

**Pattern and Usefulness of Smartphones in Undergraduate Medical Students in Central India – The Students’ Perspective.**

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**Abstract**

**Introduction:** Smartphones have become our personal digital assistant for people in all ages of life, for multitasking. They have given easy access to information and helps improve knowledge. They can also be used to access books and click pictures of slides or specimens which the students can revise. Students can also watch videos of procedures of examination of different systems, instantly Google for drugs, diseases and information they need. Students can also get access to social networking sites which are nowadays used for studying. This study was undertaken to find out the usage of smartphones by undergraduate medical students in Central India.

**Methods:** A random sampling cross sectional study among 200 undergraduate medical students of 10 medical colleges in Central India was conducted, using a validated questionnaire. The results were analyzed using SPSS version 20.

**Results:** All 200 participants owned smartphones. About 31% of the responders checked their smartphones at an interval of 1 hr and 55% kept their smartphones on silent mode during a lecture. 12% used their smartphones during lectures only when asked by the teacher. 99% of

responders used their smartphones before sleeping. Major barriers for uses of smartphones were battery life, cost, loss of data. Smartphones were mostly used for social networking followed by general use, followed by educational use. The responders were aware of hazards of smartphone usage, which are loss of concentration, eye strain and sleep disturbance. 68% of the students felt that Smartphone had an effect on their academic performance, of which 52% people had noticed a good change. Students thought that smartphones are useful to understand the topic better through videos and also to remain updated for a particular topic. Medical quizzes could also be attempted on their smartphones. Common medical apps used by students on their smartphones are Medscape, Dr Najeeb, lecturio, medical dictionary, YouTube and applications for anatomy like atlas, 3D anatomy.

**Conclusion:** Appropriate use of a Smartphone is beneficial for educational purposes in undergraduate medical students.

**Keywords:** Smartphones, undergraduate, medical students.

## Introduction

Smart phones nowadays have become a very important tool in daily life which helps in multitasking and therefore also called as personal digital assistants for all age groups. They are mini computers providing functions like email, calendar, address book, phone book, banking, paying bills, ordering products, GPS, etc.<sup>[1,2,3]</sup>

These devices also help students to get access to any book while travelling and also use as a dictionary. The camera can be used to click pictures of slides or specimens which the students could revise. They can watch videos of procedures of examinations of different systems and also Google instantly for drugs, diseases and any information they need.<sup>[4]</sup> Students also get access to social networking sites which are nowadays used for studying.

Mobiles are now used for online survey, questionnaire submissions and for video calling, which help a person in remote places to help someone in need. Phones are nowadays used to take lecture notes and also can be used for their timer function when checking a patient's pulse and respiratory rate. The lectures nowadays use power point presentation which can be emailed to students for quick review.<sup>[3,4]</sup>

Every invention has its pros and cons. Mobile phones have been known to be addictive, therefore hampering learning process and concentration. Unhealthy lifestyle, distress, loneliness and social violation leading to depression is also associated with internet usage and often defined as dependence syndrome by WHO.<sup>[5,6,7]</sup>

Microwave radiation from phones may induce or promote cancer, sleep deprivation, as mostly phones emit blue light which stimulates the brain, memory related problems, headaches and straining of eyes.<sup>[6,8]</sup> Accessories of mobile phone like earphones, bluetooth, etc are known to cause ear infections and hearing loss. Change in permeability of

blood brain barrier, electroencephalographic activity, blood pressure and withdrawal symptom have also been observed.<sup>[6,7]</sup>

## Material and Methods

**Study design:** A cross sectional study based on questionnaire.

**Study setting:** Medical colleges in Central India

**Study population:** First, second, third and final year MBBS students

**Study period:** 2 months.

**Sample size:** 200 students, 50 each from first, second, third and final MBBS selected by simple random sampling technique.

