Empirical Study of Knowledge, Attitude and Practice towards to Radiation Health Hazards of Cell Phone: a Case Study on Medical Science Students

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ABSTRACT

The cell phone has become an essential part of life, however, in developing countries, knowledge and awareness of users about its adverse health effects have not enough increased. This study aimed to develop a questionnaire to investigate knowledge, attitude and practice regarding health hazards of the cell phone among college students.

In this cross-sectional study, 230 graduate students of University of medical sciences located in Hamadan (western province of Iran) were participated, randomly. A developed self-administered questionnaire was completed by each participant to assess knowledge, attitude and practice regarding health hazards of the cell phone. The data was analyzed using SPSS 21.

The results showed that the content validity ratio and the content validity index of the developed questionnaire were 0.915, 0.79, respectively**.** Cronbach **(**alpha**),** as a criterion of the reliability of the developed questionnaire, was also equal to 0.85. The scores of knowledge, attitudes and practice among the students were 7.95±2.5, 74.78±8.8, and 28.91±9.0, respectively. Relative to the maximum achievable scores, the acquired scores of attitudes was more acceptable than the others. Moreover, the acquired scores of the knowledge were more than the practice.

The scientific controversy about health risks of the cell phones aggravated the public concerns about not well-known effects and consequently, it supported and motivated good attitude among student users. Moreover, it seems that the lack of proper knowledge about cell phone health hazards and protection principles can influence adequate practices. As low as reasonably achievable (ALARA) principle should be adopted for uses of the cell phone, while a major effort is done for monitoring of its new potential health impacts.

Keywords: Cell Phone, Health Hazards, Knowledge, Attitude, Practice**.**

INTRODUCTION

In recent years, the use of wireless devices has been popular [1]. Cell phones as wireless communication devices are an integral part of modern telecommunications. More than half of the world's population already owned a cell phone and its use are growing rapidly [2]. Moreover, cell phones were very popular and interesting among the young generation. Studies showed that almost 100% of 16-year-old students in 2001 owned a cell phone while less than 20% of 16 years old students in 1997 owned a cell phone. [3]. Approximately 87-90% of the population in developed countries, like the United States, are using cell phones, and a significant number of this population are pupils and students [4]. Different studies have indicated that cell phones have health risks and physiological and psychological effects in human that attributed to microwave radiation [5]. These adverse health effects on biological systems have been widely investigated in recent years [6, 7]. The effects generally are divided into two categories, including thermal (temperature-rise related effects) and non-thermal effects. Studies indicate that the eyes and testicles are tissues and organs of vulnerable to thermal effects [8].

Despite a large number of studies in this field, the potential health effect of electromagnetic fields is controversial (especially non-thermal effects) because many of these effects have not been proven. The safety standards of current exposure are mainly based on the thermal effects, which are inadequate. The non-thermal effects are several times more harmful than thermal effects. So, the possible risk of non- thermal effects is still an open question [9]. The non-thermal effects are stochastic effects and were divided into two categories: carcinogenic effects and other effects. Also, some of the studies have reported various biological self-report effects induced cell phones

including, headache, eye irritation, feeling of warm, fatigue and sometimes difficulty in concentration [9]. Many of these are related to changes in the electrical activity of the brain. Also, Various studies have been shown the most common non-specific health complaints related to electromagnetic radiation emitted by cell phones such as fatigue, headache, sleep disturbance, discomfort, dizziness, irritability, depression, concentration difficulties and memory loss [10-12].

Numbers of studies also have shown that microwave radiation emitted by cell phones can cause the subfertility, mainly on males and also lead to reduced semen parameters. [18]. Other discomforts were reported are effect on memory and learning, short-term memory loss and general malaise [8, 13]. International Agency for Research on Cancer (IARC), a part of WHO designates cell phones as "possible human carcinogen" (Class 2B) which have the potential to cause brain and auditory canal tumours, such as acoustic neuroma and glioma [14].

The increase of students trends to employing cell phones has caused that the cell phones considered to be as the main cause of addiction, in the 21st century [15] and studies showed more than 87% of students considered the cell phone as necessary personal device [16].

Based on the mentioned potential health effects related to cell phone radiation, people must be informed about the harmful effects of radiation and this is being done to protect them. According to the previous studies, most people do not have enough knowledge about cell phone radiation or, they don't exhibit appropriate performance, so that if they have. Therefore, considering that most of the health effects of cell phone radiation have not been proven, certainly, people's awareness about its adverse health effects and proper patterns of using cell phones can reduce the risk of microwave health hazards for special and public users.

