Otology and Mobile Phone : A Correlation

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Abstract

Introduction: The mobile phone is a modern-day invention. Since their introduction in 1980s, mobile phones have gone from being expensive items that were mainly used by the business elite, to being communication tools used by the general population. Since ear is the closest organ to mobile phones receiving higher energy deposition than other organs, the effects of mobile phone radiation on hearing will be a topic debate.

Aims and Objectives: To determine the physical and functional effect of mobile phone use on ear, To assess the hearing pattern in mobile phone users,To ascertain any other self-reported symptoms associated with mobile phone use like headache, tinnitus, hearing loss, vertigo/dizziness, tension anxiety, fatigue and forgetfulness ,To find out possible remedial measures to avoid/reduce ill effects of mobile phones in mobile phone users.

Material and Methods: A study was conducted in the Department of E.N.T., Santosh medical colleg, ghazaiabd, U.P., India which included 350 patients using mobile phones presenting to outpatient clinics. Correlation was done between mobile users and hearing.

Results: We have evaluated that among 350 subjects, 299 subjects had normal hearing,

37 subjects had 5dB hearing loss, 9 subjects had 10dB hearing loss and 5 subjects had

15dB hearing loss irrespective of duration of mobile phone use.

Conclusion: Phone should only be used when necessary and calls should be kept short ,Use of mobile phone should be avoided if the signal strength is low ,Phone should be kept away from the head, eyes, testicles, breasts and internal organs as far as possible. Hands free device should be used,Phone should be switched off when not in use**.**

Keywords*: Fine Needle Aspiration Cytology, Cervical Lymphadenopathy*

Introduction

The mobile phone is a modern-day invention. Since their introduction in 1980s, mobile phones have gone from being expensive items that were mainly used by the business elite, to being communication tools used by the general population.[1] The use of mobile phones has dramatically increased all over the world during the 1990s. Mobile Phones have become a more and more widespread means of communication. They have become a part of everyday life with a growing number of people enjoying the service and extra freedom they provide. The advent of third generation system will extend the use of most novel forms of communication

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technologies.

The mobile phone radiations have many side effects:-[2]

- Different forms of cancers (brain tumors, lymphoma)

- Neurological disease (Alzheimer's disease)

- Sleep disturbances.

Since ear is the closest organ to mobile phones receiving higher energy deposition than other organs, the effects of mobile phone radiation on hearing will be a topic debate.[3]

Most of the studies undertaken to observe the effect of mobile phone use on hearing and other associated effect on body have used a smaller sample size. In this study a decent sample size is being used to consider the effect of mobile phone use.

And see for following objectives:[4]

1.To determine the physical and functional effect of mobile phone use on ear.

2. To assess the hearing pattern in mobile phone users.

3. To ascertain any other self-reported symptoms associated with mobile phone use like headache, tinnitus, hearing loss, vertigo/dizziness, tensionanxiety, fatigue and forgetfulness.

4. To find out possible remedial measures to avoid/ reduce ill effects of mobile phones in mobile phone users.

Material and Methods

The study was conducted in the Department of Otorhinolaryngology at

Santosh Medical College and Hospital, Ghaziabad, U.P . A total no. of 350 subjects between the age group of 11-40 years using mobile phones for at least 5 years were selected and screened for otological or other physical symptoms.

The Physical and Otoscopic examination was performed in all the patients before testing in order to rule out any external or middle ear pathology that could affect audiometric measurements. The hearing levels of subjects was tested by using different frequencies (250Hz – 8000Hz) by ALPS Pure tone audiometer and Medicaid

System BERA in which latency of the subjects was tested at different intensities. All tests were performed in a sound-treated room.

The hearing status of participants for each ear was measured for both air

(250 Hz to 8 kHz) and bone (250 Hz to 2 kHz) conducted sound stimuli.

The subjects were divided into three groups for final evaluation, as follows:-

Group I:-11 – 20 years of age

Group II:-21 – 30 years of age

Group III:-31 – 40 years of age

A comparative evaluation was done to assess the otological effects of mobile phones in different age groups, sexes, dominant ear and occupation. Associated

symptoms with mobile phone use were also be evaluated to find out other effects of mobile phone use on general health and wellbeing of the subject.

