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Original Research

Assessment of hearing loss in children with diabetes

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ABSTRACT:
Background: Diabetes is the most frequent endocrine-metabolic disorder in children and adolescents, and has remained the main type of diabetes in children. The present study was conducted to assess hearing loss in children with diabetes. **Materials & Methods:** 60 children with confirmed diabetes (type I). Equal number of healthy subjects (control) was enrolled. Both air and bone conduction were tested at frequencies between 250-8000 Hz and 250-4000 Hz respectively. Hearing impairment was noted at auditory threshold above 25 dB in any frequency and the magnitude of hearing loss was assessed according to auditory threshold in conversational frequencies only. **Results:** Group I had 40 males and 20 females and group II had 35 males and 25 females. Sensorineural hearing loss was seen in 7 in group I and 1 in group II, light SNH seen in 9 in group I and 2 in group II and moderate SNH seen 4 in group I. The difference was significant (P< 0.05). **Conclusion:** Children with diabetes had higher hearing loss as compared to healthy non diabetics.
Key words: Diabetics, Hearing, Sensorineural

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INTRODUCTION

The World Health Organization (WHO) defines diabetes mellitus (DM) as a multiple-etiology metabolic disorder, characterized by chronic hyperglycemia and other metabolic abnormalities, which result in absolute or relative insulin deficiency.[1] It is the most frequent endocrine-metabolic disorder in children and adolescents, and has remained the main type of diabetes in children. Type 1 diabetes mellitus (T1DM) is a disease with an etiology of intervening environmental factors which interact with a genetic-predisposition component; it is considered a chronic autoimmune disease which causes the destruction of the pancreatic β cells which produce insulin.[2]

The Vascular endothelium's basal Membrane are thickened, which is defined as microangiopathy. Still the pathogeneses of this later abnormality, is not fully understood, but it is directly related to hyperglycemia among diabetic patients.[3] There is a controversial argument about the neuropathy, but it can be related to the microangiopathy, and disorders in the peripheral nervous system. Arthrosclerosis, which is mainly seen in diabetes Mellitus patients, and can be accompanied by neuropathy on various organs, including the hearing system.[4] The adverse effects on various organs and hearing ability can be the result of disorders of blood and reduction of nutritional transport, due to thickness of vascular membrane or indirectly due vascular constriction, which leads to degeneration of eight nerve.[5] Angiopathy in the hearing system can be due to above observations. Only few studies to date have documented presence of significant hearing loss in young patients with type 1 diabetes mellitus particularly in children who have relatively short duration of illness.[6] The present study was conducted to assess hearing loss in children with diabetes.

MATERIALS & METHODS

The present study comprised of 60 children with confirmed diabetes (type I). Equal number of healthy

subjects (control) was also enrolled. All were taken in the study after their parent gave written consent.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Group I had diabetics and group II had controls. In all, pure-tone audiometric tests were performed using an Amplaid 300 clinical audiometer in a soundproof room. Both air and bone conduction were tested at frequencies between 250-8000 Hz and 250-4000 Hz respectively. Hearing impairment was noted at auditory threshold above 25 dB in any frequency and the magnitude of hearing loss was assessed according to auditory threshold in conversational frequencies only. Sensorineural hearing loss was assessed. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I. graph I shows that group I had 40 males and 20 females and group II had 35 males and 25 females.

