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Awareness on Mobile Phone Hazards Among Medical and Dental Students - A Cross Sectional Study

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ABSTRACT:

Mobile phones are the foremost dominant portal of knowledge and communication technology. A mental impairment resulting from modern technology has come to the attention of scholars, sociologists and psychologists of education on mobile addiction. Mobile addiction and withdrawal from mobile networks may increase depression, anger, irritability, and restlessness which may alter the physiological behavior and may reduce work efficacy. Thus, the aim of the current study is to assess the awareness and knowledge on mobile phone hazards among medical and dental undergraduate students. The study was a cross-sectional questionnaire study. Survey was designed as a questionnaire in English with 2 sections. Section 1 contained demographics and section 2 had questions on various mobile phone hazards, which was

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answered by 162 medical and 165 dental undergraduate students. All the obtained data were entered on Microsoft excel sheet and analysed using SPSS by IBM. From the statistical analysis, it can be well documented that both medical and dental students are appreciably aware of the hazards of mobile phones. Yet, medical students (38%) are comparatively more aware of all the hazards caused by mobile phones than dental undergraduate students (30.85%). It can be concluded that awareness towards mobile phone hazards such as sleep disturbances, fatigue, memory loss, lack of mental concentration, tendonitis, carcinoma and tachycardia were higher among medical students. While dental students are highly aware of the fact that increased mobile phone use causes deafness than medical students. Attitudes of medical students towards mobile phones causing road traffic accidents were higher and attitude of mobile phones being a reason behind cyber bullying were considerably equal among both medical and dental students.

Keywords: Mobile phones, Fatigue, Concentration, Mental attention, Tendonitis, Retinal damage.

INTRODUCTION:

Globally, Mobile phones are considered to be one among the foremost speedily emerging technologies within humanity.[1] Mobile phones are powerful communication devices, first demonstrated by Motorola in 1973, and made commercially available from 1984. In a couple of years, hand phones became an integral part of our lives. The amount of mobile cellular subscriptions is consistently increasing per annum. In 2016, there have been quite seven billion users worldwide. the share of internet usage also increased globally 7-fold from 6.5% to 43% between 2000 and 2015. The percentage of households with internet access also increased from 18% in 2005 to 46% in 2015. By the end of 2010, there was a momentous growth in subscription of mobile phones in developing countries, reaching five billion worldwide which outnumbered the subscription in developed countries. As stated by the Telecom regulatory agency of India, there are about 929.37 million mobile subscribers in India thriving it the world's second-largest telephone utilising developing country within 2012.[2] There has been quite an enormous amount of recognition of cellular phones in younger generations within a brief span of your time. Youth is more inclined towards using mobile phones for activities aside from communication than older generations, because adolescents are more vulnerable to changing fashion trends and elegance, building them more Tech savvy which creates certain behavioral disorders.[3]

The improved popularity of mobile phones are now appealing various research sectors' attention towards them.The mobile phone culture, changes in behavioral patterns, and health risks from the hazardous radiations coming from the mobile phones are the main reasons behind this interest.[4,5] Mobile phones are not any more considered to be an adjunct and have now become a basic requirement of our lives, people are dedicating a serious part of their daily routine to those mobile phones. As stated by Psychiatrists, mobile obsession is now a foremost major non-drug addiction of this century. The stardom of the mobile phone is followed by an alarm towards the detrimental effects of cell phone radiations. Headache, irritation, Fatigue, decreased concentration and burning sensation are the main effects of excessive usage of mobile phones, as stated by various researches. The ear is the first organ to be affected by the cell phones, there's an elevated energy deposition within the ear as compared to other organs and its effect on hearing is debated.[6,7] Alongside the severe effects on general health, there was some research conducted which depicted reduction in male fertility potential.[8,9]

The recent studies also reported the rise of mobile dependence, and this might increase internet addiction. Overuse of mobile phones may cause psychological illness like dry eyes, computer vision syndrome, weakness of thumb and wrist, neck pain and rigidity, increased frequency of De Quervain's tenosynovitis, nomophobia, auditory sleep disturbances, tactile hallucinations, insecurity, insomnia, hallucinations, lower self-confidence, delusions, and mobile addiction disorders.[10] In animals, chronic exposure to Wi-Fi radiation causes behavioral alterations, liver enzyme impairment, pyknotic nucleus, and apoptosis in the brain cortex. Kesari et al. concluded that the mobile radiation may increase the number of reactive oxygen species, which plays a crucial role within the development of metabolic and neurodegenerative diseases. The dependence on the mobile is increasingly high. At an equivalent time, this new information and communication may cause harm. Although there are only limited studies on mobile phone use, it has been suggested that excessive mobile use could also be related to health-compromising behaviors, like smoking or alcohol drinking. Some

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previous studies on Internet use suggest that excessive Internet use could also be related to subjective distress, loneliness and social isolation.[11] Mobile phones are low power radio devices that transmit and receive frequency radiation (at frequencies within the microwave range of 900-1800 MHz) through an antenna near the user's head. Digital systems have recently replaced analogue. There is a concern that microwaves might induce or promote cancer, and therefore the symptoms related to their use include memory problems, nausea, fatigue, sleep disturbance, nausea, and dizziness. Changes within the permeability of the barrier, electroencephalographic activity, and vital signs have also been reported.[12] Recent research from many countries suggests, however, that there are "non-thermal" effects on living tissue, starting from immediate early organic phenomenon and micronucleus formation to changes in the permeability of the blood brain barrier and excitability of nerve cells.[13] We have successfully completed numerous epidemiological studies for the betterment of our community [14 – 24] . In this research we are studying and analyzing the knowledge on mobile phone hazards among dental and medical students.

