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Original Research Article

The impact of smart phones and mobile devices on human health and life

Sumaiya Mushroor[1], Shammin Haque[1]*, Riyadh A. Amir[2]

[1]Department of Community Medicine, Dr. Sirajul Islam Medical College and Hospital, Dhaka, Bangladesh
[2]Department of Physiology, Medical College for Women and Hospital, Dhaka, Bangladesh

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***Correspondence:**
Dr. Shammin Haque,
E-mail: shammin322@gmail.com

ABSTRACT

Background: Overuse of smart devices provides comfort and problems both physically and mentally. The aim of this study was to assess the impact of smart phone and mobile devices on human health and life.
Methods: This descriptive type of cross sectional study was conducted for three months in Dhaka city among general population aged 18 to 70 years. Four hundred and forty respondents were selected by non-probability convenient sampling technique. Data were collected by face to face interview with a semi-structured pre-tested questionnaire.
Results: Among 440 respondents majority (76.6%) were below 25 years where 72.0% were students. A large proportion (90.5%) used smart phones for communication, 53.4% used for less than 5 hours daily. Majority (65.7%) had other electronic devices, most common 197 (68.1%) were laptop users where 118 (40.8%) used for studying. More than half 322 (73.2%) used earphones, 91 (20.7%) had ear problems and 223 (50.7%) lacked concentration. Many 299 (68.0%) had good relationship with family members, 208 (47.3%) stated that increased use of mobile devices hampered family life, 88 (42.3%) thought it reduced quality family time. Majority users 253 (57.5%) experienced physical discomfort after prolonged use and 95 (37.7%) suffered from headache. Association between age of respondents and time spent on smart devices was statistically significant ($p<0.05$). There was significant ($p<0.05$) association between ear problem and ear phone usage.
Conclusions: Excessive use of smart phones should be avoided and social awareness increased through health programmes. Potential risks of cell phones and smart devices can be avoided by limiting the use.

Keywords: Cell phone, Smart phone, Smart devices

INTRODUCTION

The advent of new touch technologies and widespread use of smart phones and mobile devices have made humans embrace with technology more and extensively dependent upon them. The wireless devices like cell phones, tablet, laptops, audio players and digital cameras, are used by Wi-Fi which are connected to exchange information. Social networks allow people to interact and make new friends, but their use without any knowledge will result in harmful effects. Since these smart devices are portable, they allow continuous communication, regardless of place or situation. As these digital devices provide various convenient features, people have become reluctant in active participation such as visiting friends, buy things from stores, etc. Consequently, people will suffer from different health issues due to lack of exercise and radiations from electrical devices. Moreover, the advent of mobile technology has increased divorce rates and broken families. Smart phones and other similar devices have integrated with the most innovative

invention of modern time; the internet. It is a great tool and allows people to access information on any imaginable topic instantly. These mobile smart devices also make individuals available anywhere, anytime, which changes the way that individuals are choosing to interact within and outside the society.

In the last 20 years, worldwide mobile phone subscriptions have grown from 12.4 million to over 5.6 billion, penetrating about 70% of the global population. Its usage has also become an important public health problem as there have been reports of plenty of health hazards, both mental and physical, in people of all age groups.[1] Its user participation is increasing day by day with increase in number of social networking sites like Facebook, Twitter, MySpace etc. Since its inception by Mark Zuckerberg on February 4, 2004, Facebook has grown leaps and bound over the past decade. As of the third quarter of 2014, Facebook has 1.35 billion active monthly users with majority of its users as teenagers. With the mission "to make the world more open and connected" Facebook has become an integral part of social life of a person.[2] Mobile phones have many perceived benefits, including increased accessibility and social connection, efficiency in the workplace, convenience and improved safety. However, in recent years, there has been increasing public interest in the negative consequences of mobile phone use. Mobile phones emit radio frequency or microwave radiation. Exposure to such radiation could affect health directly. There is concern that microwaves might induce or promote cancer, and the symptoms associated with their use include sleep disturbance, memory problems, headaches, nausea, and dizziness. Changes in the permeability of the blood brain barrier, electroencephalographic activity, and blood pressure have also been reported. The use of mobile phones also results in indirect effects, such as car accidents.[3] This paper will address many threats to human health caused by smart phones and other smart mobile devices and also will try to find out some methods for raising awareness of such issues are explored.

