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RESEARCH ARTICLE

A study on the incidence of Sensorineural hearing loss in patients with Diabetes mellitus

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Abstract

Aim: The aim of this study was to evaluate the incidence of sensorineural hearing loss in Diabetes mellitus patients.

Methods: The study was carried out on 50 Diabetes mellitus patients and an equal number of age and sex matched non-diabetic controls. Details of audiometry were recorded in the patients group as well as the control group. The Patients group also underwent HbA1C test to assess glycemic control.

Results: The pure tone audiometry test revealed that 13 (26%) Diabetic cases were having mild to moderate sensorineural hearing loss as against 4 (8%) in non-diabetic controls ($p<0.05$).

Conclusions: It is concluded that the diabetic patients have significantly high incidence of sensorineural hearing loss when compared to non-diabetic control group of comparable age.

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INTRODUCTION

The objective of the present study was to determine whether patients with diabetes have a higher incidence of sensorineural hearing loss (SNHL) than the non-diabetic controls. Symptoms of dizziness, tinnitus and hearing impairment are often observed in patients with Diabetes mellitus. Generally this hearing impairment is sensorineural (Mala and Campos 2005). A recent review of literature on this aspect revealed that the results of such studies are inconclusive; while some studies reported mild to moderate hearing loss (Celick et al 1996) others showed no difference in speech discrimination scores between diabetic and a normal population (Cullen and Cinnamond 1993). Therefore there is a need for further studies not only to investigate hearing loss in diabetics but also to see the effect of progression of disease on severity of hearing loss. With this objective the present study was carried out.

Materials and Method

The present study was carried out on 50 Diabetes mellitus patients and an equal number of healthy controls. The study was approved by Institutional Review Board (IRB), Princess Esra hospital, Deccan College of Medical Sciences, Hyderabad. The patients reported to the outpatient Department of Medicine, Princess Esra hospital, Hyderabad and were in the age range of 18 to 50 years (42 T2DM and 8 T1DM cases). The cases were confirmed of suffering from Diabetes mellitus by assessing HbA1C (American Diabetes Association criteria). Of these only 9 were newly diagnosed while rest of them visited the Department of Medicine for follow-up purposes. Both the diabetic patients as well as non-diabetic controls underwent an ENT examination, routine hearing loss test and a pure tone audiogram (PTA).

Inclusion criteria: Diagnosed cases of Diabetes mellitus in the age range of 18-50 years of both genders were included in the study. Age and sex matched healthy subjects in the age range of 18-50 years served as controls.
Exclusion criteria: Patients with hearing loss associated with other causes were excluded.

Assessment of Hearing loss: Initial screening of hearing loss in both the groups was done by Tuning fork tests followed by Pure Tone Audiometry (PTA) test.

Pure Tone Audiometry: Both air and bone conduction tests were performed for each ear by the PTA method. The PTA was done by using advanced digital audiometer, ALS diagnostics, 2000.

Air conduction test: The conventional "5 up-10 down method" (Anirban Biswas 1996) was followed. In this method for each frequency the tones were lowered in 10 dB steps and increased in 5 dB steps for each frequency.

Bone conduction test: It was also done by "5 up-10 down method". Subjects were considered as suffering from sensorineural hearing impairment if the average of the pure tone thresholds in either ear exceeded 25 dB HL and the air bone gap less than 15 dB (Biswas A 1996).

Statistical Analysis: The statistical analysis was carried out by using 'Chi-Square' test. "p" value of <0.05 was considered statistically significant.

Results

Table-1 depicts criteria followed for identifying sensorineural hearing loss. Age and sex wise distribution of Diabetic and control groups were given in Table-2.The proportions of males and females in the two groups were comparable. There was no statistically significant difference between the mean age of the diabetic as well as non-diabetic groups. The PTA test revealed that 13 (26%) out of 50 diabetic patients were found to have mild to moderate sensorineural hearing loss as against 4 (8%) in the control groups ($p<0.05$) as given in Table-3. All the diabetic patients with SNHL were in the age range of 41-50 years.

Table 1: Criteria followed for identifying sensorineural hearing loss

Test	Normal	Conductive deafness	Sensori-neural deafness
Rinne	AC>BC	BC>AC	AC>BC
Weber	Not lateralized	Lateralized to poorer ear	Lateralized to better ear
ABC	Same as examiner's	Same as examiner's	Reduced

Table 1 depicts the tuning fork tests done for the identification of sensorineural hearing loss in diabetic patients and healthy controls.

Table 2: Age and sex wise distribution of Diabetics and Non-diabetics patients

Age (Years)	Diabetics			Non-diabetics		
	Males	Females	No. of patients	Males	Females	No. of patients
18-30	2	2	4	4	3	7
31-40	5	3	8	10	8	18
41-50	20	18	38	16	9	25
	Total		**50**			**50**
	Mean Age (Years)		**35.4± 3.2**			**35.6±4.1**

This table provides the information of age and sex wise distribution of both the groups. The patients in both the groups were categorized into three ranging from 18 to 50 years of age

Table 3: Sensorineural hearing loss in Diabetic and Non-diabetic controls as assessed by Pure tone Audiometry (PTA)

Hearing Loss	Diabetics	Non-diabetics	p value
Present	13*(26%)	4 (8%)	<0.05
Absent	37 (74%)	46 (92%)	
Total	**50**	**50**	

*p<0.05

The above table revealed the sensorineural hearing loss in diabetic patients and healthy controls. There was significant difference ($p<0.05$) in diabetic patients as compared to non-diabetic individuals.

Discussion

Results of the present study revealed that Diabetic patients have significantly higher incidence of sensorineural hearing loss compared to non-diabetic control subjects ($p<0.05$). In similar studies carried out in Type 2 DM patients Rajendran et al (2011) and Jankar et al (2013) reported mild to moderate sensorineural deafness. The role of age of the diabetic patients and glycemic control could not be evaluated in our study due to relatively smaller sample size. However it was observed that all the diabetic cases with SNHL belong to the age group 41-50 years.

In a retrospective data base review Kakarlapudi et al (2003) observed that sensorineural hearing loss was more common in diabetics than non-diabetic patients and the severity of hearing loss was reported to correlate with progression of the disease as reflected in serum creatinine.

Our results regarding higher age group suffering from sensorineural hearing loss are supported by the observations of Axelsson (1978) who showed that the incidence of pure tone hearing loss increased with age in patients with diabetics, even after correction for presbycusis. Microangiopathic complications are generally attributed to the observed hearing loss in diabetic patients. In order to understand histopathological changes in sensorineural hearing loss Jorgensen (1991) studied histopathological properties of temporal bones in patients with diabetes with hearing loss and observed thickening of the walls of Vasa nervosum of the VIII nerve leading to acoustic neuropathy. Microangiopathic changes in the Stria vascularis were also observed in these patients.

Conclusion: It is concluded that the incidence of sensorineural hearing loss is significantly high in Diabetes mellitus patients as compared to non-diabetic controls. However, there is a need for further studies with larger sample size in order to establish the observed SNHL in these patients.

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