

# **AWARENESS ABOUT mHEALTH AMONG MEDICAL STUDENTS – A CROSS SECTIONAL STUDY IN A MEDICAL COLLEGE IN MAHARASHTRA**

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## **Abstract**

### **Background**

The widespread use of medical software applications and internet for browsing health related topics have become a novel way to improve health and health care delivery system. Especially, in these days when covid 19 pandemic have struck the world so badly that people have less access to hospitals for their routine medical care, mHealth have shortened the distance between a patient and doctor. Advancements in mobile technologies and better reach of mobile networks have accelerated the usage of mobile apps and other electronic devices for planning ,programming and executing various health care services round the globe. Even in India during the covid pandemic, use of mobile apps like Arogya Setu have made a great impact in planning and provision of health care. This study aims at assessment of awareness on mHealth among undergraduate medical students in a tertiary centre at Maharashtra, India.

### **Methodology**

A cross sectional study was conducted among undergraduate medical students of Government

Medical College, Aurangabad, Maharashtra. A pretested semi structured questionnaire was used to collect data from the medical students. About 400 students studying in first year and second year were included in the study. An informed consent was attached along with the questionnaire. Collected data was entered in MS Excel and analyzed using SPSS 26 trial version. Quantitative data was expressed in terms of mean and standard deviation, categorical data was expressed as frequencies and percentages. Chi-square test was used to check the association between the parameters. Data was represented in tabular and graphical form.

### **Result**

Among the 379 participants, 226 (59.63%) were males and 153 (40.36 %) were females. 55.4% belonged to age group above 20 years, 85.22% were Hindus. 82.32% belonged to Class I socioeconomic class according to modified B G Prasad's classification. Among the respondents, 47.75% only had adequate knowledge, 54.8% had appropriate attitude and 64.3% followed appropriate practice regarding mHealth.

About 70% thought that usage of health related apps is not a wastage of time. 87.07% browse internet for health related queries and 76.78% of them spend only less than 30 minutes for that. 67.8% do not prefer to recommend health related apps to their colleagues. About 57% are expecting more health related apps in future, after solving the glitches in the currently available ones. Among the respondents, 95 (55.8%) of those belonging to age group less than 20 years have adequate knowledge regarding m-health, while only 40.6% of those belonging to age group more than 20 years had adequate knowledge in this regard ( $p$  value = 0.0015). Males had more knowledge about mHealth than females ( $p=0.0015$ ). 102 respondents belonging to 1<sup>st</sup> year MBBS (54.5%) had adequate knowledge as compared to 79 belonging to 2<sup>nd</sup> year MBBS (41.4%) ( $p=0.004$ ).

Males had a better attitude regarding mHealth than females ( $p=0.016$ ). Also, respondents aged less than 20 years had better appropriate practice of mHealth than others ( $p<0.00$ ).

### **Conclusion**

In this study, it has been found that more awareness must be created among health care professionals regarding use of mHealth in healthcare delivery. Majority of the respondents agreed upon the utility of health related apps in easy access to national guidelines and lab reference, faster medical score and dose calculations and for acquiring knowledge, developing skills and for evidence based practice. Hence in this context, developing an e-platform for the same can save time, money and manpower to a great extent.

Therefore, focus must be on creating apps which are user friendly and which provides maximum data in short span of time. Periodic quality checks on apps must be given to ensure accurate content delivery.

### **Keywords**

awareness, application, Technology, mHealth, medical student.

### **Introduction**

Internet has bridged the gap between knowledge source and beneficiaries. About 40 to 54 percent

of patients in developed countries have online access to medical information which in effect helps them in planning treatment line .<sup>(1)</sup> Developing countries are yet to reach such higher percentage of availability of online access to medical knowledge and services. The potential of telemedicine and computing for health care in India has been well documented. However, the acceptance of these techniques is not uniform across the country.<sup>(2)</sup> In remote areas of the country, where there is insufficient manpower and health care facilities are not that easily accessible necessity of data transmission and communication with the health care provider is of utmost importance .Also in case of elderly population where they could not visit a health care facility due to disabilities and being a dependent population, access to health care online is of great importance.<sup>(3)</sup> Especially in the era of pandemic, when even the entire global health care system had fully concentrated onto pandemic care and sidelined the routine non-covid patient care only in providing emergency medical care, online health care ,to a great extend is a blessing.