A Knowledge, Attitude and Practice (KAP) survey is a practical method that provides access to quantitative and qualitative information. The KAP study can help us to determine what people know about certain things, how they feel and also how they behave? [17]. Knowledge in the community refers to understand of any given topic about health hazards of cell phone radiations. Attitude refers to their feelings towards this subject, as well as any preconceived ideas that they may have towards it. Practice refers to the ways in which they demonstrate their knowledge and attitude through their actions. Understanding the levels of Knowledge, Attitude and Practice will enable a more efficient process of awareness creation as it will allow the program to be tailored more appropriately to the needs of the community [17]. This study aimed to assess the Knowledge, Attitude and Practice regarding health hazards of cell phone, among graduate medical sciences students.

MATERIALS AND METHODS

Study population

This cross-sectional study was carried out among 230 graduate students employed in Hamadan University of medical sciences located in Hamadan (western province of Iran) from April to June 2016.

A total of 300 questionnaires were distributed among students, but only 230 questionnaires were completed. The participants were chosen by the simple random selection method and they completed the informed consent. The purpose of the study was explained to the participants, and privacy and confidentiality were also assured. The demographic data was collected using a general questionnaire. The demographic data were including age, gender, education grade, type of cell phone, duration of using, the pattern of use, the daily using time, reasons for use. In order to assess the knowledge, attitude and practice relating to health hazards of cell phone, designed self-administrated specific questionnaires were used.

Development of KAP questionnaire

The first step was to compile a list of questions that were prepared following international and national literature research and the experiences and findings of the radiation health professionals. Therefore, the questionnaire of the knowledge, attitude and practice (KAP) relating to health hazards of the cell phone was developed based on the scientific literature and the expert consultations [2, 4, 8, 18]. The KAP questionnaire included 60-item about knowledge, attitude and practice of students to health hazards of the cell phone in three indicators:

Knowledge indicator was people's knowledge about the health hazards of the cell phone. The indicator had 20 items with two possible choices (Yes or No). The "Yes" answer was given a score of 1 and "No" answer was given a score of 0. The total score ranging was from 0 to 20 that higher scores indicate greater knowledge. Finally, the knowledge was categorized: poor score (0-7), average score (7-14) and good score (14-20).

The attitude indicator was people's attitude toward the health hazards of the cell phone. The attitude indicator had 20 items, with anchors at 5= strongly agree, 4= agree, 3= neutral, 2= disagree and, 1= strongly disagree. The total score for attitude indicator varied from 20 to 100. Finally, Attitude was categorized: poor score (20-46), average score (46-66) and good score (66-100).

Practice indicator was people's practices against health hazards of cell phone and selection of cell phone.

Practice indicator also had 20 items, which should be answered, based on a Likert scale ranging from 0= never, 1= seldom, 2=usually, 3=often, and 4= always. Thus, the minimum and maximum scores for this part were 0 and 80, respectively. Finally, the attitude was categorized: poor score (0-26), average score (26-52) and good score (52-80).

Evaluation criteria

The questionnaires were developed and validated in Persian and its content validity was determined by the expert's opinion. Factor analysis and construct validity were used to assess its Content Validity Ratio (CVR) and Content Validity Index (CVI). A relatively small group of 12 expert panelists was selected to estimate CVR and CVI. A questionnaire was developed and structured to guide and allow panelists to indicate clearly their judgments on the essentiality of the different items. The participants were requested to write their opinion as Essential, Useful but not essential and Not necessary. Content validity ratio was evaluated for each question and finally, the mean score of CVR was calculated. The data was analyzed using SPSS 21. The statistical significance was set at $p< 0.05$.

RESULTS

The results showed that the content validity ratio (CVR) and the content validity index **(**CVI**)** of the developed questionnaire were 0.915, 0.79, respectively. Cronbach **(**alpha**),** as a criterion of the reliability of the developed questionnaire, was also equal to 0.85. The results also showed that 44.6% of participations were male and 55.4% were female. The age of the participants was 28.8 ± 5.51 years. Descriptive statistics of the different characteristics of the participations are shown in Table 1.

The results showed the most frequent daily use of cell phones in MSc students was less than one hour; while in PhD students was 1 to 2 hours (Table 2). 93.9% of the students used one cell phones and the other used more than one cell phones. 74% of participations had a smartphone and 26% had a basic phone. Students were had been using cell phones for an average of 8.48 years. 91% of students used cell phones for calls and text messaging. 64% of students in addition to calls and text messaging used cell phones for the social network. 42.5% for download and movies, 19% for gaming, 22.5% for e-mail, and 13.5% for learning and virtual learning.

