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A cross-sectional study on smartphone use and mindfulness among undergraduate medical students of a medical college in Kolkata

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ABSTRACT

Background: Nowadays, increasing use of smart phone has led to smart phone addiction. Even medical students are inadvertently using these devices for non-academic purposes. Excessive smart phone use can impact mindfulness, which, in turn, can hamper patient care. **Aims and Objectives:** The objective of this study was to assess the smart phone usage and mindfulness among Undergraduate Medical Students of a Medical College, Kolkata. **Materials and Methods:** An observational study and cross-sectional in design was conducted from October 01, 2022, to December 12, 2022, among 423 undergraduate medical students of a medical college in Kolkata selected by simple random sampling technique using a pre-designed pre-tested structured questionnaire (containing mindful attention awareness scale). Besides, assessment of Digital Wellbeing and Parental Control application was done. Data were analyzed using Microsoft Office Excel 2019 and SPSSv25. Descriptive and inferential statistics were used to represent the data. **Results:** Over 80% participants were using their smart phones excessively and 52.5% students were unmindful. YouTube (26.9%) was the maximally used application. The participants spent 360 min/day on smart phone on an average. Being a male had a higher odd of excessive smart phone usage. Hostel residents were more mindful than others. Duration of smart phone use had a positive relation with mindfulness (Spearman's rho 0.108, P = 0.026). **Conclusion:** The participants spent a major portion of the day in front of smart phone screens. Smartphone use had a positive impact on mindfulness. By setting boundaries, that is, limiting daily usage in websites and apps, smart phone use can be reduced.

Key words: Smartphone; Mindfulness; Digital technology; Screen time; Undergraduate medical students

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INTRODUCTION

There is a rapid growth in technology in this 21st century which has significantly changed human behavior, that is, the introduction of smart phone, leading to revolution of information and entertainment.[1] Smart phones are Internet-enabled mobile phones having multiple lucrative functions such as watching films/videos, listening to music, accessing e-mails, and taking photographs apart from telephone calling and texting messages.[2] Over the past decade, there has been a substantial rise in the use of smart phones; and they have become an integral part of our lives. Earlier smart phones were used for socializing with family and friends but now smart phone use has become so rampant that it is turning into addiction[3]; there were 291.6 million smart phone users in India in 2017. It was

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extrapolated that the number of smart phone users will reach 490.9 million by 2022.[4] College students, nowadays, spend a major portion of their day scrolling their smart phones. Medical students have high levels of stress be due to high academic burden, long academic curriculum, frequency of examinations, and worries about their future.[5] When they face with this stress, they use smart phones as a way to relieve.[6] Studies in medical students in Jammu and Kashmir, Delhi, and Maharashtra have found a higher prevalence of smart phone addiction, ranging from 34% to 40%.[7-10] Excessive use of smart phones has resulted in an overall decrease in mood and well-being. Disastrous effects of extensive smart phone use include unmindfulness and other mental disorders.[11] To tackle the negative impact of technology on health and well-being, extensive research in this field is required. The result of one such research was the advent of "Digital Wellbeing and Parental Control" application.[12] This application helps in monitoring the duration of use of various applications on smartphone along with the number of screen unlocks.

"Mindfulness" is defined as a mental state achieved by focusing one's awareness on the present moment, while calmly acknowledging and accepting one's feelings, thoughts, and bodily sensations, used as a therapeutic technique.[13] Excessive smart phone use can impact mindfulness of medical students, which, in turn, can hamper patient care. Mindfulness therapy is a method use for treating a variety of mental disorders, including behavioral addiction like smart phone addiction.[14-18]

Very few studies have been considered for screen time and mindfulness together specially in this part of India. With this background, a study was conducted to assess the smart phone usage among Undergraduate Medical Students of a Medical College in Kolkata; to recognize the presence of mindfulness among the study population; and to appraise the relationship between smart phone usage and presence of mindfulness among them.

Aims and objectives

1. To assess the smart phone usage among Undergraduate medical students of a Medical College in Kolkata;
2. To recognize the presence of mindfulness among the study population;
3. To appraise the relationship between smart phone usage and presence of mindfulness among them.

MATERIALS AND METHODS

The Institutional Ethics Committee permission (IPGME&R/IEC/2022/517) was obtained before enrolling the subjects. Informed written consent was taken from each participant before taking data from them. Anonymity and confidentiality were maintained throughout the study.

