

Original Research

Prevalence of sensori-neural hearing loss among diabetic children

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ABSTRACT:

Background: To assess the prevalence of sensori-neural hearing loss among diabetic children. **Materials & methods:** The present study included 40 patients between age group of 5- 15 years with confirmed diagnosis of Type 1 DM and an average disease duration of more than 1 year and 40 control group subjects were considered. Chi- square test and student t test were used for assessment of level of significance. P-value of less than 0.05 was taken as significant. **Results:** In the study group, 75% of the patients (30) had normal DPOAE findings, while the remaining 25% of the patients (10) had abnormal DPOAE findings. In the control group, 97.5 % of the patients (39) had normal DPOAE findings, while the remaining 2.5% of the patients (1) had abnormal DPOAE findings. **Conclusion:** Early detection is important in affected children. Hearing loss in children suffering from diabetes mellitus is sensorineural, bilateral and symmetrical.

Keywords: hearing loss, diabetes, children.

Received: 24 February, 2022

Accepted: 29 March, 2022

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This article may be cited as: Amandeep, Aarti. Prevalence of sensori-neural hearing loss among diabetic children. Int J Res Health Allied Sci 2022; 8(2):164-166.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder resulted from complete or partial insulin deficiency. As a genetically inherited disease, DM is characterized by chronic hyperglycemia and changes in the metabolism of lipids, carbohydrates, and proteins. ⁽¹⁾ Involving approximately 9% of the world population, type 2 DM patients account for 80% to 90% of all cases, while the remaining 10% are afflicted by type 1 DM and gestational diabetes. ⁽²⁾ Diabetes is accompanied by higher mortality rates, lower quality of life, decrease in life expectancy, increase in healthcare expenses as well as increased micro and macrovascular complications such as retinopathy, nephropathy, neuropathy and cardiovascular diseases. ^(3,4)

Hearing loss is a common complaint for which referrals are frequently made to secondary care for an otolaryngologist's attention. There are two types of hearing loss; conductive and sensorineural hearing loss. ⁽⁵⁾ Sensorineural hearing loss (SNHL) is the most common type and accounts for the majority of all hearing loss. SNHL refers to any cause of hearing loss due to a pathology of the cochlea, auditory nerve, or central nervous system. Patients with new-onset hearing loss should be investigated and undergo full

audiometric evaluation by a multidisciplinary team, including an otolaryngologist, audiologist, radiologist, and speech/language therapist. ⁽⁶⁾

Most of the previous studies have marked hearing loss as another complication of DM, while others provided a different perspective. ⁽⁷⁾ The relation between DM and sensorineural hearing loss (SNHL) has been under investigation for a century. However, it has remained controversial. Changing in the metabolism of glucose alters inner ear function and leads to hearing and vestibular disorders. ⁽⁸⁾ Hence, the present study to assess the prevalence of sensori-neural hearing loss among diabetic children.

MATERIALS & METHODS

The present study included 40 patients between age group of 5- 15 years with confirmed diagnosis of Type 1 DM and an average disease duration of more than 1 year and 40 control group subjects were considered. These children were subjected to an ENT examination and Audio logical assessment was done by PTA and OAE. All selected patients with IDDM were examined in detail, which included detailed history, ENT examination TFT, PTA and OAE. Hearing thresholds were assessed by pure tone audiometric test. Bone and air conduction thresholds

were both tested at frequencies between 250-4000 Hz and 250-8000 Hz, respectively. All the results were collected and analysed by SPSS software. Chi-square test, Mann-Whitney U test and student t test were used for assessment of level of significance. P-value of less than 0.05 was taken as significant.

RESULTS

A total of 40 diabetic patients (study group) and 40 non-diabetic patients (control group) were analyzed in the present study. 37.5% of the patients (15) of the study group and 47.5 percent of the patients (19) of

the control group belonged to the age group of 8 to 11 years.

