Effect of Instructional Guidelines on Students, Practices Regarding Safe Use of Cell Phone

Hanan Shehata Mohamed[1], Magda Abd El Satar[2] and Amal Talaat[3]

[1]Medical Surgical, [2]Community Health, [3] Maternity and Neonatal Nursing Departments, Faculty of Nursing, Ain Shams University
dr.hananshehata@yahoo.com, amalsharkawy8000@yahoo.com

Abstract: Cell phones are some of the most dynamic communications and seem to be mandatory devices for the modern age and life. The aim of this study was to evaluate the effect of instructional guideline on students' practices regarding safe use of cell phone. **Design**: A quasi experimental study design was utilized, using purposeful subjects of a total number of 180 first year students, **setting**: Faculty of Nursing, Ain Shams University. Two **tools** were used to collect data; first, an interviewing questionnaire which includes three parts: 1) Demographic characteristics, number of cell phones, number of (SIM) and call duration. 2) Student's level of knowledge related to this issue. 3) Practical questionnaire to assess student's level of practical measures to reduce electromagnetic waves exposure from cell phone. Second tool, is a rating scale to assess student's attitude regarding the use of cell phone. The **results** of the study revealed positive effect of instructional guidelines on improving students' level of knowledge, practices and attitude. The study **recommended** that guidelines instruction leaflets should be available for each person, using cell phone, and increasing health awareness about its probable hazards.
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1. Introduction:

Since the middle of the last century, technologies advancements in telecommunications and other industries have led to significant increase in the use of radio frequencies, as high frequency radiation penetrates the body.

Cell phones transmit and receive radio frequency (RF) signals in order to communicate. The RF signals from cell phones fall within the microwave part of the electromagnetic spectrum. This radiation is also referred to as microwave radiation or electromagnetic radiation. If the radiation is powerful enough, the tissue or skin will be heated or burned ***(American Society, 2005; Baroncelli et al., 2010; Filip& Cruz., 2012).***

Health could be negatively affected by all the radio frequencies being bandied by cell phone and cell phone towers. British Military Scientists have discovered that cell phone transmissions disrupt the brain sites for memory and learning, causing forgetfulness and sudden confusion. Other studies show that electromagnetic signals from cellular phones reduce the ability to concentrate, calculate and coordinate complicated activities ***(Thomas, 2012).***

Cell phone transmissions damage the ability of white blood cells toward off infectious diseases by disrupting the immune systems ***(Flazone, 2010)***.Many studies had measured accelerated aging, increased cell death and cancers caused by radio frequency microwaves from cell phones and their relay towers. With the brain's electro-chemical communications repeatedly zapped by lightning like cell phone pulses headaches, fatigue, lethargy, nausea, dizziness, depression, arteriosclerosis and even Alzheimer's can result from frequent or prolonged calls on cell phones.

There is also a higher incidence of cardiac problems, long duration calls increase chance to get more heart attacks and more heart disease which have now been shown in many studies ***(American Society, 2005)***.

The biophysicist from Lincoln University in Christ Church, New Zealand has also found that cell phones can murderously modify moods. In brains and bodies seriously derailed by tiny imbalances in trace minerals and hormones, depression, suicide, anger, rage and violence can result when calcium and serotonin levels are disrupted by cell phone transmissions ***(Ahlbom et al., 2009)***.

Cell phones emit low levels of radiofrequency (RF) energy, some of which are absorbed into the body. The amount of RF energy the persons absorb depends on many factors, such as how close the person hold the cell phone to the body and the strength of the signal (***Moe,2010).***

Electromagnetic radiation appears to interfere with the production of melatonin, a hormone that is normally produced in the body. Low melatonin levels have already been linked to several diseases, including cancers. Recent research indicates that serotonin production can also be effected by electromagnetic radiation frequency ***(Skelly, 2010)***.