METHODS

This descriptive type of cross sectional study was conducted from December 2018 to February 2019 among general population aged 18 to 70 years residing in some selected areas of Dhaka city such as Malibagh, Rampura, Banosree, Hatirjeel, Gulshan, Shahbagh and Dhaka University area. People who were co-operative, mentally sound, willing to participate were selected from these areas by non-probability convenient sampling technique. After introduction with the respondents, informing about the study purpose and objective, data were collected by face to face interview with the help of a pretested semi-structured questionnaire. Data were edited, coded and categorized to detect errors and maintain consistency and validity. It was then finally analysed by using MS Excel and Statistical package for social sciences (SPSS) software. For descriptive statistics, mean, median, standard deviation for numerical data and frequencies, percentage for categorical data were calculated as required. For inferential statistics Chi-square test was used. Data were presented in frequency tables and pie charts as per needed.

RESULTS

The present study showed that among 440 respondents majority 268 (60.9%) were males, most of them 337 (76.6%) belonged to age group below 25 years age. Large proportion 317 (72.0%) were students and maximum 331 (75.2%) were unmarried. It was also found that most of the respondents 375 (85.2%) were from nuclear family and among them 154 (35.0%) had monthly family income within 40000-60000 taka (Table 1).

Table 1: Socio-demographic characteristics of the respondents.

Socio-demographic characteristics	Frequency	%
Age group (years)		
<25	337	76.6
26-35	71	16.1
36-45	21	4.8
>45	11	2.5
Sex		
Male	268	60.9
Female	172	39.1
Religion		
Islam	413	94.4
Hindu	26	5.9
Occupation		
Student	317	72.0
Job holder	77	17.5
Businessman	35	8.0
Home maker	11	2.5
Type of family		
Nuclear family	375	85.2
Joint family	65	14.8
Marital status		
Married	109	24.6
Unmarried	331	75.2
Monthly family income		
<20000	75	17.0
20000-40000	113	25.7
40000-60000	154	35.0
>60000	98	22.3

The study revealed that most of the respondents 398 (90.5%) used smart phone for communication where, nearly half 235 (53.4%) used for less than 5 hours daily. It was also found that, majority 289 (65.7%) had other electronic devices, commonly were 197 (68.1%) laptop users. Many 118 (40.8%) used for studying among which majority 227 (78.5%) used for less than 5 hours daily.

Table 2: Pattern of use of smart mobile devices.

Pattern of use of mobile devices	N	%
Purpose of use of smart mobile phone		
Communication with others	398	90.5
Entertainment	64	9.5
Duration of use in 24 hours		
<5	235	53.4
5-10	162	36.8
>10	43	9.8
Use of other electronic device		
Yes	289	65.7
No	151	34.3
Type of other electronic devices used (n=289)		
Computer	77	26.6
Laptop	197	68.1
Tablet	15	5.3
Purpose of use of other electronic device (n=289)		
For study purpose	118	40.8
Communication with others	27	9.3
For work	67	23.2
Others	77	26.6
Use of earphone		
Yes	322	73.2
No	118	26.8
Place of mobile during sleep		
Bed side	262	59.5
In a distance place	178	40.5
Duration of using smart phone before sleep at night (in hours)		
<1	122	27.7
1-2	214	48.6
2-3	41	9.3
>4	23	5.2
Monthly expense for use and maintenance of smart devices		
<500 tk	139	31.6
500-1000 tk	224	50.9
1000-2000 tk	52	11.8
2000-3000 tk	17	3.9
>3000 tk	8	1.8

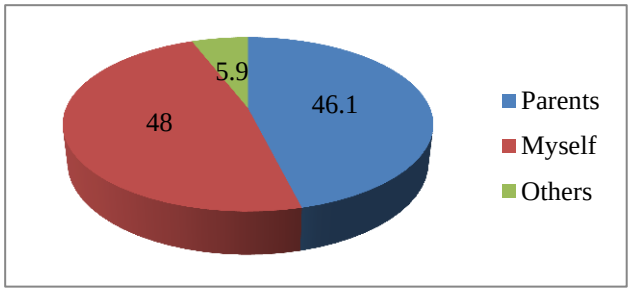

Figure 1: Distribution of respondents by source of money for monthly expenses.

