

Mobile phone usage pattern among undergraduate medical students at a Medical College of Kolkata, West Bengal, India

Bobby Paul^a, Sima Roy^b, Indranil Saha^c, Raghunath Misra^d, Sita Chattopadhyay^e,
Mausumi Basu^e,

Abstract

Objective: Mobile phone usage has reached all ages across all segments of society, and its radiofrequency waves are an increasing concern among the general population. To find out the pattern of mobile phone usage among undergraduate medical students and their perceived symptoms and awareness about negative health effects due to their exposure to the radiofrequency waves. **Methods:** A descriptive type of epidemiological study was conducted among 295 undergraduate medical students in the Institute of Post Graduate Medical Education and Research, Kolkata, in August 2012 after obtaining Institutional Ethical Clearance. Data were collected by a pre-designed and pre-tested, semi structured questionnaire and analyzed with SPSS software, version 19.0. **Results:** Among the 1st semester students, browsing of the internet became the predominant activity; while listening to music and radio was the preferred activity among the 3rd, 5th and 7th semester students. In lecture class, 1st semester students (62.5%) switch off; 40.6% of 5th semester students receive and 63.63% of 7th semester students keep the phone in silence mode. Duration of mobile phone usage was maximum among students who perceived headache as a side effect of usage. About 62.3% study subjects cited accidents as a harmful effect, followed by lack of concentration. **Conclusions:** Regulatory bodies should lay down specific regulations and guidelines regarding mobile phone usage in class as well as during patient care. Further research is needed to comment on long term health outcome keeping in view its usage and popularity among younger people.

Keywords: Mobile phone use, medical students, hazard awareness

^aAssist. Prof., Department of Community Medicine, Institute of Post Graduate Medical Education and Research, Kolkata, West Bengal, India.

^bAssoc.Prof., Community Medicine, Burdwan Medical College and Hospital, Burdwan, West Bengal, India.

^cAssoc.Prof., Community Medicine, IQ City Medical College and Narayana Hrudayalaya Hospital, Durgapur, West Bengal, India.

^dProf and HOD, Community Medicine, Institute of Post Graduate Medical Education and Research, Kolkata, West Bengal, India.

^eAssoc.Prof. Community Medicine, Institute of Post Graduate Medical Education and Research, Kolkata, West Bengal, India.

Corresponding Author: Bobby Pau, Department of Community Medicine, Institute of Post Graduate Medical Education and Research, Kolkata, West Bengal, India. E-posta: drbobbypaul@gmail.com

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Hindistan Batı Bengal'de Kolkata Tıp Okulu öğrencileri arasında cep telefonu kullanma alışkanlıkları

Özet

Amaç: Toplumun her kesiminde tüm yaş grupları arasında cep telefonu kullanılmakta ve üretilen radyofrekans dalgaları toplumda endişe yaratmaktadır. Bu çalışmanın amacı, Tıp öğrencileri arasında cep telefonu kullanma alışkanlıklarının, algılanan semptomların ve radyofrekans dalgalarına maruz kalınması nedeniyle oluşan negatif sağlık etkileri hakkındaki farkındalığın incelenmesidir. **Yöntem:** Tanımlayıcı tipteki bu çalışma Kolkata Mezuniyet Sonrası Tıp Eğitimi ve Araştırma Enstitüsü'nde 295 Tıp öğrencisinde, Enstitü Etik Onayı alındıktan sonra Ağustos 2012'de yürütülmüştür. Veri, pilot çalışma ve ön testleri yapılmış yarı yapılandırılmış bir anket ile elde edilmiştir ve SPSS istatistik programı 19.0 sürümü ile analiz edilmiştir. **Bulgular:** Birinci dönem öğrencileri arasında internette gezinmek amaçlı kullanım en sık yapılan aktivite iken, üç, beş ve yedinci dönem öğrencileri müzik ve radyo dinlemeyi tercih etmekteydi. Dersliklerde birinci dönem öğrencileri (%62.5) telefonlarını kapalı tutarken, beşinci dönem öğrencilerinin %40.6'sı açık ve yedinci dönem öğrencilerinin %63.63'ü sessiz moda tutmaktaydı. Cep telefonu kullanma süresi, başağrısını cep telefonu kullanımının bir yan etkisi olarak algılayan öğrenciler arasında en yüksek düzeydeydi. Çalışma grubunun %62.3'ü konsantrasyon eksikliğinden kaynaklanan kazaları zararlı bir etki olarak bildirdi. **Sonuç:** İlgili denetim organları, hasta bakımı süresince olduğu gibi, sınıfta cep telefonu kullanımı ile ilgili spesifik yasalar ve kılavuzlar oluşturmalıdır. Ayrıca genç bireylerde cep telefonunun yaygınlığı ve kullanımının uzun dönem sağlık etkilerini yorumlayabilmek için daha fazla araştırmaya ihtiyaç vardır.