Cell phone use is not entirely risk free; studies have shown that, using cell phones or other wireless devices can be distracting. Pearson risk of serious injury may increase if use these devices while driving, walking, cycling, or doing any other activity that requires concentration for personal safety. Cell phones may interfere with medical devices such as cardiac pacemakers, defibrillators, and hearing aids. Cell phones may also interfere with other sensitive electronic equipment, such as aircraft communication and navigation systems**, (Agarwal, 2012)**

There are 66 epidemiological studies showing that electromagnetic radiation across the spectrum increase brain tumors in human populations. Two of those studies are for particular brain tumors from cell phones ***(Moe, 2010).***

Electromagnetic waves alter electric activity of the brain and cause disturbance in sleep, causing difficulty in concentration, fatigue, and headache and increase reaction time in a time dependent manner. They increase the resting blood pressure and reduce the production of melatonin. They are also implicated in DNA strand breaks ***(American Society,2005); DeIuliis et al., 2009).***

The radiation given out by mobile phones is in the microwave range. It is very low level, but some experts believe long term exposure could be damaging. Studies looking at long term users (10 years or more) are the most likely to report an increased risk of cancers linked to mobile phones. This is because even when people are exposed to some of the strongest known carcinogens (substances that cause cancer), such as ionizing radiation or asbestos, the resulting cancers can take decades to appear. Cell- phone technology could lead to health crisis similar to those caused by asbestos and smoking ***(Lishko, 2010;Oftedal,2014).***

A study carried out on 750 people by ***Martine (2008)*** found that using a phone for 10 years or more increased the risk of acoustic neuroma, a type of benign tumor in the nerve connecting the ear to the brain. The increased risk was not found in those who had been using their phone for less than 10 years.

In a similar study, ***Hardell et al. (2007)*** reviewed 18 research papers published in peer reviewed journals and found a link between mobile phone use and brain tumors, both benign and malignant. They also found that tumors were more likely to develop on the same side of the head as normally used for talking on the phone. The risks increased significantly after 10 years of use.

In another study ***DeIuliis et al.(2009)*** found that; people who started mobile phone use before the age of 20 had more than fivefold increase in glioma (a tumour that develops from the glial cells in the brain or spine, and which accounts for over half of all primary brain tumors), compared to those who had started using them later in life.

The ***Health Canada Regulations (2011)*** remind cell phone users that they can take practical measures to reduce their RF exposure by: Limiting the length of cell phone calls especially when talking to children, keeping the mobile phone away from the body, avoiding using phone in areas of poor reception, calling when you're in an area with good reception that allows your phone to transmit with less power meaningless radiation. Getting into the habit of using fixed landline phone (but not cordless) when the person knows that call will be long and never keep a switched on phone in a breast or trouser pocket. Studies have shown that mobile phones might affect male fertility. Send a text message in place of a cell where possible so not bringing the phone close to head. Using a hand free, device for calls. Keeping phone on a desk or table a good distance away from the body and putting it on speaker phone. Turn phone off at night and stick to a conventional alarm clock for wake up call. If the person has to keep it on, place it away from bed. Choose a low radiation phone. The American Environmental Working Group (EWG) lists all phone models and their rating specific absorption rate (SAR)

WHO (2011) International Agency for Research on Cancer announced its classification of electromagnetic fields from mobile phones and other sources as possible carcinogenic to humans and advised the public to adopt safety measures to reduce exposure.

Significance of the study:

The Ministry of Communication in March, 2012, reported that, over 93.1% people carry cell phones in Egypt. Cell phones become integral part of our life and some people become addict its using the new many options such as ;Android, Tango, Twitter, Instagram, free PP, Whets App, Face Book Video, Camera, Bluetooth, checking e mail, playing games and users become a slave to the crutches of technology and because it is our health it was crucial to investigate students, practices regarding reducing risk of cell phone use to be in the safe side, avoid its negative effect and protect our health. Hence, nurses play a vital role as researchers, it was crucial to the nurses to investigate, focus more attention to this problem hoping that this effort will generate data for further studies into this topic.

Aim of the Study

This study aims to evaluate the effect of instructional guidelines on students' practices regarding safe use of cell phone through:

- Assessing students' knowledge, practices and attitude regarding safe use of cell phone.

- Developing and implementing the instructional guidelines
- Evaluating the effect of instructions of guidelines on students' knowledge, practices and attitude, regarding safe use of cell phone.

Research hypothesis:

It was hypothesized that students who will be exposed to the instructional guidelines will improve their knowledge, practices and attitude, regarding safe use of cell phones.

Research design:

A quasi-experimental study design used.

Setting:

The study was conducted in the Faculty of Nursing, Ain Shams University

Subjects:

A purposive subjects was used in this study. The total number of first year students in the academic year2013- 2014 was187.

Inclusion criteria:

Students having a cell phone and willing to participate in the study from both sexes. Choice for first year nursing students was, to be sure that they were not exposed to teaching subjects related to this issue.

