Journal of Cardiovascular Disease Research
ISSN:09758309762833. VOL14.ISSUE 07.2023

Assessment of sensorineural hearing loss in type II diabetes mellitus patients

[1]Dr. Ankit Kumar Tiwari , [2]Dr. Surendra Singh Moupachi, [3]Dr. Vineeth Kumar V, [4] Dr. Sneha Singh

[1]Senior resident, Department of ENT, Shyam Shah Medical college & Sanjay Gandhi Memorial Hospital Rewa (MP)
[2]Professor and Head, Department of ENT, Shyam Shah Medical college & Sanjay Gandhi Memorial Hospital Rewa (MP)
[3,4]Post Graduate Resident Department of ENT, Shyam Shah Medical college & Sanjay Gandhi Memorial Hospital Rewa (MP)

Corresponding Author:Dr. Sneha Singh

Article History: **Received:** 13.05.2023 **Revised:**01.06.2023 **Accepted:** 15.06.2023

ABSTRACT

Background: Sensorineural hearing loss (SNHL) is a type of hearing impairment that occurs due to damage to the inner ear. The present study was conducted to assess sensorineural hearing loss in type II diabetes mellitus patients.
Materials & Methods: 74 type II diabetes mellitus patients of both genders were subjected to Tuning fork test ,pure tone audiometry and impedence audiometer test to detect sensorineural hearing loss. The level of glycated hemoglobin was measured.
Results: Out of 74 patients, males were 44 and females were 30. Sensorineural hearing loss was present in 12 patients with <7 HBA1c levels, 15 patients with 7-8 HBA1c levels and 20 patients with >8 HBA1c levels. The difference was significant (P< 0.05).
Conclusion: There was association between sensorineural hearing loss and uncontrolled diabetes mellitus. Sensorineural hearing loss in diabetes mellitus was usually gradually progressive involving high frequency thresholds.
Key words: Diabetes mellitus, Sensorineural hearing loss, HBA1c

Introduction

Sensorineural hearing loss (SNHL) is a type of hearing impairment that occurs due to damage to the inner ear (cochlea) or the auditory nerve pathways leading from the inner ear to the brain.[1] It is one of the most common types of hearing loss and can be caused by various factors. Gradual hearing loss that occurs as a natural part of the aging process, usually affecting both ears.[2]Prolonged exposure to loud noises, such as from machinery, music, firearms, or explosions, can damage the hair cells in the inner ear and lead to hearing loss.[3]Certain genetic mutations can predispose individuals to sensorineural hearing loss, which may be present from birth or develop later in life. Certain medications, such as some antibiotics, chemotherapy drugs, and high doses of aspirin, can be toxic to the inner ear and cause hearing loss.[4]Severe head injuries can damage the inner ear or auditory nerves, leading to hearing impairment. Infections like meningitis, mumps, or cytomegalovirus (CMV) can damage the inner ear and cause SNHL.[5] Diabetes mellitus is a common metabolic disorder that is not contagious and results in a number of systemic abnormalities.[6] The consequences of diabetes mellitus on different organs in our body take on greater significance because it is the kind of diabetes that affects the general population most frequently. Diabetes mellitus prevalence is rising globally, and it is particularly pronounced in India.[7]Diabetes mellitus has been implicated as independent causative factor of sensorineural hearing loss. Most audiometric studies of hearing in patients of diabetes show a mild to moderate sensorineural hearing loss mostly in high frequency. The present study was conducted to assess sensorineural hearing loss in type II diabetes mellitus patients.

Materials & Methods

The present study consisted of 74 type II diabetes mellitus patients of both genders. All gave their written consent to participate in the study. Data such as name, age, gender etc. was recorded. Tuning fork test, puretone audiometry and impedence audiometer test was performed to detect sensorineural hearing loss. The level of glycated hemoglobin was measured. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I: Distribution of patients