Earphones were also commonly used by 322 (73.2%). More than half 262 (59.5%) of the respondents admitted that they kept their mobile sets at bedside during sleep and 214 (48.6%) used their phones for 1-2hours before sleep at night. Majority 224 (50.9%) among them spent 500-1000 taka monthly for using smart mobile devices (Table 2). Many 211 (48.0%) spent from their own income for monthly expenses (Figure 1).

Table 3: Information related to Facebook use.

Variables	Frequency	%
Facebook use		
Yes	410	93.2
No	30	6.8
Duration of Facebook usage (in hours)		
<5	333	81.2
5-10	53	12.9
>10	24	5.9
Facebook friends		
<100	28	6.8
100-500	179	43.7
500-1000	122	29.8
>1000	81	19.8
Ways of sharing feelings		
By giving like	291	71.0
By writing comments	216	52.7
By uploading photographs	192	46.8
Others	63	15.4
Purpose of Facebook use		
Social communication	383	93.4
Recreation and entertainment	27	6.6
Dislike option found in Facebook		
Yes	263	64.1
No	147	35.9

A large group of respondents 410 (93.2%) used Facebook and maximum 383 (93.4%) used it for social communication with majority 333 (81.2%) using for less than 5 hours per day. Many 179 (43.7%) Facebook users had 100-500 friends in number where mostly 291 (71.0%) shared their feelings by giving like in Facebook. Among the Facebook users, maximum 383 (93.4%) stated they used Facebook for maintaining social communication and majority 263 (64.1%) agreed to have found dislike option in Facebook (Table 3).

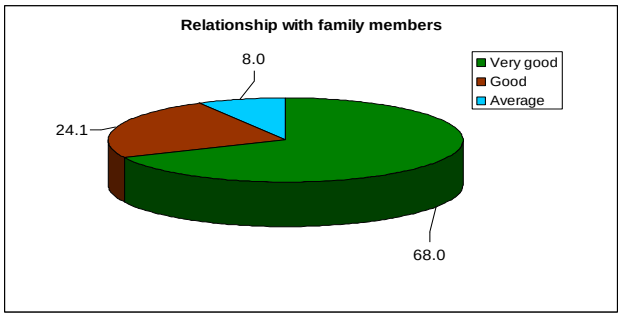

Figure 2: Distribution of respondents by relationship with family members.

Out of the total 440 respondents, majority 253 (57.5%) had physical discomfort after prolong use of mobile devices. Maximum 223 (50.7%) smart device users felt lack of concentration followed by 95 (37.7%) suffered from headache and 91 (20.7%) had ear problems (Table 4). This study also revealed that majority 299 (68.0%) had very good relationship with family members, 208 (47.3%) respondents thought that increased use of mobile device hampered family life and among them majority 88 (42.3%) stated that increased use of mobile reduced valuable quality family time (Figure 2 and Table 5).

Table 4: Information related to physical and mental hazards due to use of smart mobile devices.

Variable	Frequency (N)	%
Physical discomfort		
Yes	253	57.5
No	187	42.5
Type of physical discomfort (n=253)		
Pain in shoulder	35	13.9
Pain in hand	36	14.3
Back pain	23	9
Headache	95	37.7
Eye pain	60	25.1
Feeling of mental symptoms		
Headache	163	37
Lack of concentration	223	50.7
Anxiety	132	20.0
Emotional imbalance	72	16.4
Poor academic performance	65	14.8
Vertigo	9	2.0
Ear problem		
Yes	91	20.7
No	349	79.3

Table 5: Distribution of respondents by opinion on impact of mobile device hampering family life and time.

Distribution of respondents by opinion	Frequency (N)	%
Family life hampered		
Yes	208	47.3
No	232	52.7
Type of impact (n=208)		
Increase family demand	39	18.7
Reduce quality family time	88	42.3
Increase distance between family members	64	31
Others	11	5.1
None	6	3.0

Table 6: Association between duration of mobile phone use with age of respondents, physical and mental hazards.

