

Original Research Article

A STUDY ON HEARING LOSS AMONG DIABETIC PATIENTS

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ABSTRACT

Background: Aims and Objectives: 1. To detect Hearing loss, among patients with Type 2 Diabetes Mellitus based on age, gender and duration of diabetes and glycemic control. 2. To assess hearing loss using pure tone audiometry and also serial tuning fork tests.

Materials and Methods: A total of 100 patients with type 2 diabetes, aged 35 to 70 years, were randomly selected to participate. All patients underwent clinical ear examinations and were referred for full audiological evaluation.

Results: Of the 100 patients with diabetes, 61% of patients are in the age group of 45-65 with male preponderance. 70 patients had SNHL, out of which 63.3% had moderate-moderately severe severity of hearing loss 63% of patients had diabetes duration of more than 15 years.

Conclusion: Hearing loss is an underestimated comorbid condition in diabetic patients that needs frequent audiometric assessments and management. Early detection and treatment of diabetes and strict glycemic control prevent SNHL. Audiometry should be considered a routine test for diabetic patients by healthcare workers. Interventions should be aimed at controlling factors that may cause morphological and functional changes in the cochlea are critical in managing diabetic hearing damage.

Keywords: Diabetes mellitus, hearing loss, incidence, risk factors.

INTRODUCTION

Hearing loss is strongly associated with physical, emotional and cognitive disability, with a profound impact on social communication, quality of life, and medical and non-medical costs. The World Health Organization (WHO) estimates that over 360 million people, approximately 5% of the world's population, has disabling hearing loss and the number of cases of hearing impairment is increasing because of population ageing. Established causes of hearing loss include genetic predisposition, vascular causes, infections, ototoxic drugs and longstanding exposure to excessive noise, but the determinants of most cases of ageing-related hearing loss are uncertain. Since sensorineural hearing loss cannot be restored, identification of preventable causes of hearing loss is a major clinical and public health goal. Sensorineural hearing loss (SNHL) is a type of hearing loss in which the cause lies in the inner ear (cochlea and associated structures), vestibulocochlear nerve

(cranial nerve VIII), or central auditory processing centres of the brain. Diabetes Mellitus is one of the most important metabolic diseases which affects several organ systems in the body and risk factor for hearing loss, neuropathy, retinopathy, and nephropathy. Diabetes mellitus (DM) is a syndrome of chronic hyperglycemia due to relative insulin deficiency or resistance. As diabetes is caused by a glucose/insulin pathology, it can have a direct effect on the sensory and support cells of the cochlea. Macro- and micro-vascular insults that lead to reduced blood flow, oxygen exchange, and ion transport are primary complications of hypertension and diabetes that affect the ear. Microangiopathy of the cochlear arteries, neuropathy of the auditory nerve, and changes in inner ear glucose levels are the three primary explanations for the aetiology of sensorineural hearing loss in diabetes patients. The inner ear angiopathy causes deafness by reducing the transfer of nutrients through thicker capillary walls

or reducing blood flow through restricted vasculature. Hearing loss is one of the commonly occurring diseases in diabetes patients that could affect their quality of life and lead to hearing disabilities, so the present study aims to assess the presence and severity of hearing loss among patients with type 2 diabetes.

MATERIAL AND METHODS

Study Design: A cross-sectional study conducted at a hospital.

Setting: Department of ENT, Andhra Medical College, Visakhapatnam from November 2022 to November 2023 for a period of 1 year. A total of 100 patients were randomly selected for study and informed consent was taken.

Inclusion Criteria

1. Any patient with Type II Diabetes Mellitus with and above age of 35 years.
2. Any patient who has complained of hearing loss and requires an assessment of hearing loss.
3. Willingness to participate in the study

Criteria for Exclusion

- Anyone who refuses to participate in the study
- Patients with a history of ear infections or procedures in the middle ear
- People who have conductive hearing loss.
- Patients who are using any ototoxic drugs and also people who had a history of usage of ototoxic drugs in the past or having noise exposure at work.