Anahtar Kelimeler: Cep telefonu kullanımı, tıp öğrencileri, risk algısı

Introduction

One of the most common sights we see these days is that of people with their mobile phones next to their ears. Although they are a boon for better communication, there have always been arguments and research concerning frequent use of cell phones and its long term effects.

Mobile phones are low-powered radiofrequency transmitters, operating at frequencies between 450 and 2700 MHz with peak powers in the range of 0.1 to 2 watts through an antenna used close to the user's head.¹ Mobile phones communicate by transmitting radio waves through a network of fixed antennas called base stations. Radiofrequency waves are electromagnetic fields (EMF) and there is increasing concern among the general population that these waves might induce or promote cancer. Changes in the permeability of the blood-brain barrier, of electroencephalographic activity, and blood pressure have also been reported.² The

validity of many of these findings is uncertain; as are the mechanisms for such actions and to date EMF exposure due to mobile phone use is not known to have any major health effects.³ However self-reported symptoms associated with mobile phone use most commonly include headaches, earache, and sensations of warmth and sometimes also perceived difficulties in concentration as well as fatigue.^{4,5} In 2009, a bibliometric analysis of the studies published worldwide related to internet addiction, video games and mobile phones revealed that only 2.1% studies were concerned with mobile phone addiction.⁶ This indicates that there is dearth of studies in this regard despite the rampant usage of mobile phones.

Mobile phone usage has reached all ages across all segments of society, but especially the youth. A survey in Italy by Dimonte et al. indicated that 96% of 14 to 18 year-olds in that country owned at least one mobile phone; while 22% of them had more than one mobile phone.⁷ Subba et al.

from Mangalore, South India, reported that about 99.7% of medical students with a mean age of 20.6 ± 1.36 years used mobile phone.⁸ In spite of this, little is known about the patterns of mobile phone use, especially among the young generation who are mostly students.

This study was planned to find out the pattern of mobile phone usage among undergraduate medical students of a Medical College of Kolkata city, West Bengal, India, as well as the self reported symptoms of medical students after phone usage and their perception about harmful effects of mobile phone usage.

Methods

A descriptive type of epidemiological study was conducted among undergraduate medical students studying for the MBBS course in the Institute of Post Graduate Medical Education and Research (IPGME&R), Kolkata, West Bengal during August 2012. MBBS denotes Bachelor of Medicine and Bachelor of Surgery. It is a four and half years degree course, recognized by the Medical Council of India – the highest regulatory body in this regard of India. After graduation one has to complete a compulsory one year rotatory internship in different departments, after which one gets the MBBS certificate and can practice as a doctor. The government medical college which is also a tertiary care super speciality hospital of the state of West Bengal enrolls a batch of 100 students each year for the MBBS course. The Community Medicine lecture classes for the month of August for the 1st, 3rd, 5th and 7th Semester batches of students were scheduled twice per week. After approval of the study by the Institutional Ethical Clearance board, data were collected by using a pre-designed and pre-tested structured questionnaire on the basis of the respondents' anonymity. Pretesting was done among 30 undergraduate medical students of the same medical college and necessary modifications were made in the questionnaire. A questionnaire was developed to ascertain the usage pattern of mobile phones and to

assess the subjective health symptoms due to its use. Content validity of the questionnaire was assessed by consensus of three experts and partly by a literature review.⁹ Subjects were also asked separately about the cost of their handsets, their monthly expenditures on mobile phones and the total monthly family income. The total monthly family income was grouped into four categories based on the range of the income (Table 2). Then in different categories of monthly income, average cost of handset, and monthly expenditure for phone usage was calculated. Students belonging to different semesters were asked about the durations of their phone usage. Accordingly the mean duration of phone usage for different semester students was computed.