Variable	N	Duration of mobile phone use/24 hours			P value
		<5 hours N (%)	5-10 hours N (%)	>10 hours N (%)	
Age group (in years)					
<25	337	161 (47.8)	139 (41.2)	37 (11.0)	
26-35	71	51 (71.8)	18 (25.4)	2 (2.8)	
36-45	21	15 (71.4)	4 (19.0)	2 (9.5)	0.001[s]
>45	11	8 (72.7)	1 (9.1)	2 (18.2)	
Total	440	235 (53.4)	162 (36.8)	43 (9.8)	
Physical discomfort					
Pain in shoulder	61	30 (49.2)	25 (41.0)	6 (9.8)	0.752[ns]
Pain in hand	63	31 (49.2)	25 (39.7)	7 (11.1)	0.763[ns]
Back pain	51	24 (47.1)	21 (41.2)	6 (11.8)	0.617[ns]

Continued.

Age group (in years)	N	Duration of mobile phone use/24 hours			P value
		<5 hours N (%)	5-10 hours N (%)	>10 hours N (%)	
Blurring of vision	70	33 (47.1)	33 (47.1)	4 (5.7)	0.109 ns
Headache	166	83 (50.0)	65 (39.2)	18 (10.8)	0.525 ns
Eye pain	127	60 (47.2)	53 (41.7)	14 (11.0)	0.256 ns
Insomnia					
Yes	138	66 (47.8)	55 (39.9)	17 (12.3)	0.222ns
No	302	169 (56.0)	107 (35.4)	26 (8.6)	
Total	440	235 (53.4)	162 (36.8)	43 (9.8)	
Mental hazards					
Dizziness	68	31 (45.6)	30 (44.1)	7 (10.3)	0.556 ns
Inattention	46	24 (52.2)	19 (41.3)	3 (6.5)	0.653 ns
Anxiety	68	32 (47.1)	29 (42.6)	7 (10.3)	0.504 ns
Tension	64	27 (42.2)	28 (43.8)	9 (14.1)	0.125 ns
Emotional imbalance	66	33 (50.0)	28 (42.4)	5 (7.6)	0.545 ns
Dizziness	68	31 (45.6)	30 (44.1)	7 (10.3)	0.556 ns

s: Significant; ns: Non-significant.

Table 7: Association between ear problem and use of ear phone or mobile phone.

Ear problem	N	Use any earphone during using mobile devices		P value
		Yes N (%)	No N (%)	
Yes	91	78 (85.7)	13 (14.3)	0.002s
No	349	244 (69.9)	105 (30.1)	
Total	440	322 (73.2)	118 (26.8)	

s: Significant.

Table 8: Association between prolong use of mobile devices with poor academic performance and impairment of family life.

Poor academic performance	N	Duration of mobile phone use/24 hours			P value
		<5 hours N (%)	5-10 hours N (%)	>10 hours N (%)	
Yes	65	27 (41.5)	30 (46.2)	8 (12.3)	
No	375	208 (55.5)	132 (35.2)	35 (9.3)	0.115ns
Total	440	235 (53.4)	162 (36.8)	43 (9.8)	
Hamper family life					
Yes	208	105 (50.5)	82 (39.4)	21 (10.1)	
No	232	130 (56.0)	80 (34.5)	22 (9.5)	0.496ns
Total	440	235 (53.4)	162 (36.8)	43 (9.8)	

ns: Non-significant.

This study assessed the association between age of respondents and time spent on smart phone and devices, which was statistically significant ($p<0.05$) and there was no significant association between total usage time of mobile devices with physical discomfort, insomnia and mental hazards ($p>0.05$) (Table 6). The association between ear problems and use of ear phones was statistically significant ($p<0.05$) (Table 7). The association between prolong use of mobile devices with poor academic performance and impact on family life was not significant ($p>0.05$) (Table 8).

DISCUSSION

This descriptive type of cross sectional study was carried out with the objective to assess the impact of smart phone and mobile devices on human health and life. Among 440 respondents majority of them 268 (60.9%) were males with mostly 337 (76.6%) below 25 years age, 317 (72.0%) were students and maximum 331 (75.2%) were unmarried.

