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TTS IN MOBILE AND MP3 USERS

¹Maruthi Krishna Goud, K. and ²Arpitha

¹Assistant professor, Osmania University, India

²Faculty, Institute Of Speech and Audiology, Sweekaar Academy of Rehabilitation Sciences, India

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ABSTRACT

Introduction: It has been a challenging and interesting task for the hearing professional and medical advisor for the youth group of modern day. The basic terrible effect is “listening is hard”. Youngsters are calling an attention to the audio logical management by being modern and using mobile and MP3. This study aims to bring a awareness in the younger generation and presenting an audiometric outcome of mobile and MP3.

Aim: To compare the TTS pattern in mobile users and mp3 users after a continuous exposure of stimulus

Methodology: The present study consists of 20 subjects, 10 mobile users and 10 mp3 users in each group. The age group of 20 to 35 years subjects were selected based on inclusion and exclusion criteria.

The audiological test battery includes PTA, Speech Audiometry, Impedance and OAE evaluation were carried out before and after a period of continuous exposure of stimulus in both groups.

Results: A Significant difference in TTS pattern both in MP3 and Mobile users were seen. Audiological evaluation shows for all the subjects and when compared it has found from the base that the mobile users has normal hearing threshold where as the mp3 users has towards the higher range of normal tending to minimal hearing loss. though both the users has a threshold shift where mobile users has a mean shift of right ear mean 11 to 24, left ear mean 11 to 25.5 and mp3 users right ear mean 13 to 32, left ear mean 15.5 to 37 was showing a significant alterations on the threshold. After exposure though results were not very supportive for reflexometry in impedance audiometry but a significant change in OAE's, shows a presents of TTS as 3% of Mobile users has diminished OAE's and in Mp3 users 90% among all the subjects. it was reported subjectively from the mp3 users as presents of low pitched Tinnitus soon exposure, which is tolerable.

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INTRODUCTION

Dynamism in the modern world exposed the human being in to the mechanical world. Where the usage of more complicated electronic devices making youth's life more stylish and liveliness' present 90 % of the youth has two basic requirements and complete that at any cast they are mobile and mp3. Because of rapid increase I the use of mobile telephone especially in developing countries even a small effect on health could have major public health consequences. The amount of observed energy depends on both limit of exposure and distance from source. Since ear is the closest organ to mobile telephones and this may cause a higher energy deposition in the Ear compared the other part of the body. The exposure to electromagnetic field emitted by mobile telephones is increasing rapidly worldwide that causes side effects.

Corresponding author: Maruthi Krishna Goud, K.
Assistant professor, Osmania University, India

Ear proximity to electromagnetic source may lead to greater damage and side effect, including hearing loss. People using mobile phones for more than 4 years and longer than 30 minutes a day are at risk of developing hearing loss particularly at higher speech frequencies. The study found teenage boys generally listened to their personal mp3 players at a higher volume than girls. Mp3 players make listening to music easy whenever you are but the noise level combined with sustained listening on a daily basis on the convenient and portable music system can be highly damaging. 25% of the responders played there music at noise levels putting them at risk of hearing damage. The average noise exposure level was determined to be 79.8 dB. mp3 players particularly popular among young people. There is damage that long-term use of high volume will permanently damage people's hearing. Regularly listening to personal music players at high on hearing but slightly result in hearing loss later in life. Ozturan et al. (2002) assessed transient and distortion product evoked Oto acoustic emissions in 30 normal hearing adults before and

after a 10 minute telephone call using a GSM mobile phone transmitting microwaves at 900 MHZ. Otoacoustic emissions did not change as a result of using a mobile phone. Oysu et al. (2005) assessed the short term effects of mobile phone electromagnetic fields on the auditory evoked potential (BERA) of 18 normal hearing volunteers. The handset transmitted microwaves at 900MHZ, the SAR was 0.82 W/Kg, and the position was the right ear. BERA was done before and immediately after a 15 minute telephone call.

