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Association Between Severity of Age-Related Hearing Loss and Co-Morbidities: An Institution -Based Study in a Sub-Himalayan Tertiary Healthcare Facility of North Bengal

[1]Dr. Soumendu Bhaumik, [2]Dr. Radheshyam Mahato, [3]Dr. Monideepa Sarkar, [4]Dr. Saumik Das and [5]Dr. Shuvam Gupta

[1-5]Department of ENT, North Bengal Medical College, Sushrutnagar, Darjeeling, West Bengal, India

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Corresponding Author
Dr. Radheshyam Mahato,
Department of ENT, North Bengal Medical College, Sushrutnagar, Darjeeling, West Bengal, India

Author Designation
[1,3,5]Senior Resident
[2]Associate Professor
[4]Professor

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ABSTRACT
Age-related hearing loss or pres by acusis affecting a significant geriatric population, often with substantial negative impact on their personal and social lives. Age-related hearing loss in geriatric patients co-exists with co-morbidities like diabetes mellitus, hypertension and dyslipidaemia, though the correlation between them is still debated and relatively unexplored area. With gradual demographic transition towards higher prevalence of geriatric population in our country, clinical studies are necessary to explore any correlation between these comorbidities and age-related hearing loss. All geriatric patients presenting with hearing loss in the OPD of Department of ENT of a sub-Himalayan tertiary healthcare facility in North Bengal were evaluated for their comorbidities, if any, by reviewing medical records and recent laboratory report. They were evaluated clinically and their degree of hearing loss was evaluated by Pure Tone Audiometry. The collected data was evaluated and statistical analysis was done. In our study, 193 out of 468 (41.2%) of the geriatric patients presented with hearing loss. Among these 193 geriatric patients with hearing loss, 28.5% were diabetic and 9.8% had uncontrolled diabetes mellitus, 49.2% were hypertensive and 23.8% had uncontrolled hypertension and 22.8% dyslipidaemia and 3.6% had uncontrolled dyslipidaemia. Out of these 193 geriatric patients, 132 (68.4%) patients had age-related hearing loss. 28.8% of these patients had higher degree of hearing loss and 62.1% patients had multiple co-morbidities. On doing a multi variable logistic regression analysis, it was seen that, when adjusted for other predictors, older age (AOR 1.154), hypertensive (AOR 9.784) and diabetic patients (AOR 6.185) were at higher odds of developing more severe degrees of age-related hearing loss as compared to their counterparts. Age-related hearing loss, with the current demographic transition phase of India towards higher prevalence of geriatric population is affecting a large number of individuals. Age-related hearing loss and its degree and the correlation with existing comorbidities like diabetes mellitus, hypertension and dyslipidaemia among geriatric patients thus need insight in near future.

INTRODUCTION

Age-related hearing loss, also known as presbycusis, is defined as mid to late adult age onset bilateral progressive sensorineural hearing loss, where other causes are excluded[1]. Age-related hearing loss (ARHL) is one of the commonest chronic ailments affecting the geriatric population, prevalence being 20-43% in 60-69 years worldwide and as high as 60% in people above 70 years[2,3]. Loss of hearing often presents late to the healthcare facility, as it is not a 'visible' morbidity. Thus, elderly patients come to ENT in significantly advanced stages, leading to substantial negative impact on their personal and social lives[4]. Age-related hearing loss in geriatric patients co-exists with co-morbidities like diabetes mellitus, hypertension and dyslipidaemia, though the correlation between them is still debated and relatively unexplored area. India, currently undergoing gradual demographic transition to higher prevalence of geriatric population, has a huge burden of non-communicable diseases like diabetes mellitus, hypertension and dyslipidaemia. Hence, it is necessary for studies to explore any correlation between these comorbidities and age-related hearing loss. This study was conducted to explore the relationship, if it exists, between diabetes mellitus, hypertension and dyslipidaemia and severity of age-related hearing loss among geriatric patients presenting to the Department of ENT of a sub-Himalayan tertiary healthcare facility in North Bengal.