Tools:

Two tools were used in this study.

First tool:

A structured questionnaire developed by the researchers depending on the review of related literature, it is composed of 3 parts:

Part 1: Is concerned with demographic characteristics of the study subjects, which include; sex, number of cell phones each student has, number of calls per day, duration of call and number of SIM.

Part II: Deals with students' level of knowledge regarding mechanism of cell phone operation, safety measures for using cell phone, complications of long time use pre and post implementation of the instructional guidelines.

Scoring system: A correct answer takes one grade and an incorrect one takes zero.The total score evaluation, less than 75% was considered unsatisfactory and 75% and above was considered satisfactory.

Part three: It includes practice questionnaire sheet to assess students' level of practical measures to reduce radio-frequencies exposure from cell phone (pre and post). It consisted of 13 items.

Scoring system: A correct practice takes one grade and incorrect one takes zero. A total score less than 75%was considered unsatisfactory and 75% and above was considered satisfactory.

Second tool:

Rating scale developed by the researchers to assess student's attitude regarding the use of cell phone, pre and post implementation of the guidelines it consists of 11 items. Two levels of the rating scale were used, students were asked to rate the statements using a 2 point rating scale where 1 = disagree, and 2 = agree. The total score is 33 degree,75% and more was considered healthy attitude (positive) and less than 75% was considered un healthy attitude (negative).

Content validity of the tools:

Five experts in nursing and medicine examined the tools for content validity. Modifications were done accordingly to ascertain relevance and completeness. Tools were tested for reliability on a sample of 10% of subjects. Test- retest results revealed that all items were significant and had a correlation coefficient above the significance level (r=0.8)

Ethical considerations:

Ethical approval was given by the Dean of the Faculty of nursing, Ain Shams University. Students were verbally informed about the purpose and procedures of the study. Anonymity and confidentiality were maintained when the questionnaires were distributed. This was reinforced in the front page of the questionnaire.

Pilot study:

A pilot study was conducted on 10% of the study subjects to evaluate the developed tools for clarity, applicability and then the necessary modifications were carried out. Subjects who shared in the pilot study were included in the main study subjects as no major change done.

N.B.: A total number of 7 students were not able to complete the study to the evaluation phase.

Field work:

The questionnaires were handed to the students during a class room session identified previously.

Phase 1:

Pre assessment in the beginning of the first term. The questionnaires took nearly 15to 20 minutes to be completed. Data were collected during October 2013.

Phase 2:

Development of the instructional guideline leaflet it was done during November, 2013. It was based on the current literature review according to needs assessments to improve students' knowledge, practices and attitude regarding safe use of cell phones. Contents of the instructional guidelines dealt with how does cell phone work, nature of cell phone waves types of cell phones and levels of electromagnetic waves, radiation, short and long term health hazards that may arise with heavy use, effect of electromagnetic waves on fertility and preventive measures to reduce radio frequency exposures.

Phase 3:

Implementation phase: It was done in December 2013, in which the researchers interviewed the study

subjects explaining to them the instructional guide line leaflet. The intervention included group discussions over four sessions, to complete the number of the study subjects and replace the dropped students. It included two theoretical and two practical sessions, each session lasted for 2 hours.

Phase 4:

Evaluation phase: It was carried out in January 2014 and included post assessment questionnaire about students' knowledge, practices, and attitude toward safe use of cell phone.

3.Results

Figure (1) shows that more than two thirds (67%) of study subjects were females and less than one third (33%) were males.

Figure (2) illustrates mode of using cell phone among the study subjects, as 93% were using right side hearing and 7% were using left side and none of them were using the two sides pre implementation of the instructional guideline compared to 78%, 0% and 22% respectively post program.

Figure (3) identifies place of keeping mobile at home as reported by the study subjects as 72% were keeping it beside him/her, and 8% away from him 20% within clothes, compared to 10%, 87% and 3% respectively post instructional guideline implementation.

Figure (4) elaborates place of keeping mobile outdoor as reported by the study subjects as 50% were keeping it in trousers pocket, while 20% in the hand and 30% in the bag, compared to 40%, 10%, and 50% respectively post instructional guideline implementation.

Table (1) displays percentages of the study subjects according to number of mobiles, frequency and call duration pre guidelines implementation. The majority (86.1%) had one mobile while(11.1%) had two mobiles and 2.8% had three mobiles, however, at post instructional guideline only 8.3% had two mobiles, and no one had 3 mobiles.