The study was a descriptive type of observational study (Institute based), cross-sectional in design conducted from October 01 to December 31, 2022, over a period of 3 months, among undergraduate medical students of a tertiary care teaching institute in Kolkata.

Inclusion criteria

The study population included undergraduate medical students Phase I, Phase II, Phase III part 1, and Phase III part 2 of that teaching institute who were present during the period of data collection.

Exclusion criteria

Only those students who did not give informed written consent were excluded from the study.

A sample size of 384 was calculated using Cochran's formula ($Z^2p[1-p]/d^2$), at 95% CI, taking a prevalence (p) of 50% and 10% relative error (d). After adding 10% non-response, a sample size of 423 was estimated. The participants were selected using Simple Random Sampling technique.

A predesigned, pretested, and structured questionnaire which included questions about mobile phone addiction and mindful attention awareness scale (MAAS)[19] was administered to obtain data from the study participants. Besides, assessment of digital well-being and parental control application was also done. The MAAS is a 15 item scale designed to assess a core characteristics of dispositional mindfulness, namely, open or receptive awareness of and attention to what is taking place in the present. The scale shows strong psychometric properties and has been validated with college, community, and cancer patient samples. The questionnaire was pre-tested among 20 students who were not included in the final sample size, and modifications were made based on their recommendations.

Smartphone usage (assessed using digital well-being and parental control application in smartphone) and mindfulness (assessed using MAAS)[19] were taken as dependent variables, while independent variables were sociodemographic variables (age in completed years, gender, level of education, socioeconomic status as per Modified B G Prasad Scale 2022,[20] type of family, and total number of family members), addiction history, and presence of comorbidities.

Data were collected in between classes after taking permission from the faculties. After explaining the purpose of the study to the proposed participants, informed written consents were taken from them which were followed by administration of the questionnaire. The participants were

requested to deposit the questionnaires in a drop box after fill up. Digital control and parental application was assessed and data were recorded in data abstraction.

Data were tabulated in Microsoft Office Excel 2019 (Microsoft Corp, Redmond, WA, USA) and then imported to the Statistical Package for the Social Sciences (SPSS for Windows, version 25.0, SPSS Inc., Chicago, USA) for interpretation and analysis. Permissible screen time (smartphone) use per day for adults was taken as <4 h.[21,22] Total MAAS[19] score was calculated by taking the average of 15 items. A participant with a score more than or equals to the median MAAS score were categorized as "mindful," while others were categorized as "unmindful." Descriptive and inferential statistics were used to summarize the data. Univariate binary logistic regression was performed to ascertain the relationship between the dependent and the independent variables. Data were checked for normality (Kolmogrov–Smirnov and Shapiro–Wilk >0.05) before performing Binary Logistic Regression. Spearman's correlation was employed to assess the relation between smartphone usage and presence of mindfulness among the study population.

RESULTS

Final sample included 423 participants. Most of them (47.3%) belonged to the age group of 21–24 years, were male (58.4%), from nuclear families (81.8%), resided in hostel (71.9%), and belonged to Class I socioeconomic status as per modified B.G. Prasad Scale, updated January 2022 (77.1%).[20] Maximum participants were from phase 1 MBBS (28.6%). About 14.4% had any addiction; of whom tobacco (57.6%) was the most commonly used addictive substance found among 35 students followed by alcohol 19 (30.5%) (Table 1).

About 83.1% of the study participants spent their smart phone screens excessively (≥4 h). YouTube (26.9%) was the mobile application that was maximally used. Other commonly used applications were WhatsApp (21.3%) and Instagram (16.1%) (Figure 1).

Average duration of mobile phone use for the participants was 360 min/day and average number of notifications received was 207/day. The participants unlocked their smart phones 56 times/day on an average.

The median (IQR) mindfulness score was found to be 4.2 (1.9, 6.0). Figure 2 showed that 52.5% students were unmindful.

While being a male (OR-3.758, 95% CI - 2.187–6.455), not being addicted (OR-3.296, 95% CI – 1.156–9.395) had a significantly higher odds ratio of using smart phone excessively (Table 2).