Table 1: Descriptive statistics of the different characteristics of the studied students

Variable		Number	Percent (%)
Gender	Male	95	44.6
	Female	118	55.4
Academic degree	MSc	178	85.5
	PhD	35	16.4
Academic field	Health	123	57.7
	Nursing	45	21.1
	Medical	32	15
	Paramedical	13	6.1

Table 2: The using pattern of cell phones among the studied students

Frequency use	MSc	PhD
>1 h/day	52 (29.2%)	7 (20.0%)
1-2 h/day	44 (24.7%)	10 (28.5%)
2-3 h/day	41 (23.0%)	7 (20.0%)
3-4 h/day	16 (8.9%)	9 (25.7%)
5 h/day or more	25 (14.0%)	2 (5.7%)

The scores of KAP towards to health hazards of cell phone among participations are also shown in Table 3. The results showed the scores of knowledge, attitudes and practice were 7.95±2.5, 74.78±8.86, and 28.91±9, respectively. As shown in Table 3, relative to the maximum achievable scores, the acquired scores of attitudes were more acceptable than the others. Moreover, the acquired scores of the knowledge were more than the practice. Based on the mentioned KAP score categorization, mean scores of attitude was classified as a good category. On the other hand, Knowledge and practice were classified as an average category.

Table 3: Descriptive statistics of the acquired KAP scores among the students

Indicators	Students' scores			Questionnaire range	Relative to maximum score (%)
	Mean ± SD	Min	Max		
Knowledge	7.95±2.50	1	15	0-20	39.8
Attitude	74.78±8.86	49	96	20-100	74.8
Practice	28.91±9.00	8	61	0-80	36.1

The frequency of the students' correct answer related to Knowledge questions is shown in Table 4. The main results showed that 71.8% of students presented the correct answer about increasing distance from the cell phone can decrease the intensity of the radiation. 84.5% of students were familiar to the SAR value of their cell phone. 77.5% of students are also familiar to the SAR limit values for cell phone. 54.9% of students are also familiar to this fact that the radiation of cell phone during a conversation is more than during the call establishment. 63.8% of students were also familiar to this fact that the type of SIM card has no effect on cell phone radiation intensity.

Only 11.7% of students were also familiar with this fact that cell phone radiation can cause psychological and sleep disorders. Only 28.2% of students were also familiar to this fact that cell phone is a possible brain carcinogenic to humans.

Table 4: The frequency of the students' correct answer related to Knowledge questions

No.	Survey Question	Correct answer (%)
1	Permitted daily use of cell phones in less than half an hour per day	111 (52.1)
2	Permitted continuous time of conversation is less than 6 minutes.	72 (33.8)
3	With increasing distance from the cell phone, the intensity of the radiation will increase.	153 (71.8)
4	I know the numerical value of SAR (specific absorbed radiation) of my cell phone.	180 (84.5)
5	Excessive use of cell phones causes psychological and sleep disorders.	25 (11.7)
6	Excessive use of cell phones causes reduces in memory and concentration.	37 (17.4)
7	Excessive use of cell phones causes genetic damage and cancer.	62 (29.1)
8	I know the SAR limit recommended to select the cell phones.	165 (77.5)
9	Use of hands-free increases the intensity of cell phone radiation exposure.	69 (32.4)
10	The highest cell phone's radiation is during call establishment.	44 (20.7)
11	Radiation of cell phone during a conversation is more than during the call establishment.	117 (54.9)
12	Radiation of various cell phones is the same.	41 (19.2)
13	Cell phone radiation intensity depends on the distance from the BTS antenna.	50 (23.5)
14	Cell phone is a possible brain carcinogenic to humans.	60 (28.2)
15	The effect of the cell phone is only due to the generated heat on the surface of the ear during the call.	69 (32.4)
16	The possible effects of cell phone depending on the age of the users.	72 (33.8)
17	The intensity radiation from cell phones is more than the intensity of the antenna	53 (24.9)
18	Depending on the type of SIM card (MCI, MTN) radiation intensity is different.	136 (63.8)
19	Slow charging the battery while the conversation can indicate the intensity of produced waves.	95 (44.6)
20	Switch sides regularly while communicating on your cell phone can spread out your exposure	64 (30)

The frequency of the students' answer related to Attitude questions is shown in Table 5. The main results showed that most of the participants had a positive attitude (sum score of Strongly agree and agree) toward the various health effects of cell phone: more than 75% of students believe that the cell phone sleep disorders and fatigue, 57.7% believe that the cell phone affect brain tumours, genetic damage and cancer. Also, most participants had a good attitude toward reducing the exposure to mobile waves (11-12 questions).

