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Quantitative analysis of the effect of the demographic factors on presbyacusis

Dayasiri MBKC , Dayasena RP, Jayasuriya C, Perera DSC, Kuruppu K AMP, Peris MNP

Department of Otolaryngology, National Hospital of Sri Lanka

RESEARCH

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Corresponding Author:
Dr.Kavinda Chandimal Dayasiri
A8/2/2, Angulana ,Moratuwa, Sri Lanka.
kavindadayasiri@gmail.com

Abstract

Background

Presbyacusis is the most common type of hearing loss, often having profound effects on the quality of life in old age.

The objectives of this study were:

1. To analyse of the effect of demographic factors on presbyacusis in Sri Lanka.
2. To quantify the effect of non-demographic risk factors on presbyacusis.

Method

An observational cross-sectional study was carried out involving all the patients who presented to the National Hospital ENT clinic with hearing loss between April 2007 and April 2010. Patients whose pure-tone audiometry results were suggestive of sensorineural hearing deficit and whose tympanometry testing did not show any middle ear problems were assessed using an interviewer-administered questionnaire.

Results

Among the 567 participants studied, the mean age was 63.4yrs. Fifty eight percent were females. The majority of the patients were from the Colombo district (59.3%), however, participants came from ten districts of Sri Lanka. Most of the study participants (64.2%) were married and living with their partners, but 24.7% were widowed and the rest were either unmarried or divorced. 6.1% had communication difficulties leading to disrupted social relationships and 21% felt that hearing impairment (HI) had adversely affected their psychological well-being. The onset of impaired hearing, as perceived by the patients initially and later confirmed by pure-tone audiometry and tymanometry, had occurred at an average age of 62.9yrs.

Conclusion

There was no significant association between presbyacusis and other demographic factors such as gender, education level and marital status. A significant proportion of the participants had been widowed and that fact, too, can reduce their quality of life.

Key Words

Presbyacusis, Sri Lanka, Quality of life.

Background

Presbyacusis is the most common sensory impairment among the elderly and the effects of the resulting hearing impairment (HI) can be, physically, socially and psychologically devastating, leading to loneliness and isolation through difficulties in integration into society, anxiety and depression. Presbyacusis is also associated with other sensory impairments.[1, 2] With the population aging; the projected global rise in the proportion of persons aged ≥65 years is likely to be associated with increasing prevalence of HI among the elderly.[3, 4]

Poorly controlled hypertension or diabetes may predispose to HI through the occurrence of chronic arteriosclerosis which in turn causes a reduction in the blood supply to the inner ear.[4,5,6] As these are common chronic diseases among older adults, adequate prevention and treatment of these diseases are associated with favourable outcomes.

The majority of the world's elderly persons reside in developing countries, and this proportion is projected to rise even further in the coming decades. However, there has been little research of the major causes of disability among this population.[7] Specifically, there is a paucity of studies addressing the prevalence and correlates of HI in the elderly in developing countries with a consequent gap in our knowledge about effective strategies to prevent the problem.[5, 6]

Presbyacusis is caused by cochlear degeneration, most pronounced in the basal cochlear coil. The most common audiometric configuration is a gently sloping audiogram, particularly affecting the high frequencies.[8]

According to current literature, the aetiology of presbyacusis is thought to be mainly due to environmental noise and arterial sclerosis. Cumulative effects of social noise influence the auditory function gradually. Sclerotic change of arteries in the brain occurs along the total auditory neural pathway. Histopathological findings reveal characteristic changes in all parts of the auditory pathway in elderly persons. Thickening of the ear drum, sclerotic change of the joints between the ossicles, decreasing

number of hair cells, degeneration of the eighth nerve and of the neurons in the auditory centre are among these alterations.[9]

Risk factors for presbyacusis include systemic diseases and poor habits that cause inner ear damage and lead to impaired hearing. Age, the male gender, diabetes mellitus, hypertension and hereditary hearing loss are all identified as risk factors. Correct identification of these risk factors is relevant for prevention.[10] Presbyacusis generally develops after the age of 60 years.

Sri Lanka, being a fast-aging nation, has to address the needs of its elderly population with age-related HI to improve their quality of life. In this study, we analyzed the effects of key demographic factors such as age, gender, district of residence, educational status, ethnicity, family relationships as risk factors for presbyacusis.

Methods

The design was an observational cross-sectional study. The sample frame were all the patients who presented to the National Hospital ENT clinic, Colombo, during a three-year period from April 2007 to April 2010.