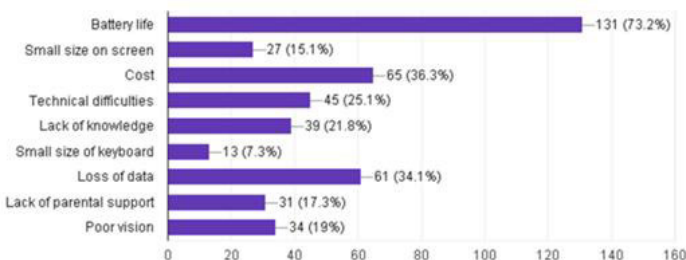
The study was conducted across 10 medical colleges in Central India using a validated questionnaire. The students' identity was not revealed in any way. Consent from students participating in study was taken. The principal investigator distributed questionnaire, took consent of the participants, clarified doubts regarding the questionnaire and then collected it. The study also made a google form based questionnaire which was used by participants on their smartphones. Results were analyzed using SPSS version 20.

## Results

The study was conducted in 10 colleges of Central India. The study received input from 200 undergraduate students at four levels of which 37% was by second MBBS students, 35% was by first MBBS students, 18% was by 3rd MBBS students and 10% was by final year students. 57% of responding population were female. Age distribution of the responders was from 18 to 24 years with most contributors being of age 20 years. Majority of the responders (164) had single smartphone 33 of the rest had two phones. 64% of responder had kept their smartphones in the pocket followed by back (32%) and

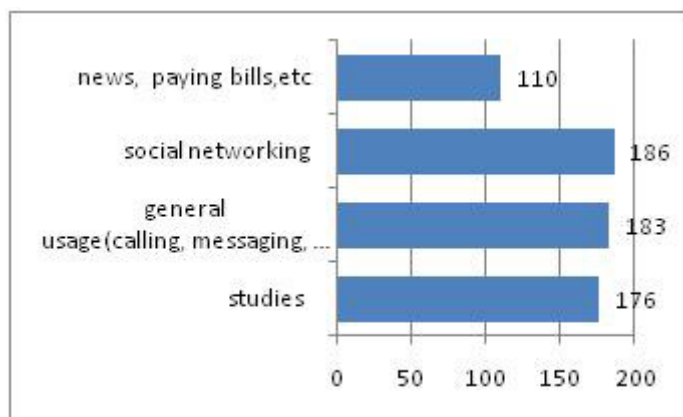
pouch (4%). Majority of the population have been using the smartphones for 4 years. About 32% checked their smartphones after every one hour while 5.5% checked whenever required. When asked about barriers of usage of smartphones most reported was battery life(73%) followed by cost 36% and loss of data (34%)(Graph 1).

**Graph1 : Bar graph showing barriers in usage of smart phones**



Smartphone was mostly used for social networking (186) followed by general used for calling messaging etc (183) and then studies (176)(Graph 2).

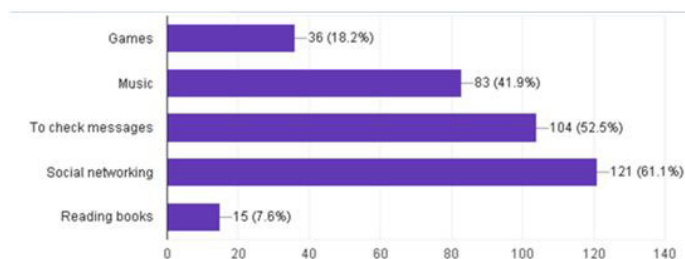
**Graph 2 : Bar graph showing purpose of use of smart phones**



68% reported that smartphone affected the academic performance of which 52% reported a good change. About 55% kept their phone on silent mode during the lecture and 40% kept on vibration mode. 12% only use their smartphone when asked by the teacher. Maximum people made and received approximately 5 phone calls daily. Maximum people received approximately 10