MATERIALS AND METHODS:

The present study was a cross sectional questionnaire study that was carried out to assess the knowledge on mobile phone hazards among medical and dental students. A total of 327 subjects participated in the study of which 162 were medical students and 165 were dental students. The survey period extended for a period of 20 days in April 2019. The study involved completion of a predesigned questionnaire that had questions on average time spent on mobile phone, the purpose of using it, duration of using it, and questions related to mobile phone hazards. The study subjects consisted of medical and dental students. Medical and dental students from 1st year till CRRI available at the time of study were included in the study while students pursuing other courses were excluded from the study.

Structure of the questionnaire

The study involved completion of a predesigned questionnaire containing 2 sections. Section I includes demographic characteristics like age, gender, course and year of study of the participants. Section two had questions on average time, duration, risk factors of mobile phones such as sleep disturbances, fatigue, memory loss, tendonitis etc. 17 questionnaires, which had been designed based on the primary objective of the study, were used. The questionnaire was prepared in English. The participants were asked to put the responses in a questionnaire. The Data was Shortlisted according to the courses, recorded in excel and was subjected to statistical analysis in SPSS by IBM.

RESULTS AND DISCUSSIONS:

A total of 327 students participated in the study of which 162 (49.5%) were medical undergraduate students and 163 (50.4%) were dental undergraduate students (Graph 1). From the statistical analysis it can be observed that 2.4% of medical students and 24.4% of dental students spend greater than 6 hours per day on mobile phones with their maximum purpose of usage being social networking 35.4% and32.1% respectively Graph 2,3). 23.2% of medical students and only 17.1% of dental students were using mobile phones for more than 4 years (Graph 4). When questioned about the ear commonly used while on call, 28.7% of medical students and 11.9% of dental students had conveyed that they use both the ears equally (Graph 5). Also, 15.9% of medical students and 18% of dental students agree to the fact that they have lost connectivity with people around them due to mobile over use (Graph 6). And, 26.3% of medical and 19.5% of dental students agree that they had often felt a burning sensation over the ears while on call for a longer duration of time (Graph 7). And, 48.9% of medical students and 44.9% of dental students are aware that increased mobile phone use can cause sleep disturbance, fatigue and dizziness (Graph 8). With regard to increased mobile phone use causing loss of mental attention and concentration, 44% of medical students and 33.9% of dental students agree upon the fact (Graph 9). And 41.5% of medical students and 27.2% of dental students think that mobile phone overuse can cause tachycardia (Graph 10). Also, 33.6% of medical students and 24.7% of dental students agree to the fact that mobile phone addiction can cause memory loss (Graph 11). Constant usage of mobile phones will cause pain in the hands, neck and shoulders called tendonitis and 43.4% of medical students and 36.3% of dental students agree to the above fact (Graph 12). The radiation emitted by mobile phones causes retinal damage and cataract, 35.4% of medical students and 31.5% of dental students

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agree to the fact (Graph 13). Also, 28.7% of medical students and 35.1% of dental students felt that proportionality of becoming deaf increases with increased use of mobile phones (Graph 14). And, 24% of both medical and dental students feel that mobile overuse has an effect on fertility (Graph 15). Also, 44% of medical students and 17.4% of dental students find mobile phone over use to be a risk factor for carcinomas (Graph 16). And, 46.4% of medical students and 39.4% of dental students agreed that increased mobile phone use is one of the important reasons behind road traffic accidents (Graph 17). Also, 28% of medical students and 24.1% of dental students had felt that cyberbullying is due to mobile phone addiction (Graph 18).

Mobile phone abuse is rising as a crucial issue among the world population including physical problems like eye problems, muscular pain, and psychological disorders like auditory delusions and tactility.[25] Along with Smartphones, availability of Wi-Fi facilities in residence places and work premises also increases mobile dependence. The continual and constant usage of mobile reduces work efficacy and intellectual capabilities. A study conducted in Chinese population (160 million out of the entire 1.3 billion people) showed that people suffering from mobile phone dependency have difficulty in concentrating on work and are unsociable, eccentric, and use phones in spite of facing hazards or having knowledge on harmful effects of this type of electromagnetic pollution.[26]

In the current study, both medical and dental students use mobile phones for greater hours than intended despite being aware of the harmful hazards of the mobile phone. This result is in accordance to the one conducted by Parasuraman et al, in 2017 who stated that the behavioral analysis of smartphone usage revealed that 66.5% of the study participants are engaged for longer duration with smartphones and 70.4% of the study participants use smartphones longer than.[27] Most of the medical and dental respondents in the current study were using mobile phones for games (7.95% of medical and 32.11% of dental students), social networking (35.4% of medical students and 32.1% of dental students) and for few for educational purposes (6.1% of medical students and 11% of dental students). Parasuraman et al, in 2017 revealed that the majority of the respondents were using mobile phones for communication purposes, photo shooting, entertainment, and educational/academic purposes.[27] With regard to connectivity with people around 15.9% of medical and 18% of dental students feel loss of touch and connectivity due to mobile phone addiction. Overuse of mobile phones can lead to lack of productivity in daily life and reduces quality of interpersonal relationships.[28] With regard to the awareness that mobile phone overuse can cause sleep disturbances, fatigue and dizziness 48.9% of medical and 44.9% of dental students agree to the same fact. This result is similar to the one stated by Parasuraman et al, that 67.5% of respondents strongly agreed that mobile phones cause fatigue, sleep disturbance and psychological disturbance.[27]