Effects of Mobile and Mp3

Whether the exposure to noise from devices like personal music players and mobile phones with this function at levels corresponding to current permissible noise emissions may cause quantifiable in particular hearing impairment to user and to specific the relevant outcomes. In case health risks are identified, the scnihr is asked.

- To identify the level of noise emission safeguarding the health of citizens, taking into account the intensity length of number of exposure to users of personal music player and mobile phone with same function.
- To identify priority issue for the research.

Following this frequent use of mobile and mp3 has shown a TTS [Temporary threshold shift]

- Intensity of fatiguing stimulus.
- The duration of the fatiguing stimulus.
- The frequency of fatiguing stimulus.
- The frequency of test stimulus.
- The time between cessation of the fatiguing stimulus and the post exposure threshold determination called the recovery interval.

Audio logical complications of population using mp3 and mobile

- High frequency hearing loss.
- Fullness in the ear.
- Tinnitus.
- Tumor.
- Acoustic neuroma.
- Ear warmth.
- Strange noise in the ear.
- Unable to hear in the class room situation.
- These are serious consequences and as the youngsters grow older their hearing will only worsen due to normal decay of sensory hair cells in the inner ear over time.

Aim of the Study

- To profile the hearing loss following MUSIC and MOBILE
- To compare the decrement of threshold shift in mobile users and MP3 users.

MATERIALS AND METHODS

In present study young college going students were selected as they would be one who will be using mobiles mp3 at maximum. 20 subjects were taken for this study dividing the subjects into two groups where group A includes mobile users of minimum of 4 hours use with a continuity of 1 hr

conversation and GROUP B includes mp3 users for minimum of 100 db exposure for 1 hr, with 10 subjects in each group.

- Selected subject has undergone the complete test battery including PTA, Speech audiometry and impedance audiometry prior to the exposure of music and talking over the mobile. Then post effects of those stimuli were measured.
- Audiological test protocol included Conventional audiometry, Impedance audiometry, DPOAE. The group was expose music for 3 to 4 hours in a day and talk over the mobile.

Instrumentation

The instrumentation used for the study as follows Conventional Frequency Audiometry, speech audiometry, Immitance Audimetry and OAE.

Procedure

Subjects undergo audiological evaluation using calibrated audiometer ALPS AD 2100, ear phones TDH 39P, BC B72. All the subjects audiological evaluation was done at first before exposure. Then both groups were exposed to the stimulus. Group A were instructed to use the Sony Ericson with GSM SIM (W3500) for continuous use of 1 hour with minimum of 4 hour usage per day. Then the audiological findings were taken as a post effect. The same way group B subjects were instructed to use the ENTER S/N 0811053194 with 100 db output along insert ear phone for a minimum period of 1 hour, then the subjects thresholds were taken as post effect. Hearing threshold of the subjects was estimated using pure tones of octave frequencies ranging from 250HZ to 8KHZ for three trials both AC and BC threshold ranging from 250-4000 HZ. The speech audiometric SRT and SDS scores are obtained from all the subjects of both the groups using Telugu stimulus for PB and Spondee words. Impedance audiometry using MAICO MA 52 was carried out for the same subjects and instructed not to swallow, hold the breath then tympanometry & reflexometry thresholds were recorded. Screener using Interacoustic using Biologic adeax is carried out to find out the outer hair cell function. All the subjects' pre audiological findings and post audiological findings after stimulus use were recorded and subjected to statistical analysis.

RESULTS

Audiological evaluation was done for the selected subjects and the results were listed below. In both group of mobile and mp3 users PTA was done and the test result shown within normal limits. Then speech audiometry was carried out for all subjects for speech Recognition threshold significant correlation of +or-12dB for Speech discrimination threshold reveals normal range.