In relation to number of SIM, there was a statistically significant decrease in number of SIM post instructional guideline implementation(X^2 =6.04 at $P < 0.05$).

According to frequency of calls/ day there was highly statistically significant decrease in frequency of calls / day as > 10 calls represented 75% pre compared to 44.4% among the study subjects post instructional guideline implementation (X^2 =77.4 at $P < 0.001$).

Regarding call duration > 30 minutes, pre guideline implementation, they accounted for 72.2%,while at post,they were 55.6% statistically significant difference was found between pre and post instructional guideline implementation (X^2 =11.8 at $P < 0.05$).

As well in table (1) reveal that some of the study subjects begin to return earth line phone 27.8% post guideline implementation compared to 11.1% pre, with statistically significant difference between pre and post instructional guideline implementation. (X^2 =16 at $p< 0.05$).

Table (2) demonstrates comparison between physical symptoms pre and post instructional guideline implementation after long duration call as reported by the study subjects as there are statistically significant decrease in all symptoms except number near ear used to hear in call with marked decrease.

Table (3) displays highly statistically significant improvement of satisfactory level of knowledge related to cell phone hazards and its prevention of the study subjects in all of the tested items post instructional guideline implementation (X^2 =130.6 at $P < 0.001$).

As seen in table (4) there is a highly statistically significant improvement of satisfactory level of practices toward safe use of cell phone as stated by the students post instructional guideline implementation (X^2 =38.7 at $p < 0.001$).

Table (5) clarifies students attitude toward use of cell phone as there was a statistically significant improvement in their attitude post instructional guideline implementation as 62.2% had healthy or positive attitude compared to 42.2% pre instructional guideline implementation (X^2= 14.2 at $p < 0.05$).

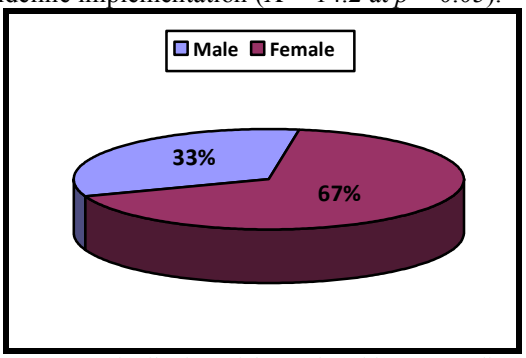

Figure (1): Distribution of the study subjects according to their gender (n = 180).

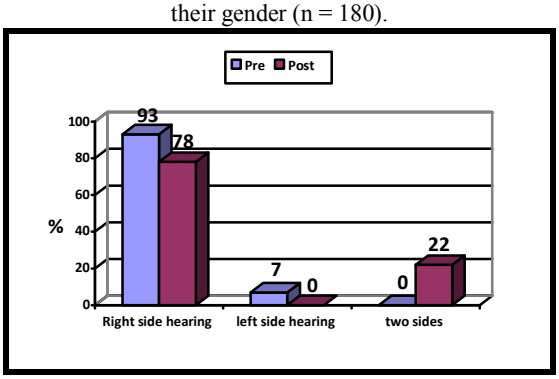

Figure (2): Mode of using cell phone among the study subjects pre /post instructional guideline sessions (n = 180).

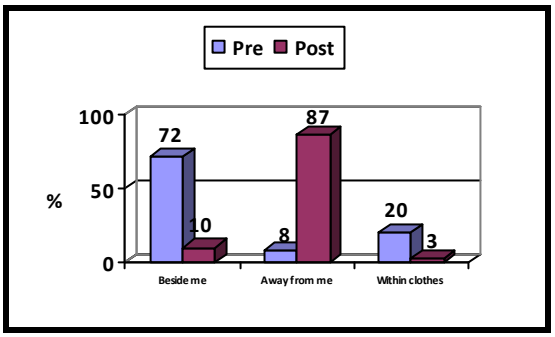

Figure (3): Place of keeping mobile **(at home)** as reported by the study subjects at pre / post instructional guideline sessions (n = 180).