Nowadays, as a part of alleviating the challenges brought about by the above said lacunae, different services and technologies have been developed in short span of time. This also includes utilization of mobile health technology, which is more accepted nowadays due to its easy access, small volume and familiarity among public.<sup>(4)</sup> There are various mobile tools for health care providers and hospitals that can be used in different scenario such as evaluating disease signs and symptoms, educating people, and to assess the treatment progress.<sup>(5)</sup>

mHealth had been defined by Global Observatory for eHealth (GOe) as medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices. mHealth involves the use and capitalization on a mobile phone's core utility of voice and short messaging service (SMS) as well as more complex functionalities and applications including general packet radio service (GPRS), third and fourth generation mobile telecommunications (3G and 4G systems), global positioning system (GPS), and Bluetooth technology. <sup>(6)</sup> The mobile health technology is capable of playing significant role in supporting health care through presenting facilities for rapid and timely access of specialist staff to patients' profiles and decrease paper files in this way.<sup>(7)</sup>

The key areas in which early and rapid gains can be achieved via mHealth are: (a) maternal and child health (b) routine immunization, (c) integrated management of childhood illness, (d) disease surveillance and control especially for diseases of poverty such as human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS), malaria and tuberculosis (TB)- where significant disease burden is there in developing countries like India.<sup>(8)</sup> Hence further extensive studies is required in view of utilization of mHealth, not only for faster and easy access of medical knowledge , also to improve provision of health care to above said key areas.

Advancements in mobile technologies and better reach of mobile networks have accelerated the usage of mobile apps and other electronic devices for planning, programming and executing various health care services round the globe. Even in India during the covid pandemic, use of mobile apps like Arogya Setu have made a great impact in planning and provision of health care. This study aims at assessment of awareness on mHealth among undergraduate medical students in a tertiary centre at Maharashtra, India.

### **Methodology**

A cross sectional study was conducted among undergraduate medical students of Government Medical College, Aurangabad, Maharashtra. A pretested semi structured questionnaire was used to collect data from the medical students, through face to face interview method . All 400 students studying in first year and second year were included in the study, among which 379 responded. An informed consent was attached along with the questionnaire. Questionnaire contained 25 questions, single response as well as open ended, assessing knowledge attitude and practice of mHealth among medical students. A pilot study was conducted initially and the questionnaire was validated thereafter, before using for the main study. Scoring was done based on 5-point Likert scale. Average of the scores were calculated and those scoring above average were considered to have adequate knowledge, appropriate attitude and practice regarding mHealth. Data was entered in MS Excel and analyzed using SPSS trial version 26.

### **Results**

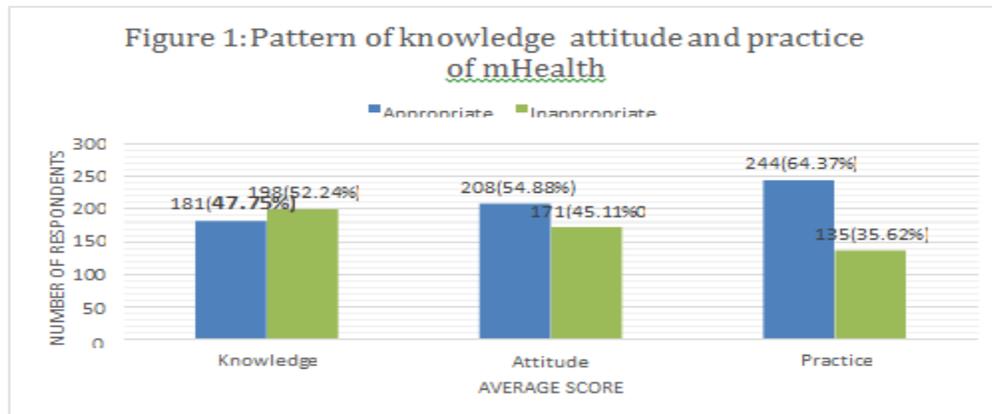
Among the 379 participants,226(59.63%) were males and 153(40.37%) were females.55.4% belonged to age group above 20 years.85.22% were Hindus,6.5% were Muslims,6.3% were Buddhists,1.3 % belonged to Jain, Christians and Sikh were least(0.26%).51.18% had less than 5 members in the family. Majority (76.25%) had family income less than 1 lakh per month. Regarding socioeconomic class (according to Modified B G Prasad scale),82.32% belonged to Class I, least being 2.63 % in Class IV.