The frequency of the students' answer related to Practice questions is shown in Table 6. Most participants had not researched about the severity waves of cell phone (58.2%), as well as most participants had not proper practice in reducing exposure to cell phone waves (6-10, 12, 13, 16 questions). Also, most participants never turn off their mobile phone while sleeping (53.1%) or when they do not need it (54%).

Table 5: The frequency of the students' answer related to Attitude questions

Survey Question	Responses				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
When you use a cell phone regularly, more people are suffering from sleep disorders and fatigue	3 (1.4)	17 (8)	33 (15.5)	115 (54)	45(21.1)
The daily continuous use of cell phones may be cause headache and dizziness	0	15 (7)	52 (24.4)	98 (46)	48(22.5)
Excessive use of cell phones can cause decreased concentration and memory	4 (1.9)	10 (4.7)	32 (15)	122 (57.3)	45(21.1)
Continued use of cell phones is likely to cause brain tumours, genetic damage and cancer combined	0	5 (2.3)	85 (39.9)	98 (46)	25 (11.7)
Disturbances of heart rate and blood pressure may be a complication of heavy usage of cell phones	0	5 (2.3)	115 (54)	80 (37.6)	13(6.1)
Continued use of cell phones can cause hormonal disorders, especially for women?	0	12 (5.6)	119 (55.9)	66 (31)	16(7.5)
The excessive use of cell phones in people may cause hearing impairment	3 (1.4)	13 (6.1)	42 (19.7)	118 (55.4)	37(17.4)
Mental disorders have increased in society due to the use of cell phones in recent years	0	8 (3.8)	65 (30.5)	96 (45.1)	44 (20.7)
Tinnitus occur more often in people with excessive use of cell phone.	0	11 (5.2)	80 (37.6)	95 (44.6)	27 (12.7)
To protect against cell phone waves, cell phone use should be limited.	0	0	32 (15)	120 (56.3)	61 (28.6)
The use of cell phones in places with poor signal coverage, an increase of the incoming waves	1 (0.5)	6 (2.8)	102 (47.9)	72 (33.8)	32(15)
use of hands-free or speaker can reduce the amount of incoming waves from the Mobile	9 (4.2)	23 (10.8)	68 (31.9)	88 (41.3)	25 (11.7)

If the time use of cell phones be limited, comfort in calls become more	0	31 (14.6)	63 (29.6)	93 (43.7)	26(12.2)
To maintain health, limitation in the use of cell phone is worth	0	7 (3.3)	28 (13.1)	113 (53.1)	65(30.5)
I cannot limit to use of cell phones because of the job and life pattern	21 (9.9)	79 (37.1)	34 (16)	67 (31.5)	12(5.6)
I'm worried about the risks of the use of cell phones.	0	33 (15.5)	40 (18.8)	102 (47.9)	38 (17.8)
The cell phone be considered as a new cigarette twenty-first century	0	13 (6.1)	40 (18.8)	82 (38.5)	78(36.6)
Concern about the cell phone waves is due to that waves are not visible	5 (2.3)	12 (5.6)	55 (25.8)	103 (48.4)	38(17.8)
The excessive use of cell phone can be dangerous to the health of the fetus in pregnant women	0	4 (1.9)	61 (28.6)	96 (45.1)	52(24.4)
Use of new communication software (such as WhatsApp, Telegram, etc.), duration of calls has increased.	8 (3.8)	22 (10.3)	25 (11.7)	72 (33.8)	86(40.4)