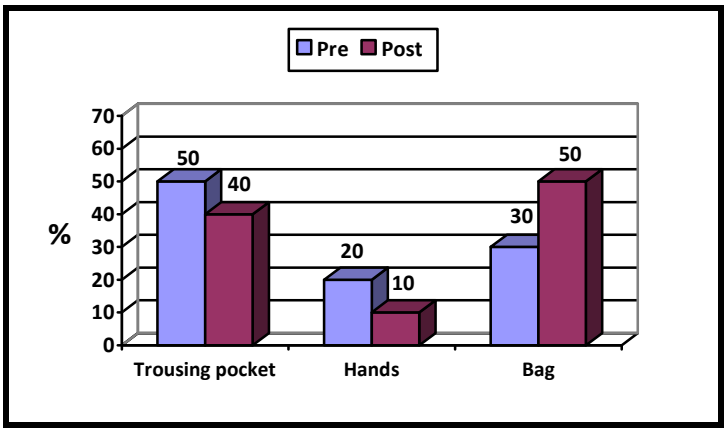

Figure (4): Place of keeping mobile **(outdoor)** as reported by the study subjects at pre /post instructional guideline sessions (n = 180).

Table (1): Distribution of the study subjects according to number of mobiles they have, frequency and call duration (n = 180).

Items	Pre		Post		Chi Square	*P* value
	No	%	No	%		
Number of mobiles						
o One	155	86.1	165	91.7		
o Two	20	11.1	15	8.3		
o Three	5	2.8	0	0	6.04*	<0.05 (S)
Number of SIMs						
o One	90	50	120	66.7		
o Two	70	38.9	45	25		
o Three	20	11.1	15	8.3	10.4*	<0.05 (S)
Frequency of calls/day						
o 1-4	15	8.3	45	25		
o 5-10	30	16.7	55	30.6		<0.001
o > 10	135	75	80	44.4	77.4	(HS)
Call duration						
o 1-3 minutes	15	8.3	18	10		
o 4-10 minutes	12	6.7	22	12.2		
o 11-30 minutes	23	12.8	40	22.2		<0.05
o > 30 minutes	130	72.2	100	55.6	11.8	(S)
Presence of earth line phone						
o Yes	20	11.1	50	27.8		<0.05
o No	160	88.9	130	72.2	16	(S)

Table (2): Distribution of the study subjects according to their reported physical symptoms after long duration call (n = 180).

Items	Pre		Post		Chi Square	*P* value
	No	%	No	%		
o Headache	50	27.8	30	16.7	6.4	<0.05(S)
o Insomnia	30	16.7	10	5.6	11.3	<0.05(S)
o Lack of concentration	50	27.8	30	16.7	6.4	<0.05(S)
o Cardiac dysrhythmia	20	11.1	9	4.2	4.6	<0.05(S)
o Number near ear used	5	2.8	3	1.7	0.52	>0.05(NS)
o Continuous pain sensation in ear and side area used during call	25	13.9	12	6.7	5.1	<0.05(S)

Table (3): Distribution of the study subjects according to their satisfactory level of knowledge related to cell phone hazards and their prevention at pre / post instructional guide line implementation(n = 180).

Items	Pre satisfactory		Post satisfactory		Chi Square	*P* -value
	No	%	No	%		
○ Nature of cell phone waves	15	8.3	180	100	130.6	<0.001** (HS)
○ Types of cell phones and levels of electromagnetic waves radiating	5	2.8	160	88.9		
○ Mechanisms of action of cell phone	8	4.4	165	91.7		
○ Short term signs and symptoms may arise with long time use	80	44.4	170	94.4		
○ Long term health hazards may arise with long time use	85	47.2	175	97.2		
○ Preventive measures to reduce cell phone hazards	20	11.1	170	94.4		
○ Effect of cell phone on brain and ear nerve disease	10	5.6	160	88.9		
○ Effect of cell phone on stress and insomnia	95	52.8	150	83.3		
○ Effect of cell phone on fertility of males and females	100	55.6	180	100		
○ Effect of cell phone on white blood cells and immunity	5	2.8	180	100		

Table (4): Distribution of the study subjects according to their stated practices toward use of cell phone at pre /post guideline implementation (n = 180).

