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ASSESSMENT OF SENSORY-NEURAL HEARING LOSS IN PATIENTS WITH CONTROLLED V/S UNCONTROLLED DIABETES MELLITUS

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ABSTRACT **Aim-** To study the prevalence of Sensorineural Hearing Loss in patients with Diabetes Mellitus and to compare the degree and severity of hearing loss in patients with diabetes controlled on medications with uncontrolled disease **Methodology-** Prospective observational study was conducted to assess prevalence of sensory-neural hearing loss in patients with diabetes mellitus attending ENT OPD at GRMC Gwalior, Madhya Pradesh, India from December 2020 to May 2022. Auditory function was measured with Pure Tone Audiometry (PTA) **Results-** Among 280 patients with Diabetes mellitus, 184 patients had Sensory-neural hearing loss (65.70%). As the disease duration increased above 10 years, incidence of SNHL increased to 88.4% in both ears. **Conclusion-** Sensorineural hearing loss is prevalent in 65.71% of type II diabetic patients. Sensorineural hearing loss in diabetes mellitus is usually gradually progressive involving high frequency thresholds. Hearing threshold increases with advanced age and increased duration of diabetes. Patients with poor control [HbA1c greater than 8.5%] of their glycemic status had raised auditory thresholds.

KEYWORDS :

INTRODUCTION

Hearing empowers us and enriches our lives. Hearing enables us to socialize, work, interact, communicate and even relax. It helps us to lead our everyday lives without limitations. Diabetes mellitus (DM) is a prevalent metabolic condition that results in a variety of bodily system abnormalities. Hearing impairment, including hearing loss and tinnitus [1-3], is one of the known consequences of DM, which leads to a lower quality of life among those affected[4]. Hearing loss in a patient with incipient diabetic coma has been known since 1857, when Jordao[5] first demonstrated it in a patient with incipient diabetic coma. Despite the fact that the association between diabetes and hearing function has been investigated for a long time, there is currently no acceptable consensus on the subject. Modern medicine's purpose is no longer just to treat diseases, but to prevent and control them, thereby increasing the quality of life of individuals and humanity as a whole.

MATERIAL AND METHODS

It's a prospective observational study conducted from December 2020 to May 2022 on all patients with type 2 Diabetes Mellitus attending ENT OPD at Madhav Dispensary and those referred from medicine department for hearing assessment All the patients with diagnosis of type 2 diabetes mellitus, age between 30 to 50 years and patients who have accepted to sign the consent for the study were included in the study. Patients having perforated tympanic membrane on otoscopic examination, Patients with actively discharging ear or with dermatological local skin infections, patients with family history of hearing loss or congenital hearing disorders and patients who have not accepted to sign the consent form were excluded from the study.

Sample was taken from Type 2 Diabetic subjects attending to Jaya Arogya Hospital, Gwalior.

Informed consent was obtained from all the subjects enrolled in the study after explaining to them in detail about the study in their own language.

The subjects selected on basis of inclusion and exclusion criteria were subjected to routine ENT, systemic ,audiometric and laboratorical assessment.

Audiometric assessment was conducted in sound treated room delivering pure tone stimuli to one ear at a time in frequencies of 250Hz, 500Hz, 1000Hz, 2000Hz, 4000Hz and 8000Hz at various selected intensities. The reference intensity level is designated □X" dB at each frequency, is the mean value of minimal audible threshold of pure tones in healthy individuals. Hearing threshold is taken as the least intensity of pure tone that was audible to the subject. The subject is advised to signal on hearing the least sound of any sort till it ceases. The subject is presented with various selected tones for 1 to 3 seconds and for a minimum gap of 1 to 3 seconds between successive presentations. Air conduction threshold is repeated for 1000Hz to assess the reliability of the procedure. Air conduction thresholds in the right and left ears were marked by "O" and "X" respectively.

RESULTS

The present study was conducted in the Department of Otorhinolaryngology, Gajra Raja Medical College and J.A. Group of Hospitals, Gwalior during the period of 18 months from December 2020 to May 2022 with type 2 DM patients with or without aural symptoms(deafness, tinnitus) were selected at random.

Table 1 : Prevalence of Sensorineural Hearing Loss

Character	Subjects	Prevalence
SNHL	184	65.70 %
Normal	96	34.30 %

In this study involving 280 type 2 diabetic patients, 184 patients (65.71%) were found to have sensorineural hearing loss and 96 patients (34.29%) were found normal.