All patients who fulfilled all the inclusion criteria were included in the study. Inclusion criteria were:

1. Patients, who had recent onset, spontaneous, hearing loss with pure-tone audiometry (PTA), suggestive of sensorineural type of hearing deficit and the tympanogram not showing any middle ear problems.
2. Patients who were clinically diagnosed as having presbyacusis by a consultant ENT surgeon.
3. Patients who gave informed verbal consent to participate in the study.

Exclusion criteria were:

1. Severely debilitated patients incuding the blind and morbidly bed ridden patients.
2. Patients diagnosed with major psychological illnesses including sever depressive disorder,severe dementia and anxiety disorder.
3. Patients who were exposed to trauma such as barotraumas, blast injury, gunshot injury etc prior to developing hearing loss.

A clinical interview with every patient was preceded by PTA and tympanogram to confirm that the reason for a patient's hearing deficit was age-related sensorineural hearing loss and not another ear condition such as chronic suppurative ottis media or Meniere's disease.

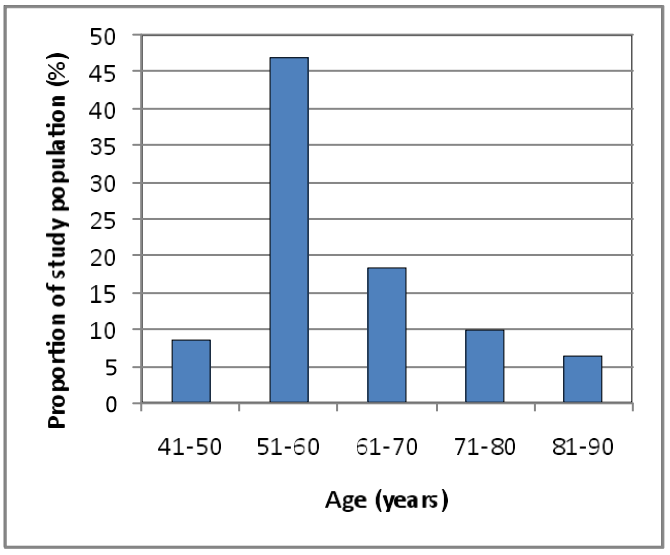
Data regarding the patient's age, duration of hearing loss, gender, occupation, PTA results, tympanometry results, education level and marital status were collected using a self-administered questionnaire.

Standard deviations (SD), standard errors (SE), standard normal deviates (SND) and probability (p) values were calculated to derive conclusions regarding significance levels.

Results

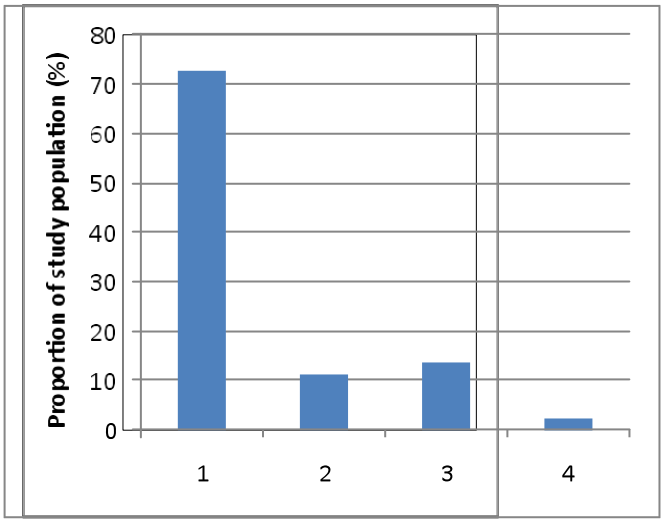
Five hundred and sixty seven patients fulfilled the inclusion criteria during the study period and were assessed. The mean age of the study population was 63.4yr. and 58% were females. The spread of patient ages are seen in Figure 1.

Figure 1: Age distribution of the study population



The mean duration of the patients' complaint of the impaired hearing was 5.89 months. The onset of impaired hearing, as perceived by the patients initially and later confirmed by pure tone audiometry and tymanometry, had occurred on average at 62.9yr. The mean age at the onset of impaired hearing among male and female patient groups was not significant (p>0.05).

Figure 2: Educational attainment of the study population ((1 = Ordinary level education (including primary and secondary education), 2 = Advanced level education, 3 = Above advanced level education (including diplomas, training courses, etc.) 4 = Graduates and higher education levels)



The majority of the patients were from the Colombo district (59.3%), however, there were patients came from ten districts of Sri Lanka.

The majority of the patients had been educated to ordinary level or below and 2.5% had received university education. The spread of education attainment are seen in Figure 2.

