

ORIGINAL RESEARCH

Assessment of effect of mobile phone usage on hearing

¹Dr. Sarvesh Bisaria, ²Dr. Aishwarya Bisaria, Dr Bharat Sharma³

¹Senior Specialist, M G Hospital Banswara, Rajasthan, India

²MBBS

³MBBS Intern, NIMS Medical College Jaipur, Rajasthan, India

Correspondence:

Dr Sarvesh Bisaria, Senior Specialist, M G Hospital Banswara, Rajasthan, India

ABSTRACT

Background: *The use of mobile phones operating in the 900 and 1800 MHz frequency bands is widespread and increasing rapidly, the use of microwave (MW) at these frequencies could cause some adverse biological effects. The present study was conducted to assess effect of mobile phone usage on hearing.*

Materials & Methods: *120 subjects of both genders were randomly divided into 3 groups of 40 each. Group I were those using mobile phones for > 1 hour per day, group II consists of those who were using mobile phones for <1 hour per day and group III were those who did not use mobile phones or very occasional users (<1 hour per week). All subjects were subjected to tympanometry and distortion product otoacoustic emission (DPOAE) tests.*

Results: *There were 18 males and 22 females in group I, 20 males and 20 females in group II and 17 males and 23 females in group III. Sensorineural hearing loss was seen among 7 in group I, 3 in group II and 1 in group III. Side was left in 3 and 2 and right in 4, 1 and 1 in group I, II and III respectively. The difference was significant ($P < 0.05$). Frequency was low seen in 17%, 23% and 20%, midin 6%, 10% and 7% and high in 45%, 30% and 20% in group I, II and III respectively. The difference was significant ($P < 0.05$).*

Conclusion: *Frequent use of mobile phones led to hearing loss among population.*

Key words: *Hearing, mobile phones, microwave*

INTRODUCTION

India is the world's fastest growing mobile phone market after China. It is estimated that 1009.46 million Indian population uses mobile phone. India is also the second largest telecommunication network in the world in terms of number of wireless connections.¹ Because the use of mobile phones operating in the 900 and 1800 MHz frequency bands is widespread and increasing rapidly, the use of microwave (MW) at these frequencies could cause some adverse biological effects.² Digital GSM telephones transmit in the 900MHz band with a maximum power level of 2W. Multiplexing is used within each channel, and up to eight calls can be transmitted simultaneously. Thus, any one telephone transmits only one-eighth of the time. Information is sent in bursts of 577 μ s duration at a rate of 217 bursts per second.³

Scientists use two major methods to assess whether handheld cellular phones present a health risk: epidemiological and laboratory studies. In recent years, results of increasing numbers of studies of the effects of MW radiation from cellular phones and base stations appear to indicate that the MW emitted by cellular phones is not statistically dangerous.⁴ However, because some studies of MW emitted from mobile phones have reported positive findings, continuing research is advisable.⁵ The present study was conducted to assess effect of mobile phone usage on hearing.

MATERIALS & METHODS

The present study comprised of 120 subjects of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. They were randomly divided into 3 groups of 40 each. Group I were those using mobile phones for > 1 hour per day, group II consists of those who were using mobile phones for <1 hour per day and group III were those who did not use mobile phones or very occasional users (<1 hour per week). All subjects were subjected to

tympanometry and distortion product otoacoustic emission (DPOAE) tests. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Gender wise distribution

Gender	Group I	Group II	Group III
Male	18	20	17
Female	22	20	23

Table I shows that there were 18 males and 22 females in group I, 20 males and 20 females in group II and 17 males and 23 females in group III.

Table II Distribution based on deafness

Deafness	Side	Group I	Group II	Group III	P value
SNFL	Left	3	2	0	0.05
	Right	4	1	1	

Table II, graph I shows that sensorineural hearing loss was seen among 7 in group I, 3 in group II and 1 in group III. Side was left in 3 and 2 and right in 4, 1 and 1 in group I, II and III respectively. The difference was significant (P< 0.05).