Table 2: Distribution of SNHL patients according to their onset of Hearing Loss (N = 184)

Onset of Hearing Loss	Number	Percentage
Gradual	180	97.8%
Sudden	4	2.2%

In this study of 280 diabetes mellitus patients, 184 patients had SNHL, out of which 180 were of gradual onset, 4 were of sudden onset.

Table 3: Distribution Of Patients According To Their Degree Of Hearing Loss

PTA	No.	Percent
<25 dB	96	34.3 %
26-40 dB	182	65.0 %
>40 dB	2	0.7 %

Mean ± SD	29.73 ± 7.23 dB
Range	11.6-46.7 dB

In this study of 280 diabetes patients 96 had normal hearing , whereas 184 patients had hearing loss in both the ears .Out of the 184 patients with hearing deficit 182 had mild hearing loss and 2 had moderate hearing loss.

Table 4: Association of hearing loss of DM patients with their HBA1c Levels

HbA1C	Right Ear			Left Ear		
	No Hearing Deficit	SNHL	Prevalence	No Hearing Deficit	SNHL	Prevalence
<6.5	50	28	35.9 %	50	28	35.9 %
6.5-8.5	12	18	60.0 %	14	16	53.3 %
>8.5	34	138	80.1 %	32	140	81.4 %

In this study involving 280 patients, There were 78 patients with controlled HbA1C and 101 patients with Uncontrolled Diabetes. Out of 78 patients, 28 had SNHL in Left and Right Ear (35.9 %) while out of remaining 202 patients with uncontrolled diabetes, 156 (64.1%) patients had SNHL in both Right and Left Ear.

Table 5: Association of hearing loss of DM patients with the Duration of DM

Duration of DM in years	Left Ear			Right Ear		
	No Hearing Deficit	SNHL	Prevalence	No Hearin	SNHL	Prevalence
< or = 5	62	36	36.7 %	60	38	38.8 %
6-10	24	72	75 %	26	70	72.9 %
> 10	10	76	88.4 %	10	76	88.4 %
P Value	<0.0001			<0.0001		

In this study population of 280 patients, 98 patients had duration of less than or equal to 5 years, out of which 36 (36.7%) had SNHL in Left Ear and 38 (38.8%) had SNHL in Right Ear, 96 patients had duration between 6 to 10 years, out of which 72 (75%) patients had SNHL in Left Ear and 70 (72.9%) patients had SNHL in Right Ear, 86 patients had Duration of more than 10 years, out of which 76 (88.4%) patients had SNHL in both right and left ears.

DISCUSSION

In this study involving 280 patients of type 2 diabetics of age 30 to 50 years from various backgrounds in social life, the prevalence of sensorineural hearing loss was found to be 65.71% which is of gradual onset and progressive type. The results approximate to those that of Friedman6 (55%) and Aggarwal (64.86%)[7].

In this study 180 out of the total 184 SNHL cases had gradual onset which is highly significant. Only 4 patients had sudden onset SNHL which recovered on treatment. But Shuen Fu8 in 2005 reported a series of 68 Sudden onset SNHL in diabetes.

In this study, it was noted that there was an increase in hearing threshold with increase in duration of diabetes mellitus. It was seen that as duration increases more than 6 years the prevalence of hearing deficit increases to a greater extent. As was noted in this study, the prevalence of sensorineural hearing loss increased to 88.4% with duration diabetes mellitus more than 10 years.

HbA1C was taken into consideration since it directly gives an idea about the blood sugar control of the patient in the earlier three months. In our study prevalence of SNHL among poorly controlled patients is 80.23 % whereas it is 42.6% among patients in control, which is highly significant. The clinical studies of Lasisi et al9 (2003), Kurien et al10 (1989) conclusively demonstrate that poorly controlled diabetics have significant hearing loss in all frequencies This could be explained by the cumulative effects of advanced glycation end products and their effects on the inner ear

CONCLUSION

In this study, Sensorineural hearing loss is prevalent in 65.71% of type 2 diabetic patients. Sensorineural hearing loss in diabetes mellitus is usually gradually progressive involving high frequency thresholds. Hearing threshold increases with advanced age and increased duration of diabetes. Patients with poor control [HbA1c greater than 8.5%] of their glycemic status had raised auditory thresholds.

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