In the study group, 75% of the patients (30) had normal DPOAE findings, while the remaining 25% of the patients (10) had abnormal DPOAE findings. In the control group, 97.5 % of the patients (39) had normal DPOAE findings, while the remaining 2.5% of the patients (1) had abnormal DPOAE findings. While comparing the DPOAE findings in between the study group and the control group, significant results were obtained.

Table 1: DPOAE findings

DPOAE	Study group (n=40)		Control group (n= 40)		p- value
	No. of patients	%age	No. of patients	%age	
Normal findings	30	75	39	97.5	0.02
Abnormal findings	10	25	1	2.5	
Total	40	100	40	100	

Table 2: Pure tone auditory findings (Both ear response)

Pure tone auditory	Study group		Control group		Chi-sq. value	p- value
	number	%age	number	%age		
1000 <25	38	95	35	87.5	1.05	0.42
>25	2	5	5	12.5		
4000 <25	32	80	38	95	4.004	0.03
>25	8	20	2	5		

DISCUSSION

Acute sensorineural hearing loss is defined as a hearing loss greater than 30 dB in at least three consecutive audiometric frequencies over 72 hours.⁽⁹⁾ This is usually classified as an otolaryngologic emergency condition, which requires prompt management.

Diabetes mellitus is believed to be a chronic metabolic disorder. Its characteristics are hyperglycemia and numerous abnormalities in metabolism of fat and protein. Its association with a number of microvascular complications has been known for long, most commonly affecting eyes and kidneys. Neuropathy, involving somatic and autonomic nerve fibers is one of the many microvascular complications of diabetes mellitus. An association between maternally inherited type of diabetes mellitus in Wolfram syndrome and congenital severe hearing impairment has been established.^(10,11) In our study, total of 40 diabetic patients (study group) and 40 non-diabetic patients (control group) were analyzed in the present study. 37.5% of the patients (15) of the study group and 47.5 percent of the patients (19) of the control group belonged to the age group of 8 to 11 years.

Associations between DM and hearing loss also have been found in large studies of veterans. Some researchers examined electronic medical records of 12,575 PWD and 53,461 age-matched nondiabetics. SNHL was identified via ICD codes. The prevalence

of hearing loss was 13.1% in PWD compared with 10.3% in the nondiabetic group ($p < 0.05$). For a subset of 1,888 PWD and SNHL, audiometric data were available. Higher (poorer) hearing thresholds and lower (poorer) speech discrimination scores correlated with increasing creatinine levels.⁽¹²⁾ Similarly, a study was conducted of behavioral thresholds from 250 to 14,000 Hz in 302 veterans classified as T1DM, T2DM, or nondiabetic. Three age groups (< 50, 50–56, and > 57 years) were considered. Among the youngest subjects (< 50 years), thresholds were higher (poorer) in persons with T2DM compared to those without across the frequency range. For young persons with T1DM, significant differences were observed only for frequencies less than 2,000 Hz and above 8,000 Hz. For middle aged and older participants, low-frequency (but not high-frequency) differences in behavioral thresholds were observed.⁽¹³⁾ In our study, the study group, 75% of the patients (30) had normal DPOAE findings, while the remaining 25% of the patients (10) had abnormal DPOAE findings. In the control group, 97.5 % of the patients (39) had normal DPOAE findings, while the remaining 2.5% of the patients (1) had abnormal DPOAE findings. While comparing the DPOAE findings in between the study group and the control group, significant results were obtained.

In one of the study, the incidence of SNHL was 85.71% among poorly controlled patients with a glycosylated haemoglobin (HbA1c) level >8, 62%

among those with moderate control and HbA1c 7–8, and 38% in wellcontrolled subjects with HbA1c<7. It was shown that poorly controlled diabetic patients had a significant hearing loss in all frequencies. ⁽¹⁴⁾

CONCLUSION

Early detection is important in affected children. Hearing loss in children suffering from diabetes mellitus is sensorineural, bilateral and symmetrical.

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