-28 years). 183 (73.2 %) were from English medium, 55 (22 %) from Marathi, 11 (4.4 %) from Hindi and one (0.4 %) from Urdu medium of education in school. Within 250 students, 98 students had combination of desktop, laptop, smartphone while 91 had only smartphone, 37 had only laptop and 24 had only desktop. 249 (99.6%) have email id and 239 (95.6%) have access to internet. Out of 239, 98 had access on smartphone, 81 on laptop and 60 on desktop.

The use, skills and hours related to computer use is given in table 1. The use of computer by males was 6.68 ± 0.46 and by females was 6.14 ± 0.34 (p<0.001). The skills of using computer by males were 6.29 ± 0.49 and by females was 5.91 ± 0.44 (p<0.001). The use of computer by urban students was 6.92 ± 0.73 and by rural students was 5.81 ± 0.65(p<0.001) and skills by urban students was 6.77 ± 1.05 and by rural students was 5.70 ± 1.12 (p<0.001).

Out of 250, 213 (85.2 %) use the computer in home/hostel, 21 (8.4 %) use in medical college and 16 (6.4 %) internet café. Among 250, 130 (52 %) had access to printers where 76 had access to printer at home/hostel, 43 at internet café and 11 at medical college. The first time use of computer by the medical students at different academic years is given in table 2.

Out of 250, 124 (49.6 %) feel confident, 80 (32.00 %) feel they can cope, 44 (17.6 %) feel some confidence and 2 (0.8%) completely lack in confidence in using computers. The students familiarize themselves to the computer 151 (60.4 %) through self-learning, 51 (20.4 %) by parents, 34 (13.6 %) by friends and 14 (5.6 %) by special course

While using the activities on computer 187 (74.8%) students gave first preference to Internet followed by 27 (10.8 %) gave first preference in using word document, 16 (6.4%) gave first preference to using Multimedia and 20 (8.0 %)

Academic year	Everyday	2-3 days/week	Once a week	Once a month	Total
I MBBS	19	14	13	4	50
II MBBS	17	16	11	6	50
III MBBS	23	11	7	9	50
IV MBBS	18	14	8	10	50
Interns	27	11	6	6	50
Total	104	66	45	35	250

Table-3: Frequency of computer use by medical students at different academic years

gave first preference to using Medline. Frequency of computer use by medical students is given in table 3.

For academic activities 39 use computer every day, 84 use 2-3 days/week, 57 use once a week, 70 once a month. For personal use 88 ($p < 0.0001$) use computer every day, 64 use 2-3 days/week, 56 use once a week, 42 ($p=0.0027$) once a month.

To acquire knowledge of computers 98 (39.2 %) acquired by Independent work on the computer, 45 (18 %) learned it in school, 36 (14.4 %) at home, for 23 (9.2%) students someone else taught work on computers while 48 (19.2 %) had attended computer courses. Among 48, 30 had done Maharashtra State Certificate in Information Technology (MSCIT), 8 Java, 4 C-programming, 3 Basic course and one each of Animation, Web design, Hardware and Networking.

For upgrading medical knowledge 203 use supplementary online resource materials, 189 use reading text material, 163 use images, 79 use animation, 65 use audio and 60 interactive media. Out of 250, 211 (84.4 %) feel there is need to receive training in use of computers while 39 (15.6 %) feel there is no need. 94 students had responded to reasons for not using computer, among them 44 feel that there is no need of computer in medical field, while 3 feel they do not know how to use computer properly, 18 feel they do not have interest and 29 feel that they had no opportunity to learn computer of which 28 were from rural area.

Out of 250, 248 (99.2%) feel that computer education is important while 2 feel it is not important at all. 151 (60.4 %) would like to use computer as a replacement for theoretical teaching. Regarding the relevance of computers to medicine 214 (85.6 %) expect that computers will deliver great benefits to doctors and their patients, 10 (4.0 %) feel computers are overused by doctors and physician, 19 (7.6 %) think that computers is encroaching on medicine while 7 (2.8 %) students don't think that computers will ever play an important role in medicine.