The study revealed that, majority smart phone users 253 (57.5%) had physical discomfort after prolong use and among them some suffered from ear problems and headache, 91 (20.7%) and 163 (37%) respectively. There was a significant association between ear problem and use of ear phones, which is analogous to another study that showed association between use of mobile phones and hearing and vision complaints, where 34.59% problems were related with impaired hearing, ear ache and/or warmth on ear.[4] Other investigators found that

exposure to radio frequency radiation waves may have a negative impact on tissues that are near the handset, such as the auditory nerve. These risks include tumours, acoustic neuromas, and other potential concerns. Also that audiologic disturbances may be increased with increase in cell phone usage.[5,6] These findings were similar to the present study.

According to our work, 37.7% suffered from headache, followed by 28.9% and 42.9% from eye pain and ear pain, respectively. Almost half 223 (50.7%) suffered from experienced lack of concentration. Qasim et al found similar results that most smart phone users suffer from headaches (65.5%), eye irritation (66.7%) and ear problems (72.5%), also there was a strong relation between the time spent using smart phones and these variables.[7] Another similar study by Acharya, found that the most common symptom was headache followed by irritability and lack of concentration.[1]

We found that only 31.4% (138) suffered from sleep disturbance but majority 262 (59.5%) kept their mobile set at bedside during sleep and maximum 214 (48.6%) used smart phone for 1-2 hours before sleep at night. There was no significant association between insomnia or sleep disturbance and use of mobile phone. Some other researchers found different results compared to our work where some young peoples' sleep was disturbed when friends gave a phone call or texted messages.[8,9] A cross-sectional study on "effects of smart phones on sleep" was conducted among 236 undergraduate students of SKIMS Medical College, Srinagar, Jammu and Kashmir from October 2017 to December 2017, where 62.7% were identified as poor sleepers.[9]

A large group 398(90.5%) used smart phone for communication followed by entertainment 2.7%, study 2.5%, browsing 2.3%, business 2.7%, others 3.6% with majority 235 (53.4%) used smart phone less than 5 hours daily. It was also found that, majority of the respondents 289 (65.7%) had other electronic devices, among them majority were laptop 197 (68.1%) users. Maximum 118 (40.8%) used electronic devices for studying while majority 227 (78.5%) used for less than 5 hours daily. Nawwaz et al found that their subjects spent 137 minutes on mobile daily on average, 16% used for alarm, 15% played games, 13% played songs, 12% used camera,11% used calculator, 11% used calendar and 8% used to listen to radio.[10] These findings differed from our study. Another research found that 45% of urban population used mobile for entertainment while 65% of rural population used for entertainment.[11]

This study assessed the association between prolong use of mobile device with poor academic performance which was not statistically significant. Nawaz et al found that, time spent on mobile daily and time spent in studying were inversely related with each other which was comparable to our study.[12] They also found that on average a student's pocket money is 1179 rupees and spent 632 rupees on mobile. In our study, majority 224 (50.9%) spent 500-1000 taka for mobile phones monthly. These findings were similar to our study.

The present study revealed that duration of use of smart phone was less than 5 hours daily for majority 235 (53.4%) which was similar to a study in Switzerland where maximum used their phones for 1- 2 hours 501 (33%).[12]

There was no significant association between prolong use of mobile devices with anxiety, depression and tension, lack of concentration in our work. Youssef et al found that mobile phone use was significantly associated with vertigo, tinnitus and dizziness.[3] Pamukcu et al found that women significantly complained more often of headache, vertigo or dizziness, fatigue, forgetfulness and tension-anxiety than men.[13] These findings contradict with our study.

CONCLUSION

Use of mobile smart devices acts as a risk factor for development of various types of disease in human body and hampers our family life. Thus it is suggested that excessive use of mobile phones should be avoided and social awareness should be increased through health programmes. In this research we tried to bring attention to the potential risks that cell phones and other devices can cause to users and provide some solutions as how to mitigate side-effects of cell phones and mobile devices on the users by limiting its use.

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