With regard to the awareness of mobile overuse causing tendonitis 43.4% of medical and 36.3% of dental students are aware of the fact. The 2015 statistical report from the British Chiropractic Association revealed that 45% of young people aged between 16 to 24 years suffered with back pain due to overuse of electronic gadgets.[29] Also, 44% of medical students and 33.9% of dental students agree upon the fact that mobile phone addiction can cause memory loss and decrease concentration. To the fact that radiation emitted by mobile phones can cause retinal damage and cataract 35.4% of medical students and 31.5% of dental students agreed. Also, 28.7% of medical students and 35.1% of dental students felt that proportionality of becoming deaf increases with increased use of mobile phones. Leonard et al, in 2017 stated that the long term usage of smartphones may cause incurable anxiety, stress, occipital neuralgia, depression, eyesight problem, nomophobia, hearing problems, and many other health issues.[30] A study conducted among university students of Iran, revealed that 21.49% of the participants were obsessed with mobile phones, 17.30% participants had major affective disorder, 14.20% participants had obsessive-compulsive disorder, and 13.80% had interpersonal sensitivity.[31] Nearly 72% of South Korean children aged 11–12 years spend 5.4 h each day on mobile phones, 25% of these children were considered addicts to smartphones.[32]

Studies on association of mobile overuse and fertility are still being investigated seriously. Bhat el al, in 2013 argued that cellular devices emit radio frequency electromagnetic radiations that may cause hindrance to the spermatozoa quality and may decrease Male fertility.[33] In the current study 24% of respondents agree to the above-mentioned fact as well. In the current study, 44% of medical and 17.4% of dental students are aware that long term use of mobile phones is a risk factor for carcinoma. A study conducted by Lennart Haradal et al, in 2006 proved that there exists a statistically significant

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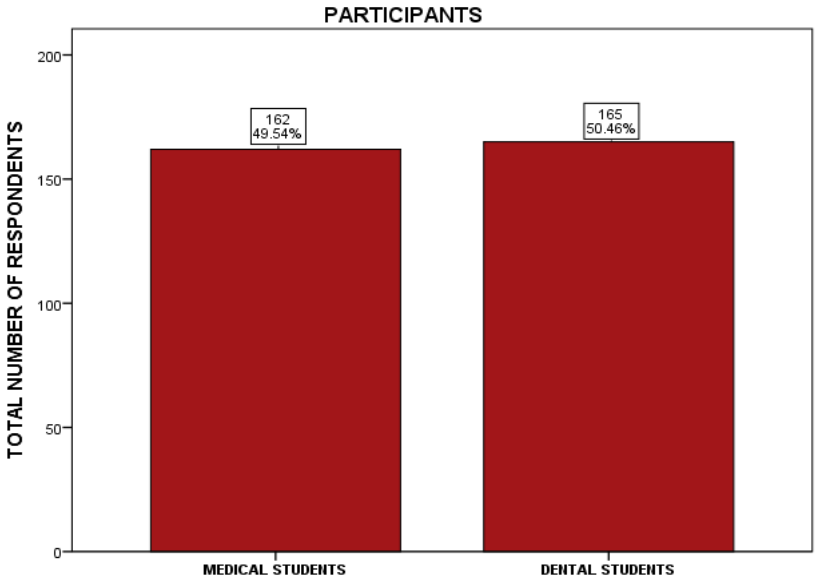
association between brain tumours (particularly acoustic neuromas and malignant carcinomas) and mobile phone overuse. [34]

Also, both medical and dental students spend a minimum of 4 to 6 hours on mobile phones everyday with their maximum purpose of using it for social networking. There is thus an increased concern regarding impact of mobile phones on human health and environment. Formulation of guidelines by appropriate regulatory bodies regarding phone usage in the workplace for students, doctors, and other professionals is of utmost importance. This could be supplemented by mass media efforts (both electronic and print media) and further CDE and CME programmes should be conducted to raise awareness among people regarding the possible health effects of mobile phones and the guidelines to attenuate its exposure and use phones judiciously to avoid becoming hooked in to technology rather than mastering it. Our institution is passionate about high quality evidence based research and has excelled in various fields [35–47]. We hope this study adds to this rich legacy.

With the current study as a platform, awareness on mobile phone hazards among medical and dental students can be analysed and this will also enable students to gain a thorough knowledge on pros and cons of mobile phones and technology. Limitations of this study include unicentric study with few incomplete and unclear data. The Future scope of this study will yield a better and more accurate result when different ethnic populations are considered.



Graph 1 : Bar graph showing the total number of respondents. Total number of medical and dental participants are represented in red. The X axis represents the course of respondents and Y axis scale shows the total count of responses from 0 to 200. From the graph it is evident that 49.5% of the respondents were medical students and 50.4% of respondents were dental students.

