ORIGINAL ARITCLE

Frequency of Age-related Hearing Loss in General Population of 60 Years and above

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ABTRACT

Aim: To determine the frequency of age-related hearing loss (ARHL) so that an effective strategy can be designed for rehabilitation of the elderly patients with hearing loss.
Study design: Randomized controlled trial
Place and duration of study: ENT Department, Sharif Medical City Hospital from 1st March 2019 to 31st October 2019.
Methods: Two hundred people (one hundred males and one hundred females) of age 60 to 95 years were randomly selected from outpatient department. Detailed history, complete ENT examination and relevant Audiological investigations (Pure tone Audiometry and Tympanometry) were carried out.
Results: Mean age of individuals was 75.2 years for males and 74.4 years for females. According to age groups, males had significantly poorer thresholds at 4 kHz than females. On 4 frequency average >25 dB HL of hearing impairment was 43.5% between 60 to 69 years, 52.2% between 70 to 79 years and 48.4% 80 years above years while 4FA>40 dB HL of disabling hearing impairment between 60 to 69 years, 70 to 79 years and above 80 years were 21.7%, 36.9.0% and 41.9%, respectively.
Conclusion: A significant proportion of these individuals have disabling hearing impairment (4 Frequency Average>40 dB) affecting their daily lives adversely and all of them must use some form of hearing rehabilitation.
Keywords: Presbycusis or age-related hearing impairment (ARHI), Pure tone Audiometry.

INTRODUCTION

Hearing is the sense by which all living creatures respond to sound stimuli. Ear is the organ of hearing and it has three main parts; the outer, middle and the inner ear. A malfunction of any of these parts can cause hearing loss. Hearing loss is of three types, conductive, sensorineural and mixed based on the defects in different parts of the ear. Hearing loss is divided into different categories depending on the severity of the condition. It can be mild, moderate, severe and profound[1].

Presbycusis or age-related hearing impairment (ARHI) has been a well recognized cause of hearing disability since ancient times. It is characterized by reduced sensitivity to hearing, reduced capacity to understand speech in a noisy environment, poorer central processing of auditory stimuli and impaired sound localization.[2] Hearing enables us to share, communicate, do activities and experience the world through listening. Hearing provides important environmental knowledge, including the presence of danger. Sirens, smoke alarms and warning cries need to be heard[3]. Loss of hearing may induce disorders of communication, depression and loss of social activity.[4] Impaired hearing may cause problems in day to day activities and thus reduce an individual's quality of life[5].

Presbycusis mostly causes a high frequency hearing loss which affects both the ears symmetrically. Many of our routine speech sounds are high frequency sounds and even a mild loss in these frequencies can greatly impair a person's ability to understand speech. For this reason, an elderly patient with presbycusis typically complains first that he can hear people but cannot understand speech[6].

A study identified four types of risk factors associated with ARHL in humans: genetic predisposition, environmental, health co-morbidities and cochlear aging.[7] The process of ageing is associated with slow degeneration of the auditory system. Further damages to the cochlea can result from prolonged noise exposure or use of ototoxic drugs and contribute to the hearing difficulty experienced by older people[8].

Presbycusis is the most common cause of hearing loss and is one of the most common conditions affecting elderly people throughout the world. Estimates suggest that about two-thirds of people over the age of 70 in the US are suffering from ARHL and that by 2020, about 50 percent of all hearing loss people in the US will be over 70 years old. ARHL has been shown to be separately correlated with cognitive decline, dementia, depression, and isolation, contributing to an estimated annual economic burden of medical expenditure of over $3 billion. Although many of these related disorders have been shown to be improved by the use of hearing aids and/or cochlear implants, ARHL remains substantially under-treated[9].

The hearing loss develops slowly with age and decline in hearing acuity is more pronounced during the 8th decade of life[10].

In a study, older individuals with hearing loss showed a 30-40% accelerated rate of cognitive decline and a 24% increased risk for incident cognitive impairment during a 6-

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year period compared with individuals having normal hearing[11].

The increasing burden of presbycusis in the elderly is troubling, and it is imperative that countries facing ageing populations find ways to address these challenges.[12]

Presbycusis leads to a progressive bilateral sensorineural hearing loss with major socio-economic implications[13]. Due to a slow development of the disease ARHL remains an often undetected, misunderstood and overlooked disorder in the elderly population. If left untreated, ARHL would have a significant impact on patients, their families and society as a whole[14].

Clinically, presbycusis diagnosis criteria are as follows (i) hearing loss is progressive; (ii) the deficiency is bilateral; and (iii) it starts from high frequencies[15]. Hearing Aids and Cochlear Implants are the instruments most widely used to treat moderate to severe presbycusis[6]. Use of hearing aids in patients with presbycusis significantly improves the quality of life and is therefore recommended[4].

As our understanding of cochlear changes caused by aging continues to develop, our capacity to provide therapeutic intervention will certainly help the increasing elderly population[16].

The elderly population of Pakistan has grown more rapidly in recent years than the other age groups; it is worth studying this population better, especially in terms of hearing impairment, so as to give them a better quality of life[17].

PATIENTS AND METHODS

This randomized controlled trial study was carried out at Sharif Medical City Hospital Lahore from March 2019 to October 2019. A total of 200 patients with age 60 years and above were included. History of significant noise exposure, use of ototoxic drugs or having any middle-ear pathology (abnormal tympanogram) or individuals with perforated tympanic membrane were excluded. Pure-tone Audiometry was conducted on each participant using Oscilla SM950 diagnostic audiometer. The audiometer had undergone acoustic calibration by an external vendor. Tympanometry was also done on each individual. Using SPSS version 25, data was tabulated and analyzed. The proportion relationship was compared through the chi-square test.