Table 6: The frequency of the students' answer related to Practice questions

Survey Question	**Responses**				
	Never	seldom	Usually	often	always
I researched about the severity of waves produced when buying a cell phone.	124 (58.2)	70 (32.9)	13 (6.1)	4 (1.9)	2 (0.9)
I use the landline phone in prolonged conversations instead of the use of cell phones.	36 (16.9)	91 (42.7)	58 (27.2)	22 (10.3)	6 (2.8)
I reduced my time in the use of cell phone calls as much as possible.	26 (12.2)	40 (18.8)	77 (36.2)	31 (14.6)	39 (18.3)
I turned off the cell phone when I do not need it.	115 (54)	57 (26.8)	30 (14.1)	4 (1.9)	7 (3.3)
I turn off the cell phone at bedtime.	113 (53.1)	61 (28.6)	14 (6.6)	7 (3.3)	18 (8.5)
I use hands free during long conversations.	114 (53.5)	69 (32.4)	18 (8.5)	8 (3.8)	4 (1.9)
I use the speakerphone to reduce the waves when talking on a cell phone.	89 (41.8)	97 (45.5)	15 (7)	7 (3.3)	55 (2.3)
I use vegetables and fruit (antioxidants) to reduce the potential impact of the waves.	53 (24.9)	66 (31)	65 (30.5)	18 (8.5)	11 (5.2)
I place the cell phone in a pocket when not use.	18 (8.5)	44 (20.7)	33 (15.5)	57 (26.8)	61 (28.6)
I'm looking at cell phone away from my ear during a call.	60 (28.2)	78 (36.6)	49 (23)	14 (6.6)	12 (5.6)
In order to use the Internet, I try to use my computer instead of a cell phone.	23 (10.8)	35 (16.4)	65 (30.5)	59 (27.7)	31 (14.6)
I will refrain from speaking on the phone in places with poor signal coverage	53 (24.9)	77 (36.2)	50 (23.5)	28 (13.1)	5 (2.3)
I have read the manual of the cell phone and I abide by the safety warnings mentioned.	81 (38)	68 (31.9)	48 (22.5)	8 (3.8)	8 (3.8)
I place the phone in the vicinity of sleep at bedtime.	32 (15)	29 (13.6)	77 (36.2)	44 (20.7)	31 (14.6)
I use on my phone Ring Back Tone.	130 (61)	46 (21.6)	27 (12.7)	6 (2.8)	4 (1.9)
I use anti-radiation cover for my cell phone.	127 (59.6)	27 (12.7)	23 (10.8)	18 (8.5)	18 (8.5)
I use the ordinary covers for my cell phone.	51 (23.9)	48 (22.5)	50 (23.5)	31 (14.6)	33 (15.5)
I try to update my information about the effects cell phone waves	61 (28.6)	88 (41.3)	41 (19.2)	12 (5.6)	11 (5.2)
Most of the time I try to use SMS to make calls and exchange information.	18 (8.5)	53 (24.9)	87 (40.8)	35 (16.4)	20 (9.4)
Most of the time I carry the cell phone in my hand.	24 (11.3)	52 (24.4)	76 (35.7)	28 (13.1)	33 (15.5)

DISCUSSION

Today, technological advances have made changes in human life. The mobile phone is one of the most important inventions that have become an integral part of people's lives, especially young people and students. The purpose of this study was to assess the knowledge, attitude and practice of medical students regarding the health risks of mobile waves.

The results showed that the KAP questionnaire developed, can identify people's knowledge about the health hazards of cell phone, in that, how they feel and also how they act. Also, the results confirmed that there is a lake of knowledge and Practice about the health hazards and safe use of cell phone among students. However, the average knowledge and performance score was low. The first step to minimize the adverse health effects of the cell phone and effective performance is Knowledge enhancement about potential hazards. Therefore, in order to improve the performance of individuals, it is necessary to increase their knowledge. Also, the participant's knowledge and preventive methods should be increased by adequate prevention program and different training methods to minimize adverse health effects relating to the use of the cell phone.

According to the type of population studied, it was expected that students have the better KAP but, the results are shown that the KAP of persons about cell phones is not enough to protect against adverse effects. The results of this study should be considered as a warning for the community. Also, it should be increased the knowledge and performance of the community about the hazards of mobile phone.

Students had a good attitude towards the health hazards of using cell phones (average score: 74.8),

which shows that most of them had appropriate evaluator responses, but their low practice score showed that their real behaviour was different. The scientific controversy about health risks of the cell phones aggravated the public concerns about not well-known effects and consequently, it supported and motivated good attitude among users.

Due to the lack of awareness about the dangers of using mobile phones, it seems that there is no proper behaviour in the proper use of this device. However, due to concerns about the health effects of electromagnetic fields (EMF), there was a stronger belief in the need for prevention and care against the waves in students.

Pendse *et al*. showed an average good score of knowledge and attitude in students about the health hazards of cellphone [19]. In another study, about students' knowledge toward physical risks of cell phone, about 73% of men and 70% of women had average knowledge [19]. Kumar *et al*. reported that among 200 participants, 124 participants were aware of the harmful effects of cell phone [20]. Another study also, the use of cell phones among medical students was high and 32% of them were aware of the protective measures against the hazards of cell phone [21]. Awareness about the risk of the cell phone is an important part of control programs [22]. So, in order to reduce the harmful effects of cell phones, the awareness and knowledge of people should have increased.

