

Original Research Article

The Comparative Study of Subtle Deafness in Cosmopolitan, Town and Rural Population

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Abstract

Background: The presbycusis patients (usually beyond 50 years) come to us with much loss of hearing sensitivity. The deafness unperceived starts much earlier before their perception.

Objectives: To identify the severity of the subtle deafness in the cosmopolitan, small town and rural areas.

Materials and methods: We had selected the people with absolutely normal hearing (claimed by the subjects) between 21-50 years. They were confident of their hearing status, even on deep probing. We divided the people into three categories like cosmopolitan, small town and rural. We had selected the people of Mumbai under the cosmopolitan category. The audiological evaluation was carried out in sound treated room meeting the ANSI Standards of permissible ambient noise levels in sound treated room. Manual Pure Tone Audiometer in a two room set up that confirm to ANSI S-3.6-1996 standard was used. The instrument used for this study was calibrated ALPS AD 2100 audiometer with TDH 49 ear phones.

Results: The cosmopolitan population were affected most. Later small town people and lastly rural area people were affected. In cosmopolitan population the 4 kHz was mostly affected, suggesting the significant impact of noise on their hearing. In town population also the 4 kHz is affected, but not to the extent of cosmopolitan people. The cosmopolitan people were affected worst among the three categories. And interestingly the small town population and rural population have almost the same hearing thresholds.

Conclusion: The severity of subtle deafness is most in cosmopolitan, lesser in small town and least in rural population. The pure tone audiometry should be done in cosmopolitan people in early twenties, in small town people in early thirties and in rural population in early forties.

Key words

Subtle deafness, Comparison, Cosmopolitan, Town, Rural, Population.

Introduction

We are living in the modern society and paying the price with hypertension, diabetes, hyperacidity, psychiatric problems, cancers and lung problems. Now it is the right time to include deafness also.

The presbycusis patients (usually beyond 50 years) come to us with much loss of hearing sensitivity. The deafness unperceived starts much earlier before their perception. Until now there is no term to mention this unperceived deafness and we are referring this unperceived deafness as '*subtle deafness*'.

We tried to identify the severity of the subtle deafness between 20-50 years of age group. We divided the population into three categories such as cosmopolitan, small town and rural. We tried to identify the severity of the subtle deafness in the three category people. And we had done the pure tone audiometry in these three categories between 20- 50 years of age and compared them.

Aim

- To identify the severity of the subtle deafness in the cosmopolitan, small town and rural areas.

Materials and methods

We had selected the people with absolutely normal hearing (claimed by the subjects) between 21-50 years. They were confident of their hearing status, even on deep probing. We divided the people into three categories like cosmopolitan, small town and rural. We had selected the people of Mumbai under the cosmopolitan category. We had selected the Raigarh (Chhattisgarh) town for small town and

remote villages of the Raigarh district for rural population. We had divided each category people into three age groups. They were between 21-30, 31-40 and 41-50. We had done the pure tone audiometry on twenty persons in each group i.e. 60 persons in each category and compared their mean hearing thresholds.

Inclusion criteria

- People between the age of 21- 50
- There should be no perceived deafness.
- There should be no family history of deafness
- There should be normal external and middle ear.
- Rinne's test must be positive and Weber's test must be centralised.
- No history of ear problems within one year.
- No hospitalisation and prolonged medical treatment for any serious medical conditions.

Exclusion criteria

- Persons below 20 and above 51 years.
- Persons with ear problems like discharge, tinnitus, vertigo, recent history (within 1 year) of ear problems.
- Persons with family history of deafness.
- External ear and middle ear abnormalities.
- Patients with chronic nasal problems like allergy, sinusitis and nasal obstruction.

Demographic information of the subjects was taken. Hearing test Questionnaire developed by American Academy of Otolaryngology was used for hearing screening. Subjects were interviewed using a structured interview in questionnaire format collecting demographic data about family

history, habits, medical history, occupation, discomfort faced during conversation in social environment etc. Otoscopic examination of subjects was performed to examine any abnormality in the external auditory canal and the tympanic membrane. Any subjects found with any abnormality were excluded from the study.

The audiological evaluation was carried out in sound treated room meeting the ANSI Standards of permissible ambient noise levels in sound treated room. Manual Pure Tone Audiometer in a two room set up that confirm to ANSI S-3.6-1996 standard was used. The instrument used for this study was calibrated ALPS AD 2100 audiometer with TDH 49 ear phones.

The subjects of the rural and small town categories were tested in our hospital audiometry room and for the cosmopolitan subjects; we went to the Mumbai and collected the data.

Appropriate statistical analysis tool was used to analyze for the threshold determination of all subjects.

Results

The cosmopolitan population was affected most. Later small town people and lastly rural area people were affected. In cosmopolitan population the 4 kHz was mostly affected, suggesting the significant impact of noise on their hearing. In town population also the 4 kHz is affected, but not to the extent of cosmopolitan people. Rural population hearing threshold is best among the three categories (**Figure – 1**).