Table I Distribution of patients

Groups	Group I	Group II
Status	Diabetics	Non- diabetics
M:F	40:20	35:25

Graph I Distribution of patients

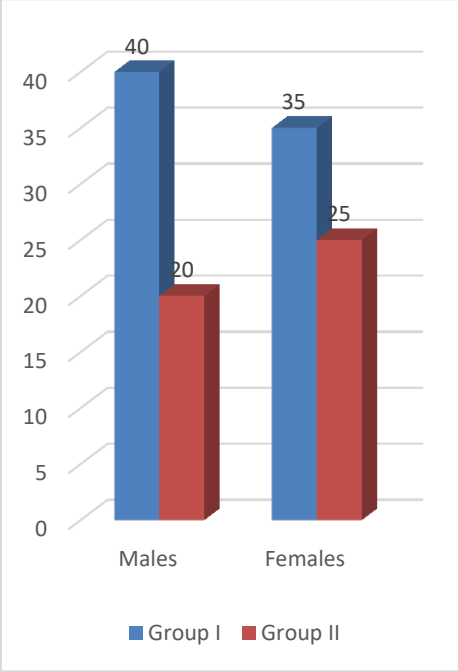
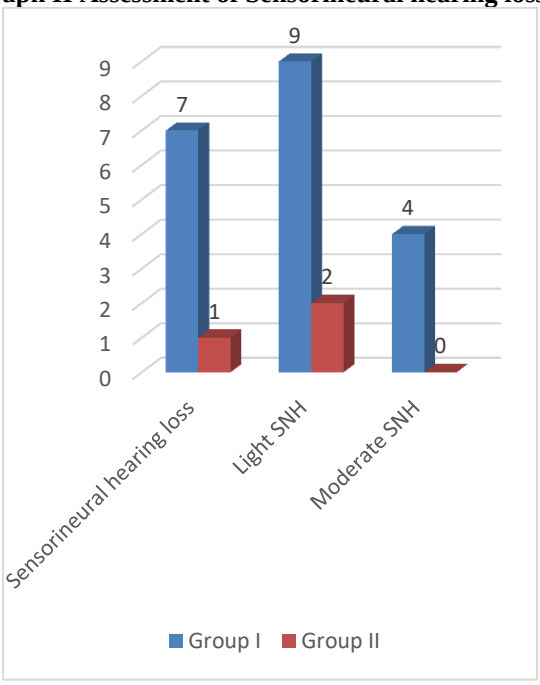


Table II, graph II shows that sensorineural hearing loss was seen in 7 in group I and 1 in group II, light SNH seen in 9 in group I and 2 in group II and moderate SNH seen 4 in group I. The difference was significant (P< 0.05).

Table II Assessment of Sensorineural hearing loss

Parameters	Group I	Group II	P value
Sensorineural hearing loss	7	1	0.01
Light SNH	9	2	
Moderate SNH	4	0	

Graph II Assessment of Sensorineural hearing loss



DISCUSSION

Diabetes Mellitus is a genetic disorder, with abnormal elevated serum glucose, due to partial or absolute lack of Insulin, although in type –II diabetes, insulin is either normal or elevated, and the etiology of the disease mainly relay on the receptor for the insulin. The average age of the onset of the disease is between 7 and 15 years of age; however, it may occur at any age.[7] Values of the HbA1c>6% higher than the normal range (5–6%) have been considered a risk of developing micro- and macroangiopatic complications. The affection of the blood vessels which supply the inner ear and the vascular stria have been reported by different authors as a physiopathological cause of SNHL in T1DM patients.[8] Treatment with insulin, maintaining on average HbA1c of 7.2%, reduces the onset and progression of microangiopatic complications, atrophy, and demyelination of the spiral ganglion by up to 76%. Sensorineural hearing loss (SNHL) is a loss of hearing at any frequency more than 25dB, with conductive and sensorineural gaps lower that 20dB, and affecting the patient's ability to communicate, his or her education, job prospects and social relationships, and also causes stigmatization.[9] The present study was conducted to assess hearing loss in children with diabetes.

In present study, group I had 40 males and 20 females and group II had 35 males and 25 females. Taziki et al[10] compared the hearing loss among diabetic with non-diabetic patients. In this study 66% and 34% of participants were men and women respectively. The age distribution of the patient were 15-75 years. The hearing loss among diabetic patients and non- diabetic subjects were 16% and 5% respectively, which showed that the diabetic patient has 3.2 times more possibility to acquire hearing problem. It was also shown, that there was a direct correlation between increasing age and hearing loss. More women are at risk, of getting hearing loss than men. The hearing loss also has a correlation with the duration of disease onset and the consumption of Glibanclamid.

