

## HEARING HANDICAP IN OLDER ADULTS: A MULTI-CENTER STUDY

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## ABSTRACT

**Objective:** To determine the level of hearing handicap and its age and gender association in older adults.

**Study Design:** Cross sectional analytical study.

**Place and Duration of Study:** Study conducted at Ear, Nose & Throat outpatients of Yusra General Hospital, National Institute of Rehabilitation Medicine Islamabad and Cantonment General Hospital Rawalpindi, from Jul to Sep 2017.

**Methodology:** We recruited two hundred cases of self-reported hearing difficulty, using non-probability consecutive sampling, who fulfilled inclusion criteria. After recording demographic details including history, subjects were screened by the Screening Version of Hearing Handicap Inventory for the Elderly (HHIE-S). Followed by otoscopy and pure tone audiometry. Analysis was done using SPSS-24.

**Results:** Study revealed 133 (65.5%) males and 67 (33.5%) females with mean age of  $65.45 \pm 7.50$  years. Out of 179 (89.5%) had significantly high level of hearing handicap with HHIE-S score  $>43$ , while 21 (10.5%) revealed mild to moderate handicap with score of 17-42. Hearing handicap was significantly associated with aging ( $p < 0.001$ ), while no significant gender association was noted. Hearing loss was mainly of sensory-neural type 192 (96%).

**Conclusion:** In older adults with self-reported hearing loss, high level of hearing handicap was present in majority (89.5%) and mild to moderate in 10.5%, with significant association with aging and hearing loss was predominantly sensory-neural type.

**Keywords:** Aging, Age related hearing loss, Hearing loss, Hearing handicap, Older adults, Prevalence, Quality of life.

**How to Cite This Article:** Zahra GE, Saqulain G, Mumtaz N. Hearing Handicap in Older Adults: A Multi-Center Study. Pak Armed Forces Med J 2021; 71 (Suppl-3): S590-593. Doi: <https://doi.org/10.51253/pafmj.v1i1.3137>

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## INTRODUCTION

Impaired hearing is a common issue in older adults having a prevalence of 25.7%, with age-related hearing loss (AHL) being the commonest etiology.<sup>1</sup> AHL is a degenerative condition and characterized by sensori-neural hearing loss (SNHL).<sup>2</sup> Hearing impairment causes significant deterioration in quality of life (QOL) and results in communicational difficulties and more social isolation in elderly resulting in handicaps.<sup>3</sup> Therefore management is a significant public health.

AHL results from simple degenerative process occurring with age, a number of risk factors are incriminated in causation including aging of cochlea, noise exposure, genetic predisposition, and co-morbidities like smoking and atherosclerosis and genetic factors,<sup>4</sup> which may explain the onset, degree and variations in HL in the older adults. Hearing loss (HL) is independently related to poor physical activity hence regular exercise has been noted to slow its progression.<sup>5</sup>

Hearing handicap is a disastrous situation associated with hearing impairment in the older adults, though level of hearing impairment in all elders may not be perceived socially and emotionally in day to

day life as disabling.<sup>6</sup>

Hearing loss in older adults significantly impacts QOL of millions of aging individuals and is more commonly seen as age advances,<sup>7</sup> with two thirds of adults aged 70 and above affected in United States alone.<sup>8</sup> Hence it is important to prevent, timely detect and manage as well as mitigate hearing handicap and its impact on families of hearing impaired.<sup>9</sup> There is dearth of literature on hearing handicap in Pakistan though some authors have studied hearing impairment as a whole,<sup>10</sup> without focusing on older adults. Therefore, no organized, screening, prevention, treatment and rehabilitation program for the older population facing hearing impairment are in place, resulting in increasing burden of disability.

Therefore the current research focused to determine the level of hearing handicap and its age and gender association in the older adults. This research could be used as a significant reference and base supporting initiatives for future research and help improve QOL of affected, by timely planning management and rehabilitation of this neglected community.

## METHODOLOGY

This was a cross sectional analytical study conducted in the twin cities of Rawalpindi and Islamabad at ENT outpatient clinics of National Institute of

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Rehabilitation Medicine (NIRM), Islamabad; Yusra and Cantonment General Hospitals, Rawalpindi, Pakistan, using non-probability consecutive sampling technique, to determine the level of hearing handicap and its age and gender association in older adults in Rawalpindi Islamabad region, from July 2017 to September, 2017.

A sample size of 377 cases of self-reported HL was recruited after calculating using Raosoft calculator with 5% margin of error, 95% confidence level and a population of 20000 with 50% response distribution. Those who could not properly fill the questionnaire were excluded from the study, leaving behind a sample of 200 eligible cases who fulfilled the selection criteria and consented for inclusion.

