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Original Research Article

Prevalence and etiology of hearing impairment in urban area of Shimla, Himachal Pradesh, India: a cross sectional observational study

Trilok C. Guleria[1]*, Shobha Mohindroo[2], Narender K. Mohindroo[1], Ramesh K. Azad[1]

[1]Department of Otolaryngology – Head and Neck Surgery, Indira Gandhi Medical College, Shimla, Himachal Pradesh, India
[2]Department of Pathology, Indira Gandhi Medical College, Shimla, Himachal Pradesh, India

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***Correspondence:**
Dr. Trilok C. Guleria,
E-mail: tcguleria@gmail.com

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ABSTRACT

Background: The ear is a marvelously complex and sensitive organ. Disease of the ear have profound effect on the health and quality of life of millions of people around the globe. Data regarding the magnitude of hearing impairment in our country is limited and the literature search revealed that no such studies have been conducted in this region.
Methods: A community based cross sectional observational study was carried out among the 306 individuals in urban area of Shimla, Himachal Pradesh, India. Information was obtained by a structured questionnaire, clinical ENT examination and audiological tests after obtaining informed consent.
Results: The study group had 48.4% males and 51.6% females. Maximum 29.4% of individuals were in the age group of 31-45 years. Mean age was 32.22±20.15. The prevalence of hearing impairment was 13.1%. Among individuals with hearing loss, maximum 57.5% were in the age group of ≥60 years. Sensorineural hearing loss was found in 70%, maximum 55% had mild hearing loss. Among majority of individuals with hearing loss cause was presbyacusis 57.5% followed by infectious ear disease 27.5%. Among majority of individuals with hearing loss 37.5% required no further action at the time of study.
Conclusions: In the present study, prevalence of hearing loss was found to be 13.1% and predominantly mild sensorineural or conductive type of hearing loss. An early intervention and quality patient education was necessary for prevention of hearing impairment in majority of cases.

Keywords: Hearing loss, Prevalence, Presbyacusis, Sensorineural, Urban

INTRODUCTION

The ear is a marvelously complex and sensitive organ. Unfortunately, damage to the organ, whether through disease, physical insult, long term exposure to excessive noise, some drugs or simply the effects of aging, can cause the ear to malfunction. The result of malfunction is usually to produce some degree of deafness.[1]

Disease of the ear have profound effect on the health and quality of life of millions of people around the globe.[2] According to the 2005 estimates of WHO, 278 million people have disabling hearing impairment.[3] The prevalence of deafness in Southeast Asia ranges from 4.6% to 8.8%. In India, 63 million people (6.3%) suffer from significant auditory loss. A lack of skilled manpower and human resources make this problem a huge challenge.[4] Hearing loss is hearing impairment of various degrees. A significant proportion of cases of hearing loss are due to common ear diseases i.e. ear wax, external auditory canal infections, otomycosis, ASOM, CSOM, OME etc, which if diagnosed early and managed properly can significantly reduce the burden of decreased hearing.[3]

The ability to communicate is a crucial aspect of human life as auditory sense is very important for communication of any kind. It is indispensable for normal mental development of a child. Hearing impairment and Deafness acquire a special significance as a large percentage of population affected are children. Along with this increase in elderly population, rapid industrialization and use of aminoglycoside and other ototoxic drug is rapidly increasing this problem.[5] Data regarding the magnitude of hearing impairment in our country is limited and the literature search revealed that no such studies have been conducted in Himachal Pradesh. Thus, our study is an attempt to determine the prevalence and determinants of hearing impairment among urban population of Shimla, Himachal Pradesh, India.

METHODS

This community based observational cross sectional study was carried out by the department of Otorhinolaryngology - Head and Neck Surgery, IGMC Shimla, Himachal Pradesh, India over a period of 1 year from July 2015 to June 2016 in urban area of Shimla, Himachal Pradesh, India.

Based on earlier studies and available literature, the prevalence of hearing impairment was found to vary from 5% to 17% in different parts of India. Assuming an average prevalence of 10%, absolute precision of 5% and 95% confidence interval with design effect of 2, sample size was calculated to be 278. Considering 10% non-response, the total sample size required was 306.

Multistage cluster sampling technique was used at the following levels in urban area. List of all wards in the Shimla town under Municipal Corporation obtained. Five wards were selected by simple random sampling from list of all wards in the town at the first stage by SRS. List of all colonies in five selected wards were obtained. One colony was selected from each of five selected wards by SRS. The households in the selected colonies were covered in proportionate manner.