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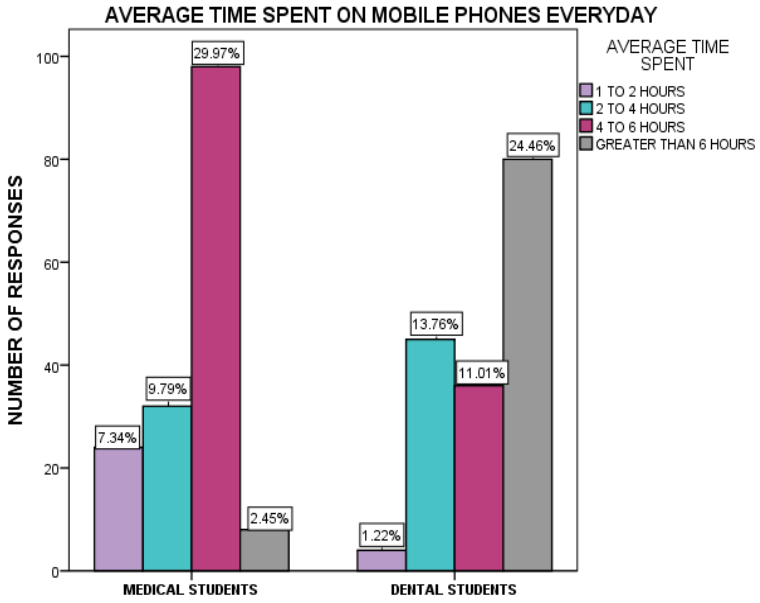
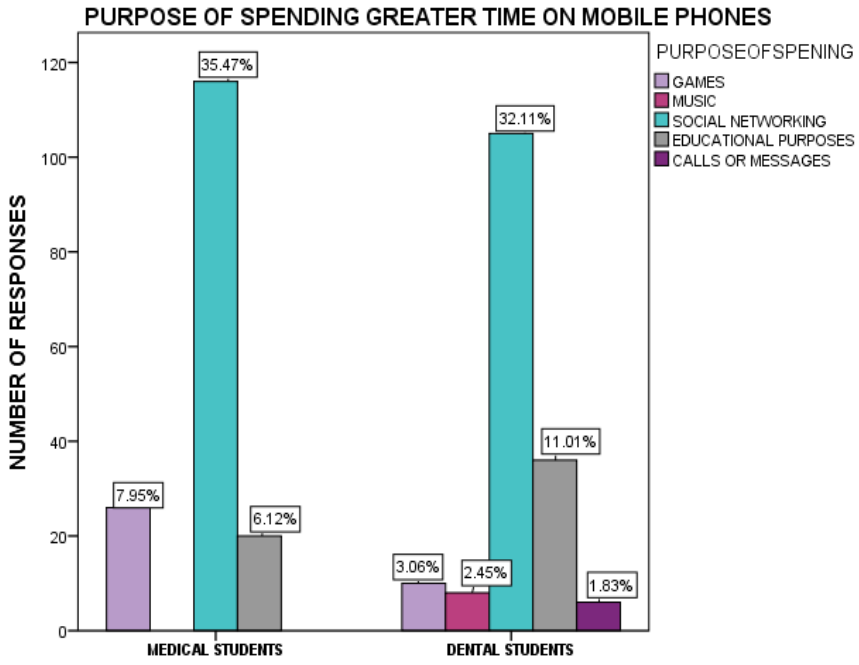


Graph 2: Bar graph showing the responses made by medical and dental students for the question on average time spent on mobile phones everyday. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical students spend 4 to 6 hours only, while a higher percentage of dental students spend greater than 6 hours on mobile phones everyday. It is evident that medical students spend a greater time on mobile phones than dental students. This finding is statistically significant. (Pearson Chi-SquareValue:104; p value=0.000- statistically significant).



Graph 3: Bar graph showing the responses made by medical and dental students for the question on maximum purpose of mobile phone usage. The X axis represents the course of respondents and Y axis scale shows the total count of

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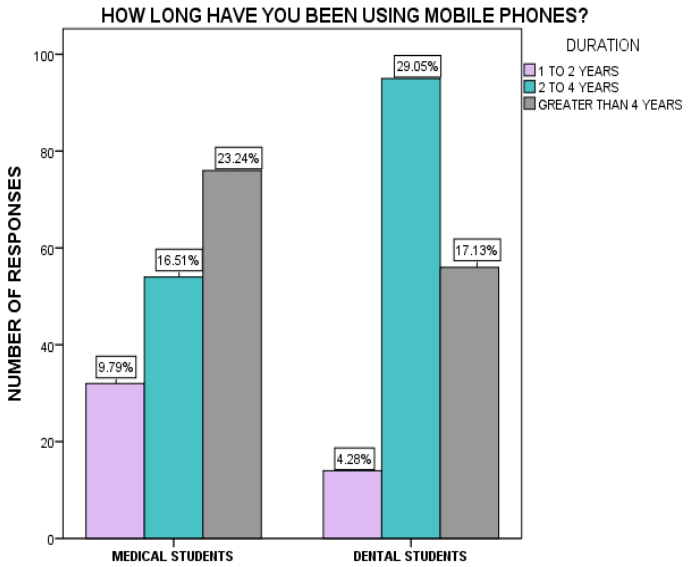
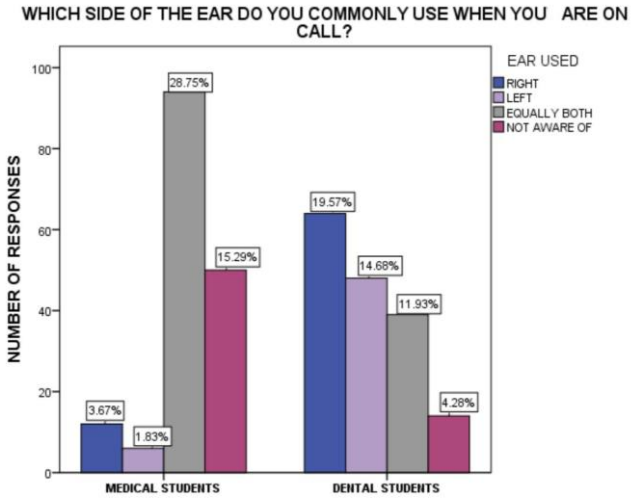
responses. From the graph it is evident that a higher percentage of both medical and dental students utilise mobile phones for social networking. This proves that both medical and dental students use mobile phones for social networking. This finding is statistically significant. (Pearson Chi-SquareValue:26.2 p value=0.000- statistically significant).



Graph 4: Bar graph showing the responses made by medical and dental students for the question on how long have they been using mobile phones. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical students have been using mobile phones for greater than 4 years, while a higher percentage of dental students have been using mobile phones for about 2 to 4 years. It is thus evident that both medical and dental students spend a minimum of at least 4 hours on mobile phones everyday. (Pearson Chi-SquareValue:21.3; p value=0.000- statistically significant).