Year of study(MBBS) of respondents were almost equally distributed,49.34% in first year and 50.65% belonging to second year.286 (75.46%) respondents knew the WHO definition of mHealth.64.11% of the respondents had installed health related applications in their mobile. Majority prefer unpaid health apps and only 5.8% used paid health related apps in their mobile.

87.07 % browse internet for health related queries and 76.78% of them spend only less than 30 minutes for that.48.28% of the respondents who use mobile apps, use them once a day and rest of them use less frequently.52.5% of mobile app users use multiple apps ,while Arogya Setu was found to be the most used app (39.06% ).

On assessing the knowledge regarding health related apps, it was found that 85.48 % failed to recognize the right purpose of Arogya Setu app even though it is the most used app among the respondents. Also 62.53% were unaware about ‘Mahakavach’ -an app developed by govt of Maharashtra, related to covid 19. Only 53.56% of the respondents knew National Institute of Nutrition to be the developer of Nutrifly India Now app.

About 70% thought that usage of health related apps isnot a wastage of time, whereas 24.2% considered it to be a wastage of time and 5.8% were still unsure about the same. Majority disagreed to the statement that reliable information can be obtained from health related apps, compared to print media. When majority opined that books hold the first place in medical knowledge than apps,49.8% were unsure whether paid apps holds an upper hand than free health



related apps .Regarding dependability over health related apps for patient care and improvement of clinical skill ,more than 40% of the respondents were unsure. Majority agreed to the fact that internet browsing provides faster access to national guidelines and lab reference, faster medical score and dose calculations and accepted health related apps to be easy access for acquiring knowledge, developing skills and for evidence based practice. About 57% are expecting more health related apps in future, after solving the glitches in the currently available ones.

97.36% of the respondents spend less than 2 hours browsing internet for health related topics.48.28% used health related mobile apps daily, among which 52.50 % used more than one health related mobile apps. Even then 67.8% do not prefer to recommend health related apps to their colleagues. Among the recommended apps, Arogya Setu is the most recommended app, followed by 1mg and Healthifyme.

Among the respondents, 95 (55.8%) of those belonging to age group less than 20 years have adequate knowledge regarding mHealth, while only 40.6% of those belonging to age group more than 20 years had adequate knowledge in this regard and the relation was found to be statistically significant( $p$  value= 0.0015)(Table 1).Males had more knowledge than females in case of mHealth and it was found to be statistically significant( $p$ = 0.0015).Socioeconomic class doesn't have much role in determining knowledge,still respondents belonging to Class I , II socioeconomic class according to modified B G Prasad scale had more knowledge than those of lower class. 102 respondents belonging to 1<sup>st</sup> year MBBS(54.5%) had adequate knowledge as compared to 79 belonging to 2<sup>nd</sup> year MBBS(41.4%) and the relation was found to be statistically significant( $p$ =0.004).