Total- 74		
Gender	**Male**	**Female**
Number	44	30

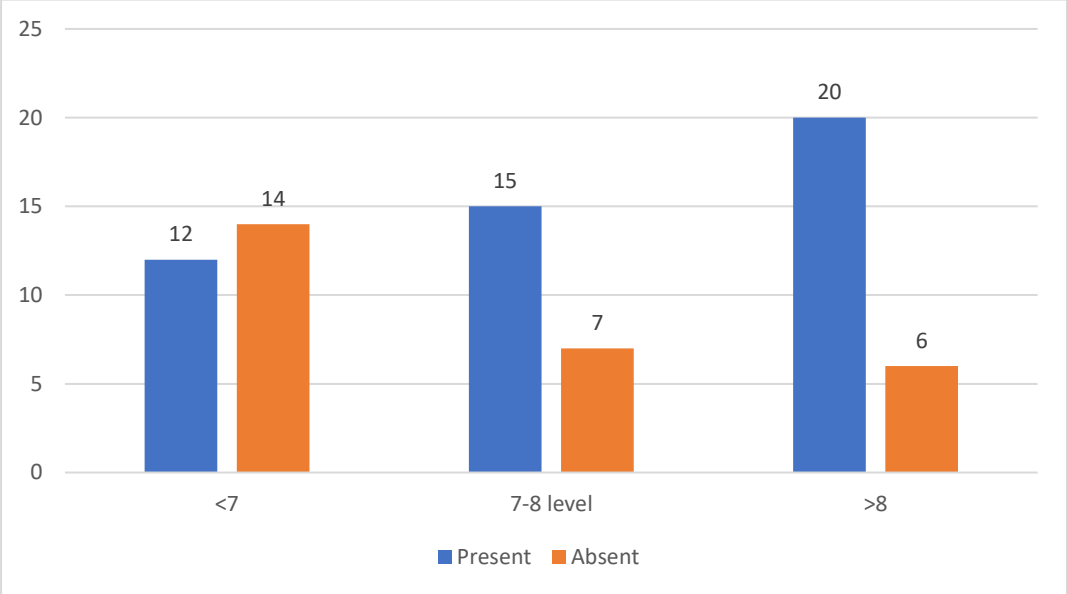
Table I shows that out of 74 patients, males were 44 and females were 30.

Table II: Distribution of hearing loss and HBA1c levels

HBA1c levels	Present	Absent	P value
<7	12	14	0.05
7-8	15	7	
>8	20	6	

Table II, graph I shows that sensorineural hearing loss was present in 12 patients with <7 HBA1c levels, 15 patients with 7-8 HBA1c levels and 20 patients with >8 HBA1c levels. The difference was significant (P< 0.05).

Graph I: Distribution of hearing loss and HBA1c levels



Discussion

Diabetes mellitus is a chronic metabolic disorder, due to relative or absolute lack of insulin, which results in elevated blood sugar levels.[8] Morbidity in Diabetes Mellitus is mainly due to long term micro and macro vascular complications affecting blood vessels of eyes, kidneys, heart and nerves.[9] The relationship between diabetes mellitus and hearing loss has been debated for many years. It has been postulated that the microvascular & neuropathic complications of diabetes do affect the hearing of individuals.[10] Studies in diabetic animals have demonstrated thickening of the basement membrane of capillaries of striavascularis.[11,12]The present study was conducted to assess sensorineural hearing loss in type II diabetes mellitus patients. We found that out of 74 patients, males were 44 and females were 30. Srinivas et al[13] in their study a total of 50 type 2 diabetics of age group 30–65 years were involved. Sensorineural hearing loss was found in66 % of type II diabetic patients and 34 % were found normal. Out of 50 diabetes mellitus patients, 33 patientshad SNHL. All cases of SNHL detected were of gradual in onset and no one had hearing loss of sudden onset. Normal hearing was found in 34 % of patients, whereas 54 % of patients had mild hearing loss and 12 % of patients had moderate hearing loss. Association of hearing loss of DM patients with sex of the patient is insignificant. However, there is significant association between older age group, longer duration and uncontrolled DM with that of SNHL. In subjects with HbA1c more than 8 and duration of diabetes mellitus more than 10 years prevalence of SNHL is more than 85 %, which is statistically significant. Sensorineural hearing loss in diabetes mellitus is gradually progressive involving high frequency thresholds. Hearing threshold increases with increasing age duration of diabetes and also high level of HbA1c greater than 8%. We found that sensorineural hearing loss was present in 12 patients with <7 HBA1c levels, 15 patients with 7-8 HBA1c levels and 20 patients with >8 HBA1c levels. Harkare et al[14]assessed the hearing threshold level in patients of diabetes