Aims and Objectives:

- To determine the proportion of geriatric patients having hearing loss attending the ENT OPD.
- To determine the proportion of geriatric patients having hearing loss with diabetes mellitus, hypertension and dyslipidaemia attending the ENT OPD with age stratification.
- To find the association between degree of hearing loss in geriatric patients with or without above said comorbidities with age stratification.

MATERIALS AND METHODS

- Institution-based observational study with cross-sectional design.
- OPD of Tertiary healthcare facility in Sub-Himalayan region in North Bengal.
- 16 months, February 2021 to July 2022.
- **Study Population:** All geriatric patients attending the OPD.
- The study was conducted using a pre-designed questionnaire.
- Co-morbidity related data were obtained from their medical records and recent laboratory reports.
- Each geriatric patient with hearing loss underwent the following with their informed consent.
- General physical examination.
- Examination of ear without speculum.
- Otoscopic examination.
- Hearing assessment with Tuning forks.
- Hearing loss assessment by Pure Tone Audiometry.

Inclusion Criteria:

- Patients >=65 years.
- Patients providing written consent for the study.

Exclusion Criteria:

- History of ear trauma.
- Hearing loss as sequelae of infection.
- Drug induced hearing loss.
- Diagnosed cases of other causes like Meniere's disease, Acoustic neuroma.

For Assessment of Severity of Hearing Loss, Degree of Hearing Loss was Classified as Per Who Classification:

- **Mild:** 26-40 dB.
- **Moderate:** 41-55 dB.
- **Moderately Severe:** 56-70 dB.
- **Severe:** 71-91 dB.
- **Profound:** >91dB.

RESULTS AND DISCUSSIONS

Demographic Profiles:

- Out of 468 geriatric patients attending ENT OPD, **193 (41.2%)** had complaint of hearing loss.
- 64.2% patients belonged to the age group of 65-69 years.
- 67.4% patients were male.
- 39.4% patients had BMI 23-27.5 kg/m2 i.e. Overweight.
- 65.8% patients belonged to rural areas.
- 45.6% patients belonged to Class IV of B.G. Prasad Socio-economic scale.

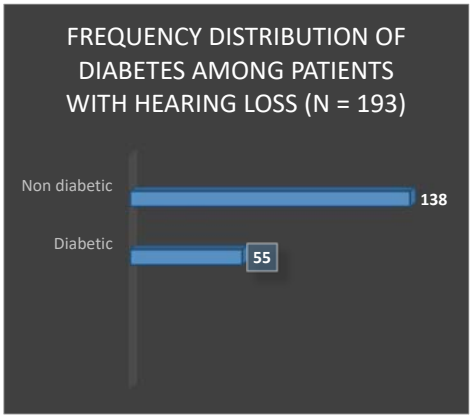

Fig. 1a: Frequency Distribution of Patients with Diabetes

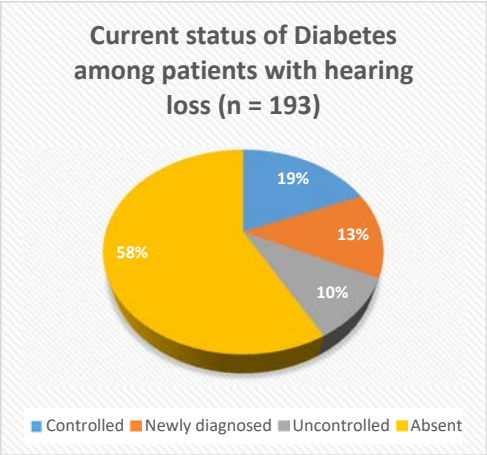

Fig. 1b: Frequency Distribution According to Current Diabetic Status

28.5% of the patients with hearing loss were diabetic and **9.8%** had uncontrolled diabetes mellitus.