The cosmopolitan people were affected worst among the three categories. And interestingly the small town population and rural population have almost the same hearing thresholds. Comparing this graph (**Figure - 2**) to previous graph (**Figure - 1**) over all hearing threshold of the three categories increased with age. The rural population hearing threshold increased faster comparing with other categories.

Figure – 3 showed a surprising result in the age group of 41-50 years. All the categories of the people were almost equally affected. The exception was for the rural population in high frequencies only. Again there was rapid deterioration in the hearing sensitivity of the rural population.

Figure - 1: Mean Hearing Threshold in dBHL, Age group 21 to 30 years.

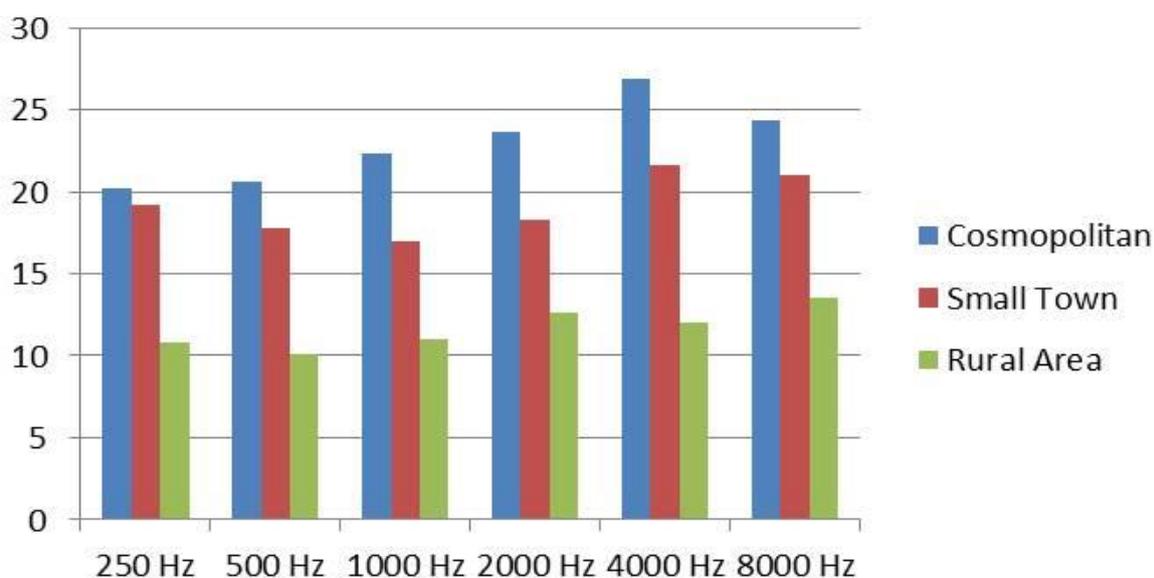


Figure - 2: Mean Hearing Threshold in dBHL, Age 31 to 40 years.

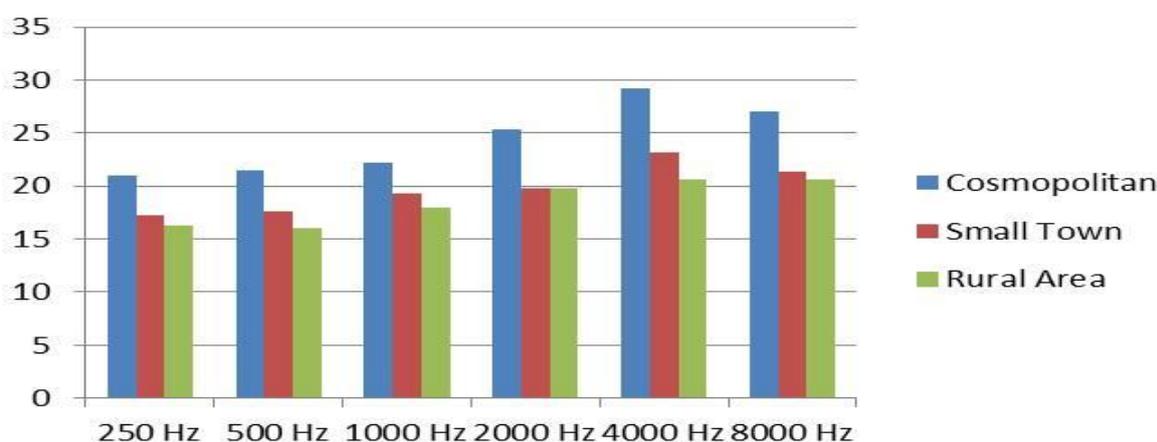
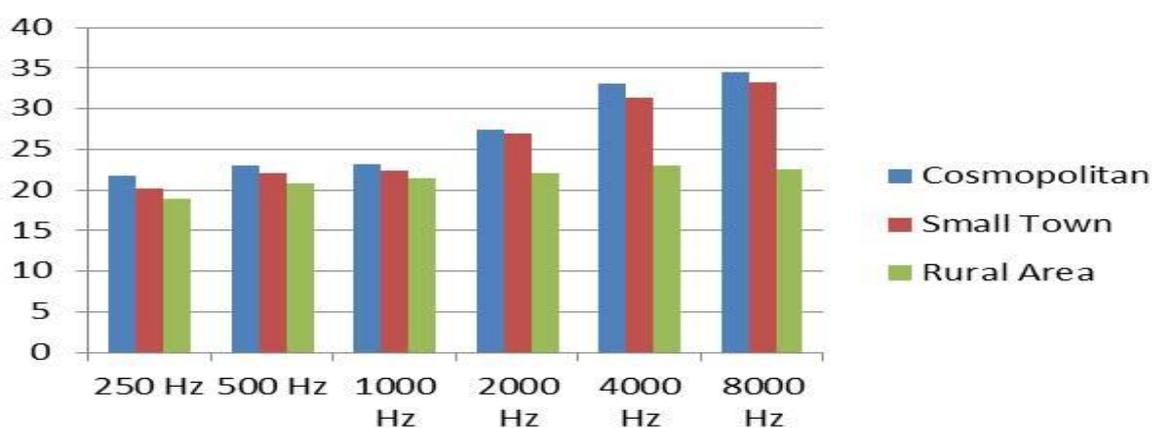