Most of the study participants (64.2%) were married and living with their partners but 24.7% were widowed and others were either unmarried or divorced (see Table 1)

Table 1: Family relationship status distribution of the study population

Marital status	***Percentage***
Married	64.2
Widowed	24.7
Unmarried	9.9
Divorced	1.1

The majority of the patients were Sinhalese (91.4%) Other ethnic groups comprised only a minority of the study sample (see Table 2)

Table 2: Ethnic distribution of the study population

Ethnic group	***Percentage***
Sinhala	91.4
Tamil	6.2
Muslim	2.5

Seven percent of patients had a family history of presbyacusis among either first degree or second degree relatives. Thirty-nine percent had been diagnosed with diabetes mellitus and 21% had been diagnosed with chronic essential hypertension.

Communication difficulties leading to disrupted social relationships was found in 6.1% patients and 21% believed that their HI had adversely affected their psychological well-being.

Discussion

Sri Lanka is a fast-aging nation so it is important to address the needs of its elderly population with age-related HI to improve their quality of life. In this study, we analyzed the effects of key demographic factors such as age, gender, district of residence, educational status, ethnicity, family relationships as risk factors for presbyacusis. This study has shown no significant association between presbyacusis and other demographic factors such as gender, education level and marital status.

An important observation noted in this study was that 24.7% of the study participants had been widowed and 6.1% had communication difficulties leading to disrupted social relationships. Therefore provision of social support, financial assistance for quality of life improvement measures such as hearing aids are likely to help the majority of patients with presbyacusis through assistance with reintegration back into society.

Twenty-one percent of patients felt that their HI had adversely affected their psychological well being. Perhaps increasing the awareness of the general public regarding the psychosocial effects of presbyacusis, and related health issues of the elderly, could lead to changes in the subjective perception of people towards presbyacusis and, subsequently, an improved outcome.

Our study found that 39% of patients with presbyacusis had been diagnosed with diabetes mellitus and 21% with chronic essential hypertension. As these are common chronic diseases among older adults, their prevention and improved treatment may significantly improve outcomes with regard to presbyacusis. The association between prebyacusis and diabetes, [11, 12] and systemic hypertension[13, 14] is well demonstrated in the literature and correlates with our findings.

There was a positive association between presbyacusis and a family history of this condition. Genome studies have found X-linked probably mitochondrial genetic loci affecting male subjects.[15, 16]

In 2009, the percentage of the population in Sri Lanka, aged more than 65 years was 8.1% (male = 803,172, female

=926,372) and the mean life expectancy of a male was 73.1yr, compared with 77.3yr for a female.[17] As our study shows, the mean age of onset of HI in our study population was 62.9yr. Therefore, affected individuals are likely to have a long period of time in which they will have to live with this problem. The impact of this disease and its effect on quality of life will only become greater as the number of elderly people increase.

Among health care professionals, there is a huge lack of knowledge about the advantages and gains a specific hearing re-education can bring about for the elderly with HI. Literature suggests that public healthcare centres with physicians and speech and hearing therapists, should develop and/or implement guidelines for diagnosis, purchase of hearing aids and hearing re-education for the elderly with presbyacusis, so that they may enjoy their social relations and maximise their quality of life.[18]

Limitations of this study

The sample size available to calculate the variation in the onset of HI among different ethnic groups of the country was inadequate so confident conclusions regarding such issues could not be made.

Data regarding the duration of the HI was obtained through patient recall. Memory and recall capacity can regress with age, thus introducing a risk of inaccuracy of this data.

This study does not contain an in-depth analysis of the associations of demographic factors such as marital status and educational level as the main study objective was to identify the effects of these factors on presbyacusis rather than different levels of associations.

Recommendations

1) Age-related HI starts to occur, on average, at 62yr, therefore widely available screening programs for its early identification and screening for risk factors should be targeted at this age group.

2) The majority of patients studied with presbyacusis were having problems with family relationships in their old age, and this factor too can lead to an overall poor quality of life. Therefore, the authorities need to promote social support and external assistance for affected individuals to enhance their psychological and social health.

Conclusion

Onset of impaired hearing, as perceived by the patients initially and later confirmed by pure tone audiometry and tymanometry, had occurred at an average age of 62.3yr. There was no significant association between presbyacusis and other demographic factors such as gender, education level and marital status. 6.1% of patients studied had communication difficulties leading to disrupted social relationships and 21% had the opinion that HI had adversely affected their psychological well being. A significant proportion of the participants had been widowed and that fact, too, can further reduce their quality of life.

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