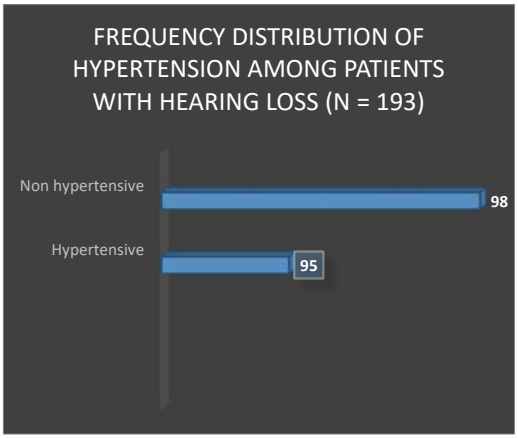

Fig. 2a: Frequency Distribution of Patients with Hypertension

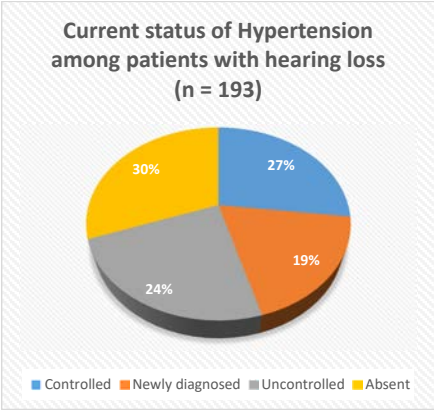

Fig. 2b: Frequency Distribution of Current Hypertensive Status

49.2% of the patients with hearing loss were hypertensive and **23.8%** had uncontrolled hypertension.

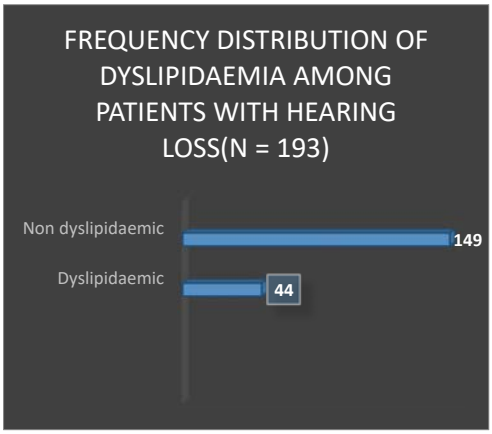

Fig. 3a: Frequency Distribution of Patients with Dyslipidaemia

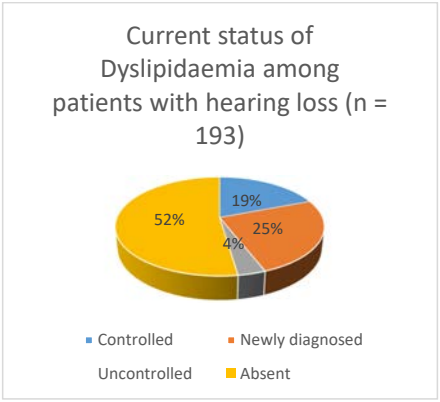

Fig. 3b: Frequency Distribution of Current Status of Dyslipidaemia

22.8% of the patients with hearing loss were dyslipidaemic and **3.6%** had uncontrolled dyslipidaemia. Out of 193 geriatric patients with hearing loss, **132 (68.4%)** patients had age-related hearing loss and 61 (31.6%) patients had hearing loss due to other causes.

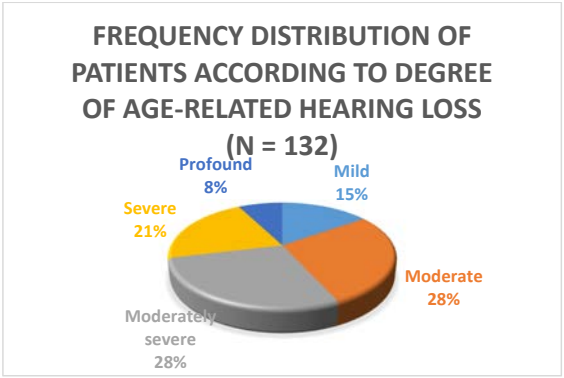

Fig. 4: Frequency Distribution of Patients According to Degree of Age-Related Hearing Loss

28.8% patients had severe and profound sensorineural hearing loss.

