

Effects of the Mobile Phones on the Hearing Function of the Users

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Background: There is a public concern of the health effects of the extensive use of mobile phone. Many studies were conducted producing controversial results. Very few studies were performed in the Middle East.

Objective: To study the effects of the mobile phone on the hearing function of the users.

Method: Forty-eight Students aged 18-23 years old were divided into three groups. They were investigated from September 2005 till October 2007. Group one 16 girls who have used mobile phones frequently and spoken approximately 3-4 hours per day for two years. Group two 16 girls who have used mobile phones for 1-2 hours per day for two years. Group three 16 girls who have never used mobile phones (control group). Medical history was obtained and pure tone was performed.

Result: Examination showed that four students from group one had reported ear pain, headache, tinnitus, weddings noise, and party noise in the used ear and only one from group two suffered from tinnitus and headache. While two from group three suffered from tinnitus.

Conclusion: Our findings, conducted on small number of individuals for limited period, showed that high degree of limited hearing loss might be associated with long-term use of the mobile phones. However, the possibility remains that there could be other health effects and that we need to conduct further study on larger number of individuals and for a longer period.

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Mobile phone possession and usage is now widespread and public concern has developed over possible harmful physiological effects of their use. Effects and possible health outcomes of exposure to radiofrequency fields from mobile phones and its radiation waves consist of oscillating electric and magnetic fields which interact differently with biological systems such as cells of plants, animals and human beings¹. "There is a general concern on the possible hazardous health effects of radiofrequency electromagnetic radiation (RER) emitted from wireless communication devices especially following the enormous increase in use of wireless mobile technology"².

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Some medical studies showed that mobile phones may cause adverse health problems such as headache, sleep disturbances, impairment of short term memory, lack of concentration, brain tumors and high blood pressure amongst users of mobile phones³.

Few studies conducted on the health hazards of the use and abuse of mobile phones in the Arabian Gulf region.

The aim of this research is to study the effects of the mobile phone on the hearing function of the users.

METHOD

Forty-eight students aged 18-23 years old divided in to three groups. They were investigated from September 2005 till October 2007. Group one 16 girls who have used mobile phones frequently and spoken approximately 3-4 hours per day for two years. Group two 16 girls who have used mobile phones for 1-2 hours per day for two years. Group three 16 girls who have never used mobile phone (the control group). Medical history was obtained and questionnaire was filled. Otoscopic examination was carried out, and pure tone was performed to detect any hearing differences between the two experimental groups and the control group in the right /left ear in the frequency 500Hz, 1000Hz 2000Hz and 4000Hz using a calibrated Madsen O.B.8-22 audiometer. We applied the test every 8 months to investigate the prevalence of student mobile phone ownership and any possible chronic effects of usage on hearing, tinnitus, headache and party noise in used ear.

RESULT

Four students from group one reported ear pain, headache, tinnitus, weddings noise, and party noise in the used ear and only one from group two suffered tinnitus and headache. The difference between the two experimental groups in threshold was 1½ dB in the high frequency and between the used ear and the non-used ear was 5 dB in group one and 7 dB in group two, also there were differences between right and left ear in 4 students 1-2 (dB) in high frequency in the control group. However, 12 from group one and 8 from group two reported temporary fatigue and ear pain when extensive use for more than 2 hours continued (see Table 1).

Table 1: Details of Subjects with Respect to Category for the Three Groups

Groups	Threshold shift 1/2dB	Headache	Ear pain	Tinnitus	Weddings noise	Temporary fatigue/ear pain extensive use (Yh+)	Differences between used & unused ear (1-2 dB)
Group one	0	ξ	ξ	ξ	ξ	12	0
Group two	7	1	-	1	-	8	7
Group three	-	-	-	2	-	-	ξ
Total (ξλ)	12	0	ξ	7	ξ	20	12

DISCUSSION

Mobile phone radiation and health concerns have been raised, especially following the enormous increase in the use of wireless mobile phone throughout the world.

The use of mobile phones had increased among students in our society especially at the examination time because they are not able to meet together for group study outside family home, which is socially unacceptable within our conservative society.

In this study, students reported pressure of time and an increasing need to achieve a good examination result by studying with friends, but without being separated from the family, the mobile phone has extremely transformed the social and family boundaries which govern our society.

In this study the differences between the two experimental groups in threshold was 1½ dB in the high frequency and between the used ear and non-used ear was 5 dB in group one and 7 dB in group two. In the control group, there was difference between right and left ear in 4 students, 1-2 dB in high frequency. Some studies have reported a higher degree of hearing loss which was associated with long-term exposure to electromagnetic field emitted by mobile phone⁴.

Radiofrequency exposure emitted from mobile phones is concentrated in the tissue closest to the handset, which includes the auditory nerve. If this type of exposure increases tumor risk, acoustic neuroma would be a potential concern⁵.

The World Health Organization (WHO) had concluded that serious health effects (e.g. cancer) are very unlikely to be caused by cellular phones or their base stations, and expects to make recommendations about mobile phones in 2007–2008⁶. However, others recommend to their citizens measures to minimize exposure (e.g. use hands-free to decrease the radiation to the head, keep the mobile phone away from the body and do not telephone in a car without an external antenna). Examples of the recommendations are national radiation advisory authorities, including those of Austria, France, Germany and Sweden⁷. However, the use of "hands-free" was not recommended by the British Consumers' Association in a statement issued in November 2000⁷. Although there is a vast body of material on the biological effects of radiofrequency field, current risk assessment is still limited.

In this study, four students from group one were reported to have ear pain, headache, tinnitus, weddings noise, and party noise in the used ear and only one from group two suffered from tinnitus and headache. While two from group three suffering from tinnitus. However, 12 from group one and 8 from group two reported temporary fatigue and ear pain when the mobile is extensively used for more than 2 hours. That indicates the possibility of health effects which remain a possibility. While the hearing loss at high frequencies were limited; they were consistent with the report by Professor Anthony Swerdlow, chairman of the advisory group, who said that the report is based on what is known at the moment and warned that the situation could change⁸. "It's hard to communicate degrees of uncertainty and it is often difficult to know how uncertain things are and what might be found in 10 years time. One cannot be absolutely sure what we will find in the future"⁶. Another study result showed that a higher degree of hearing loss is associated with intensive use of mobile phones. While short-term exposure had no effect on the hearing, those people who used their mobile phones frequently had a significant difference in hearing at various frequencies, compared to those who only used their phone moderately and the nonusers⁹.

According to Oktay and Dasdag study presented at the American Academy of Otolaryngology-Head and Neck Surgery Annual Meeting, 100 people who had used mobile phones for over a year suffered increasing degree of hearing loss over the span of 12 months. Furthermore, the study discovered that people who used their phones for more than 60 minutes a day had a worse hearing threshold than those who use it less than that³. Moreover, people who use their mobile phones for longer than an hour per day found it hard to distinguish high frequency sounds (e.g. s, f, h, t, and z) at the starting of the word. We should educate public to discourage the excessive usage of the mobile phones.

CONCLUSION

Our findings showed that there is a limited high degree of hearing loss which could be associated with long-term use of mobile phones. However, the possibility remains that there could be other health effects, which need further investigation with a

longitudinal study not less than 10 years. Moreover, we need to educate the public about excessive use of mobile phones.

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