

Prevalence and Determinants of Hearing Impairment among the Adult Population in a Coastal Area of Villupuram District, Tamil Nadu



Medical Science

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ABSTRACT

Introduction: Hearing loss is the most common sensory deficit. World over, it is the second leading cause for 'Years lived with Disability (YLD)'. As per WHO estimates, approximately 63 million people are suffering from hearing impairment in India. In order to set policies and priorities regarding hearing problem, it is essential to have information on prevalence and determinants of hearing impairment. Objective: To determine the prevalence and determinants of hearing impairment among the adult population in coastal area of Villupuram district, Tamil Nadu. Methods: A community based cross sectional study was conducted from 4th February 2013 to 2nd March 2013 among the 1034 individuals (>18 years old) at Marakkanam block, Villupuram District, Tamil Nadu. Multistage Cluster sampling technique was followed. Data was collected using a predesigned structured and validated questionnaire by house to house interview/examination by trained medical students after obtaining informed consent. Data was analysed using SPSS version 16.0 and p value <0.05 was used as statistically significant. Results: The prevalence of hearing impairment is 8.5% (CI: 7.92, 9.68). It is significantly associated with age (p=0.03) and occupation (p=0.01). The proportion of hearing impairment is significantly higher in the respondents with family history of hearing loss (41%, p<0.001), Diabetes (16.3%, p=0.04), history of ear trauma (18.5%, p=0.02). Conclusion: Hearing impairment is a significant public health problem and there is a need to strengthen the existing strategies and formulate innovative strategies to halt and reduce the burden of hearing impairment

Introduction

Hearing impairment is the most common sensory deficit in humans today. World over, it is the second leading cause for 'Years lived with Disability (YLD)'. According to World Health Organisation (WHO) "A person who is not able to hear as well as someone with normal hearing with hearing thresholds of 25dB or better in both ears is said to have hearing loss. Hearing loss may be mild, moderate, severe or profound. 'Hard of hearing' refers to people with hearing loss ranging from mild to severe. In 2012, WHO released new estimates on the magnitude of hearing impairment which showed that there are 360 million persons in the world with disabling hearing loss (5.3% of the world's population) and 328 million (91%) of these are adults. It is noteworthy that 32 (9%) million of these are children¹. As per WHO estimates, in India there were approximately 63 million people suffering from significant auditory impairment; this places the estimated prevalence at 6.3% in Indian population. As per NSSO survey in 2002, there were 291 persons per one lakh population² suffering from severe to profound hearing loss. Out of these, a large percentage was children between the ages of 0 to 14 years³. With such a large number of hearing impaired young Indians, it amounts to a severe loss of productivity, both physical and economic. Consequences of hearing impairment include inability to interpret speech sounds, often producing a reduced ability to communicate, delay in language acquisition, economic and educational disadvantage, social isolation and stigmatization. It may be worsened by some medical conditions such as hypothyroidism, diabetes. The common causes of hearing impairment are earwax, congenital hearing loss, sensorineural deafness, use of ototoxic drugs, noise Trauma etc⁴. Studies have proven that age, sex, family history of hearing loss, noise exposures etc were found to be significant risk factors for hearing impairment⁵. In order to set policies and priorities and to evaluate global ear health, it is essential to have up to date information on prevalence and on causes of visual impairment. 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 Tamil Nadu. Thus, our study is an attempt to determine the prevalence and determinants of hearing impairment among adult population of coastal

areas of Tamil Nadu.

Methodology

A community based cross sectional study was carried out from 4th February to 2nd March 2013 at Marakkanam Block, Villupuram district, Tamilnadu. All adults in the age group of 18 years and above who were willing to participate were included in the study. Severely ill adults were excluded from the study. The operational definition used for pronouncing a person as hearing impaired was "Any Person having either conductive deafness or sensorineural hearing loss at least in one ear". A pretested, structured questionnaire which was checked for its validity and reliability was used as the study tool. Stadiometer, weighing machine, Sphygmomanometer, Tuning forks (256 Hz) were the other tools used in the study. Prior to the actual study, a pilot study was conducted among 50 individuals. Necessary changes in the tools/survey plan were made as per the observations of pilot study. The pilot study respondents were not included in the final analysis.

Based on the previous studies it was found that the prevalence of hearing impairment varies from 7% to 18%⁶. Assuming the average prevalence of hearing impairment as 12%, absolute precision of 3% and 95% confidence interval with design effect of 2, sample size calculated was 902. Considering 10% of non response, we studied a total of 1034 individuals.