Graph 5: Bar graph showing the responses made by medical and dental students for the question on commonly used ear when on calls. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical students are not aware of which ear they were using while on call, while a higher percentage of dental students have been using right ear commonly while on call. Thus, it is evident

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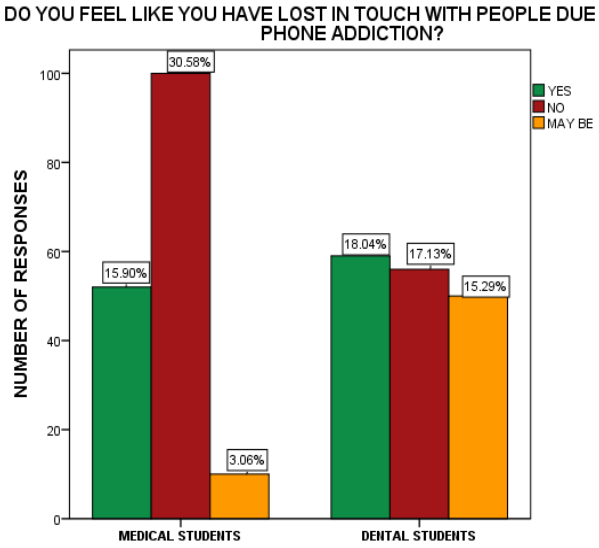
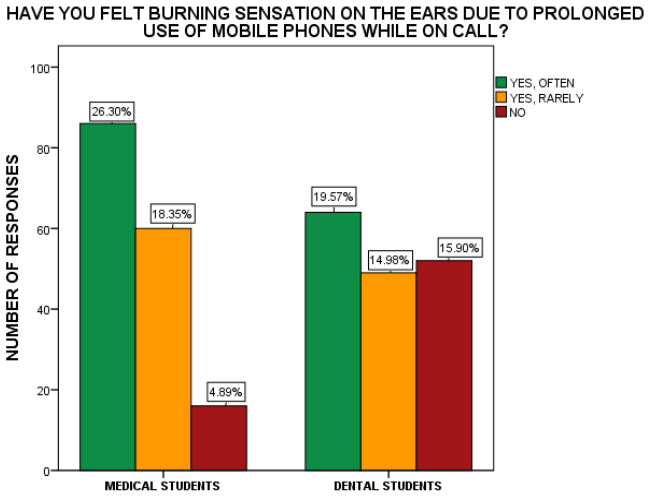
that a greater percentage of students are not aware of which ear they use while on call. (Pearson Chi-SquareValue:111.2; p value=0.000- statistically significant).



Graph 6: Bar graph showing the responses made by medical and dental students for the question on if they feel like they lost connectivity among people due to mobile phone addiction. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical students disagree, while a higher percentage of dental students agree that they have lost connectivity with people around. Thus attitude of medical students towards mobile phones and life relationships is gretely positive than dental students. (Pearson Chi-SquareValue:39.4; p value=0.000- statistically significant).



Graph 7: Bar graph showing the responses made by medical and dental students for the question on if they had felt a burning sensation while using mobile phones for a longer duration. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical and dental students had felt a burning sensation in their ears, with medical students having an increased experience of having felt the burning sensation. Thus both medical and dental students had felt a burning sensation on Thetis ears while on call for a longer duration of time. Pearson Chi-SquareValue:23.3; p value=0.000- statistically significant).

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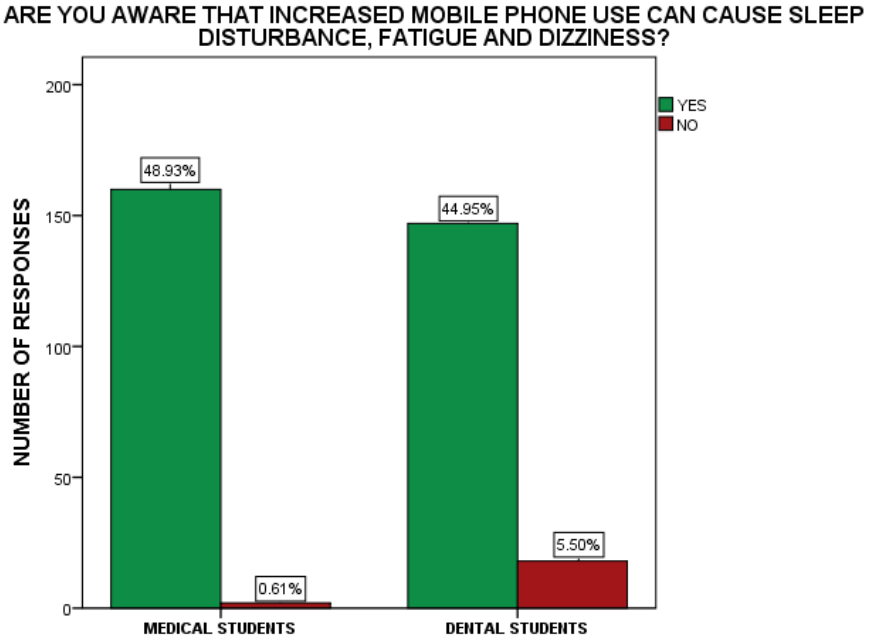
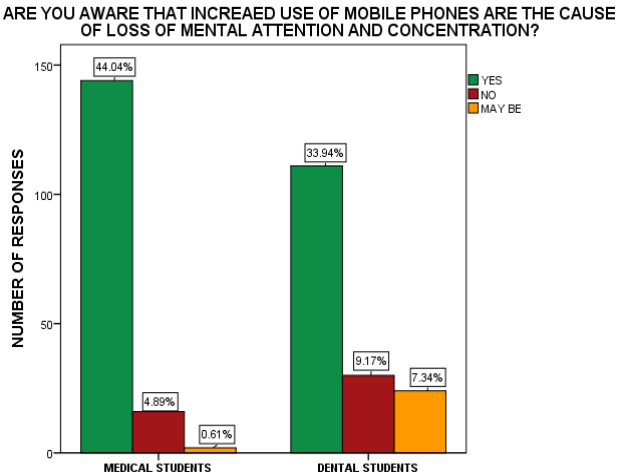


Graph 8: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse can cause sleep disturbances, dizziness and fatigue. The X axis represents the course of respondents and Y axis scale shows the total count of responses. It is evident that a higher percentage of medical students agree to the fact that mobile overuse can cause sleep disturbances, fatigue and dizziness than dental students. Medical students are thus more aware of mobile phone hazards than dental students. (Pearson Chi-Square value:13.2; p value=0.000- statistically significant).