Males had a better attitude regarding mHealth than females( $p$ = 0.016)(Table 2).Also, respondents aged less than 20 years had better appropriate practice of mHealth than others and the finding is statistically significant( $p$ <0.00)Whereas, respondents belonging to second year MBBS was found to have better practice regarding those in first year( $p$ =0.04)(Table 3).

| <b>Table 1: Determinants affecting sociodemographic factors and knowledge regarding mHealth</b> |                      |                       |                         |          |                 |
|---|----------------------|-----------------------|-------------------------|----------|-----------------|
|   |                      | Adequate Knowledge(n) | Inadequate knowledge(n) | $\chi^2$ | P value         |
| Age   | <20 years            | 95                    | 75                      | 8.7      | <b>0.0015</b>   |
|   | $\geq$ 20 years      | 85                    | 124                     |          |                 |
| Gender  | Male                 | 122                   | 104                     | 8.69     | <b>0.0015</b>   |
|   | Female               | 59                    | 94                      |          |                 |
| Socioeconomic class according to BG Prasad scale  | Class I              | 99                    | 92                      | 1.285*   | 0.1289          |
|   | Class II             | 63                    | 90                      |          |                 |
|   | Class III            | 15                    | 10                      |          |                 |
|   | Class IV             | 5                     | 5                       |          |                 |
|   | Class V              | 0                     | 0                       |          |                 |
| Year of Study   | 1 <sup>st</sup> Year | 102                   | 85                      | 6.817    | <b>0.004514</b> |
|   | 2 <sup>nd</sup> Year | 79                    | 113                     |          |                 |

\*For calculating Chi Square, Class I and II had been grouped together and Class III and above had been taken as second group.

| <b>Table 2: Determinants affecting sociodemographic factors and attitude regarding mHealth</b> |                      |                      |                        |          |              |
|--|----------------------|----------------------|------------------------|----------|--------------|
|  |                      | Appropriate attitude | Inappropriate attitude | $\chi^2$ | P value      |
| Age  | <20 years            | 67                   | 103                    | 0.3895   | 0.2663       |
|  | $\geq$ 20 years      | 89                   | 120                    |          |              |
| Gender   | Male                 | 103                  | 123                    | 4.504    | <b>0.016</b> |
|  | Female               | 53                   | 100                    |          |              |
| Socioeconomic class according to BG Prasad scale   | Class I              | 155                  | 36                     | 1.745*   | 0.09         |
|  | Class II             | 123                  | 30                     |          |              |
|  | Class III            | 18                   | 7                      |          |              |
|  | Class IV             | 7                    | 3                      |          |              |
|  | Class V              | 0                    | 0                      |          |              |
| Year of Study  | 1 <sup>st</sup> Year | 148                  | 39                     | 0.6034   | 0.218        |
|  | 2 <sup>nd</sup> Year | 158                  | 34                     |          |              |

\*For calculating Chi Square, Class I and II had been grouped together and Class III and above had been taken as second group

| <b>Table 3: Determinants affecting sociodemographic factors and practice regarding mHealth</b> |                      |                      |                        |          |             |
|--|----------------------|----------------------|------------------------|----------|-------------|
|  |                      | Appropriate practice | Inappropriate practice | $\chi^2$ | P value     |
| Age  | <20 years            | 111                  | 59                     | 31.39    | <0.0000001  |
|  | ≥20 years            | 76                   | 133                    |          |             |
| Gender   | Male                 | 146                  | 80                     | 0.012    | 0.45        |
|  | Female               | 98                   | 55                     |          |             |
| Socioeconomic class according to BG Prasad scale   | Class I              | 162                  | 108                    | 0.3721*  | 0.27        |
|  | Class II             | 56                   | 18                     |          |             |
|  | Class III            | 14                   | 8                      |          |             |
|  | Class IV             | 10                   | 3                      |          |             |
|  | Class V              | 0                    | 0                      |          |             |
| Year of Study  | 1 <sup>st</sup> Year | 122                  | 65                     | 2.997    | <b>0.04</b> |
|  | 2 <sup>nd</sup> Year | 141                  | 51                     |          |             |

\*For calculating Chi Square, Class I and II had been grouped together and Class III and above had been taken as second group

## Discussion

In this technology driven world, it is a great call to utilize the same to the fullest for easing the delivery of medical knowledge online, especially in this time of pandemic. Being a time-saver and easy access to medical knowledge, utilization of mHealth must be encouraged for ensuring provision of better health care to public. This study aims at finding the knowledge, attitude and practice regarding mHealth among medical undergraduates in a medical college.