mellitus, correlate degree of hearing loss with duration and severity of hyperglycemia and complications of diabetes mellitus. Patients of previously diagnosed cases of diabetes mellitus below 60 years of age were subjected to fasting and post-meal blood sugar levels and Pure Tone Audiometric tests. Seventy four percent diabetics were affected with sensorineural hearing loss. There was no statistically significant association between the age and the sex of diabetic patients with hearing loss. The results showed bilateral significantly high frequency, mild to moderate sensorineural hearing loss in uncontrolled diabetics as compared to those with controlled diabetes. Diabetics with poorly controlled blood sugar level have increased risk of hearing loss. Samelli et al[15]found that hearing thresholds and speech test results were significantly worse in the group with diabetes than in the group without diabetes. However, no significant differences were found between participants with and without diabetes after adjusting for age, gender, and the presence of hypertension. Hearing thresholds were not affected by occupational noise exposure in the groups with and without diabetes. In addition, no association between the duration of diabetes and hearing thresholds was observed after adjusting for age, gender, and hypertension. The limitation the study is small sample size.

Conclusion

Authors found that there was association between sensorineural hearing loss and uncontrolled diabetes mellitus. Sensorineural hearing loss in diabetes mellitus was usually gradually progressive involving high frequency thresholds.

References

1. Friedman SA, Schulman RH, Weiss S. Hearing and diabetic neuropathy. Arch Intern Med 1975;135(4):573- 6.
2. Weng SF, Chen YS, Hsu CJ, Tseng FY. Clinical features of sudden sensorineural hearing loss in diabetic patients. Laryngoscope 2005;115(9):1676-80.
3. Rajendran S, Anandhalakshmi, Mythili B, Viswanatha Rao. Evaluation of incidence of sensorineural hearing loss in patients with type2 diabetes mellitus. Int J Biol Med Res 2011;2(4): 982-87.
4. Axelsson A, Sigroth K, Vertes D. Hearing in diabetics. Actaotolaryngol 1978;356 (Suppl):3-21.
5. Cullen JR, Cinnamond MJ. Hearing loss in diabetics. J Laryngol Otology 1993;107:179-82.
6. Kurien M, Thomas K, Bhanu TS. Hearing threshold in patients with diabetes mellitus.JLaryngolOtol 1989;103(2):164-68.
7. Taylor IG, Irwin J. Some audiological aspects of diabetes mellitus. J LaryngolOtol1978;92:99-13.
8. Parving A. Hearing problems and hormonal disturbances in the elderly. Act OtolaryngolSuppl (Stockh) 1990;476:44-3.
9. FangchaoMa, Orlando Gomez-Marin, LeeDJ, Balkany T. Diabetes and hearing impairment in Mexican American adults: a population based study. J LaryngolOtol1998;112:835-839.
10. Zewoski J, Ozdowska A (2010) Could glycated hemoglobin beused as a diagnostic tool in diabetes mellitus. Pol Arch MedWewn 120:109–114.
11. Bayındır T, Erdem T, Uzer E, Toplu Y, Sarı R, Ozturan O (2010)Evaluation of the auditory effects in controlled and uncontrolledtype 2 diabetes mellitus using otoacoustic emissions. J InonuUniv Med Fac 17(4):337–341.
12. Panchu P (2008) Auditory acuity in type 2 diabetes mellitus. Int JDiabetes Dev Ctries 28(4):114–120.
13. Srinivas CV, Shyamala V, Shiva Kumar BR. Clinical study to evaluate the association between sensorineural hearing loss and diabetes mellitus in poorly controlled patients whose HbA1c> 8. Indian Journal of Otolaryngology and Head & Neck Surgery. 2016 Jun;68:191-5.
14. Harkare VV, Deosthale NV, Khadakkar SP, Dhoke PR, Dhote KS, Gupta A. A Prospective Study Hearing Status in Patients with Diabetes Mellitus. PJSR2014;7(2):38-2.
15. Samelli AG, Santos IS, Moreira RR, Rabelo CM, Rolim LP, Bensenõr IJ, Lotufo PA. Diabetes mellitus and sensorineural hearing loss: is there an association? Baseline of the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil). Clinics. 2017;72:5-10.