The students were approached at the end of their lecture classes, were briefed about the purpose of the study, and were invited to participate in the study freely. After taking informed verbal consent from them, the questionnaire was distributed. The ones who refused to participate were instructed to return the questionnaires unfilled. Out of the total strength of 387 undergraduate medical students studying in the medical college, and excluding 30 students who participated in pretesting, 309 pupils could be surveyed (86.6% i.e. 309/357) due to their attendance at the lecture class on the day of data collection. A total of 302 students returned the filled questionnaires, 7 were returned in unfilled state and 7 questionnaires were discarded as they were incompletely filled. Finally 295 questionnaires were taken for data analysis of which 58 students were from the 1st semester, 81 from the 3rd semester, 96 from the 5th semester and the rest i.e. 60 were from the 7th semester. There were 100, 90, 103 and 94 students in 1st, 3rd, 5th, and 7th semesters respectively and the participation rate in the corresponding batches was 58%, 90%, 93% and 63.8% respectively.

The data were entered and compiled in MS Excel worksheet. Categorical data were expressed as proportions, while continuous data were expressed as mean

values. The dispersion of data was expressed in terms of standard deviation (SD). In contingency tables, the significance of association between the two attributes was analysed using the chi-square (χ^2) test; Student's t test and one-way ANOVA (analysis of variance) test were used to compare mean values. Degree and direction of relationships between two variables was computed by the Pearson's product moment correlation co-efficient (r). P value less than 0.05 was considered as statistically significant. All the statistical analysis was done in SPSS software, version 19.0 (Statistical Package for the Social Sciences Inc, Chicago, IL, USA).

Results

Mobile phone usage was found among 293 students (99.3%) of whom 233 (79.5%) were males and 60 (20.5%) were females; and only two 1st semester students were non-users of mobile phones. 100% of those living in hostels were users of mobile phones. 234 (79.9%) of them possessed one phone and the rest i.e. 59 (20.1%) had two or more mobile phones. The mean age of the users was 20 ± 2.12 years. 192 i.e. (65.5%) had their permanent residence in a rural area, and the rest in an urban area.

On analysis of preferences for keeping mobile phones, it was found that about one third of the male students (71.7%) preferred to keep their mobile phone in a garment pocket, while about half of the female students (56.7%) preferred to keep their mobile phone in a bag, and this was found to be statistically significant ($\chi^2=123.03$, $P < 0.05$). Regarding the purpose of buying the phone everybody, in both sexes, cited the reason for communication. Recreation for males (89.7%) and internet use for females (51.6%) emerged as second common reason (Table 1).

The mean average cost of a handset increased gradually and significantly with the increase in total monthly income of the family, suggesting positive correlation coefficient ($r= 0.24$, $P < 0.05$). The standard deviation had also increased, suggesting more dispersion of the cost of hand set in the

high total monthly income group. Monthly expenditures on mobile phones also increased among the high monthly income group; the highest expenditure being incurred by those students whose family monthly income was \geq Rs 45000 which is equivalent to \$749.69 in US dollars. Though the Pearson correlation coefficient was found to be positive, it was not significant statistically ($r= 0.11$, $P > 0.05$) (Table 2).

The mean duration of phone usage per day increased from first semester students (41.01 ± 36.63 minutes) to 5th semester students (92.97 ± 50.96 minutes), then in the 7th semester students, it was slightly lower (78.25 ± 46.67 minutes). This usage pattern was significant statistically ($F=14.22$, $P < 0.001$). The same was true for median values. Among the 1st semester students, daily browsing of internet was the predominant activity (29.68 ± 24.15 minutes), followed by listening to music and radio (25.37 ± 18.41 minutes); while listening to music and radio was the preferred activity among the 3rd, 5th and 7th semester students, followed by browsing the internet. Overall, listening to radio and music was the preferred activity over browsing of internet. Overall, among all the different groups, the usage pattern was statistically different by the ANOVA test (Table 3). According to their practice of phone usage during lectures, it was found that 1st semester students (62.5%) switch off; 40.6% of 5th semester students receive and 63.63% of 7th semester students keep the phone in silence mode. During ward visits or clinical tutorial classes, 7th semester students mostly tended to receive calls (63.3%), whereas students of the 1st, 3rd, and 5th semesters kept their phones in the silent mode. While attending to patients, almost all student groups preferred receiving the phone, except 1st semester students who had no such exposure. While crossing a road, the majority of students, in all batches, except the 3rd semester students, preferred receiving or continuing talking over phone which is a dangerous habit and is against law. When asked about their preferred practice while driving or riding a motorcycle or bicycle, it was found that a large proportion of 7th semester students (46.7%)

receive calls, but among the students of the other batches who drive, they usually preferred to ignore or keep the phone in the silent mode (Table 4).