Graph I Distribution based on deafness

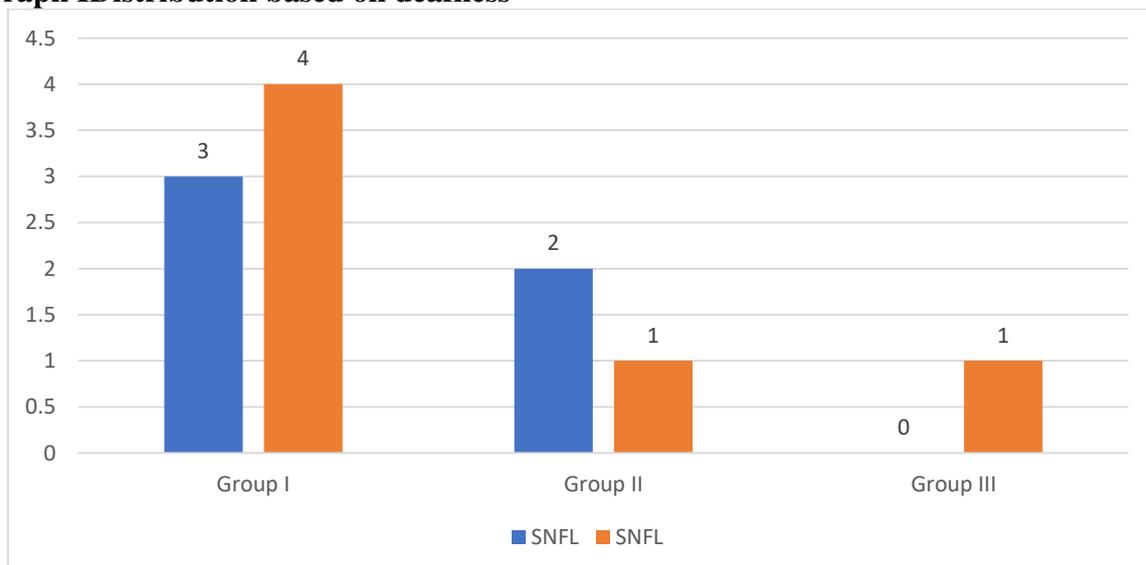
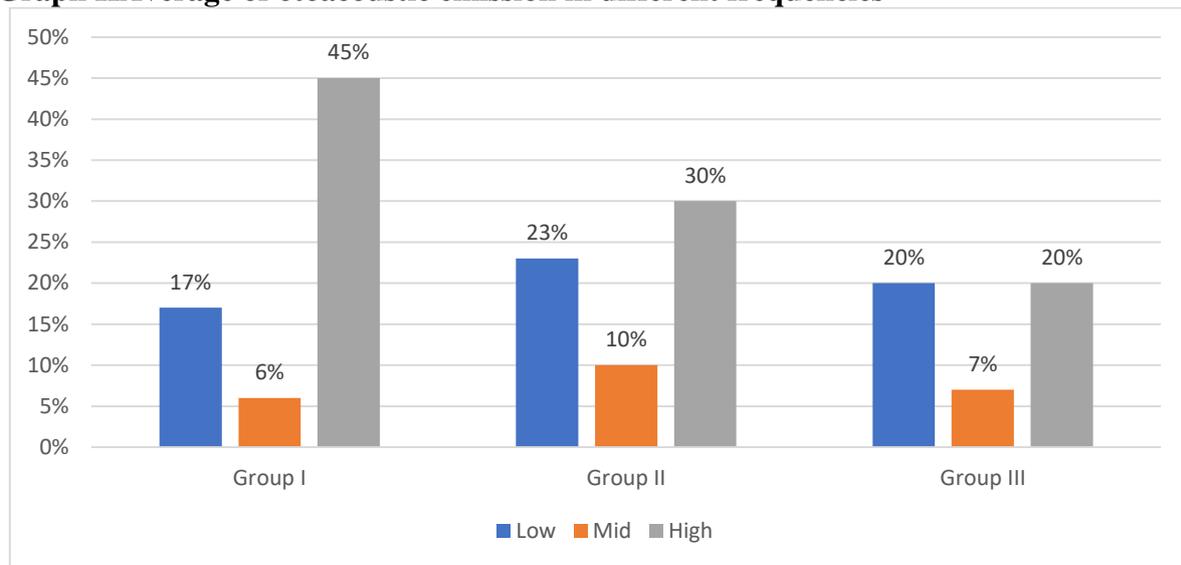