Graph 9: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse can cause loss of mental attention and concentration. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical students are aware of the fact that mobile overuse can lead to loss of mental concentration and attention than dental students. Medical students are thus more aware of mobile phone hazards than dental students. (Pearson Chi-SquareValue:27.1; p value=0.000- statistically significant)

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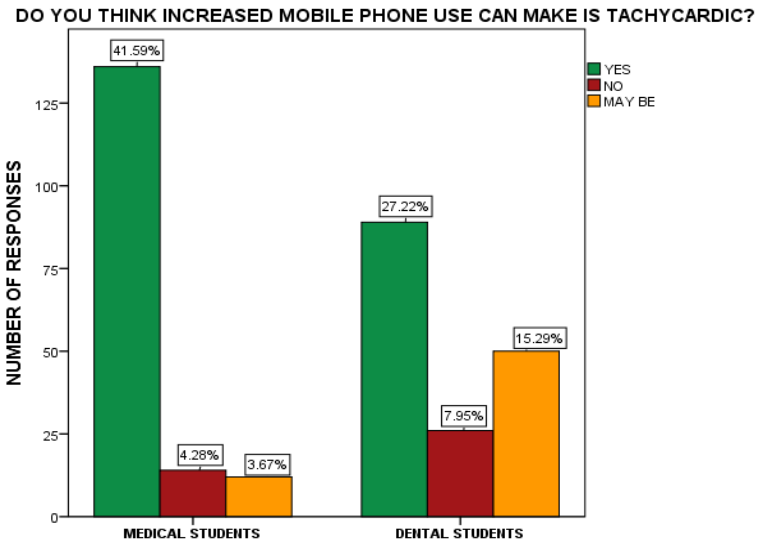
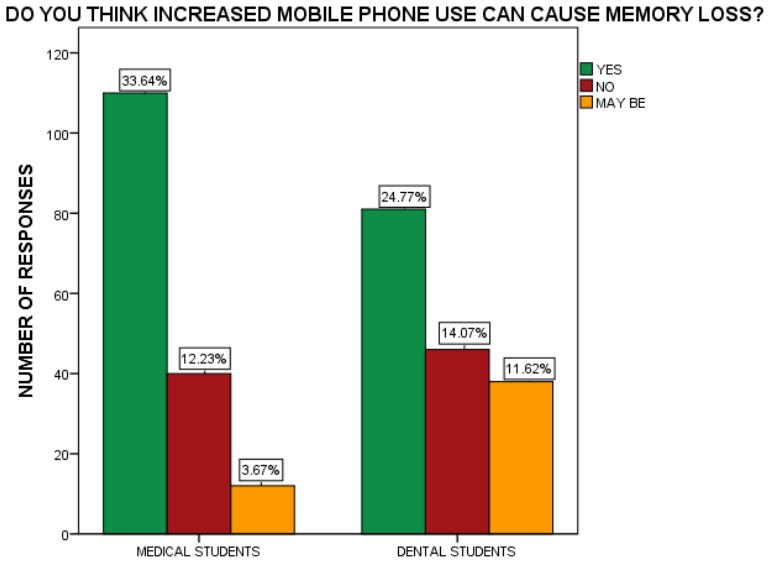


Graph 10: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse can cause tachycardia. Green represents yes, red represents no and orange represents may be. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical students possess a more positive attitude towards mobile phones causing tachycardia than dental students. Medical students are thus more aware of mobile phone hazards than dental students. (Pearson Chi-SquareValue:36.6; p value=0.000- statistically significant).



Graph 11: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse can lead to memory loss. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical students had a school of thought that mobile overuse or addiction can lead to memory loss in comparison to dental students. Medical students are thus more aware of mobile phone hazards than dental students. (Pearson Chi-SquareValue:18.3; p value=0.000- statistically significant).

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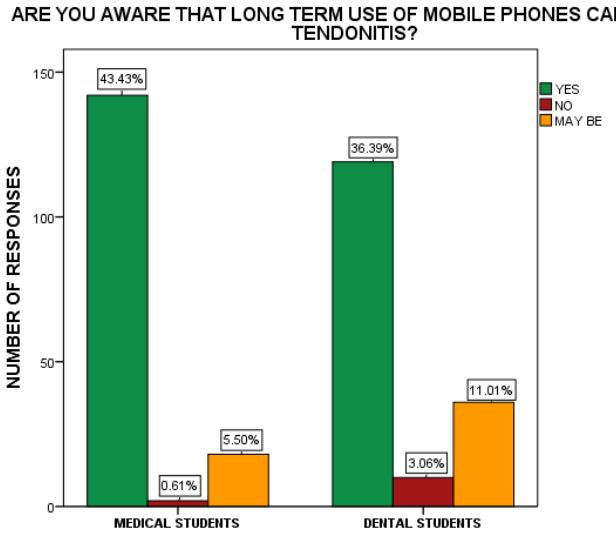
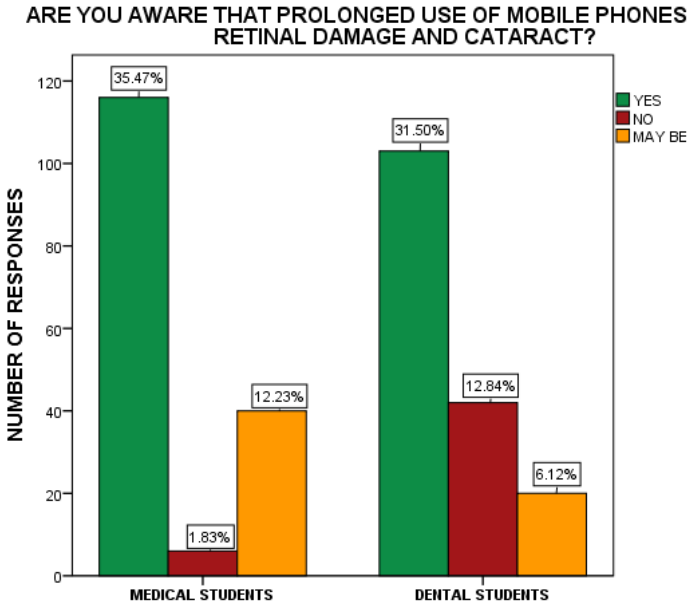