The websites used by students for academic activities is given in table 4 and for nonacademic activities is given in table 5. The different computer skills used by medical students are given in table 6.

DISCUSSION

Information Technology is fast becoming a part of our everyday life. The Internet has given us easy access to information at the click of few buttons.[9] Now-a-days health and medical education have been modified from conventional mean of teaching to modern teaching methodology including information technology.[2]

In our study the computer use and skills was more in males and statistically significant as compared to females also more and statistically significant in urban students compared to rural. A study by Chowdhury et al had students within 20 -22

Academic year	Website (Number of students)						
	Pubmed	Webmed	Medscape	Medline	Wikipedia	Youtube	Google
I MBBS	9	1	2	1	25	33	7
II MBBS	16	5	8	5	19	21	11
III MBBS	18	2	11	1	27	14	9
IV MBBS	13	5	19	3	27	25	6
Interns	11	3	14	4	30	16	8
Total	67	16	54	14	128	109	41

Table-4: Computer website used for academic at different academic years

Academic Year	Website (Number of Students)					
	Facebook	Wikipedia	Google	Youtube	Yahoo	Shopping
I MBBS	29	17	32	15	0	16
II MBBS	20	24	18	16	4	0
III MBBS	18	29	35	28	1	16
IV MBBS	20	29	29	21	0	13
Interns	18	23	26	25	1	12
Total	105	122	140	105	6	57

Table-5: Computer website used for nonacademic use at different academic years

	Computer Skills (Number of Students)										
	1	2	3	4	5	6	7	8	9	10	11
I MBBS	50	50	48	48	45	43	37	9	29	24	9
II MBBS	49	49	50	49	48	47	24	25	33	36	0
III MBBS	49	49	47	48	46	44	39	18	43	35	9
IV MBBS	50	49	49	46	43	39	38	5	24	21	5
Interns	50	49	47	46	43	40	37	8	39	36	5
Total	248	246	241	237	225	213	175	65	168	152	28

1:Able to turn a computer on and off, 2: Able to use a mouse, 3:Able to use pendrive/hard disk, 4:Cut and paste information from one application to another, 5:Print out a document, 6:Set up folders or file directories, 7:To word process an essay or a letter , 8:To analyze data using a statistical package, 9:Send a file as an email attachment, 10: To install a software package, 11:Design a web page

Table-6: Usage distribution of computer skills by medical students at different academic years

years in which 54.7% were females and the average computer skill was 61.8%, 66.8% had own computer at home while 52.2% had laptop and 69.6% used computer mostly for personal purpose.[16] Study by Ahmed et al stated that consultants rated 60% and junior doctors rated 53.1% as their computer abilities.[17] A study by Safdari found that 61.6% medical students had smart phone.[18] The findings related to computer use in our study were similar to other studies.

In our study 74.8% of the students used Internet as first preference in using computers, 95.6% students had access to internet. 122 students had first use of computer around 10-15 years of age. According to Chowdhury et al medical students used internet every alternative day, 35.7% email and browsing.[16] Study by Ahmed et al stated that 84.4 % of consultants and 78.9% students use Internet. 55.0% of consultants used Internet daily as compared to 18.2% of junior doctors.[17] A study by Mattheos suggest that 72% have access to the Internet.[19] Study by Asgari-Jirhandeh had email as the most frequent used application.[20] The findings related to internet use in our study was similar to other studies.