**Inclusion Criteria:** Cases with self-reported hearing difficulty, of both genders, aged 50-80 years, residing in the area of Rawalpindi & Islamabad.

**Exclusion Criteria:** Cases with obstructive & inflammatory pathologies of outer and middle ear, known cases of otosclerosis, Meniere’s, Acoustic neuroma and cases with noise exposure.

The sample was subjected to Screening version of Hearing Handicap Inventory for the Elderly (HHIE-S), developed by Ventry and Weinstein and validated and found easy and reliable to use by Oberg 11 to identify older adults with HL/hearing handicap. This was followed by pure tone audiometry (PTA). Before institution of HHIE-S screening, history was recorded on hospital history sheets in a confidential setting including duration of HL, treatment history, and comorbidities. Later careful physical ear examination was done including otoscopy to rule out any obstructive and inflammatory pathology. HHIE-S questionnaire includes 25 questions to evaluate emotional and social issues related to hearing loss. One of three responses, “yes”, “sometimes” or “no”, was scored as 4, 2 or 0, respectively, according to HHIE-S scoring system. PTA was performed in sound proof room with a audiometer model MAICO MA 51 and made in Germany. Pure tone thresholds were recorded at 250, 500, 1000, 2000, 4000 & 8000 Hz.

Data collected was analyzed using SPSS-24. Age was presented by Mean ± SD and categorical variables were presented by frequency and percentage. Chi-square test was used to detect association between variables and *p*-value ≤0.05 was considered significant.

**RESULTS**

Sample population revealed 133 (66.5%) males and 67 (33.5%) females and an age range of 50-80 years

and mean age of 65.45 ± 7.5 years (figure). Age group distribution (Table-I), revealed highest frequency of 66-70 years (24.5%), with 61-65 age being second commonest.

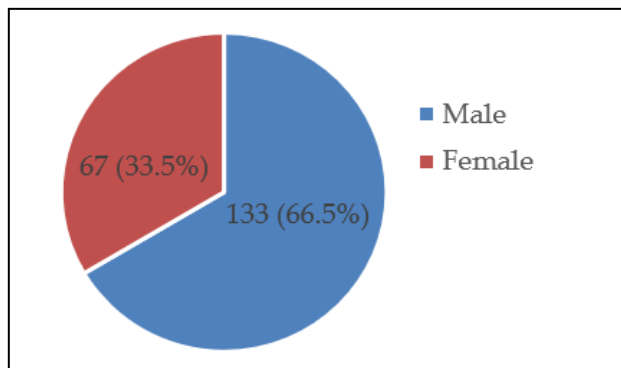


Figure: Gender distribution (n=200).

Table-I: Age distribution of the study sample (n=200).

Characteristics		Value (n=200)
Age (Years)	Mean ± SD	65.45 ± 7.50
Age Groups	50-55 years	22 (11%)
	56-60 years	37 (18.5%)
	61-65 years	41 (20.5%)
	66-70 years	49 (24.5%)
	71-75 years	32 (16%)
	76-80 years	19 (9.5%)

Table-II showed that 179 (89.5%) cases had a score of ≥43 indicating severe hearing handicap and 21 (10.5%) revealed score of 17-42 i.e., mild to moderate handicap. There was much higher score in male compare to female indicating that age related hearing loss was more common in male gender, however the difference was not statistically significant (*p*=0.147) (Table-II).

To determine the level of hearing handicap, the percentage of the HHIE-S based self-identified hearing handicap and PTA based HL was studied by dividing the subjects into age groups. It was noted (Table-II) that SNHL and hearing handicap were more common in higher age groups indicating higher prevalence with advancing age with maximum percentage of cases reported with HL in the 66-70 years age group. However in this study the percentage of cases after 70 years of age dropped. Also it was noted that few cases of conductive hearing loss were present in the younger age groups with higher frequency of age related SNHL with advancing age.

A statistically significant association of HHIE-Score with age with positive correlation was present, while difference for gender and HHIE-Score was not statistically significant (Table-II).

**Table-II: Age & gender distribution versus handicap severity (HHIE-S Score) & cases of audiometry proven hearing loss distribution: cross tabulation& chi-square correlation (n=200)**

Variable	Variable Characteristics	Audiometry		Handicap Severity Score		Chi-Square
		SNHL	CHL	Score: 17-42	Score: >43	X <sup>2</sup> (p-value)
		n (%)	n (%)	n (%)	n (%)	
Age Group (Years)	50-55	18 (9)	4 (2)	14 (7)	8 (4)	81.952 (0.000)
	56-60	34 (17)	3 (1.5)	6 (3)	31 (15.5)	
	61-65	40 (20)	1 (0.5)	1 (.5)	40 (20)	
	66-70	49 (24.5)	-	-	49 (24.5)	
	71-75	32 (16)	-	-	32 (16)	
	76-80	19 (9.5)	-	-	19 (9.5)	
	Total	192 (96)	8 (4%)	21 (10.5)	179 (89.5%)	
Gender	Male	129 (67.19)	4 (2)	11 (8.27)	122 (91.73)	2.100 (0.147)
	Female	63 (32.81)	4 (2)	10 (14.93)	57 (85.07)	
	Total	192 (96)	8 (4)	21 (10.5)	179(89.5)	