Multistage cluster sampling technique was used i.e., Marakkanam (A total of 56 villages) was divided into four blocks (14 villages in each block). One block was selected by simple random method and from that block four villages were selected randomly. In each village 250 individuals were recruited. Recruitment of study participants was by selection of first house hold randomly followed by continuous selection from consecutive households till the required sample size was achieved. In case of multiple eligible participants in the same house, all were included for the interview. Data was collected by the final year medical students, interns under the supervision of Post graduate (PG) students and Faculty from the Department of Community Medicine, Pondicherry Institute of Medical Sciences. For standardiza-

tion and perfection of examination skills the students, interns and PGs were trained by the resident of Otolaryngorhinology department over a one day workshop prior to initiation of data collection.

The data obtained from the survey was entered, collated and analyzed by Statistical Package for the Social Sciences (SPSS) software version 16.0. Chi Square test was performed to determine the level of significance of the association between the determinants and hearing impairment. Odds ratio was used to assess the strength of association. P value < 0.05 was considered as the level of significance. Informed verbal Consent was obtained from all the study participants. All those who were detected with hearing impairment or with any co-morbid condition were referred to Pondicherry Institute of Medical Sciences and they are under regular follow up.

Results

A total of 1034 individuals were studied out of which 637 (61.7%) were females and 391 (38.3) were males. Maximum (26%) were between the age group of 29-38 years and 39% of the study population were illiterates. Majority of the respondents' (69%) belong to the lower socioeconomic class.

A total of 88 (8.5%, 95% CI=7.9, 9.7) individuals were suffering from hearing impairment (Fig 1). The prevalence of conductive deafness is 5.1% and 2.8% in right and left ear respectively and the prevalence of sensorineural deafness is 0.4% and 1.5% in right and left ear respectively. Overall, 7.1% of the participants were found to have bilateral deafness.

Table 1 shows that among the socio demographic factors studied, age and occupation were significantly associated with hearing impairment (p=0.03 and p=0.01 respectively). The prevalence of hearing impairment is slightly higher among females (8.9%) than males (7.8%) but the difference is not statistically significant (p=0.53).

The odds of having the history of trauma to the ear is 2.5 times more in the participants with hearing impairment (p=0.02) compare with participants without hearing impairment. Similarly odds of diabetes is double the time more in hearing impairment individuals when compared with normal individuals (p=0.04). Forty one percent of the respondents with family history of hearing loss were found to be suffering from hearing impairment compared with only 7.2 % of the participants without family history of hearing loss (OR=8.9 (4.5,17.6), p < 0.0001). Although, 10.6 % of the individual with hypertension were found to be hearing impaired and 8.4% of the individuals without hypertension were found to be hearing impaired but this association was found to be statistically insignificant (p=0.52).

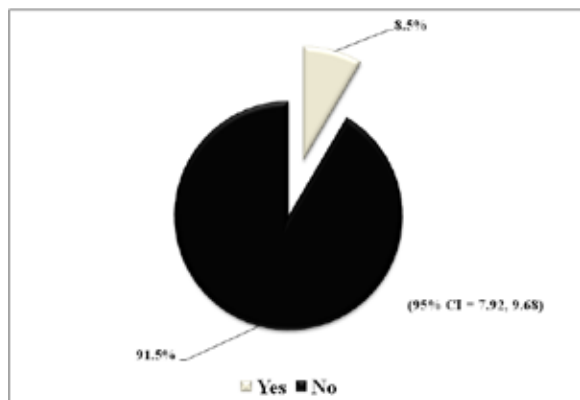


Fig 1: Prevalence of Hearing impairment in the study respondents (n=1034)