Table 1: Distribution of the study population as per sociodemographic characteristics and clinical profile (n=423)

Sociodemographic characteristics and clinical profile	Number	Percentage
A. Sociodemographic variables		
Age group		
18–21	191	45.2
21–24	200	47.3
>24	32	7.6
Gender		
Male	247	58.4
Female	176	41.6
Residence		
Day scholar	119	28.1
Hostel resident	304	71.9
Occupation of mother		
Homemaker	331	78.3
Semi-professional	13	3.1
Professional	79	18.7
Occupation of father		
Unskilled, semiskilled, and skilled	44	10.4
Semi-professional	35	8.3
Professional	236	55.8
Others and business	108	25.5
Type of family		
Nuclear	346	81.8
Joint	77	18.2
Socioeconomic class		
Upper (I)	326	77.1
Upper middle (II)	48	11.3
Middle (III)	29	6.9
Lower middle (IV)	13	3.1
Lower (V)	7	1.7
Current academic profile		
Phase I	121	28.6
Phase II	105	24.8
Phase III part 1	100	23.6
Phase III part 2	97	22.9
B. Clinical profile		
Addiction to any substance		
No	362	85.6
Yes	61	14.4
Presence of comorbidities		
No	413	97.6
Yes	10	2.4

Being a hostel resident (OR-1.573, 95% CI 1.022–2.420) and studying in Phase III part 2 MBBS (OR-2.131, 95% CI 1.236–3.676) had statistically significant higher odds ratio of being mindful among the study population (Table 3).

Duration of smart phone use had a positive correlation with mindfulness (Spearman's rho: 0.108, P=0.026) (Figure 3).

DISCUSSION

In the present study, majority of the students were smart phone addicted which was higher than many previous studies in India and abroad. There was smart phone addiction by 45.15% medical students in a college of

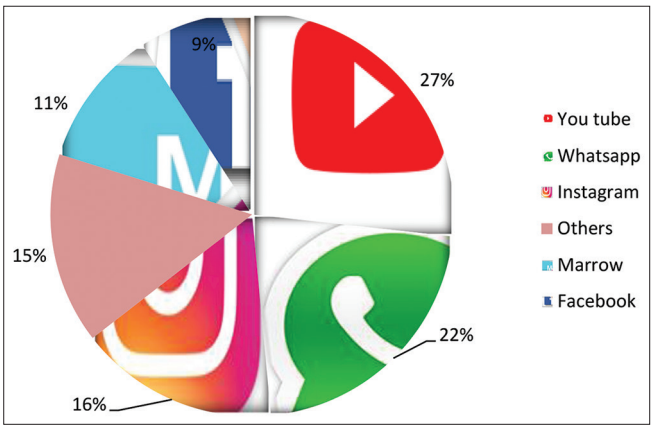

Figure 1: Pie diagram showing distribution of the study population according to the duration of use of each mobile application (n=423)

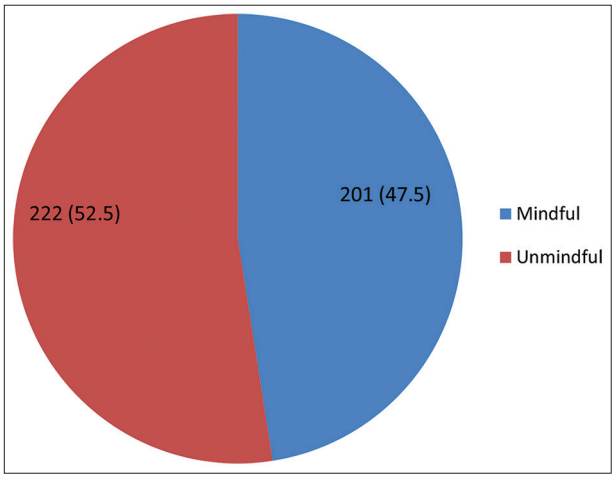

Figure 2: Pie chart showing distribution of the study population based on their mindfulness (n=423)

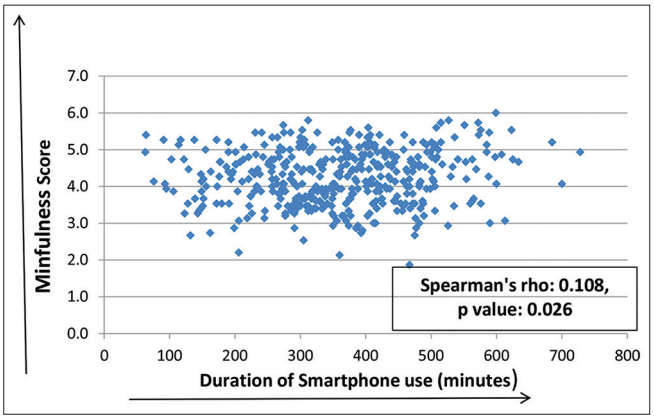

Figure 3: Scatter plot showing relationship between mindfulness and duration of smartphone use among the study population (n=423)

Western Maharashtra by Dharmadhikari et al.,[23] 40% in undergraduate medical students at New Delhi by Basu et al.,[24] and 42.6% at Kolkata Medical students by Dasgupta et al.[25] This difference may be due to heterogenecity of methodology used for assessment of mobile phone addiction.