On tympanometry it has shown A Type tympanogram with presence of both Ipsilateral, Contra lateral reflexes in reflexometry indicative of no middle ear pathology. OAE was found the presence of normal cochlear function of TEOAE&DPOAE. The audiometric results documented for present results then subjects were exposed to mobiles. After post effect audiological test battery was done for both the groups respectively & the results were showed in the tabular form.

| Mode | S.No. | PTA | | SRT | | SDS | | Tympanogram | Reflexometry | | OAE |
|--------------|-------|-------|------|-------|------|-------|------|-------------|------------------|------------------|------------------|
| | | Right | Left | Right | Left | Right | Left | | Ipsi | Contra | |
| Mobile Users | 1 | 10 | 15 | 22 | 27 | 90% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 2 | 10 | 10 | 22 | 22 | 95% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 3 | 5 | 10 | 17 | 22 | 95% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 4 | 10 | 5 | 22 | 17 | 90% | 85% | A Type | Present, Present | Present, Present | Present, Present |
| | 5 | 15 | 10 | 27 | 22 | 85% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 6 | 10 | 15 | 22 | 27 | 90% | 85% | A Type | Present, Present | Present, Present | Present, Present |
| | 7 | 15 | 20 | 27 | 32 | 90% | 80% | A Type | Present, Present | Present, Present | Present, Present |
| | 8 | 10 | 5 | 22 | 27 | 90% | 95% | A Type | Present, Present | Present, Present | Present, Present |
| | 9 | 10 | 10 | 22 | 22 | 90% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 10 | 15 | 10 | 27 | 22 | 90% | 95% | A Type | Present, Present | Present, Present | Present, Present |
| MP3 Users | 1 | 15 | 10 | 27 | 22 | 90% | 95% | A Type | Present, Present | Present, Present | Present, Present |
| | 2 | 10 | 15 | 22 | 27 | 95% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 3 | 20 | 10 | 32 | 22 | 85% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 4 | 10 | 20 | 22 | 32 | 90% | 80% | A Type | Present, Present | Present, Present | Present, Present |
| | 5 | 15 | 20 | 27 | 32 | 90% | 85% | A Type | Present, Present | Present, Present | Present, Present |
| | 6 | 10 | 15 | 22 | 27 | 90% | 85% | A Type | Present, Present | Present, Present | Present, Present |
| | 7 | 15 | 20 | 27 | 32 | 95% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 8 | 10 | 15 | 22 | 27 | 95% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 9 | 10 | 10 | 22 | 22 | 85% | 85% | A Type | Present, Present | Present, Present | Present, Present |
| | 10 | 15 | 20 | 27 | 32 | 90% | 85% | A Type | Present, Present | Present, Present | Present, Present |

Table. 2

| Mode | S.No. | PTA | | SRT | | SDS | | Tympanogram | Reflexometry | | OAE |
|--------------|-------|-------|------|-------|------|-------|------|-------------|--------------------|------------------------|------------------------|
| | | Right | Left | Right | Left | Right | Left | | Right | Left | |
| Mobile Users | 1 | 25 | 30 | 37 | 42 | 90% | 85% | A Type | Present, Present | Present, Present | Present, Present |
| | 2 | 25 | 25 | 37 | 37 | 90% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 3 | 20 | 25 | 32 | 37 | 90% | 85% | A Type | Present, Present | Present, Present | Present, Present |
| | 4 | 30 | 20 | 42 | 32 | 90% | 95% | A Type | Present, Present | Present, Diminished | Present, Diminished |
| | 5 | 30 | 25 | 42 | 37 | 90% | 85% | A Type | Elevated, Present | Present, Diminished | Present, Diminished |
| | 6 | 25 | 30 | 37 | 42 | 90% | 80% | A Type | Present, Elevated | Diminished, Present | Diminished, Present |
| | 7 | 30 | 35 | 42 | 47 | 85% | 80% | A Type | Elevated, Elevated | Diminished, Present | Diminished, Present |
| | 8 | 25 | 20 | 37 | 32 | 85% | 90% | A Type | Present, Present | Present, Present | Present, Present |
| | 9 | 30 | 25 | 42 | 37 | 90% | 95% | A Type | Elevated, Present | Diminished, Present | Diminished, Present |
| | 10 | 30 | 25 | 42 | 37 | 90% | 95% | A Type | Present, Present | Present, Present | Present, Present |
| MP3 Users | 1 | 35 | 30 | 47 | 42 | 90% | 95% | A Type | Elevated, Elevated | Diminished, Present | Diminished, Present |
| | 2 | 30 | 40 | 2 | 52 | 85% | 80% | A Type | Elevated, Elevated | Diminished, Diminished | Diminished, Diminished |
| | 3 | 40 | 35 | 52 | 47 | 90% | 95% | A Type | Absent, Elevated | Absent, Diminished | Absent, Diminished |
| | 4 | 30 | 40 | 42 | 52 | 90% | 85% | A Type | Elevated, Elevated | Diminished, Diminished | Diminished, Diminished |
| | 5 | 35 | 40 | 7 | 52 | 90% | 85% | A Type | Elevated, Absent | Diminished, Absent | Diminished, Absent |
| | 6 | 30 | 40 | 42 | 52 | 90% | 85% | A Type | Elevated, Elevated | Diminished, Diminished | Diminished, Diminished |
| | 7 | 30 | 40 | 42 | 52 | 90% | 90% | A Type | Elevated, Absent | Diminished, Absent | Diminished, Absent |
| | 8 | 30 | 35 | 42 | 47 | 90% | 85% | A Type | Elevated, Elevated | Diminished, Diminished | Diminished, Diminished |
| | 9 | 30 | 30 | 42 | 42 | 90% | 90% | A Type | Elevated, Elevated | Diminished, Diminished | Diminished, Diminished |
| | 10 | 30 | 40 | 42 | 52 | 90% | 85% | A Type | Elevated, Absent | Diminished Absent | Diminished Absent |