Regarding symptoms perceived, 53.9% reported one or more symptoms with a mean duration of usage being 83.56±51.04 minutes, which was significantly higher (unpaired Student's t= 3.28, P< 0.05) than the mean usage time (64.23±49.4) of asymptomatic users. Among the symptomatic users 35.4% of the students complained of headache, and spasms of arm or neck muscles (31.0%) or loss of attention (24.7%) were the second and third most common symptoms respectively. The duration of mobile phone usage (in minutes) was maximum for students having headaches (112.5±61.95), followed by loss of attention (105.0±62.82) and a whizzing sound in the ear (91.48±57.5) respectively.

The mean duration of usage was much higher among the students having headaches and loss of attention in comparison with other symptoms. The differences of the mean durations of usage among the students having different types of symptoms were significant statistically (F=29.11, p<0.01) (Table 5).

Perceptions about adverse effects of mobile phone usage were present among 212 respondents (73.6%), and among them, more than half (62.3%), cited accidents, followed by lack of concentration (44.3%), infertility (41%), brain cancer (36.8%) and deafness (26.4%); their primary source of knowledge being newspapers (67.1%), and internet (44.3%). 32 respondents (15%) reported accidents of themselves or acquaintances in their lifetime of usage; this included 9 accidents (4%) that required urgent hospitalisation with no reported mortality.

Table 1. Distribution of the mobile phone users in both sexes according to certain characteristics

Characteristics	Male (n= 233) n (%)	Female (n= 60) n (%)
Preference of keeping mobile phone *		
Garment pocket	167 (71.7)	14 (23.3)
Hand held	50 (21.5)	6 (10.0)
Separate pouch attached to garment	9 (3.8)	6 (10.0)
Bag	7(3.0)	34 (56.7)
Purpose of buying (multiple responses)		
Communication	233 (100)	60 (100)
Internet access	173 (74.2)	31 (51.6)
Recreation	209 (89.7)	21 (35)

* $\chi^2 = 123.03$, d.f.= 3, p < 0.05

Table 2. Cost of mobile phone handset and monthly expenditure among different family income group

Total monthly family income (Rs.)	Average cost of handset Mean ± sd (Rs.)	Monthly expenditure Mean ± sd (Rs.)
< 15000	987.01 ± 158.34	205.62 ± 30.93
15000–30000	2098.24 ± 532.09	317.88 ± 103.20
30000–45000	2593.32 ± 605.20	394.45 ± 173.51
≥ 45000	2873.55 ± 1011.92	488.50 ± 152.23

Pearson's Correlation coefficient; r= 0.24, p < 0.05

r= 0.11, p > 0.05

Table 3. Mobile phone usage pattern among the different semester students

Usage pattern	1 st Semester (n= 56) Mean±sd Median	3 rd Semester (n= 81) Mean±sd Median	5 th Semester (n= 96) Mean±sd Median	7 th Semester (n= 60) Mean±sd Median	All students (N= 293) Mean±sd Median
Duration of usage/day *	41.01±36.63 30	74.16±50.48 65	92.97±50.96 92.5	78.25±46.67 75	75.03±51.13 65
<u>Patterns of using</u>					
Talking to family/day	12.31±9.64 10	10.69±7.91 10	17.7±14.95 19	13.69±8.41 10	12.89±10.07 10
Talking to friends/day	17.25±16.6 10	15.78±16.81 10	22.38±20.49 15	24.63±19.62 17.5	20.76±21.70 15
Sending SMS/day	8.9±7.74 5	6.83±4.69 5	9.62±5.93 10	12.72±11.53 10	8.81±6.27 5
Playing games/day	15.56±6.34 15	18.28±11.18 15	22.31±12.75 20	20.45±10.22 20	19.95±11.36 20
Listening music radio/day	25.37±18.41 15	40.58±12.32 30	39.9±25.1 30	39.78±19.62 30	37.54±25.32 30
Browsing Internet/day	29.68±24.15 15	23.85±10.52 30	27.37±17.91 30	31.67±27.53 30	36.87±21.12 30
ANOVA (F) @ (P value)	15.08 (< 0.01)	92.30 (< 0.01)	32.94 (< 0.01)	21.73 (< 0.01)	138.77 (< 0.01)

* ANOVA test statistic was calculated as compared to different semester students (F= 14.221, p < 0.05)

@ This ANOVA was calculated as compared to different pattern of usage semester wise.