In the present study, 83.1% of the study population spent more than 4 h on their smart phones and unlocked their smart phones at least 56 times/day on an average. This proportion was much higher compared to the previous studies.[26-28] A study conducted by Parasuraman et al.,[26] on adult residents of Malaysia revealed that 64.3% participants spent more than an hour on mobile phones and 39.6% checked their smart phones 30 times/day on an average. In Italy, Serra et al.,[27] performed a study on smart phone addiction among children and adolescents during COVID-19 pandemic which showed that 66.2% spent more than 4 h/day scrolling their smart phone screens. Another study by Chatterjee and Kar[28] among undergraduate medical students of a tertiary care teaching hospital in North India documented that 55.60% used a smartphone for 3–5 h a day. However, our finding was comparable to the survey by Rideout and Robb[29] in San Francisco where 89% of adolescents engaged in heavy smart phone use and media multitasking.

Parasuraman et al.,[26] found no significant changes on mobile phone addiction behavior between the participants having accommodation on home and hostel, while, in our study, hostel residents were more addicted.

Jenaro et al.,[30] performed a study among Spanish college students and found that female gender was associated with excessive cell-phone use. In contrast, the present study revealed that males were more smart phone addicted whereas in Delhi study[24] and North India study;[28] there was no significant difference across gender. This discrepancy in the findings might be due to contrast in the gender composition and/or might be due to more male participants in this study.

In the present study, non-addicted students were associated with more smart phone use, which might be due to the reason that they spent their times scrolling smart phone for academic purpose.

In the present study, YouTube was used maximally, but in the research by Serra et al.,[27] Instagram took the upper hand.

Few studies[31,32] carried out on mindfulness among college students were based on mindfulness exercise; but the present study used a validated scale (MAAS) for assessment of mindfulness among medical students. In the study conducted by Jin et al.,[31] Mean±SD (60.01±7.73) was used for describing mindfulness, but, in the present study, median (IQR) of 4.2 (1.9, 6.0) was used for this purpose.

In our study, mindfulness is associated with those who were from Phase III part 2 and hostel residents; probable

Table 2: Univariate binary logistic regression of excessive smartphone use by the study population on their sociodemographic characteristics and clinical profile (n=423)

Variables	Categories	Total count	Excessive smartphone use (n_2)	OR (95% confidence interval)	P-value
Age group	18–21	191	155	0.139 (0.018–1.051)	0.056
	21–24	200	165	0.152 (0.020–1.151)	0.068
	>24	32	31	1	1
Gender	Male	247	224	3.758 (2.187–6.455)	0.001
	Female	176	127	1	1
Family type	Nuclear	346	10	1.463 (0.713–3.002)	0.300
	Joint	77	67	1	1
Residence	Day scholar	119	49	0.802 (0.464–1.388)	0.430
	Hostellite	304	255	1	1
Occupation of Mother	Homemaker	331	280	1.739 (0.958–3.155)	0.069
	Semi-professional	13	11	1.174 (0.354–8.562)	0.495
	Professional	79	60	1	1
Occupation of Father	Unskilled, semiskilled and skilled	44	40	2.273 (0.729–7.083)	0.157
	Semi-professional	35	26	0.657 (0.267–1.615)	0.360
	Professional	236	197	1.148 (0.633–2.081)	0.649
	Others	108	88	1	1
Socioeconomic status	Upper (I)	326	268	1.892 (0.429–8.340)	0.400
	Upper middle (II) and Middle (III) Lower middle (IV) and lower (V)	97	83	1	1
Current Academic Qualification	Phase I	121	101	1.230 (0.615–2.462)	0.559
	Phase II	105	89	1.355 (0.652–2.815)	0.416
	Phase III part 1	100	83	1.189 (0.577–2.452)	0.639
	Phase III part 2	97	78	1	1
Addiction to any substance	No	362	294	3.296 (1.156–9.395)	0.026
	Yes	61	57	1	1
Presence of comorbidities	No	413	344	2.137 (0.539-8.467)	0.280
	Yes	10	7	1	1

reason for this association might be as they were in the final year of their curriculum, they used smart phone for academic purposes (educational video) which made them more mindful.