Given the fact that the cell phone is a relatively new technology and the use of this device is not long overdue for a long time, therefore, the biological effects of the use of cell phones on people have not yet been determined. In addition to mobile phones, people daily encounter a wide range of electromagnetic fields in their living environments, so it's natural that people do not have enough information on how to prevent exposure to these waves. Therefore, It should have sufficient knowledge about protective measures including using hands-free during the talking, regarding the allowable time of cell phones use, awareness about average of specific absorption rate (SAR) of cell phone, minimize the duration of using cell phones, turn off cell phone at night can reduce radiation exposure by cell phones.

The analysis of the results indicated that there is a significant relationship between education and attitude. So, the attitude of PhD students was more than MS students. Unlike the, there was not a significant relationship between education with knowledge and practice of participants. Pendse *et al.* reported a relationship between educational level and awareness about the physical and psychological effects of cell phones [19].

Given that, in recent years, cell phones have a wide variety of services other than telephoning, the use of smart cell phones had increased significantly. Thus, according to the results of the study, more than74% of subjects used a smartphone. In another study, Jamal *et al.* showed that 53.2% of students used smartphone [23] and reported that students used a cell phone for chatting, text messaging, MMS, email, Internet access, short-range wireless communication, medical applications, gaming and photography [23]. Also, In the same study, Gahlot *et al.* reported that 94% of medical students used smartphone and40% of them were using the cell phones to listen to music and surfing in the net [21]. Most use of cell phones among the student was calling and messaging (91%). Whereas Subha *et al.* showed that 51% of students use the cell phone for talking to their parents. Another study showed that students had used a cell phone for music and internet (the favourite features among medical students) (40%) camera and gaming (8%) and text messaging (9%) [21].

Considering the various features and applications of smartphones, the use of this technology is both a threat and an opportunity. The excessive use of cell phones, in addition to biological effects, can cause addiction and physical and psychological effects in humans. Overall, despite awareness about the negative effects of excessive use of mobile communications and even educational benefits cannot be ignored phones.

In this study, 27.7% of subjects had used a cell phone for less than 1 hour each day. Whereas, in the study of Jamal *et al.* showed that 54.7% of the students had used the smartphone about1-3 hours per day and 32.8% of the students also had higher use of smart cell phone (more than 3 hours per day) [23]. Also, in the study of Gahlot *et al.*, about72% of medical students used cell phone less than 2 hours per day. Dependency on the cell phone has increased in the recent century [15, 20]. Therefore, regarding health concerns of microwave radiation and also poor awareness about unwanted effects, the awareness about the negative effects of excessive use of cell phone by appropriate policies and innovation strategies is necessary. Manivannan Senthil Velmurugan suggested that choosing cell phone with low specific absorption rate(SAR), and the landline phone use instead of the cell phone can decrease the radiation dose to as low as reasonably achievable (ALARA) radiation [18].

Finally, our KAP survey can be used to identify knowledge gaps, cultural beliefs, and behavioural patterns that may identify needs, problems, and barriers to help plan and implement interventions about the usability of the cell phone. It can also help to deepen the understanding of commonly known information, attitudes, and factors that influence behaviour and generate baseline levels and measure

changes that result from interventions. It is proposed that the same new studies are designed with a wider scope and much large sample size to confirm the current findings and explore relevant features. The developed questionnaire can be used by health professionals in other societies to determine the level of awareness, attitudes, and personal behaviour about the health hazard of the cell phone.

CONCLUSION

The attitude of students about the use of the cell phone and its hazards was good but their knowledge and practice were poor. The scientific controversy about health risks of cell phones aggravated the public concerns about not well-known effects and consequently, it supported and motivated good attitude among users. Moreover, it seems that the lack of proper knowledge about cell phone health hazards and protection principles can influence adequate practices. As low as reasonably achievable (ALARA) principle should be adopted for uses of the cell phone, however, a major effort is done for monitoring of its new potential health impacts.

ETHICAL ISSUES

Ethical issues including plagiarism have been observed by the authors.

CONFLICT OF INTEREST

The authors declare that they have no competing interest.

AUTHORS' CONTRIBUTIONS

All authors participated in all stages of the study and contributed equally**.**

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