Discussion

Mobile phone use has reached every aspect of the community and it has a special presence in the lives of young people, and college students. However, its excessive use and its effect on health are relatively new

Ownership of phones among males was higher than among females and this is in concordance with a study conducted by Mortazavi et al. among junior high school students with significant higher usage among males. Their preferred place of keeping mobile phones was a bag (70%), whereas the present study reported waist and chest garment pockets.¹¹ The mean monthly expenditure on mobile phones was Rs 221.94 (equivalent to 3.69 US\$) which was lower than what that reported by Subba et al. (Rs 300 or 4.98 US\$⁸ and Mittal et al. in his study among medical students (Rs 359.42 or 5.97 US \$).¹² Mittal et al. also reported the trend of frequent changing of handsets among the students which furthermore increased the economic burden to the parents.¹²

issues that have come forth only in the recent years. In the present study, nearly all students (99.3%) used mobile phones, which was higher than usage prevalence among medical students as reported by Mahmoodabad et al.¹⁰ in 2009 (73.5%) and similar (99.7%) to that of Subba et al.⁸

The overall mean duration of usage in our present study was 75±51.13 minutes/day with a median duration of 65 minutes. Total mean duration of talking to friends was 20.76±21 minutes while time spent on listening to music or radio and browsing the internet was close to about 40 minutes per day which was higher than that reported by Subba et al. and Mahmoodabad SSM et al.¹⁰ who reported a median duration talk time of 45 minutes overall.⁸

The use of mobile phones by students at places and situations where its use should be restricted is quite common, as reported by Subba et al. as ranging from 17.9% who used it while driving to 95.5% who used it in their classrooms although the majority i.e. 98% of the students who used the phones in class, kept it in silent mode.⁸

Table 4. Distribution of the study population according to their usual practice of phone usage in different situations

Practice	Phone silent /ignore n (%)	Receive n (%)	Switch off n (%)	Not experienced n (%)
<u>During lecture class</u>				
1 st semester (n=56)	7 (12.5)	14 (25.0)	35 (62.5)	-
3 rd semester (n=81)	34 (41.9)	19 (23.5)	28 (34.6)	-
5 th semester (n=96)	45 (46.9)	39 (40.6)	12 (12.5)	-
7 th semester (n=60)	38 (63.3)	12 (20.0)	10 (16.7)	-
<u>During ward/clinics</u>				
1 st semester (n=56)	32 (57.2)	11 (19.6)	13 (23.2)	-
3 rd semester (n=81)	47 (58.1)	23 (28.4)	11 (13.5)	-
5 th semester (n=96)	49 (51.1)	41 (42.7)	6 (6.2)	-
7 th semester (n=60)	20 (33.3)	38 (63.3)	2 (3.3)	-
<u>During attending patients</u>				
1 st semester (n=56)	-	-	-	56 (100.0)
3 rd semester (n=81)	22 (27.2)	56 (69.1)	3 (3.7)	-
5 th semester (n=96)	24 (25.0)	72 (75.0)	-	-
7 th semester (n=60)	9 (15.0)	51 (85.0)	-	-
<u>During crossing road</u>				
1 st semester (n=56)	22 (39.3)	34 (60.7)	-	-
3 rd semester (n=81)	48 (59.3)	33 (40.7)	-	-
5 th semester (n=96)	33 (34.4)	63 (65.6)	-	-
7 th semester (n=60)	27 (45.0)	33 (55.0)	-	-
<u>During driving</u>				
1 st semester (n=56)	16 (28.6)	7 (12.4)	2 (3.6)	31 (55.4)
3 rd semester (n=81)	35 (43.2)	8 (9.9)	5 (6.2)	33 (40.7)
5 th semester (n=96)	50 (52.1)	10 (10.4)	4 (4.2)	32 (33.3)
7 th semester (n=60)	14 (23.3)	28 (46.7)	-	18 (30.0)