There was no significance in the hours utilized by the students at various academic years. The Interns, II and III MBBS students utilized more hours for computers than IV and first year students, this might be due to more syllabus to be covered in less time. In our study students preferred Wikipedia followed by Pubmed for academic use and Google followed by Wikipedia for Nonacademic use. According to Egle the most commonly used websites were Uptodate, Google, Medscape, Wikipedia and Epocrates.[21] According to Kraenbring et al Wikipedia is increasingly used by students for knowledge acquisition and learning. It is an accurate, comprehensive source for drug related information for undergraduate medical education.[22]

The positive attitude was reflected in our study where 85.6% feel that computers will deliver great benefits to patients and doctors while study by Chowdhury et al 59% of students consider computer as a hindrance in their study while 38.2% found it helpful to improve study[16] and study by Mattheos 60% of students use computers for their education.[19]

In our study the time for nonacademic use was more than the academic use. The excessive use of computers should be integrated to learn more of their professional knowledge. All the fields of medical and allied require adequate skills of computer and Internet sciences.[2] The major goals of education are to encourage medical students to increase their knowledge of medical science and become life-long learners.[3] The use of computers should be channelized to acquire more professional knowledge and skills. This will not only improve the quality of care but also enhance the use of evidence-based treatments, to maintain and update knowledge.[11]

In our study 99.2% feel computer education is important, 84.4% feel there is need to receive computer related training, 11.6% feel had no opportunity to learn computers while 19.2 % had some form of computer training. In our study the students were lacking in using a statistical package and designing web page, this can be part of the computer training module for medical students. In study by Asgari-Jirhandeh the average score for computer knowledge on scale of 0-10 was 4.19 and 86% of students agreed that computer skills will be beneficial to them in future and 62% students wanted a structured course in computer.[20] Study by Matttheos stated that only 23.2 % students had some form of computer course training while 38.4 % had never learned any computer related programme.[19] A study by Safdari stated that training courses required for familiarity and way of using applications on smartphone be held.[18] Our study and other studies have highlighted the need of computer training in medical students.

In the present study 39.8% acquire knowledge by independent work, while 203 students used supplementary online resources for upgrading their knowledge. Computer based training is effective for basic surgical skills training in medical students.[23] Studies have shown that with the help of computer assisted learning there is improvement in performance at Multiple Choice Questions, Objective Structured Clinical Examination, problem solving skills and also increases student satisfaction. Computers are being increasingly utilized as aid in undergraduate medical education and also increasingly utilized in postgraduate teaching programmes that play an essential role in Continuing Medical Education activities. Thus it is evident that having competent computer skills has become vital for medical undergraduates.[6] According to Wilkinson for the students to increase the use of e-learning require development in computer and technology advances.[24] However, for this to be successful, students must be adequately skilled at using computer.[9] Thus there is urgent need of a computer learning module for the medical undergraduates in India to remain up-to-date with the ever changing medical field. The foundation of computers knowledge will help in efficiently using e-learning modules in various fields of medicine. This will help in enhancing the performance of medical undergraduates so they will be at par with the global standards in medical field.

Limitations

It was conducted at one medical college and tertiary care hospital, so the results may not be indicative of the entire population. It was a questionnaire based study, it depends on the recall ability of the respondents.

CONCLUSION

There is a need to efficiently use computer for academic use in medical students especially from rural area. This can be done by increasing computer training or by introducing a computer training module for the students in undergraduate programme. The course should include statistical software's, and also ability to search the content in the right website. As the students lack understanding and also technical skills, the course should integrate student's competency of computer skills, in their medical education, as to be update in academic and professional career.