Figure - 3: Mean Hearing Threshold in dBHL, Age 41 to 50 years.



Discussion

In **Figure - 1**, there was gross difference in the hearing sensitivity of the three category people. In **Figure - 2**, the small town and rural people almost had the same hearing threshold and cosmopolitan people hearing threshold is worse. In **Figure - 3**, all the three category people were affected almost equally. The most obvious factors that might be affecting the hearing of

these people are exposure to loud sounds, air pollution and malnutrition.

Effect of Noise

Noise induced hearing loss is the second most common cause of acquired hearing loss after presbycusis. The noise level varies (**Table - 1**) in cosmopolitan, town and rural areas [1, 2, 5].

Table - 1: Variation in noise level.

Area (Region)	Ambient Noise Levels (maximum)	
	Day Time dB (A)	Night Time dB (A)
Metropolitan Areas (Mumbai)	80.14	77.05
Town Area (Raigarh)	58.40	48.20
Rural Area	45	35

Source: Draft report on metropolitan cities noise monitoring 2014 (Mumbai). Executive Summary Report: Environmental Impact 2010 (Raigarh). Phoenix Expansion Project: Environmental Impact Statement 2007.

The cosmopolitan and small town people are exposed to loud sounds (traffic sounds, television, audio and video songs, mobile usage) more in their day to day life [3, 4]. It has been estimated that over 20 years, since the early 1980s to 2000, the number of young people with social noise exposure has tripled from 6.7% to 18.8% [6]. Small town people were affected lesser than the cosmopolitan people. Rural people live in peaceful environment and are rarely exposed to unwanted loud sounds.

Noise-induced hearing loss is associated with the damage and loss of sensory outer hair cells in the cochlea. Recently, it has been shown that acoustic overexposure can also produce a rapid and irreversible loss of cochlear nerve terminals on inner hair cells and a slow degeneration of spiral ganglion cells. This emphasizes that exposure to different types of noise and sounds since early childhood should be recognized as having potential cumulative effects on hearing impairment in adulthood and in old age [7, 8].

Effect of Air Pollution

We all know that the air pollution is most in the cities, lesser in the towns and least in the rural areas. Mumbai city ranks third among the most polluted cities of India.

Air pollution has been implicated as a chronic source of neuro-inflammation and reactive oxygen species (ROS) that produce neuropathology and central nervous system disease [3]. There is an association between exposure to severe air pollution and neural dysfunction of the auditory pathway [4].

Effect of Malnutrition

The World Bank estimates that India is one of the highest ranking countries in the world for the number of children suffering from malnutrition. Under-nutrition is more prevalent in rural areas, again mainly due to low socio-economic status. Anaemia is found in over 70% of individuals in the state of Chhattisgarh.

The low serum Folate and Cobalamine (B12) might be the factor responsible for the hearing loss [11]. Age-related hearing loss has been associated with a variety of environmental factors, including ambient noise, malnutrition, ototoxicity and infection. Two studies have shown an association between age-related hearing loss and dysfunction and low serum levels of cobalamine and folate. The studies found evidence of improved hearing following supplementation [9, 10].

The malnutrition which is common in rural population might be causing rapid deterioration in the hearing sensitivity in rural category between 31 to 50 years.

Conclusion

The severity of subtle deafness is most in cosmopolitan, lesser in small town and least in rural population. The pure tone audiometry should be done in cosmopolitan people in early twenties, in small town people in early thirties and in rural population in early forties. The government should take proper actions to control the noise pollution in cities and towns. The people who are living in cities and towns also should take proper precautions from noise pollution at individual level. The nutritional programs in rural areas should be monitored properly and this type of study should be repeated at the interval of five years.

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