Subjects having conductive or sensorineural hearing loss, tinnitus, vertigo and headache due to any cause, were not be included in this study.

Result

Age Groups:-

In our study we have divided subjects into three different age groups.

Group -I included age groups between 11-20years.

Group -II included age groups between 21-30years.

Group -III included age groups between 31-40years.

110 subjects in Group-I, 145 subjects in Group-II and 95 subjects in Group-III were included in this study.

Symptoms at Presentation:-

Subjects complained of headache, tinnitus, sleep disturbance, tension, anxiety, dizziness, increased lacrimation and forgetfulness on mobile phone use. We found that 18% of subjects complained of headache after prolong mobile phone use, 7% complained of tinnitus, 3% complained of sleep disturbance, 2% complained of tension anxiety/dizziness/increased lacrimation and 1% complained of forgetfulness.

Hours of Exposure:

In our study 129 subjects (37%) used mobile phone for less than 1hour per day, 175 subjects (50%) used mobile phone between 1-2 hours per day, and 46 subjects (13.1%) used mobile phone for more than 2hours per day.

AVERAGE DAILY MOBILE PHONE USE AND HEARING LOSS IN dB:-

In this study we observed that, hours of exposure play an important role in hearing loss on different frequencies. 129 Subjects used mobile phone for less than 1 hour per day had hearing loss of 5dB in 5% of subjects, 175 subjects used mobile phone between 1-2 hours had 5dB loss in 10% of subjects, 10dB loss in 2.1% of subjects & 15dB loss in 1.3% of subjects and 46 subjects used mobile phone for more than 2hours per day had hearing loss of 5dB in 7% of subjects, 10dB loss in 3.8% of subjects & 15dB loss in 1.9% of subjects.

We have evaluated that among 350 subjects, 299 subjects had normal hearing,

37 subjects had 5dB hearing loss, 9 subjects had 10dB hearing loss and 5 subjects had

15dB hearing loss irrespective of duration of mobile phone use.

HEARING STATUS IN THE DOMINANT EAR:-

We observed that out of 350 subjects, 283 (80.85%) subjects were right

handed and used right ear while using mobile phone and 67 (19.14%) subjects were left handed and used left ear while using mobile phone. Hence, in this study right ear was the dominant ear.

GROUP WISE DISTRIBUTION OF HEARING STATUS:-

On observing the group wise distribution of hearing loss, it was seen that out of a total of 110 subjects in Group I, hearing impairment was observed in 13 subjects (11.81%).

In Group II out of 145 subjects, hearing loss was seen in 23 subjects (15.86%).

In Group III out of 95 subjects, hearing loss was seen in 15 subjects (15.79%).

It was observed that hearing loss in different age groups was 11.81% (Group I),

15.86% (Group II) and 15.79% (Group III).

Hearing loss was minimum in 11-20 years of age group, who have been using mobile phone for the same duration as was being used in other groups.

Discussion

The study was conducted in the Department of Otorhinolaryngology at

Santosh Medical College and Hospital, Ghaziabad, U.P (West). A total no. of 350 subjects between the age group of 11-40 years using mobile phones for at least 5years or more were selected and screened for otological or other physical symptoms.

The present study has been undertaken with a view to establish any ill effects of prolonged mobile phone use in healthy young adults.[5] In this study, we have taken a large sample size, to get good representation of results.

Sensorineural deafness in the audiogram is suggested by hearing loss at higher frequencies and no gap between air and bone conduction curve in audiometry.

WHO recommended the following classification on the basis of pure tone audiogram taking the average of thresholds of hearing for frequencies of 500, 1000 and 2000 Hz with reference to ISO:R.389-1970 (international calibration of audiometers).[6]

1. Mild 26-40 dB

2. Moderate 41-55 dB

3. Moderately severe 56-70 dB

4. Severe 71-91 dB

5. Profound >91 dB

We found mild hearing loss in all the cases with hearing impairment using mobile phone. However, the hearing loss was not very significant, as many of the subjects did not report the symptoms and some of them were even not aware of the hearing impairment.[7]

350 healthy subjects of age group of 10-40 years have been included in this study, in different age groups:-[8]

· Group I - 110 subjects of 11-20 years of age.