Determinants	Hearing impairment			p Value
	Present n (%)	Absent n (%)	Total	
Age in years				
18-28	21 (8)	242 (92)	263 (100)	
29-38	15 (5.5)	256 (94.5)	271 (100)	
39-48	17 (7.4)	212 (92.6)	229 (100)	
49-58	14 (11.7)	106 (88.3)	120 (100)	0.03
>=59	21 (13.9)	130 (86.1)	151 (100)	
Gender				
Male	31(7.8)	365(92.2)	396(100)	0.536
Female	57(8.9)	581(91.1)	638(100)	
Education				
Illiterate	34(8.1)	384(91.9)	418(100)	
Primary	14(10.2)	123(89.8)	137(100)	
Middle	22(9.9)	201(90.1)	223(100)	0.924
High	12(7.5)	147(92.5)	159(100)	
Intermediate	3(8.1)	34(91.1)	37(100)	
Graduate/ Professional	3(6.2)	57(93.8)	60(100)	
Occupation				
Unemployed	53(9.9)	485(90.1)	538(100)	
Unskilled	11(5.7)	182(94.3)	193(100)	0.012
Semiskilled	20(11.8)	149(88.2)	169(100)	
Skilled & above	4 (3)	130 (97)	134 (100)	
Socio economic class				
Upper	0(0)	4(100)	4(100)	
Upper middle	0(0)	30(100)	30(100)	0.380
Lower middle	6(7.1)	78(92.9)	84(100)	
Upper lower	61(8.5)	654(91.5)	715(100)	
Lower	21(10.4)	180(89.6)	201(100)	

Table 1: Socio demographic profile and hearing impairment

Determinants	Hearing impairment			Odds ratio (95% CI)	p Value
	Present n (%)	Absent n (%)	Total		
Ear trauma					
Yes	7 (18.5)	31(81.5)	38 (100)	2.5 (1.07, 5.8)	0.02
No	82 (8.2)	914 (91.8)	996 (100)		
Diabetes					
Yes	10 (16.3)	51 (83.7)	61 (100)	2.2 (1.1, 4.6)	0.04
No	78 (8)	895 (92)	973 (100)		
Hypertension					
Yes	7(10.6)	59(89.4)	66(100)	1.3 (0.6, 2.9)	0.528
No	81(8.4)	887(91.6)	968(100)		
Head injury					
Yes	4(13.8)	25(86.2)	29(100)	1.7 (0.6,5.1)	0.301
No	84(8.4)	921(91.6)	1005(100)		
Family history of hearing loss					
Yes	16(41)	23(59)	39(100)	8.9 (4.5,17.6)	<0.001
No	72(7.2)	923(92.8)	995(100)		

Table 2: Determinants of Hearing impairment

Discussion:

Hearing is one of the essential senses of human communication and any abnormality in the hearing system at any stage in the life may affect the quality of life. In our study we have found hearing impairment among the adult population of coastal areas of Tamil Nadu was really a burden i.e., the prevalence of hearing impairment was found to be 8.5% (95% CI 7.92, 9.68). A similar study done by Westerberg et al at Uganda showed that the prevalence of hearing impairment is 9.7%, which is comparable to our study.

It is a well known fact that as age increases the problem of hearing impairment also increases 5-7. This has been corroborated by our study i.e., the prevalence of hearing impairment is more among the persons older than 58 years (13.5%) and there was a significant association between age and hearing impairment (p=0.03). A study done by Agrawal et al among American adult population also showed the similar findings which supports our study.

Occupation had marked effects on hearing impairment. In our study, it was found that the hearing impairment is more in the semiskilled group (11.8%) and the association is statistically significant ($p=0.012$). The major occupation of study population classified in semi skilled were fishermen and other related works. Therefore, noise induced hearing impairment might be the reason for high prevalence of hearing impairment in semi-skilled group. Similar study was done in Denmark, where they found that the hearing loss was common among seafarers and fishermen⁹.

In our study, 16.3 % of the participants with diabetes were found to be suffering from hearing impairment and only 8% of the participants without diabetes were having hearing impairment ($p=0.04$). The Odds ratio of diabetes for the presence of hearing loss was 2.2 (95% CI=1.1, 4.6). A study done by Sakuta et al¹⁰ showed that the hearing loss was more prevalent among diabetic subjects and the odds ratio was 1.87. Other studies done by Dalton et al and Stolk et al also reported the similar findings.¹¹⁻¹²

We found that the participants with family history of hearing loss have statistically significant ($p<0.0001$) high prevalence of hearing loss (41%) than those without any family history (7.2%). Similar finding was reported in the study done by McMohan et al.¹³

Our study setting is community based where audiometric assessment was not feasible. So, we have used tuning fork tests as the diagnostic tool to detect hearing impairment. The sensitivity of hearing loss detected by tuning fork test is less than the audiometric assessment and it is unreliable¹⁴. Therefore, estimates based on tuning fork test may underestimate the true estimates and it should be interpreted with caution.

The present study has highlighted that there is high prevalence of hearing impairment among adult population in coastal areas of Tamil Nadu and is associated with the factors like age, diabetes, family history and ear trauma. Therefore, there is a need to formulate innovative strategies by all stake holders to reduce the burden of hearing impairment in the community.

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