Graph 12: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse can cause tendonitis. The X axis represents the course of respondents and Y axis scale shows the total count of responses. It is evident that a higher percentage of medical students have a knowledge of mobile overuse causing tendonitis or pain in the neck, hands and back. Medical students are thus more aware of mobile phone hazards than dental students. (Pearson Chi-SquareValue:13.3; p value=0.001- statistically significant).



Graph 13: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse can cause retinal damage and cataract. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical students are aware that radiations due to mobile overuse can cause retinal damage and cataract when compared to dental students. Medical students are thus more aware of mobile phone hazards than dental students. (Pearson Chi-SquareValue:34.4; p value=0.000- statistically significant).

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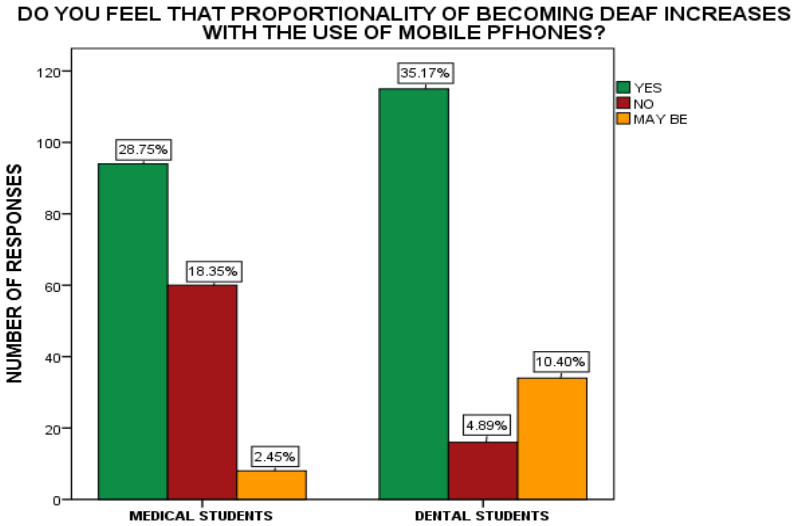
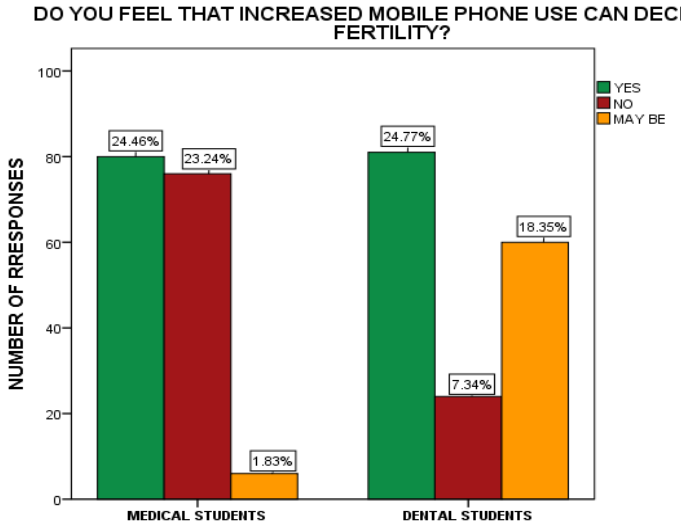


Graph 14: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse can cause deafness. The X axis represents the course of respondents and Y axis scale shows the total count of responses. It is evident that a higher percentage of dental students are aware that mobile overuse can cause deafness than medical students. Dental students are thus more aware of mobile phone overuse causing deafness than medical students. (Pearson Chi-SquareValue:43.6; p value=0.000- statistically significant).



Graph 15: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse can cause infertility. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical and dental students are equally aware of the fact that mobile phone overuse can lead to infertility. Medical students and dental students are thus more aware of mobile phone overuse causing infertility. Pearson Chi-SquareValue:71.2; p value=0.000- statistically significant).