Procedure for the Study

All patients with hearing loss and Type II Diabetes Mellitus who visit the ENT OPD will be asked to give their informed consent to participate in the study. Demographic data including age, sex, occupation, smoking, alcoholism and diabetes history, hypertension history and treatment history were recorded. Haemoglobin levels, FBS/ppBS levels, and HbA1c levels are all standard investigations done. Examination of the ear nose and throat, including tuning fork tests [rinne, Weber and absolute bone conduction] was done

PTA is used to evaluate hearing loss in these patients. They are exposed to pure tones that can be increased or decreased in intensity in 5 dB steps in this manner. Tones of 125Hz, 250, 500, 1000, 2000, 4000, and 8000 Hz, air conduction thresholds and bone conduction thresholds are evaluated. The average audiometric hearing threshold at 500, 1000, 2000, and 4000 Hz for both air and bone conduction was determined; this was taken to be the pure-tone average for both air and bone conduction. This was categorized following the American Speech-Language-Hearing Association (ASHA), hearing impairment was classified; as normal hearing = -10-15 dB hearing threshold level (HL), slight hearing loss = 16-25dBHL, mild hearing loss = 26-40 dB HL, moderate hearing loss = 41-55 dB HL, moderately severe hearing loss = 56-70 dB HL, severe hearing loss = 71-90 dBHL and profound hearing loss = + 91 dbhl.

RESULTS

Table 1: Shows The Age-Wise Distribution of Hearing Loss

Age group	Number of patients	percentage
35-45	10	10
45-55	20	20
55-65	41	41
>65	29	29
Total	100	100

Table 2: Shows The Gender-Wise Distribution of Hearing Loss

Gender	No of patients	percentage
male	65	65
female	35	35

Table 3: Type of hearing loss

Type	No of patients	Percent
normal	30	30
SNHL	65	65
mixed	5	5
total	100	100

Table 4: Shows diabetes duration

Diabetes duration	Number of patients	percentage
<10 years	15	15
10-15 years	22	22
>15 years	63	63
total	100	100

Table 5: Severity of hearing loss in right ear

Age group	Number of patients	percentage
Mild[26-40db]	20	28.5
Moderate[41-55db]	35	50
Moderately severe[56-70db]	10	13.3
Severe[71-90 db]	4	5.7
Profound[>91 db]	1	1.4
total	70	100

Table 6: Severity of hearing loss in left ear

Age group	Number of patients	percentage
Mild[26-40db]	12	17
Moderate[41-55db]	35	50
Moderately severe[56-70db]	18	25.7
Severe[71-90 db]	4	5.7
Profound[>91 db]	1	1.4
total	70	100

Table 7: Shows glycemic control among diabetes patients

HbA1C Levels	Number of patients	percentage
<6.5% [good control]	30	30
6.6-7.9% [fairly good control]	45	45
>8% [poor control]	25	25
total	100	100

DISCUSSION

In this large cohort study, participants with DM were at an increased risk of incident hearing loss. The association of DM with hearing loss was evident even after adjusting for multiple potential confounders, including demographic characteristics, occupational noise exposure, lifestyle risk factors and other metabolic abnormalities.

In the present study, 61 % of patients were in the age group 45-65 years and male preponderance is seen. This is comparable to studies by Cullen and Cinnamon et al,^[1] Al-Rubeaan K2 et al and Pemmaiah KD,^[3] et al.

In the present study, 70% of patients had SNHL of which 63% of the patients had moderate to moderately severe hearing loss. FRIEDMAN,^[4] incurred an average of 55% hearing loss in diabetic patients. In Rajendran S,^[5] study, 73.3% had SNHL among diabetics when compared to controls 6.7% which is highly significant.

In a study by Kakarlapudi V,^[6] et al, in patients with diabetes and SNHL average pure tones in the right ear was 53db in the left ear and 52 db in the right ear comparable to the present study. This study found that hearing loss in diabetics coincided with higher frequencies yielding to moderate degree of hearing loss.

In the present study, 63% have a diabetes duration of >15 years which is comparable to Lin,^[7] et al and Gupta S,^[8] et al In a study by Sunkum AJ,^[9] et al, diabetic patients have a poorer hearing threshold and significant high-frequency loss correlated with an increase in age.

Glycemic control is an important factor, HbA1c levels were positively correlated to the degree of hearing loss, as par with studies with Al-Rubeaan K2 and Pemmaiah KD,^[3] et al. In a study by Misra V,^[10] et al concluded that the age of the patient and

degree of glycemic control had positive correlation with hearing loss.

CONCLUSION

More than 60% of diabetic patients in this study aged between 30-60 years, had hearing loss of varying degrees with 50% of them having moderate to severe degree hearing loss. In our study there was a correlation between HbA1c levels and SNHL. Early glycemic control, can be considered as a modifiable risk factor. Early detection and treatment of diabetes and strict glycemic control prevent SNHL. Diabetic patients are at increased risk of hearing impairment, although they may frequently have other confounding comorbidities. As the severity, course, and consequences of SHNL can be influenced by the medical treatment of diabetes, Audiometry should be considered as a routine test for diabetic patients by healthcare workers.

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