Table 1: Frequency Distribution of Patients with Age-related Hearing Loss According to Presence of Multiple Co-Morbidities (n=132):

Co-morbidities	Frequency	Percentage (%)
None	8	6.1
Hypertension	22	16.7
Diabetes	7	5.3
Dyslipidaemia	13	9.8
Hypertension+Diabetes	26	19.7
Hypertension+Dyslipidaemia	32	24.2
Diabetes+Dyslipidaemia	8	6.1
Hypertension+Diabetes+Dyslipidaemia	16	12.1
Total	132	100

62.1% patients had multiple co-morbidities

Statistical Analysis:

Statistically Significant Associations (p<0.05) were Observed Between Severity of Sensori-Neural Hearing Loss with:

- Age of the patients.
- Positive history of diabetes mellitus.
- Current uncontrolled diabetes mellitus status.
- Current uncontrolled hypertension status.

No Statistically Significant Association was Observed Between Severity of Sensori-Neural Hearing Loss with:

- Sex.
- BMI.
- Residence.
- Socio-economic status.
- Positive history of hypertension.
- Positive history of dyslipidaemia.
- Current status of dyslipidaemia.

Table 2: Multi Variable Logistic Regression Showing Predictors Associated with the Severity of Sensori-Neural Hearing Loss Among the Participants with Age-Related Hearing Loss After Adjustment

Parameters	Adjusted Odds Ratio	95% CI	p-value
Age (years)	1.154	1.019, 1.308	0.024*
Female	1.336	0.530, 3.369	0.539
BMI≥23 kg/m2	1.576	0.599, 4.142	0.357
Hypertension	9.784	2.158, 34.362	0.003*
Diabetes	6.185	1.150, 28.210	0.039*
Dyslipidaemia	2.058	0.732, 5.786	0.171

On doing a multivariable logistic regression, it was seen that, when adjusted for other predictors, **older age** (AOR 1.154), **hypertensive** (AOR 9.784) and **diabetic patients** (AOR 6.185) were at higher odds of developing more severe degrees of age-related hearing loss as compared to their counterparts.

41.6% of the geriatric patients in the ENT OPD presented with hearing loss.It has been seen that as adults age, they progressively develop hearing loss, to as much 1db loss on average per year after 60 years[5], attributed to various possible causal pathways[6] like, age-related changes in ion-channels of cochlea, oxidative stress, age-related changes in central auditory pathways and effects of metabolic disorders like diabetes mellitus, hypertension and dyslipidemia (altered microcirculation in inner ear?) Our institute caters large population from far flung Sub-Himalayan tea-gardens and villages, surrounding states of North Bengal and neighboring states. Female patients attended our OPD to lesser extent, especially for an 'invisible' condition like hearing loss. In our study, statistically significant associations were found not only between severity of age-related hearing loss and positive history of diabetes mellitus but also with current uncontrolled diabetes status. Thus, if kept unchecked, diabetes can pose serious detrimental effect among geriatric patients as already stated by Konrad-Martin[7]. India is currently going through an epidemic of hypertension. National Family Health Survey (NFHS-5) estimates a prevalence of 23% among Indian females and 24% among Indian males, with high burden among elderly[8]. In our study, statistically significant association was found between severity of age-related hearing loss and current uncontrolled hypertension status, as evidenced by Roy[9]. Though no statistical significance was found between degree of severity of age-related hearing loss and dyslipidemia in our study, current consensus shows that uncontrolled dyslipidemia can hasten the progression of age-related hearing loss as per Elias[10]. In developing countries like India, more and more people are being affected by multiple co-morbidities like hypertension, diabetes and dyslipidemia[11]. Also, there is further complicating of the fact that, these abovementioned conditions can increase the risk of the development of the other conditions[12]. Thus, it is extremely difficult to establish which of the abovesaid conditions play a more important role in age-related hearing loss and which one act as confounder in population studies. In our study, **62.1%** of study populations have more than one co-morbidity. **Hypertension was the most important predictor for higher degrees of age-related hearing loss** i.e. hypertensives were at 9.784 times higher chance of developing severe degrees of age-related hearing loss compared to non-hypertensive individuals. **Diabetes was next important predictor**, with diabetics at 6.185 times higher odds of developing severe degrees of age-related hearing loss compared to non-diabetics. A geriatric patient with co-existent hypertension and diabetes was at (9.874+6.185) i.e. 15.969 times higher odds of developing higher degree of age-related hearing loss compared to non-diabetic and non-hypertensive counterpart.