Items	Pre		Post		Chi Square	*P* value
	No	%	No	%		
○ Using cell phone for short calls; less than 3 minutes	20	11.1	50	27.8	38.7	<0.001**
○ Keeping cell phone off at home	0	0	90	50		
○ Outside home, keeping cell phone away from the body	50	27.8	80	44.4		
○ Using an earth line instead of cell phone for long calls	15	8.3	50	27.8		
○ Using message (SMS) instead of call	30	16.7	75	41.7		
○ Using hand free instead of direct cell phone on head or use speaker	55	30.6	100	55.6		
○ Alternating the side of hearing every 2 minutes in long call	6	3.3	30	16.7		
○ Keeping cell phone away from bedroom turned off during sleeping	20	11.1	70	38.9		
○ Using of conventional alarm clock instead of cell phone	20	11.1	95	52.8		
○ Keeping cell phone charger out of bed room	18	10	105	58.3		
○ Avoid using cell phone in elevators or closed settings; its signals become very strong	0	0	47	26.1		
○ Avoid using cell phone in area of poor reception	10	5.6	55	30.6		
○ Avoid using cell phone while charging	5	2.8	66	36.7		

Table (5): Distribution of the study subjects according to their attitude toward use of cell phone at pre / post guideline implementation (n = 180).

Attitude	Pre				Post				Chi Square	*P* value
	Agree		Disagree		Agree		Disagree			
	No	%	No	%	No	%	No	%		
I feel frightened from cell phone side effects	85	47.2	95	52.8	150	83.3	30	16.7		
I use cell phone but with caution	25	13.9	155	86.1	152	84.4	28	15.6		
I think prolonged exposure to cell phone electromagnetic waves are serious to health	50	27.8	130	72.2	156	86.7	24	13.3		
I believe that using cell phone between colleagues for studying is not right	155	86.1	25	13.9	170	94.4	10	5.6		
I see that using cell phone for playing and e-mails is danger	130	72.2	50	27.8	175	97.2	5	2.8		
I think cell phone affects health of different age groups	100	55.6	80	44.4	160	88.9	20	11.1		
I think cell phone call should not exceed 3 minutes	95	52.8	85	47.2	150	83.3	30	16.7		
During long call, I should change between ears	39	21.7	151	83.9	170	94.4	10	5.6		
Arriving at home, cell phone should be turned off and use the earth line phone	89	49.4	91	50.6	168	93.3	12	6.7		
I believe cell phone should be far from bed-rooms.	40	22.2	140	77.8	160	88.9	20	11.1		
Cell phone is not a necessity of life and can be left	15	8.3	165	91.7	2.5	13.9	155	86.1		
Total Positive Negative	76 104		42.2% 57.7%		112 68		62.2% 37.7%		14.2	*<0.05

4.Discussion

Cell phones**,** proved to be highly beneficial tools for many tasks and activities, health-related issues and other negative effects have been a cause for concern about the excessive and inappropriate use of cell phones. Scientists from the International Agency for Research on Cancer (IARC) a group affiliated with WHO, which reported that, mobile phones are a possible carcinogen that may cause cancer, classifies radio frequency carcinogenic to humans (Group 2B) ***(WHO, 2011).*** The present study results revealed that, most of the study subjects were using right side hearing. Pre implementation of the instructional guidelines which significantly improved post as more than one fifth became using 2 sides for hearing. This to some extent, in agreement with the ***(Health Canada Regulations, 2011)***, which insure alternating the side of hearing every 2 minutes in long call.

This study results revealed that more than two thirds of the study subjects keep mobile beside them and sometimes under the pillow and one fifth within their clothes, this might be due to lack of heath awareness about cell phone hazards. These finding contradict with the guideline ***(WHO, 2011)*** for safe human exposure to radiofrequency energy, Which stated that, keeping mobile away from bed because waves emitted from it, may affect the power of the brain, causing sleep disturbance, headache and lack of concentration. On the same line, ***Filip and Cruz (2012)*** mentioned that some earlier studies suggested a link between exposure to radiation from cell phones and an increased risk of acoustic neuroma – a cancerous tumor of the nerve connecting the ear to the brain.

As regards keeping mobile outdoor, half of the study subjects, either males or females keep mobile in the trousers pocket some girls put mobile under scarf on their heads. This finding contradicted with ***Fejes (2005)*** and ***Agarwal et al. (2008)***,who reported that use of cell phones decreases the semen quality in men by decreasing the sperm count, motility, viability and normal morphology. The decrease in sperm parameters was dependent on the duration of daily exposure to cell phones. As well, the previous results were also in accordance with ***Blank et al. (2009) and Shaw (2009)***, who identified possible negative health effect from prolonged exposure as reproductive problems in both males and females.