Table 5. Distribution of study population according to symptoms perceived after phone usage

Symptoms perceived	Users n (%)	Duration of usage mean \pm sd (minutes)
Headache	56 (35.4)	112.5 \pm 61.95
Whizzing sound in ear	27 (17.1)	91.48 \pm 57.5
Sleep disturbances	27 (17.1)	61.63 \pm 48.23
Memory lapse	6 (3.8)	70.0 \pm 24.49
Loss of attention	39 (24.7)	105.0 \pm 62.82
Fatigue	15 (9.5)	82.67 \pm 55.45
Palpitation	5 (3.2)	66.0 \pm 13.41
Arm and neck muscle spasm	49 (31.0)	54.89 \pm 42.96
Burning sensation of ear and skin	24 (15.2)	65.0 \pm 47.15

n = 158 *; ANOVA F statistic = 29.11, p < 0.05

Almost similar observations were reported by Mahmoodabad et al. who found 84% of medical students used a phone in classrooms and 18.6% while driving.¹⁰ The present study however revealed that 63.63% of 7th semester students kept it in silence mode while 46.7% of them received calls while driving or riding cycles. This denotes their dependency on mobiles to an extent where they could not resist the temptation of using them even in places where the use is restricted. This was similar to the British study which found that 90% of the study subjects carried their phones wherever they went.¹³ In the present study, while attending to patients almost all of them preferred to receive calls which is in coherence with findings of Gibbons et al. who reported this preference among 47% of medical personnel.¹⁴ The need for stringent enforcement of laws for prevention of phone usage while driving and guidelines of Medical Regulatory bodies regarding rules and regulations of phone usage while at class or attending patients is of utmost importance.

Salama et al. in their study among the faculties of Alexandria University reported 72.5% of users were complainants of health manifestations¹⁵ which was higher compared to the present finding. Symptoms reported were headache, loss of attention were similar to those reported in other studies (Thomé et al.¹⁶, Mahmoodabad et al.¹⁰, Mortazavi et al.¹¹, Soderquist et al.¹⁷ and Salama et al.¹⁵). Despite repeated horror stories in print and media about hazards of mobile phone usage, the benefits outweigh

the risks involved, and up to the present research do not suggest any consistent evidence of adverse health effects from exposure to radiofrequency fields at levels below those that cause tissue heating.¹ Further, research has not provided support for a causal relationship between exposure to electromagnetic fields and self-reported symptoms, or "electromagnetic hypersensitivity".¹ The only established health hazard cited by an Independent Expert Group on Mobile Phones¹⁸ came from its use while driving, the risk of accident increasing with age which was equivalent (when braking times are measured) to a blood alcohol level of 0.05%. The risk was the same when the phone was used "hands free" (via a loudspeaker), implying the distraction is caused by the conversation.

Our study also reported accident hazard awareness among 62.3% of the medical students.

Conclusion and recommendation

The present study found that mobile phone usage consumed substantial time of the medical students which they could have otherwise devoted to their studies. The unrestricted use of phones in class and while attending to patients were also noted which causes distraction of attention. Regulatory bodies should lay down specific regulations and guidelines regarding mobile phone usage in class as well as during patient care which in turn will benefit the students. Educational programs stressing its appropriate usage and the avoidance of being a slave of technology but becoming its

master should also be undertaken for the promotion of students' health. Orientation workshops to make the students aware of appropriate usage of mobile phones in classrooms, wards, while driving, crossing the road, as well as the harmful effects should also be conducted at the same time.

In response to increasing concern regarding adverse effects of mobile phone usage, WHO has started a formal risk assessment of all studied health outcomes from radiofrequency fields exposure. Moreover, lack of data on exposure to mobile phones over time periods longer than 15 years also warrants further research to consider long term health outcome keeping in view its usage and popularity among younger people.

Limitations

Being a descriptive study, it elicited only the usage pattern of the respondents at that particular point of time. Perceptions about side effects of phone usage could have been better studied in a longitudinal design. Since the study was conducted upon medical students, the findings might not reflect the usage pattern of students other than medical professionals in the same age group.

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