Table III Average of otoacoustic emission in different frequencies

Frequency	Group I	Group II	Group III	P value
Low	17%	23%	20%	0.17
Mid	6%	10%	7%	0.15
High	45%	30%	20%	0.04

Table III, graph II shows that frequency was low seen in 17%, 23% and 20%, mid in 6%, 10% and 7% and high in 45%, 30% and 20% in group I, II and III respectively. The difference was significant ($P < 0.05$).

Graph II Average of otoacoustic emission in different frequencies

DISCUSSION

The increase use of wireless communication, especially handheld cellular phones, has generated controversy over whether or not these systems induce a risk to human health. As we know mobile phones emit microwave radio frequency (RF) energy.⁶ At high power levels, microwave RF exposure can rapidly heat tissue and cause visible damage, such as burns. Mobile phones operate at power levels well below the level at which such overt heating effects occur.⁷ The mobile phone health issue has generally focused on whether there are any adverse biological nonthermal effects from long-term or frequent exposure to low-level RF emission.⁸ The use of mobile phones is becoming increasingly popular and almost indispensable in modern daily life. This is one of the fastest-growing technological developments of our times. However, there is an increasing amount of public concern over possible health risks of electromagnetic field (EMF) exposure from cellular phones.⁹ The present study was conducted to assess effect of mobile phone usage on hearing.

We found that there were 18 males and 22 females in group I, 20 males and 20 females in group II and 17 males and 23 females in group III. Philip et al¹⁰ investigated the adverse effects of mobile phone usage on auditory functions and studied the pattern of hearing threshold in mobile phone users. The study group consisted of 150 healthy volunteers between the age group of 21 and 45 years. They were divided into three groups; Group A consists of fifty participants who were using mobile phones for more than 1 h per day, Group B consists of fifty participants who were using mobile phones for 1 h/day) and Group C (control group).

We found that sensorineural hearing loss was seen among 7 in group I, 3 in group II and 1 in group III. Side was left in 3 and 2 and right in 4, 1 and 1 in group I, II and III respectively. Otkay et al¹¹ determined the effects of radiation emitted by mobile phones on the hearing of users. The study was carried out on three groups: 1) 20 men who have used a cellular phone frequently and spoken approximately 2 h per day for four years; 2) 20 men who have used a cellular phone for 10–20min per day for four years; and 3) 20 healthy men who have never used a cellular phone (the control group). Brainstem evoked response audiometric (BERA) and pure tone audiometric (PTA) methods were used to measure the effects of exposure on hearing function of the subjects. In BERA measurements, I–III, III–V, and I–V interpeak latencies were evaluated. The BERA results showed no differences among the groups. In PTA measurements, detection thresholds at 250Hz, 500Hz, 1000 Hz, 2000Hz, 4000Hz, and 8000Hz frequencies were measured in all three groups. No differences were observed between moderate mobile phone users (10–20 min. per day) and control subjects. However, detection thresholds in those who talked approximately 2 hours per day were found to be higher than those in either moderate users or control subjects. Differences at 4000Hz for both bone and air conduction for right ears, and 500Hz, and 4000Hz bone and air conduction for left ears were significant for mean hearing threshold.

We found that frequency was low seen in 17%, 23% and 20%, mid in 6%, 10% and 7% and high in 45%, 30% and 20% in group I, II and III respectively. Sahoo and Sebastian¹² in their study showed that 5% of participants had complaints of tinnitus, 4% had vertigo, and 10% and 8% had ear discomfort and fullness in the ear, respectively

CONCLUSION

Authors found that frequent use of mobile phones led to hearing loss among population.

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