The findings of the study indicate an inadequate awareness, but appropriate attitude and practice regarding mHealth among medical students who are already practicing mHealth. David A. Hanauer concluded that texting by mobile phone for controlling blood sugar is highly proper for Tele-education.<sup>(9)</sup> According to Anna M. Lindquist et al, pocket computer is an easy device for physicians and students studying in the medical field, and gives rapid access to medical information which in turn improves health care.<sup>(10)</sup> Unfortunately, according to the present study, students are not properly utilizing it, probably due to lack of knowledge.

In the present study, males were found to have more knowledge regarding mHealth than females. This statistically significant finding is consistent with the result in a study conducted in Ghana.<sup>(11)</sup>

The Electronic Medical Information Exchange (known as eMix) is an example of a cloud-based information system. It allows health care providers and patients to access medical reports from anywhere in a secure distribution system. Also 2net Platform developed by Qualcomm Life, US transfers, stores, and helps convert and display interoperable electronic medical device data in a cloud based system. A similar system used in India is the Health Management Information System (HMIS) a digital initiative under National Health Mission. The information available on this portal is derived data from data uploaded by the States/ UTs. HMIS data specifically

designed to support planning, management, and decision making based on grading of facilities, various indicators at Block, District at State as well as National Level, which is being used in the centre where the current study had been conducted. <sup>(12)</sup>

Applications such as the iWander app for Android devices are being used in US for patients suffering from Alzheimer's disease or dementia. Through GPS function of smart phones it tracks patient locations. If the individual travels away from their home or other known locations, it triggers a signal to the person's family or caretaker to check on their status. <sup>(13)</sup> Whereas in the current study, it was found that majority were unsure about the fact that mHealth improves health care delivery and improvement of clinical skills.

Regarding browsing internet for health related topics, a study of the site : [www.TuDiabetes.org](http://www.TuDiabetes.org) had around 500 patients of US report their experience with hypoglycemic events, age, gender, use of insulin pumps, and health issues. It was like an open forum, where viewer can see what all were the problems faced by those patients and what remedial measures were suggested by others. <sup>(14)</sup> In the present study, about 70% had an opinion that browsing internet for health related topics is not a waste of time, still 97% of them spend only less than 2 hours in browsing internet for the same. Hence ,it would be advisable if the concerned could develop such websites and mobile apps which could give maximum concise data in short span to the one seeking the same.

In this study, about 67% do not prefer to recommend the currently available health related apps to their colleagues and 57% expect more better apps or modification in the presently available apps in future. This in turn reflects the lacunae in reach of these apps among budding health care professionals. This is consistent with the finding in a study conducted in Bangladesh by Fatema .et.al, where it was found that sense of ownership, evidence of utility, a positive attitude to the use of mHealth, and intentions towards future use of mHealth were driving forces in the adoption of mHealth services. <sup>(15)</sup>

A project called "mPowering Frontline Health Workers" is addressing the problem of lack of awareness regarding mHealth among health care workers by using mobile devices to provide the latest medical information to frontline health care providers. It is a public private partnership by USAID, UNICEF, mHealth Alliance, Frontline Health Workers Coalition, Qualcomm, Vodafone, Intel, MDG Health Alliance, GlaxoSmithKline, and the Praekelt Foundation. <sup>(16)</sup>

In South Africa, for example, nurses and physicians use mobile devices with a library of clinical resources. They can access the latest in medical information concerning diagnosis, treatment. <sup>(17)</sup>

In the current study, majority of the respondents agreed upon the utility of health related apps in easy access to national guidelines and lab reference, faster medical score and dose calculations and for acquiring knowledge, developing skills and for evidence based practice.

## **Conclusion**

In this study, it has been found that more awareness must be created among health care professionals regarding use of mHealth in healthcare delivery. More awareness programs must be formulated to empower our frontline health care workers in view of utilization of mHealth facilities. Promotion of use of wearable gadgets among them and maintaining a cloud system by the concerned health care centre to impart health related knowledge in a supervised manner and

periodic quality check on mHealth applications can be considered in future.

Hence in this context, promotion of mHealth and developing an e-platform for health care delivery, can save time , money and manpower to a great extend.

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