



ILL EFFECTS OF EXCESSIVE CELL PHONE USE IN ADULT PATIENTS- A PILOT STUDY

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ABSTRACT

Introduction- Every individual in a family is a potential cell phone users and therefore he is exposed to sound and surrounded by electromagnetic radiations most of the time. This is a pilot study on patients who came to our outpatient department with auditory complaints and general irritability which were because of excessive cell phone uses and effect of reducing or modifying the use.

Method- Cases were screened in outpatient department based on primary auditory complains related to cell phone. 50 cases fulfilling our criteria were selected for this study. Each case selected was assessed by experienced audiologist (blinded). Complete data recorded and then these patients were advised to stop or reduce cell phone use.

Results- from this study suggested that intolerance to cell sounds & general irritability was most common presentation in patients. Hearing loss was not presenting complaint in any of these patients.

Conclusions- Although cell phone use is unavoidable, but its excessive use can cause temporary or permanent problems.

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INTRODUCTION

We are the fastest growing market in world and also having second largest market of telecommunications after china [1]. Now every individual in a family is a potential cell phone users and therefore he is excessively indulge in talking, exposed to loud sound and surrounded by electromagnetic radiations, even at sleeping. There are so many studies already published regarding cell phone uses and its effect on individual and its impact on hearing. This is a pilot study on patients who came to our outpatient department with auditory complaints of general irritability which were because of excessive cell phone use and study of effect of reducing or modifying the use on these patients.

REVIEW OF LITERATURE

As per literature, there are two kinds of adverse health effects associated with prolonged cell phone use: thermal and non-thermal or ionizing and non-ionizing radiations. It corresponds to duration of cell phone usage. Radiofrequency radiation includes bands used in radio and television, cell phones, and microwave are in the non-ionizing EM radiation. [2, 3]

The reported adverse health effects and extensive portfolio of non-thermal effects that have been published in the scientific literature during the past few years, which indicates that the kind of radiation now used in GSM phone can and does affect living organisms in various non-thermal ways. Phones emit a pulsed high frequency electromagnetic field, which may penetrate the scalp and the skull. These electromagnetic fields

are known to alter distinct aspects of the brains electrical response to acoustic stimuli.[4]

RF exposure from cell phones is concentrated to the tissue closest to the handset, which includes auditory nerve. [5] Of particular concern to the WHO is the fact that, if any adverse health effect is established from cell phone use, it will be global concern because developing countries are establishing this technology in preference to the more expensive fixed line systems. The exposure to cell phones can be calculated and quantified by means of the amount of radio frequency energy absorbed by a unit mass of an object, which is expressed as the specific absorption rate (SAR) with units of W/kg. [6] The SAR depends not only by the types of the cell phones but also from the manufacturer, model of the phone, the distance between a cell phone and its tower. According to the ICNIRP guidelines for limiting exposure to time-varying electric, magnetic, and EMFs, the maximum SAR value has been set at 2 W/kg for cell phones. It means in countries such as India where these guidelines are adopted, the SAR of every cell phone sold in the country should be <2 W/kg. [7,8]

Outer hair cells (OHC) are kind of piezoelectric devices in our inner ear which may get damaged by continuous exposure of EM radiations despite being placed in dense bone. Short exposure causes Temporary affect with minimal hearing loss but long or continuous exposure may have some permanent effect. A 10 db confirm threshold shift has been observed in various study. [9].

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In a study conducted by I-Khlaiwi *et al.*, [10] the overall mean percentage for presenting complaints in all group were Headache (21.6%), sleep disturbance (4%), tension (3.9%), Fatigue (3%), and dizziness (2.4%). Meo and Drees in a study Showed about 34.59% of problems were related with impaired Hearing, earache and/or warmth on the ear, and 5.04% of complaints with decreased and/or blurred vision. [11] A WHO fact sheet updating conclusions and recommendations regarding health effects from cell phone use and exposure to base stations was published in June 2000 (WHO 2000). [12]. WHO recommend the following:

1. Strict adherence to health-based guidelines. International guidelines have been developed to protect everyone in the population: cell phone users, those who work near or live around base stations, as well as people who do not use cell phones.
2. Precautionary measures: Present scientific information does not indicate the need for any special precautions for use of cell phones. If individuals are concerned, they might choose to limit their own or their children's RF exposure by limiting the length of calls, or using "hands free" devices to keep cell phone away from the head and body.

MATERIAL AND METHODS

This study was carried out at Pankaj ENT hospital, outpatient department over a period of two and a half year from June 2016 to December 2018. Audiologist was blinded for these patients.

Inclusion criteria

1. Age 15 yrs and above and not exceeding 50 yrs.
2. Primary Auditory complaints with general irritability related to cell phone use.
3. Patients who were willing to reduce cell phone use.

Exclusion criteria

1. Age beyond inclusion criteria.
2. Diabetes mellitus, thyroid disorders or other metabolic diseases.
3. Working/residing in high or loud noise area like factory workers.
4. Ototoxic drugs exposure.
5. History of sudden acoustic trauma.
6. Any known ear disease affecting hearing.
7. Patients who refused to reduce cell phone use because of nature of their work.

Cases were screened in outpatient department based on primary auditory complains related to cell phone. 50 cases fulfilling our criteria were selected for this study. Detailed history was taken regarding the duration of cell phone use per day in toto and how did they used it like, speaker phone, at ear or with ear phones. What were their specific complaints and how was it related to duration of use. Detailed ENT examinations were done for all patients with otoscopes and rigid endoscopes and these patients were subjected to Pure Tone Audiometry. Each cases selected were assessed by experienced audiologist (blinded). Complete data recorded and then these patients were advised to stop or reduce cell phone use. If necessary they were advised to use phone at speaker phone, then at ear and ear phones were discouraged most. In situations where speaker phones could not be used, at ear users were advised to keep volume to minimum and keep the cell

phone away from the ear as much as possible. No medication was prescribed. Patients were called at six weeks interval and those who could not reduce the use were again excluded from study. Detailed history, audiological examinations were done six weekly for next two visits.