We found that sensorineural hearing loss was seen in 7 in group I and 1 in group II, light SNH seen in 9 in group I and 2 in group II and moderate SNH seen 4 in group I. Dayem et al[11] found that assessment of pure tone audiometry revealed that the diabetics had a significantly higher reading in high frequency at 8000 Hz, 16,000 Hz, 17,000 Hz, and 18,000 Hz on the right side and at 4000 Hz, 8000 Hz, 16,000 Hz, 17,000 Hz, and 18,000 Hz on the left side. There was a significantly lower level in speech reception threshold, repetition of words, and masking level of diabetics on the left side. Evaluation of transient otoacoustic emission revealed that diabetics recorded significantly lower signal to noise ratio at 4000 Hz on the right side and at 1000, 1500, 4000, and all Hz on left side. There was significant lower emission amplitude in the right side of the diabetics group at 1500 and 4000 Hz and at 1000, 1500, and 4000 Hz on the left side. Patients with failed otoacoustic emission were significantly higher in disease duration >10 years. Elamin et al[12] in their study sixty-three diabetic patients below the age of 18 were investigated together with 63 age and sex matched non-diabetic controls. Pure-tone audiometric tests were performed using an Amplaid 300 clinical audiometer in a soundproof room. Both air and bone conduction were tested at frequencies between 250-8000 Hz and 250-4000 Hz respectively. Hearing impairment was noted at auditory threshold above 25 dB in any frequency and the magnitude of hearing loss was assessed according to auditory threshold in conversational frequencies only. The hearing acuity was lower in the diabetic patients than in the control subjects in all tested frequencies, but the differences achieve statistical significance only at middle and high frequencies. The hearing loss was symmetrical, generally mild, and affects both sexes equally. Duration of diabetes, HbA1c concentration, and angiopathic complications showed positive correlation with the increased hearing thresholds; while, age at onset, insulin dose per day, presence of neuropathy, and frequency of DKA and hypoglycaemic episodes were not associated.

CONCLUSION

Authors found that children with diabetes had higher hearing loss as compared to healthy non diabetics.

REFERENCES

1. Chacra AR .Diabetes mellitus. EM: Parado FC, Ramos JA, Borges DR, Rothschild HA, editors, Tratado de atualizacao teraputica.20a ed. Sao: Artes medicas:C amara publicadora do livro. 2001, p.375-89.
2. Robbins SL Contran RS, Kumar V ,Pathological basis of disease 3rd ed Philadelphia: WB Sauders Co. 1991; 776-890.
3. Makishima K , Tanka AK, pathological changes of the inner ear and central auditory pathway in diabetes. Ann Otol Rhinol Laryngol, 1971; 80(2) 218-28.
4. Taylor IG, Irwin J. some audiological aspect of diabetes mellitus J laryngol Otol, 1978, 92(2): 99-13.
5. Costa OA. Inner ear pathology in experimental diabetes. Laryngoscope. 1976.77:68-75.
6. Fukiui M Kitagawa Y Nakamura N, Kadono M, Mogami S, Ohnishi M et al Idiopathic sudden hearing loss in patients with type2 diabetes. Diabetes Res Clin Pract. 2004;63; 204-11.
7. Sieger A, White NH, Skinner MW. Auditory function in children with Diabetes Mellitus. Ann. Othol Rhinol Laryngol. 1983; 92; 237-41.
8. Drnrz TH and Guide HL. Hearing loss in patients with diabetes mellitus Braz Otorhinolarjngol. 2009, Jul-Aug. (4); 573-8.
9. Donaldof, Austin-Dawn, Konrod- Martin et al Diabetes-Related. Changes in hearing' Largnoscope. 2009, Sep.119(9)-96.
10. Taziki Mohammad H, Mansourian Azad R. The comparison of hearing loss among diabetic and non-diabetic patients. Journal of Clinical and Diagnostic Research. 2011;5(1):88-90.
11. Abd El Dayem SM, Abd El Ghany SM, Beshr AE, Hassan AG, Attaya MS. Assessment of hearing in children with type 1 diabetes mellitus. Journal of Pediatric Endocrinology and Metabolism. 2014 May 1;27(5-6):393-402.
12. Elamin A, Fadlallah M, Tuevmo T. Hearing loss in children with type 1 diabetes. Indian Pediatr. 2005 Jan 1;42(1):15-21.