All persons who were willing to participate were enrolled into study after taking informed written consent. Information was obtained by a structured questionnaire, clinical ENT examination and audiological tests. All the data was entered into Microsoft excel format and SPSS software 16.0. All discrete variables were expressed as percentages.

RESULTS

Total of 306 individuals were studied in different age groups, with minimum age 3 months and maximum age 89 years (Mean age 32.22±20.15). Maximum number of individuals were in the age group of 31-45 years 90 (29.4%) followed by 75 (24.5%) individuals in the age group of 0-15 years, 71 (23.2%) in the age group of 16-30 years, 37 (12.1%) in the age group of ≥60 years and 33 (10.8%) in the age group of 46-59 years (Table 1).

Table 1: Age group wise distribution (N = 306).

Age	Distribution
0-15 Years	75 (24.5%)
16-30 Years	71 (23.2%)
31-45 Years	90 (29.4%)
46-59 Years	33 (10.8%)
≥60 Years	37 (12.1%)

There were 148 (48.4%) males and 158 (51.6%) females in the study population (Table 2).

Table 2: Sex distribution (N=306).

Sex	Distribution
Male	148 (48.4%)
Female	158 (51.6%)

Maximum individuals 128 (41.8%) were in the upper middle class, 104 (34%) were in lower middle class, 39 (12.7%) in upper class, 35 (11.4%) in upper lower class and no individual was in the lower class (Table 3).

Table 3: Socioeconomic status (N = 306).

Socioeconomic status	Distribution
Upper class	39 (12.7%)
Upper middle class	128 (41.8%)
Lower middle class	104 (34%)
Upper lower class	35 (11.4%)
Lower class	0 (0%)

Among 266 (86.9%) individuals there was no hearing loss. Hearing loss was present in 40 (13.1%) individuals, out of which in right ear 6 (2%) individuals, in left ear 8 (2.6%) individuals and in both ears 26 (8.5%) individuals. So the prevalence of hearing loss was found to be 13.1% (Table 4).

Table 4: Hearing loss (N = 306).

Hearing loss	Distribution
No hearing loss	266 (86.9%)
Right ear	6 (2%)
Left ear	8 (2.6%)
Both ears	26 (8.5%)

Out of 40 (n) individuals with hearing loss, maximum were in the age group of ≥ 60 years 23 (57.5%) followed by 6 (15%) in 31-45 years, 5 (12.5%) in 16-30 years, 3 (7.5%) in 0-15 years and 3 (7.5%) in 46-59 years age group. Out of 40 individuals with hearing loss, 24 (60%) were male and 16 (40%) were female. In 40 individuals with hearing loss, maximum were from upper middle class 16 (40%) followed by 12 (30%) lower middle class, 8 (20%) upper class and 4 (10%) upper lower class. In 40

individuals with hearing loss, sensorineural was found in 28 (70%), conductive in 11 (27.5%) and mixed in 1 (2.5%) (Table 5).

Table 5: Type of hearing loss (n=40).

Type of hearing loss	Distribution
Conductive hearing loss	11 (27.5%)
Sensorineural hearing loss	28 (70%)
Mixed hearing loss	1 (2.5%)

Out of 40 individuals with hearing loss, maximum 22 (55%) individuals had mild hearing loss, 16 (40%) individuals had moderate hearing loss, 1 (2.5%) with severe hearing loss and 1 (2.5%) with profound hearing loss (Table 6).

Table 6: Degree of hearing loss (n=40).

Degree of hearing loss	Distribution
Mild hearing loss	22 (55%)
Moderate hearing loss	16 (40%)
Severe hearing loss	1 (2.5%)
Profound hearing loss	1 (2.5%)

Out of 40 individuals with hearing loss, among majority of individual's cause was presbyacusis 23 (57.5%) followed by infectious ear disease in 11 (27.5%), systemic disease in 3 (7.5%), in 2 (5%) cause of hearing loss cannot be determined and 1 (2.5%) with congenital type of hearing loss (Table 7).

Table 7: Etiology of hearing loss (n=40).

Etiology of hearing loss	Distribution
Infectious ear disease (ASOM/CSOM/Cholesteatoma)	11 (27.5%)
Presbyacusis	23 (57.5%)
Congenital	1 (2.5%)
Systemic diseases	3 (7.5%)
Cause cannot be determined	2 (5%)

Table 8: Further action (n=40).