CONCLUSION

Age-related hearing loss, with the current demographic transition phase of India towards higher prevalence of geriatric population is affecting a large number of

individuals. Age-related hearing loss and its degree and the correlation with existing co-morbidities like diabetes mellitus, hypertension and dyslipidaemia among geriatric patients thus need insight.In our study, out of all geriatric patients presenting to ENT OPD, **41.6%** had hearing loss. Statistically significant association was found between severity of age-related hearing loss with positive history of diabetes, uncontrolled status of diabetes and uncontrolled status of Hypertension. In patients with multiple co-existing co-morbidities, Hypertension was found to be the most important predictor of higher degree of age-related hearing loss with AOR 9.874 followed by Diabetes with AOR of 6.185. Thus, age-related hearing loss, along with co-existing co-morbidities is going to be a Major Public Health problem in near future. Early intervention will reduce the morbidity among patients and burden on the health authorities.

REFERENCES

1. Huang, Q. and J. Tang, 2010. Age-related hearing loss or presbycusis. Eur. Arch. Oto-Rhino -Laryngology, 267: 1179-1199.
2. Agrawal, Y., et al., 2008. Prevalence of Hearing Loss and Differences by Demographic Characteristics Among US Adults<subtitle>Data From the National Health and Nutrition Examination Survey, 1999-2004. Arch. Internal Med., 168: 1522-1530.
3. Gratton, M.A. and A.E. V??zquez, 2003. Age-related hearing loss: Current research. Curr. Opin. Otolaryngology and Head Neck Surg., 11: 367-371.
4. Frisina, R.D., B. Ding, X. Zhu and J.P. Walton, 2016. Age-related hearing loss: Prevention of threshold declines, cell loss and apoptosis in spiral ganglion neurons. Aging, Vol. 8 .10.18632/aging.101045.
5. Liu, X. and D. Yan, 2007. Ageing and hearing loss. The J. Pathol., 211: 188-197.
6. Lee, K.Y., 2013. Pathophysiology of Age-Related Hearing Loss (Peripheral and Central). Korean J. Audiology, Vol. 17 .10.7874/kja.2013.17.2.45.
7. Konrad-Martin, D., K.M. Reavis, D. Austin, N. Reed, J. Gordon, D. McDermott and M.F. Dille, 2015. Hearing Impairment in Relation to Severity of Diabetes in a Veteran Cohort. Ear and Hearing, Vol: 36.
8. International Institute for Population Sciences., 2021. National Family Health Survey-5: India Fact Sheet [Internet]. New Delhi: Government of India., Vol.
9. Roy, P., M. Chandra, A. Mishra, V. Verma and K.K. Sawlani et al., 2019. Otological and Visual Implications of Diabetes Mellitus in North Indian Population. Indian J. Otolaryngology Head and Neck Surg., 71: 1639-1651.
10. Elias, T.G.A., R.D. Monsanto, J.B. do Amaral, L.M. Oyama, P.K. Maza and N.D. Penido, 2021. Evaluation of Oxidative-Stress Pathway and Recovery of Sudden Sensorineural Hearing Loss. Int. Arch. Otorhinolaryngol., 25: 428-432.
11. Mutasingwa, D.R., H. Ge and R.E. Upshur., 2011. How applicable are clinical practice guidelines to elderly patients with comorbidities? Canadian Family Physician., 57: 253-262.
12. Mitsutake, S., T. Ishizaki, R. Tsuchiya-Ito, C. Teramoto and S. Shimizu et al., 2020. Association of pharmacological treatments for hypertension, diabetes, and dyslipidemia with health checkup participation and identification of disease control factors among older adults in Tokyo, Japan. Preventive Med. Rep., Vol. 17 .10.1016/j.pmedr. 2019.101033.