(Note: n=Frequency, %=Percentage)

## DISCUSSION

The current study comprised of self-reported cases of hearing loss with an age range of 50-80 years and Mean age of  $65.45 \pm 7.50$  years. HHIE-S results revealed that 179 (89.5%) had severe hearing handicap with a score of  $> 43$ , while 21 (10.5%) revealed mild to moderate handicap with score of 17-42. In contrast in a study by Servidoni & Conterno in which sample were collected from an otolaryngology clinic prevalence of mild to moderate handicap was 47.1% and severe handicap was present in 29% and remaining population had no handicap.<sup>12</sup> The higher frequency of severe HL and handicap in our setup might be due to dearth of diagnostic and rehabilitation facilities.

Hearing handicap was significantly associated with aging ( $p < 0.001$ ) and was mainly sensory-neural in 192, 96% indicating that age related hearing loss was the main etiology. Also study revealed a male preponderance with 66.5% (133) males and 33.5% (67) females, however the gender association with HHIE-S score did not reveal any statistically significant association. AHL is a neurodegenerative process and the commonest cause of hearing impairment, which can also result in psychological distress due to compromised QOL.<sup>13</sup> AHL has a very high prevalence affecting around 40% of those above 65 years of age, with Homans *et al*, reporting a prevalence of 33% in males and 29% females of hearing loss above 35 dB in cases 65 years and above in a large cohort study.<sup>7</sup> In the present study also AHL was more prevalent in males with male female ratio of 1.98:1. Elahi *et al*, reported a prevalence of hearing loss of 7.9% in children 5-15 years of age,<sup>14</sup> but local statistics regarding hearing handicap and hearing loss in the older adults are lacking, which was the stimulus for this study. Clinically, progression of AHL is variable, the typical course being, beginning in 6th decade of a

slow, symmetric but persistent decrease in hearing threshold with age in the high-frequency range.<sup>15</sup> Age limit for AHL is not well defined however, Roth *et al*, in their review article noted a lower limit of 60 years for AHL.<sup>16</sup>

The results of our study revealed there was association of hearing loss/handicap with advancing age, as seen in table-II, with frequency increasing with age from 11% in 50-55 years age group to a maximum of 24.5% in 66-70 years age group. However the frequency dropped in age group 71-75 (16%) and 76-80 (9.5%). Literature review revealed heterogeneity in available international data making it difficult to make a proper quantitative overview of prevalence of HL over age. However studies were noted to reflect an increase of hearing loss with increasing age, with male preponderance.<sup>17</sup> In a Saudi Arabian study Al-Ruwali *et al*, reported higher prevalence of HL/ handicap with advancing age on the basis of HHIE-S screening with prevalence of 4.7% at 41-45 years age, 10.17% at 46-50 and 38.35 in 71-75 years age group.<sup>18</sup> Gates *et al*,<sup>19</sup> also reported higher prevalence of hearing loss with increasing age from 6th to 9th decade with 25-40% above 65 years, 50% above 75 years and 80% above 85 years age. However this did not differ by gender.<sup>19</sup> It is interesting to note that the very high prevalence seen in the  $>75$  years and  $>85$  years age group in Framingham cohort study by Gates *et al*.<sup>19</sup> and Walling *et al*.<sup>20</sup> was not present in our study. WHO survey of the year 2017 in Pakistan revealed a life expectancy of 65.5 years for males and 67.5 years for female. This could be the cause of high frequency of HL/handicap up to age group of 66-70 and less frequency beyond this age. In a review article, Roth *et al*<sup>16</sup>, noted that for Europe the prevalence of AHR was 30% for males and 20% for females at age of 70 years and 55% males and 45%

females at age of 80 years which is in contrast to our study. This fact is of importance, since increase in life expectancy of our population could result in increased burden of HL/handicap in Pakistan. According to Mathers & Luycar, AHL was projected to be one of the top 15 causes of burden of disease by year 2030.<sup>21</sup>

Since prevention, early diagnosis and intervention can enhance QOL and reduce the burden of disability, therefore, it was imperative to determine the frequency of HL and hearing handicap in our elderly population, to obtain basic statistical data about magnitude of problem in our setup. This can also help develop a strategy for adult hearing screening, its diagnosis and plan management and rehabilitation.