RESULTS

There were 100 (50%) males and 100 (50%) females with age group 60-69 contains 20 males and 26 females, 70-79 contains 50 males and 42 females and age group ≥80 contains 30 males and 32 females. Mean age was 75.2 years for males, 74.4 years for females (Table 1).

The study showed PTA average of speech frequencies (0.5, 1, 2 and 4kHz) of the subjects. The males had significantly poorer thresholds at 4 kHz than females of ages. According to 4 frequency average >25 dB HL was 43.5% between 60 to 69 years, 52.2% between 70 to 79 years and 48.4% between 80 years and above years of hearing impairment while disabling hearing impairment (4FA >40 dB HL) was 21.7% between 60 to 69 years, 36.9% between 70 to 79 years and 41.9% above 80 years. Out of these, worse hearing impairment (4FA >60 dB HL) between 60 to 69 years, 70 to 79 years and above 80 years were 8.7%, 13% and 25.8%, respectively (Table 2).

Table 1: Frequency of age group according to gender

Age (years)	Male		Female	
	No.	%	No.	%
60-69	20	20.0	26	26.0
70-79	50	50.0	42	42.0
≥80	30	30.0	32	32.0

Table 2: Percentage of hearing loss amongst the elderly

Age (yrs)	No.	Subjects with hearing level			
		≤25 dB	>25 dB but ≤40dB	>40 dB but≤60 dB	>60 dB
60-69	46	16 (34.8%)	20 (43.5%)	6 (13%)	4 (8.7%)
70-79	92	10 (10.9%)	48 (52.2%)	22 (23.9%)	
>80	62	6 (9.7%)	30 (48.4%)	10 (16.1%)	16 (25.8%)
Total	200	32 (16%)	98 (49%)	38 (19%)	32 (16%)

DISCUSSION

Age-related hearing loss (ARHL) is a major public health issue[14]. The Center for Disease Control (US), reported in 2003 that age related hearing loss was the second most common disorder in aged population after arthritis[1]. Irrespective of etiology, hearing loss may have detrimental effects on quality of life and general functioning in people over 60 years of age[6].

The person with hearing loss may not be aware of the consequences of their disease, and may not always be the key instigator to seek guidance on the problem's care.[8] It is important to recognize not only the effects of presbycusis on speech comprehension but also the effectiveness of speech production and communication[18].

The most promising therapeutic approach could be early detection and prevention of ARHL, and future work should concentrate on long-term approaches by which this can be accomplished[9].

The prevalence of hearing loss in elderly people worldwide varies depending on the region, sample size, age classification of the elderly and the audiometric criteria used for hearing loss[12].

Pure-tone Audiometry is a reliable way of defining a population's hearing status, although it does not represent all of the impairments caused by hearing loss in the elderly. Presbycusis prevalence rates vary from 30 to 83 per cent in adults 65 years of age and older, depending on the definition of hearing loss and the studied population[19].

In our study 84% of individuals above sixty years of age had some degree of hearing impairment. This is only slightly more than the 1995 UK national study of hearing disorders which showed that 75 % of individuals over sixty years of age had hearing impairment[8]. Our numbers are higher than a study carried out in Singapore by Lee et al[12] which showed that 63.7% of people over sixty years had some degree of hearing impairment. This may represent demographic difference in the prevalence of presbycusis. Similarly 35% individuals in our study had disabling hearing impairment (4 Frequency Average>40 dB) as compared to 16.2% in the study by Lee et al[12].

Our results are higher than a local study by Adeel and Awan[17] which showed prevalence of presbycusis to be 58.4% in individuals sixty years and older. This difference could be due to the fact that mean age of patients in our study (75.2 years for males, 74.4 years for females) was more than their study (70.4 years for males, 69.8 years for females).

Recently it has been reported that presbycusis is increasing in younger ages. Our study showed that 65.2% of individuals in age group 60-69 years had some degree of hearing loss. This is comparable to a study by Agarwal et al[20] which showed that 77% of individuals in age group 60-69 years had hearing loss of some degree. In this age group of 60-69 years, 21.7% individuals had disabling hearing impairment (4 Frequency average>40 dB) which is significantly higher than 9.1% reported by Lee et al[12].

In the age group 71-80, our study showed that 89.1% individuals had hearing loss of which 36.9% had a disabling hearing impairment. Our numbers are more than those by reported by Lee et al[12] which showed that 82.2% individuals had hearing impairment and 22% individuals had disabling hearing impairment. Similarly Fransen et al[21] reported that 60% of individuals in this age group had hearing impairment.

For individuals older than 80 years in our study, the percentage of subjects with a hearing impairment (4FA >25 dB HL) and with a disabling hearing impairment (4FA >40 dB HL) was 90.3% and 41.9% respectively. These values are comparable to 93.5%and35.7% respectively, reported by Lee et al[12].

Our study showed that across all age groups, males had significantly poorer thresholds at 4 kHz than females. Lee et al[12] reported similar results. It is well known that presbycusis in females generally begins a decade later and women usually have better hearing thresholds than men[2,10]. This difference could be related to the fact that generally males are more exposed to noise in life (Occupational noise, Firearm noise) than females.[19,22] Furthermore in our society males smoke significantly more than females and a study by Cruickshanks et al[23] found that, current smokers were 1.69 times as likely to have a hearing loss as nonsmokers.

CONCLUSION

Age-related hearing impairment (ARHI) is a significant health problem in individuals aged sixty years and above in the world and our country is no exception. A significant proportion of these individuals have disabling hearing impairment (4 Frequency Average>40 dB) affecting their daily lives adversely and all of them must use some form of hearing rehabilitation. All individuals above sixty years should undergo pure tone Audiometry to find out their hearing thresholds so that hearing rehabilitation can be offered to those who need it at an early stage.

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