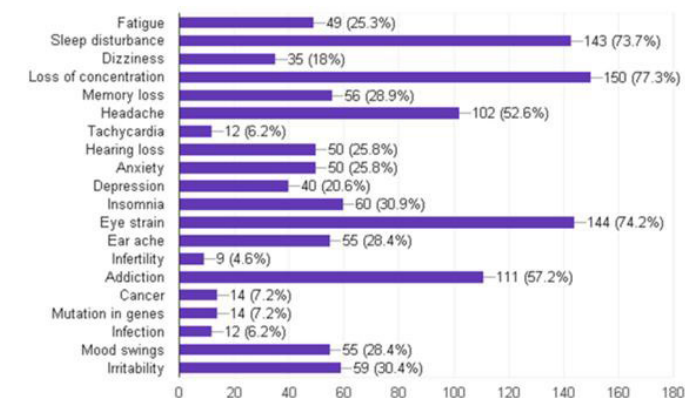
messages daily. Majority of the responders received approximately 5 emails daily. 98% of the responders use their smartphones before sleeping, mostly for social networking (61%) which was followed by messaging (52%) and listening to music (42%)(Graph3).

**Graph 3 : Bar graph showing the purpose for which smart phone is used before sleeping**



57% responders placed their smartphones on their beds during sleeping. Most of the responders never use their smart phones while driving whereas 34% used only if it was urgent and 3% used it every time it rung. Maximum responders used their right ear to attend calls. About 45% of the responders spend Rs100 to less than Rs 300 which was followed by spending Rs300 to Rs 500(31%), about 8% spent more than 500 rupees per month. When the respondents were asked about the hazards of uses of smartphones most reported was loss of concentration 77% which was followed by eye strain 74% and sleep disturbances (Graph 4).

**Graph 4 : Bar graph showing their awareness of various hazards of smartphones use**



## Discussion

200 Medical students from 10 different medical colleges (all 4 professional levels) in Central India volunteered as responders for the study. Nowadays almost every individual has a smartphone. The usage starts about after the end of class ten, junior college or at the start of their medical career.<sup>[5,7]</sup> At times people carry more than one smartphone; mostly two which increases the exposure to phone radiation. This was found in studies from Malaysia and Jodhpur, India.<sup>[5,7]</sup>

Smart phones are mostly carried in the pocket thus they are easily accessible whenever required.<sup>[5]</sup> Some people have a habit of frequently checking their smartphones for missed calls or messages. They are mostly bored or anxious or depressed so they check their smartphone to have small conversation with people. This may also indicate addiction to smart phone. There is also a positive side to this, as the smart phone is used as a stress coping tool. They could ask advice about their problem or express their feeling better which may be difficult for few people in a face-to-face conversation. This was mentioned in a study from Japan.<sup>[4]</sup> Smartphones can also be used to contact family and friends during emergency.

On being inquired about the barriers of smartphone usage, battery life was the prevalent concern reported, followed by cost, loss of data, technical difficulties and lack of knowledge. Cost increases with the level of sophistication of smartphone. Technical difficulties and lack of knowledge to use a device was mentioned by student, in institutes where smart phone based learning is encouraged, mentioned in a study from Africa.<sup>[2]</sup>

In our study, smartphones were mostly used for social networking followed by general use (for calling and messaging) studies, paying bills, reading news, etc. These findings were similar to other Indian and Pakistani

studies.<sup>[1,7,10,12]</sup> Students spending more time on social networking sites tend to have a negative impact on the academic performance.<sup>[1,11]</sup> These days social networking sites have many groups or pages created by teachers which can be helpful in increasing the students' knowledge in a fun way. This would happen only if the smart phone is used in a proper and smart way. One of the studies also showed that smart phone dependence leads to a more comprehensive health care guide to follow a healthy lifestyle.<sup>[5]</sup>

Majority of the responders found a change in the academic performance of which 52% said it was a good change and 48% said it was a bad change. A few students also reported that there was no change in the academic performance after usage of smartphone. Similar results were obtained by Ghosh A.<sup>[1]</sup>

Good change may be due to the following saying "Study while studying and play while playing". This means while studying it would be better to cut off your contact from all the unnecessary notification which may urge you to access the phone constantly and take small adequate breaks to refresh your mind.

Bad change may be due to spending a lot of time on smart phone using social networking sites, playing games, watching movies etc. These things are addictive and students do not realise the amount of time they have misused.