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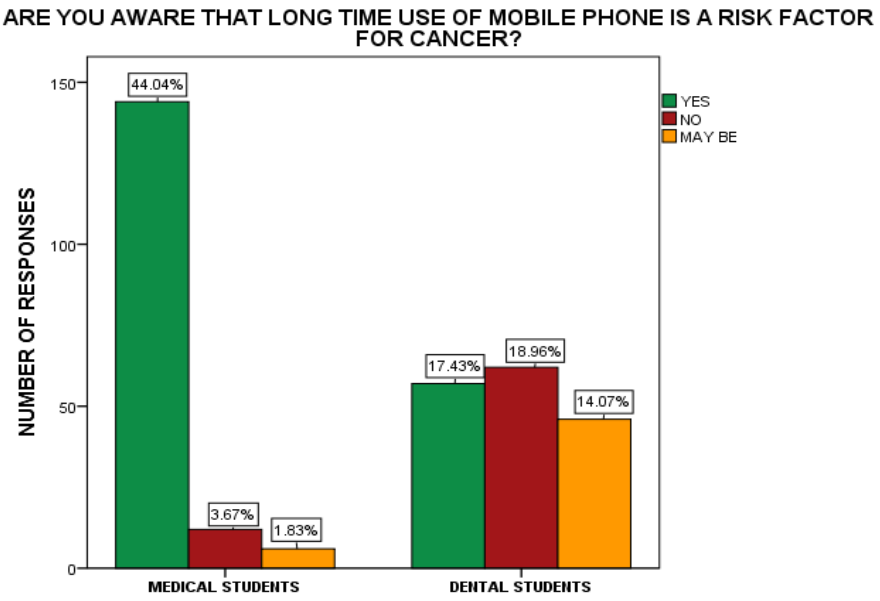
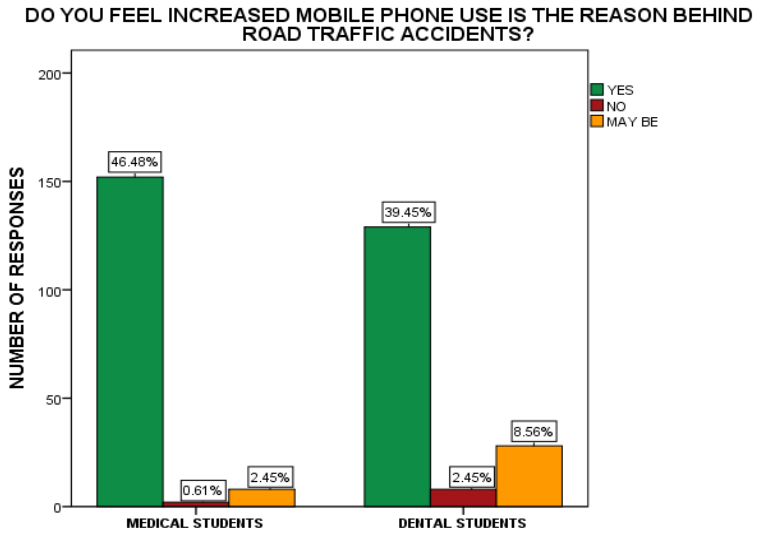


Graph 16: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse can cause carcinoma. Green represents yes, red represents no and orange represents may be. The X axis represents the course of respondents and Y axis scale shows the total count of responses. It is evident that a higher percentage of medical students are aware of the fact that increased mobile phone use is one of the etiology for carcinoma than dental students. Medical students are thus more aware of mobile phone hazards than dental students. (Pearson Chi-SquareValue:102.1; p value=0.000- statistically significant).



Graph 17: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse is a reason behind road traffic accidents. The X axis represents the course of respondents and Y axis scale shows the total count of responses. From the graph it is evident that a higher percentage of medical and dental students are aware of the hazards caused by mobile phones. However, medical students tend to have a greater positive attitude of mobile phones being a reason for road traffic accidents. Medical students are thus more aware of mobile phone hazards than dental students. (Pearson Chi-SquareValue:16.5; p value=0.000- statistically significant).

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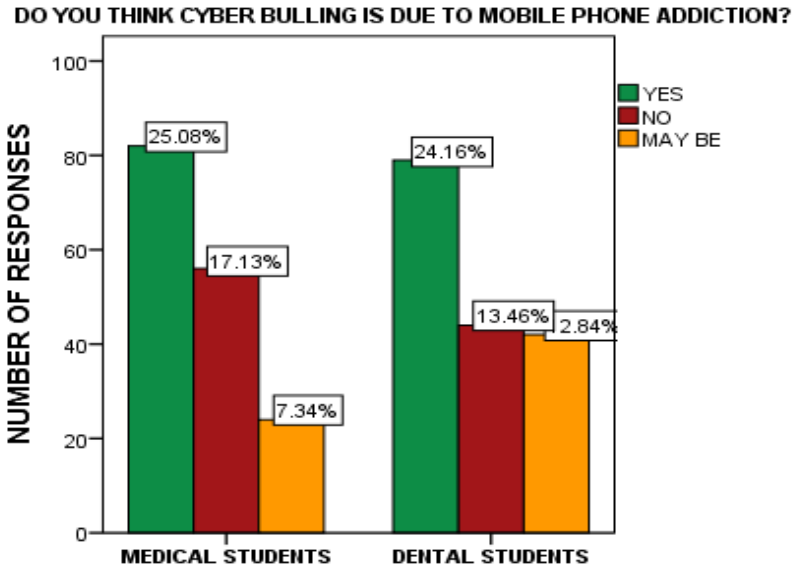

Graph 18: Bar graph showing the responses made by medical and dental students for the question if they are aware that mobile overuse is a reason behind cyberbullying. The X axis represents the course of respondents and Y axis scale shows the total count of responses. It is evident that a higher percentage of medical and dental students have the same attitude towards mobile phones being a reason behind cyber bullying. Medical and dental students are thus more aware of mobile phones being a reason for cyberbullying. (Pearson Chi-SquareValue:6.3; p value=0.041- statistically significant).

CONCLUSIONS:

Within the limitations of the current study, it can be concluded that medical students are more aware of the facts on the harmful effects that mobile phones have on health and environment such as sleep disturbances, fatigue, memory loss, lack of mental concentration, tendonitis, carcinoma and tachycardia than dental students. While dental students are highly aware of the fact that increased mobile phone use causes deafness than medical students. Attitudes of medical students towards mobile phones causing road traffic accidents were higher and attitudes of mobile phones being a reason behind cyber bullying were considerably equal among both medical and dental students.

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CONFLICT OF INTEREST:

Nil.

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