· Group II - 145 subjects of 21-30 years of age.

· Group III - 95 subjects of 31-40 years of age.

These subjects have been using mobile phone ranging from less than 1 hr/day to more than 2hrs/day up to 5years or more. So, we tried to include a large group of subjects who have been using mobile phone for a considerably long duration of time.

Similar studies have been undertaken by various workers who have included varying number of subjects. Large sample size has been studied by Garcia Callejo11 (323),

Sultan Meo and Abdul M. Al-Drees12 (873), M.Shayani-Nasab et al17 (200), Hutter

HP et al33 (200), Panda NK et al34 (172), Chu MK et al36 (247) and Kucer N andPamukcu T44 (350).

Studies have been conducted with smaller sample size also by various workers

Gabo Stefanics et al17 (30), Kwon MS et al32 (17), GC Sahoo and Honeymol sebastian35 (100), CS Ramya et al38 (50), Hitesh Patel and Rizwan Qureshi46 (30) and G Revanth et al47 (70).[9]

But the results and inferences drawn on a smaller sample size are debatable.

In our study, there were healthy young subjects who were using mobile phone for a longer duration of time. We have included subjects up to the age of 40 years only, so as to avoid the element of presbyacusis in the subjects.

In our study, we have included 225 males and 125 females with a ratio of 1.8:1. In similar studies conducted by various workers, the male female ratio was almost similar.

IngridaUloziene et al10 (18 males & 12 females), Meo and Abdul M.Al-

Dress12 (498 males and 348 females), M.Shayani-Nasab et al14 (160 males and 40 females) and GC Sahoo&Honeymol Sebastian35 (62 males and 38 females).[10]

In this study, we observed decreased hearing, ear ache and increased lacrimation in the subjects using mobile phones. Similar complaints were noticed by

Sultan A Meo and Abdul M. AL-Drees12. Our study is in agreement with this study, as far as such symptoms are concerned.

In our study, we analysed that out of 350 subjects in 283 subjects right ear was dominant ear and 67 subjects had left ear as dominant ear.

Those subjects who used mobile phone predominantly in right ear i.e. 283 subjects, among those 243 subjects were with normal hearing, 29 subjects (10.47%) had 5 dB hearing loss, 7 subjects (2.56%) had 10 dB hearing loss and 4 subjects (1.58%) had 15 dB hearing loss at speech frequencies.

Those subjects who used left ear as dominant ear i.e. 67 subjects, among those 56 subjects were with normal hearing , 8 subjects (11.94%) had 5 dB hearing loss, 2 subjects (2.98%) had 10 dB hearing loss and 1 subject (1.58%) had 15 dB hearing loss at speech frequencies.

In our study, duration of daily mobile phone use was from less than 1hour/day to more than 2hour/day. It was observed that the subjects who used mobile phone for longer duration of time had more hearing loss.

Sultan A.Meo and Abdul M.Al-Drees et al12 also observed that those who used mobile phone for less than 5min/day, 32% had hearing complaints and those who used mobile phone for 5-10min/day, 33% of subjects had hearing complaints.

In this study, those subjects were included, who used mobile phone at least for 5 years. We found increased hearing threshold in these subjects. In similar studies conducted by GC Sahoo&Honeymol Sebastian35, Chu MK et al36, CS Ramya et al38 and G Revanth et al47 it was observed that those mobile phone users who used mobile phone for up to 5 years, had statistically significant altered hearing thresholds.

Conclusion

It is concluded that mobile phone use has detrimental physical and functional effects on the body; including hearing. So following measures are recommended to avoid these effects:-

· Phone should only be used when necessary and calls should be kept short.

· Use of mobile phone should be avoided if the signal strength is low.

· Phone should be kept away from the head, eyes, testicles, breasts and internal organs as far as possible. Hands free device should be used.

· Phone should be switched off when not in use.

Ethical Clearance- Taken from ethical committee of institution

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Conflict of Interest – Nil

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