The current study elaborate that 86.1% had one mobile, while 11.1% had two mobiles, this agrees with the Kingdom Saudi Arabia as 180 mobiles for each 100 people as nearly each one had 2 mobile and most of them are adolescents and this contradicted with ***Trosi et al. (2011)***, who reported that electromagnetic radiofrequency radiation could be a cause of DNA breaks in renal and liver cells of rats. As well, the previous results were against ***Lamel et al. (2012)***, who mentioned that mobile teledermatology

using cellular phones is an innovative and convenient modality of providing dermatologic consultations for skin cancer screening. Moreover disagreement with ***Yang et al. (2012)***, who mentioned that their study indicates that microwaves radiation, can promote cellular neoplastic transformation.

Regarding frequency of calls > 10 calls per day, they represented three quarters of the study subjects pre instructional guideline implementation, however there was reduction to less than half. This findings agrees with ***DeIuliis et al. (2009),*** who discovered that cell phone transmissions disrupt the brain sites for memory and hearing, causing forgetfulness and sudden confusion. Similarly, findings agreed with ***Savitz (2009)***, who mentioned that body cells communicate internally and externally by means of electrical signals. These signals can be altered by electromagnetic wave which generates electrical currents within the body causing changes in both cellular activity and structures.

In relation to call duration more than half an hour and can reach hours, more than two thirds of the study subjects pre instructional guideline implementation as stated by some students can use mobile as recorder for lectures and listen to them in their suitable time, which is dangerous. This study finding is in accordance with the ***International Agency for Research on Cancer WHO report (2011)*** which found an increased risk for glioma in the highest category of heavy users (30 minutes / day over a 10 year period) The current study finding is in agreement with ***Hardell et al. (2007)***, who stated that harmful effects were found of microwave radiation of hours of cell phone chatting on the brain, which affect sleep patterns in pre-teens and teens, is a more serious issue also cause abnormalities in behavioral patterns such as irritability, lack of patience, these sometimes affect heavy users of cell phones.

Nearly one third of the study subjects began to return to earth line phone post instructional guideline implementation. This is congruent with ***Shenouda (2006),*** who insure the use of earth line and close mobile when arriving to home.

As regards physical symptoms as reported by the study subjects from long call, there was statistically significant decrease post guideline implementation. This might be due to that subjects becoming more aware by the negative effects of mobile on health, they took this issue seriously to protect their health. The current study result is congruent with ***DeIuliis et al. (2009)***, who mentioned that cell phones cause genetic damage also reduce the effectiveness of anti asthmatic drugs and retard recovery from illness.

According to the current study subjects, their level of knowledge was highly statistically significantly improved post instructional guideline implementation. This finding is congruent with that of ***Mohamed et al. (2013)***, who found improvement in their study subjects' level of knowledge post implementation of their self care instructional guideline program.

Regarding to students practices toward reducing exposure to radiofrequency microwave, there was highly statistically significant improvement post instructional guideline implementation. This could be due to that students becoming more aware about health risks from thin electromagnetic waves, they need to protect their health, and becoming oriented about how does a mobile work, as well as wireless send and receive voice and text messages via radio waves and these waves, are a form of electromagnetic radiation. This result is congruent with ***Hamed (2013)*** who found similar result in his study about electromagnetic waves and pregnant women. On the same line, the ***WHO (2010)*** mentioned that using the speaker of the device permanently, this greatly reduces the risk of exposure to these waves.

Concerning students' attitude toward use of cell phones in the current study, there was a statistically significant difference between pre/post sessions as they became healthier attitude compared to pre instructional guideline implementation. The current study finding is congruent with ***Abdel-Rassoul et al. (2007)***, who reported that with newer cell phones being all in one entertainment devices, young users tend to get immersed in their cell phones for hours on end. Family interaction becomes limited and negative consequences happen over time. Moreover, on the same line with ***Hamed (2013)*** who reported in his study about electromagnetic waves and pregnant women representing more than half of the study subjects had negative attitude pre counseling while more than half had positive attitude post counseling.

Conclusion:

This study concluded that, the results support the research hypothesis which stated that instructional guidelines improved students' practices regarding safe use of cell phones.

Recommendations: *The study recommends:*

1. Increasing public awareness regarding possible cell phone hazards through mass media.
2. Using cell phone with appropriate not excessive manner.
3. Developing electromagnetic topic in teaching curriculum for undergraduate nursing students.

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