Most responders made and received 5 calls per day and few were more than or equal to 20.<sup>[5]</sup> Mostly, the responders received and sent maximum 10 messages and the number was even less with emails amounting to 5. Number of calls, messages, email sent and time spent also determines time devoted to academics. Calling, messaging, emailing if used for sharing information related to medicine will help improve the academic

performance<sup>[2]</sup> Increasing use of smart phones among students lead to psychological dependence. They are also prone to develop nomophobia ( irritational fear of being without your smart phone or being unable to use your smart phone for some reason such as running out of battery ), phantom ring (the perception that's one's phone is vibrating or ringing when it is not) and habit of checking the pocket for smart phones . Long term usage may lead to certain personality changes this was brought into light by Singh B.<sup>[7]</sup>

About 98% responders used the smart phone before sleeping mostly for social networking followed by messaging, music, games and reading as seen in other studies.<sup>[1]</sup> Late night exposure to the blue light emitted by the phones' screen affects the melatonin (a photo pigment present in retina )which is responsible to maintain the circadian rhythm. Few studies have also shown melatonin based photo reception modulates sleep, mood and learning. This delays the onset of sleep therefore affecting the concentration and energy level, thus reducing the efficiency of students.<sup>[15]</sup> Maximum of the responders sleep with their smart phones in bed. This may be because they use it as their alarm or can't sleep without them because of addiction.<sup>[1,7,11]</sup>

Majority of responders did not use the smart phone while driving ,as they knew that it may lead to accidents.<sup>[5,7]</sup> It has been found that the risk of accident was same even when phone was on loudspeaker ,implying that conversation causes distraction as suggested by Vadlamani S.<sup>[6]</sup> Most of the responders used right ear to answer their calls. Similar results were found by Kumar L.<sup>[5]</sup>

The responders were well aware of the hazards of smart phone which include loss of concentration, eye strain, sleep disturbance, addiction, headache and many

others.<sup>[5,6,7]</sup> The hazards cannot be completely avoided but frequency and intensity can be reduced by decreasing the use of smartphone, like keeping it at a distance during sleep, proper and smart use, switching off when not in use, using loudspeaker mode and landline phone .<sup>[5]</sup> Most commonly used accessory was earphones followed by headphone, bluetooth speaker, power bank, aux cable, USB, OTG, smart watch and air pods.

Mostly the students use smart phones for better understanding of the subject. Smartphones can also be used to improve patient care, learning, communicating with team members about patient related and patient non related matters. A few drawbacks like encouraging superficial learning, at time compromising the security of patient information<sup>[9]</sup> and increased reliance on devices was stressed by Ibrahim NA<sup>[2]</sup>

The responders were also asked to give an opinion about how smart phones can be used for self learning and how teachers can help. The student responded that they could use a dictionary, download lectures, attend video conference lecture, use medical apps, take notes, solve online quizzes, read PDF books, take pictures and download PPT. They can even contact their teachers for quick and proper guidance. Messaging apps could be used for discussing group study topics. Common medical apps used by students are Medscape, Dr Najeeb , lecturio , medical dictionary ,YouTube and applications for anatomy like atlas,3D anatomy.

Smartphones can become a useful tool in survey and research. It only requires the investigator to forward the link and thus reach a large number of people. This helps in recording a large number of responses.

The students found it interesting and easy to absorb when a video was shown for the topic and regular updates about any new discovery of change, the lecture PPT could be

sent by the teacher, lecture end quizzes after class for a real time assessment could be done. Group discussion, well labeled diagrams and quick review notes could be shared by the teacher via a smart phone.

### Conclusion

Smart phones have become an important part in most peoples lives, including the medical students. It has both advantages and disadvantages. The advantages, if used appropriately, would help the medical students in their education in a large way. Eventhough students are aware of the disadvantages and harmful effects of the device, they need to exercise a lot of self-control to minimise their effects. Making our medical students aware of many useful application of smart phones through awareness programs will definitely help them in their education.

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