Further action	Distribution
No action	15 (37.5%)
Medication	2 (5%)
Corrective middle ear / mastoid surgery – non-urgent	9 (22.5%)
Hearing aid	11 (27.5%)
Probable cochlear implant	1 (2.5%)
Others	2 (5%)

Out of 40 individuals with hearing loss, 15 (37.5%) required no further action at the time of study. Among 11 individuals with infectious ear disease, 9 (22.5%) needed corrective middle ear surgery in the form of myringoplasty / tympanoplasty for CSOM safe and 2 (5%) with ASOM needed medications. Among individuals with sensorineural hearing loss, 11 (27.5%) needed hearing aids, 2 (5%) needed further investigations for the cause of hearing loss and 1 (2.5%) with congenital hearing loss needed cochlear implant (Table 8).

DISCUSSION

The disease burden estimations based on sound epidemiological research provide the foundation for appropriate public policy focus and measures for effective management of disease conditions. A significant proportion of cases of hearing loss are due to common ear diseases, which if diagnosed early and managed properly can significantly reduce the burden of decreased hearing.[1-3] In present study, prevalence of hearing loss was 13.1% in urban area. Sensorineural hearing loss more prevalent followed by infectious middle ear diseases. According to WHO there were 360 million persons in the world with disabling hearing loss (5.3% of the world's population) and 328 million (91%) of these were adults.[6] ICMR study on prevalence and epidemiology of hearing impairment, revealed that the prevalence of hearing impairment in urban area was 6.8%.[7] Study also showed that in the urban area, sensorineural hearing loss was more prevalent. In present study prevalence in the urban areas was higher as compared to WHO and ICMR reports, but sensorineural hearing loss was more prevalent as shown in ICMR report.

In our study, we found individuals with earlier onset of sensorineural hearing loss in age group of 46-59 years due to the presence of systemic diseases. Agrawal Y et al. survey showed similar results that increase in hearing loss prevalence occurred earlier among participants with smoking, noise exposure and systemic diseases.[9] Lin FR et al. analyzed data from hearing assessment in adults aged 70 years and older. Prevalence of hearing loss was 63.1%.[12] In present study, we found prevalence of hearing loss ≥60 years age group was 57.5% which was consistent with this study.

In present study, mild degree of hearing was most common and presbyacusis was the most common cause of hearing loss. Bisht RS et al. study on OPD basis, showed similar results with presbyacusis was the most common cause of hearing loss.[14] In present study, prevalence of sensorineural hearing loss necessitating hearing aids was 27.5%. The need of corrective middle ear surgery non-urgent (Myringoplasty / Tympanoplasty) was 22.5%. Mishra A et al multi-cluster survey in rural and urban population, showed overall hearing impairment of 5.9% in urban population. The prevalence of sensorineural deafness necessitating hearing aids was 50% in urban area.[11] In present study, among individuals with hearing loss 60% were males and 40% were females. Among individuals with hearing loss, sensorineural hearing loss was present in 70%, conductive hearing loss in 27.5% and mixed hearing loss in 2.5% cases. In individuals with hearing loss, mild degree of hearing loss was present in 55%, moderate

hearing loss in 40%, severe hearing loss in 2.5% and profound hearing loss in 2.5% cases. Balasubramanian GK et al study comprises males 64% and females 36%. Out of this, about 15% had conductive deafness and 42% had sensorineural hearing loss. About 29% suffered from mild hearing loss, 26% moderate and 11% severe hearing loss.[13]

Hearing assessment in the age group of <4 years was done with behavior observation audiometry and OAE. BERA was used as gold standard diagnostic tool. John M et al performed neonatal hearing screening of high risk babies by which recommended use of otoacoustic emissions followed by BERA for screening of hearing.[8] Jose DJ et al assessed high risk babies by 2 staged DPOAE screening and those who failed the second stage DPOAE screening were subjected to diagnostic BERA.[15] 0.9% of the high-risk babies had hearing loss. In present study, we found 2.5% cases of congenital type of hearing loss among the individuals with hearing loss and probably needed cochlear implant. Mehra S et al showed similar results with average incidence of neonatal hearing loss is 1.1 per 1000 infants, with variation among states.[10]

CONCLUSION

In the present study prevalence of hearing loss was found to be 13.1%. Prevalence of bilateral hearing loss was more common and majority of individuals with hearing loss were in the age group of ≥60 years. Hearing loss was common in males. Most of individuals with hearing loss were from socioeconomic status of upper and lower middle class Most of the individuals with hearing loss had sensorineural type of hearing loss. Predominantly mild degree of hearing loss was present. Presbyacusis was leading cause of hearing loss followed by the infectious middle ear diseases. Since hearing loss has been found to have predominantly mild sensorineural or conductive hearing loss, an early intervention and quality patient education was necessary for prevention of hearing impairment in majority of cases.

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