### CONCLUSIONS

In older adults with self-reported HL, high level of hearing handicap was present in majority (89.5%) and mild to moderate in 10.5%, with significant association with aging and hearing loss was predominantly sensory-neural type. Therefore this elderly population of age beyond 50 years requires screening, assessment and treatment along with rehabilitative measures to reduce the burden of disability.

**Conflict of Interest:** None.

### Authors' Contribution

GEZ: Data collection, statistical analysis & Interpretation, GS: Manuscript writing, methodology, literature review & responsible for publication, NM: Conception of work & critical revision of manuscript.

### REFERENCES

- Moraes CKG, Pacheco FA. Prevalence of self-reported hearing loss and associated risk factors among the elderly in Manaus: a population-based study. *Rev. CEFAC* 2015; 17(6): 1946-1956.
- Pearlman RC. Presbycusis: the need for a clinical definition. *Am J Otol* 1982; 3(3): 183-186.
- Mick P, Kawachi I, Lin FR. The association between hearing loss and social isolation in older adults. *Otolaryngol Head Neck Surg* 2014; 150(3): 378-384.
- Yamasoba T, Lin FR, Someya S, Kashio A, Sakamoto T, Kondo K. Current concepts in age-related hearing loss: epidemiology and mechanistic pathways. *Hear Res* 2013; 303(1): 30-38.
- Han C, Ding D. Effects of Long-Term Exercise on Age-Related Hearing Loss in Mice. *J Neur* 2016; 36(44): 11308-11319.
- Chang HP, Ho CY, Chou P. The factors associated with a self-perceived hearing handicap in elderly people with hearing impairment-results from a community-based study. *Ear Hear* 2009; 30(5): 576-583.
- Homans NC, Metselaar RM, Dingemanse JG, van der Schroeffer MP, Brocaar MP, Wieringa MH et al. Prevalence of age-related hearing loss, including sex differences, in older adults in a large cohort study. *Larynx* 2017; 127(3): 725-730.
- Lin FR, Thorpe R, Gordon-Salant S, Ferrucci L. Hearing loss prevalence and risk factors among older adults in the United States. *J Gerontol A Biol Sci Med Sci* 2011; 66(5): 582-590.
- Davis A, McMahon CM, Pichora-Fuller KM, Russ S, Lin F, Olusanya BO, et al. Aging and hearing health: the life-course approach. *The Gerontol* 2016; 56(2): 256-267.
- Musani MA, Rauf A, Ahsan M, Khan FA. Frequency and causes of hearing impairment in tertiary care center. *J Pak Med Assoc* 2011; 61(2): 141-144.
- Oberg M. Validation of the Swedish hearing handicap inventory for the elderly (screening version) and evaluation of its effect in hearing aid rehabilitation. *Trends Hear* 2016; 20(2): 2331216516639234.
- Servidoni AB, Conterno LO. Hearing loss in the elderly: is the hearing handicap inventory for the elderly - screening version effective in diagnosis when compared to the audiometric test?. *Int Arch Otorhinolaryngol* 2018; 22(1): 1-8.
- Corna LM, Wade TJ, Streiner DL, Cairney J. Transitions in hearing impairment and psychological distress in older adults. *Can J Psych* 2009; 54(8): 518-525.
- Elahi MM, Elahi F, Elahi A, Elahi SB. Paediatric hearing loss in rural Pakistan. *J Otolaryngol* 1998; 27(6): 348-53.
- Yang CH, Schrepfer T, Schacht J. Age-related hearing impairment and the triad of acquired hearing loss. *Front Cell Neuro* 2015; 9(1): 276-280.
- Roth TN, Hanebuth D, Probst R. Prevalence of age-related hearing loss in Europe: a review. *Eur Arch Otorhinolaryngol* 2011; 268(8): 1101-1107.
- Cruickshanks KJ, Wiley TL, Tweed TS, Klein BE, Klein R, Mares-Perlman JA, et al. Prevalence of hearing loss in older adults in Beaver Dam, Wisconsin. The Epidemiology of Hearing Loss Study. *Am J Epidemiol* 1998; 148(9): 879-886.
- Al-Ruwali N, Hagar A. Prevalence of Presbycusis in the Elderly Saudi Arabian Population. *JTU Med Sci* 2010; 5(1): 21-26.
- Gates GA, Cooper JC Jr, Kannel WB, Miller NJ. Hearing in the elderly: the Framingham cohort, 1983-1985. Part I. Basic audiometric test results. *Ear Hear* 1990; 11(4): 247-256.
- Walling AD, Dickson GM. Hearing Loss in Older Adults. *Am Fam Phys* 2012; 85(12): 1150-1156.
- Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 2006; 3(11): e442.