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REFERENCES

1. Masic I, Karcic E, Hodzic A, Mulic S. Information

Technologies in Education of Medical Students at the University of Sarajevo. Acta Inform Med. 2014;2:228-23.
2. Najia R, Nesar S, Parveen S, Rehman R, Shakeel S. Computer and internet use among medical, dental and pharmacy students of Karachi, Pakistan. Journal of pharmaceutical and biomedical sciences. 2013;31: 1118-1122.
3. Ayatollahi A, Ayatollahi J, Ayatollahi F, Ayatollahi R, Shahcheraghi SH. Computer and Internet use among Undergraduate Medical Students in Iran. Pak J Med Sci. 2014;30:1054-58.
4. Han H, Nelson E, Wetter N. Medical students' online learning technology needs. The Clinical Teacher. 2014;11:15–19.
5. Samuel M, Coombes JC, Miranda JJ, Melvin R, Young EJW, Azarmina P. Assessing computer skills in Tanzanian medical students: an elective experience. BMC Public Health. 2004;4:1-7.
6. Ranasinghe P, Wickramasinghe SA, Pieris WA, Karunathilake I, Constantine GR. Computer literacy among first year medical students in a developing country: A cross sectional study. BMC Research Notes. 2012;5:504.
7. Cook CA, Thompson WG. Comfort and experience with online learning: trends over nine years and associations with knowledge. BMC Medical Education. 2014;14:128.
8. Salehi M, Khalili MN, Hojjat SK, Salehi M, Danesh A. Prevalence of Internet addiction and associated factors among medical students fromMashhad, Iran in 2013. Iran Red Crescent Med J. 2014;16:e17256.
9. Lim TA, Wong WH, Lim KY. Perceived skill and utilisation of Information technology in Medical students among final year medical students, Universiti Putra Malaysia. Med J Malaysia. 2005;60:432-440.
10. Rajab LD, Baqain ZH. Use of Information and communication technology among dental students at the university of Jordan. Journal of dental education. 2005;69:387-398.
11. Romanov K, Aarnio M. A survey of the use of electronic scientific information resources among medical and dental students. BMC Medical Education. 2006;6:34-39.
12. Drup J. Experience and Attitudes towards Information Technology among First-Year Medical Students in Denmark: Longitudinal Questionnaire Survey. J Med Internet Res. 2004;6:e10.
13. Hattab NM, Lahmiti S, Abdelaziz AB, Saidi H, Fikry T. Internet and medical student in Marrakech. Ann Afr Med. 2010;9:68-72.
14. YapaYM, Dilan MM, Karunaratne WC, Widisinghe CC, Hewapathirana R, Krunsthilake I. Computer Literacy and Attitudes towards elearning among SriLankan Medical Students. SriLanka Journal of Bio-Medical Informatics. 2012;3:82-96.
15. Link MT, Marz R. Computer literacy and attitudes towards e-learning among first year medical students. BMC Medical Education. 2006;6:34.
16. Chowdhury NS, Chowdhury NN, Rabbi F, Tabassum R, Ishrat S. Computer Literacy and Attitudes Towards e-learning among Bangladeshi Medical Students. Update Dent. Coll. j. 2013;3:03-06.
17. Ahmed AM, Yousif E, Abdalla ME. Use of the Internet by Sudanese doctors and medical students. East Mediterr Health J. 2008;14:134-41.
18. Safdari R, Jebracily M, Rahimi B, Doulani A. Smartphone medical applications use in the clinicaltraining of medical students of UMSU and its influencing factors. European Journal of Experimental Biology. 2014;4:633-637.
19. Mattheos N, Nattestad A, Schittek M, Attström R. Computer literacy and attitudes among students in 16 European dental schools: current aspects, regional differences and future trends. Eur J Dent Educ. 2002;6:30-5.
20. Asgari-Jirhandeh N1, Haywood J. Computer awareness among medical students: a survey. Med Educ. 1997;31:225-9.
21. Egle JP, Smeenge DM, Kassem KM, Mittal VK. The Internet School of Medicine: use of electronic resources by medical trainees and the reliability of those resources. J Surg Educ. 2015;72:316-20.
22. Kräenbring J, Monzon Penza T, Gutmann J, Muehlich S, Zolk O, Wojnowski L, Maas R, Engelhardt S, Sarikas A. Accuracy and completeness of drug information in Wikipedia: a comparison with standard textbooks of pharmacology. PLoS One. 2014;9:e106930.
23. Summers AN, Rinehart GC, Simpson D, Redlich PN. Acquisition of surgical skills: a randomized trial of didactic, videotape, and computer-based training. Surgery. 1999;126:330–336.
24. Wilkinson A1, While AE, Roberts J. Measurement of information and communication technology experience and attitudes to e-learning of students in the healthcare professions: integrative review. J Adv Nurs. 2009;65:755-72.

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