Our study demonstrated that duration of smart phone use had a positive correlation with mindfulness. This findings was corroborated with findings of few previous studies which also have demonstrated that long use of mobile phones have positive benefits for physical and mental wellbeing.[33-36] Study by Bae has reported that using SNS and messenger is not related to problematic smart phone use.[34] Studies by Przybylski and Weinstein;[35] Orben and Przybylski[36] showed that excess of the recommended screen time has no negative consequences or has an insignificant effect to warrant. In contrast, study by Jeong et al.,[37] showed that use of SNS, such as Facebook and Instagram, is related to depression, anxiety, negative physicality, and alcohol abuse.

Chatterjee and Kar[28] found that there is a vicious cycle of excessive smartphone use and poor mental health. Cheng et al.,[38] and Liu et al.,[39] conducted studies among Chinese college students where mindfulness and smart phone addiction had a negative relation.

Thus, there are mixed impact and blurred understanding of prolonged screen time and mindfulness in different studies and conflicting conclusions of those studies have rendered them controversial.

We may conclude that screen time and mental health have a complex association which depends on the purpose of usage (playing games, reading, and communicating) rather than a linear relationship. The previous many studies documented and confirmed an U-shaped relation between screen time and mental health,[40-42] which increased the risk of depressive symptoms in groups with high screen time but conversely had a positive effect in groups with low or moderate screen time levels. These study results suggest that uncontrolled and excessive use of digital media, rather than absolute screen time, more negatively affect the mental health.

Strengths of the present study were large sample size, assessment of digital well-being, and parental control application for analysis of smart phone use and use of a validated tool for assessment of mindfulness. This is one of the pioneer studies in India conducted to correlate smartphone addiction and mindfulness in medical students. In spite of these strengths, our study had few limitations

Table 3: Univariate binary logistic regression of mindfulness of the study participants on their sociodemographic characteristics and clinical profile (n=423)

Variables	Categories	Total	Mindfulness (n_2)	Odds ratio (95% confidence interval)	P-value
Age group	18–21	191	95	1	1
	21–24	200	112	0.778 (0.522–1.158)	0.215
	>24	32	15	1.122 (0.530–2.374)	0.174
Gender	Male	247	127	1	1
	Female	176	95	1.108 (0.752–1.633)	0.603
Family type	Nuclear	346	183	1	1
	Joint	77	39	1.094 (0.667–1.793)	0.722
Residence	Day scholar	119	72	1	1
	Hostellite	304	150	1.573 (1.022–2.420)	0.039
Occupation of mother	Professional	79	43	1	1
	Homemaker	331	173	1.091 (0.667–1.785)	1
	Semiprofessional	13	6	1.394 (0.430–4.521)	0.581
Occupation of father	Others	108	57	1	1
	Unskilled, semiskilled and skilled	44	18	1.614 (0.794–3.283)	0.729
	Semiprofessional	35	19	0.941 (0.438–2.022)	0.422
	Professional	236	128	0.943 (0.597–1.488)	0.801
Socioeconomic status	Upper Middle (II) Middle (III) Lower Middle (IV) and Lower (V)	326	181	1	1
	Upper (I)	97	41	1.110 (0.452–2.725)	0.022
Current Academic Qualification	Phase I	121	51	1	1
	Phase II	105	57	1.630 (0.962–2.761)	0.069
	Phase III part 1	100	55	1.678 (0.983–2.862)	0.058
	Phase III part 2	97	59	2.131 (1.236–3.673)	0.006
Addiction to any substance	No	362	194	1	1
	Yes	61	28	1.361 (0.790–2.346)	0.267
Presence of comorbidities	No	413	219	1	1
	Yes	10	3	2.634 (0.672–10.327)	0.165

such as shorter duration of study, involvement of students from a single medical college, and inability to differentiate between the use of smart phones for academic and non-academic purpose.

Limitations of the study

1. Shorter duration of study,
2. Involvement of students from a single medical college,
3. Inability to differentiate between the use of smart phones for academic and non-academic purpose

CONCLUSION

The students spent a major portion of the day in front of smart phone screens and YouTube was the maximally used application. Substantial number of participants were found to be unmindful. Males without addiction used smart phones excessively. Those who were hostel resident and students in Phase III part 2 were more mindful. It was found that smartphone use had a positive relation with mindfulness.

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