OBSERVATION & RESULT

Age -36 to 45 yrs group was most affected by cell use related auditory and general complaints.

Table 1

Age Group (Yrs)	Percentage of patients involved
15 - 25	4 (8%)
26 - 35	11 (22%)
36 - 45	32 (64%)
46 - 50	3 (6%)

Sex - Both male and females were almost equally affected, males being slightly more affected.

Table 2

	Male	Female
Numbers of patient	28 (56%)	22 (44%)

Symptoms and side of cell phone use

Most patients presented with symptoms in bilateral ear rather than one ear and those who presented with one ear, right and left were almost equally involved. This also did not correlated with the side of more cell phone use. This rules out that being right handedness is more common doesn't mean that right ear is more affected.

Table 3

	Bilateral ear	Right ear	Left ear
Numbers of patient	29(58%)	10 (20%)	11 (22%)

Symptoms

Ear pain, heat sensation at ear while talking on cell phone, irritability and intolerance to cell sounds (and other loud sounds sometimes) tinnitus and rarely hearing loss were the main presenting symptoms. Surprising fact in these patients were that they themselves did not correlated these complaints with their cell phone use. This was after detailed history that they realized that it was more with their phone uses and really symptoms correlated with the duration of phone use. Most affected were ear phone users, next being at ear use and least affected were speaker phone users. Above data from this study suggested that intolerance to cell sounds & general irritability was most common presentation in patients. From our small data gathered, pain, tinnitus, all have nearly same rate of presentations. Hearing loss was not presenting complaint in any of these patients hearing loss

Table 4 Symptoms

Symptoms at presentation	General irritability	Pain in ear	Feeling of heat sensation in ear	Intolerance to loud sound	Hearing loss	Tinnitus
Number of Patients	37	22	20	40	0	16

Pure tone audiometry

Very less number of patients were having actual deterioration of hearing threshold. – number of patients were having obvious

high frequency dip and most of these patients were having Tinnitus and hyperacusis.

Table 5

Hearing Threshold	Number of patients
Normal	32 (64%)
Mild unilateral sensorineural hearing loss	11 (22%)
Mild bilateral sensorineural hearing loss 6 (12%)	
Moderate hearing loss unilateral	0 %
Moderate hearing loss bilateral	1 (2%)

Hours of exposure vs. hearing loss (dB)

We made group of patients according to number of hours of cell phone used in a day multiplied by total years of cell phone used. Thus calculating Hour-Year. Hour-Year of exposure to cell phone was really not correlated with symptoms as well as hearing loss. There was much individual variations in patients with more symptoms and patients having hearing loss in PTA, this was also nor correlated.

Table 6 Number of patients having hearing loss related to hour-year of cell use (Total 18)

Hour – Year uses of Cell phone use	Hearing loss.
1hour year	2
2 hour year	1
3 hour year	11
4 hour year	2
5 hour year or more	2

Methods of Cell Phone Use

Ear phone users were found to have more symptoms and objective hearing loss in comparison to at ear phone users. Ear phone users also used it for music and gaming which could be a factor affecting the results.

Table 7 Symptoms

Method of usual cell phone use	Hearing loss
Ear phone	8
At Ear	4
Speaker phone	6

Result after reduced / modified Cell phone use

There was a great relief in general irritability, heat sensation around ear and pain. However Tinnitus and hyperacusis was not changed.

Symptoms

Table 8 Symptoms after 12 weeks restriction / modification of cell use

Symptoms at presentation	General irritability	Pain in ear	Feeling of heat sensation in ear	Intolerance to loud sound	Hearing loss	Tinnitus
Number	37	22	20	40	0	16
Of Patients	8	10	4	38	0	14

Hearing Threshold

There was no visible change in hearing threshold after the cell phone use restriction.

Table 8 Pre and post restriction of cell phone uses audiogram

Before consultation	After cell use restriction of 12 weeks
18	18

DISCUSSION

The use of cell phones is increasing day by day because of various factors. The cheap sets and cheaper tariff. Phone based professions, socializing on phone, music and gaming also increases ear phone use. Several patients in our study presented with complaints like heating effect at ear and surrounding area and associated discomfort with it without cell phone actually being heated. In our study, intolerance to cellrings, sounds & general irritability is most common presentation in patients. From our small data gathered, pain,tinnitus, high frequency hearing loss in PTA all have nearly same rate of presentations. Although there was no reversal in hearing threshold or Tinnitus but there was definite improvement in general irritability, pain in ear, heating effect and hyperacusis after reducing and or modifying the cell phone use. We recommend to avoid the cell phone use unnecessarily. Not to use the ear phones. Keep volume of phone to minimum and keep phone away from the head as much as possible. Keep on Changing the ear exposed while long talks. Use speaker phone at all situations where possible. Patient can change the cell set for few days for therapeutic trial.

CONCLUSION

Cell phones use in to days life is unavoidable. It is double edge sword with excessive use of cell phones in causing serious social and medical problems. Although the numbers in the study is small but it is showing a trend of increasing problems with cell phone use. In our study, general irritability while use of cell phones and intolerance to cell sound was most common findings, however we were not able to confirm these by any objective tests. We recommend hereby to have a more valuable study in these areas to have more data on this topic.

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