Mobile users: PTA results for mobile users showed as 15-20dB after continuous exposure for 1 hour. Speech Audiometry results were correlating PTA threshold. No effect of Mobile and Mp3 on Tympanometry showing A Type Tympanogram for the groups. Reflexometry reveals elevated reflexes in 4 subjects out of 10 subjects. OAE's were diminished in 4 subjects and present in remaining subjects.

MP3 Users: PTA results for mp3 users showed as 20-38dB shift after exposure for 1 hour. Speech Audiometry results were correlating to PTA threshold. No effect of Mobile and Mp3 on Tympanometry and it was showed A Type tympanogram for the groups. Reflexometry reveals absent reflexes in 4 subjects and elevated in 6 subjects. OAE' were absent in 4 subjects and Diminished in remaining subjects.

DISCUSSION

From the above mentioned results we came to the result that the usage of high prolonged stimulus induced due to mobile and mp3 has adverse effect of hearing threshold. Audiological evaluation shows for all the subjects and when compared it has found from the base that the mobile users has normal hearing threshold where as the mp3 users has towards the higher range of normal tending to minimal hearing loss.

Though both the users has a threshold shift where mobile users has a mean shift of right ear mean 11 to 24, left ear mean 11 to 25.5 and mp3 users right ear mean 13 to 32, left ear mean 15.5 to 37 was showing a significant alterations on the threshold. After exposure though results were not very supportive for reflexometry in impedance audiometry but a significant change in OAE's, shows a presents of TTS as 3% of Mobile users has diminished OAE's and in Mp3 users 90% among all the subjects. It was reported subjectively from the mp3 users as presents of low pitched Tinnitus soon exposure, which is tolerable. It was evident from the present study that on an average, with the stimulus exposure of mobile and mp3, mp3 population has immediate and short threshold shift. However audiological test battery is not very sensitive to the TTS, OAE's shows 90% of TTS in mp3 users than mobile users.

Clinical implication

- Making the youth to be safe from TTS by using mobile and mp3.
- Usage of protective plugs with higher attenuation ear phones.
- Stop using mobiles and mp3 with higher output or more than 100dB.

According to various studies, a study by OZTURAN et al. (2002) has recommended caution in mobile phone use to minimize exposure of the auditory system to microwaves. These authors have proposed that mobile phones should be used only when absolutely needed, and even then, for short calls. Hands- free kits or preferred, as they may reduce the microwave load by about 90%.

Limitations

However the study was carried out on youth with no medical history. It was done on a small sample of 10 members irrespectively of gender. The same study can be carried out to know the TTS recovery period for the mobile users and mp3 users.

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