



Sensorineural Hearing Loss and Type 2 Diabetes Mellitus: A clinical study

Authors

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Abstract

Background: DM is one of the most important healthcare concerns in the world since this disease can affect virtually every system in the human body. It is a non-communicable disease with numerous cardiovascular, neurological, infectious complications. The association of sensorineural hearing loss (SNHL) in diabetes mellitus patients is known since decades, yet there is no clear consensus among previous studies, with respect to the prevalence of SNHL in type 2 diabetes patients and the effect of duration and control of diabetes on hearing acuity. Hence the objectives of this study are to find the prevalence of SNHL in type 2 diabetes patients and to find the effect of duration and control of diabetes on hearing loss. The present study was conducted to identify whether patients with diabetes have a higher incidence of sensorineural hearing loss than the general population and examine whether control of diabetes is related to severity of hearing loss.

Method: The present study was conducted on 100 patients with 50 patients having type 2 diabetes and 50 patients as control attending Government Medical College, Jammu in the age group of 30-70 years. After detailed history taking and clinical examination, all subjects underwent FBS, PPBS estimation and HbA1c evaluation was done for diabetic patients. All underwent pure tone audiometry and the findings were recorded and analyzed.

Results: Diabetes patients had insidious onset, gradually progressive, bilaterally symmetrical SNHL. SNHL is prevalent in 67.44% of type 2 diabetes patients compared to 23.26% of controls. It is aggravated with the increasing age and duration of diabetes. Poor control of diabetes showed increased prevalence of SNHL compared to good control of diabetes.

Conclusions: There is increased prevalence of SNHL in type 2 diabetes patients and it is seen more in patients with poor diabetic control.

Keywords: Sensorineural hearing loss, Diabetes mellitus, Glycosylated Hemoglobin.

Introduction

Diabetes mellitus is a metabolic disorder due to relative or absolute lack of insulin resulting in elevated blood glucose levels associated with long term vascular and neurological complications.^[1] The long term complications of the disease can be macrovascular (CAD, stroke, etc.) or microvascular (neuropathy, retinopathy, etc.). Patients with DM often show symptoms such as

dizziness, tinnitus, and hearing loss. A frequent complication in type-2 DM is deafness. Diabetes mellitus has been implicated as an independent causative factor of sensorineural hearing loss (SNHL).^[2] Hearing loss in diabetics is described as progressive, bilateral sensorineural type usually affecting the higher frequencies.^[3,4] Regarding the duration of diabetes and hearing loss, it is found that the mean hearing thresholds in patients with

diabetes of less than 10 years of duration were far better than those with more than 10 years of duration and other studies also support that the threshold becomes poorer as duration of diabetes increases, while some studies state that there is no relation between hearing threshold and duration of diabetes.^[5-9]

Material and Methods

The present study was done to assess the effect of type 2 DM on sensorineural hearing loss conducted in Government Medical College, Jammu on 100 patients comprising of 50 type 2 DM compared with 50 non-diabetic controls in the age group of 30-70 years. The patients were selected by simple random sampling method into two groups of 50 each. Written consent was obtained from all the subjects enrolled in the study after explaining to them in detail about the study in their own language. After detailed history taking, all the subjects underwent general physical examination and complete ENT examination including tuning fork tests. After that all subjects underwent FBS, PPBS estimation and glycosylated hemoglobin levels [HbA1c] estimation was done for diabetic patients. Both air and bone conduction tested for each ear. Their hearing thresholds were compared with non-diabetic control group.

Results

The study included 100 subjects comprising 50 type 2 diabetes patients matched 50 non-diabetic controls in the age group of 30-70 years. Equal number of diabetic 'cases' and non-diabetic 'controls' were enrolled in 4 age group with 10 year gap from 30 to 70 years. Equal number of males and females were taken as cases and controls.

SNHL was found 92% prevalent in diabetic females and 40% in diabetic males although the prevalence picture was different in Non-diabetic patients with respect to gender distribution with 28% females and 16% males having SNHL (Table 1).

In diabetic patients, the prevalence of SNHL was highest among 41-50 years age group (22%) followed by 51-60 years age group (18%). In non-diabetic controls the prevalence of SNHL was highest among 61-70 years age group (45%), elderly subjects followed by 51-60 years age group (23%) (Table 2). Hence, there was pattern of more prevalence of SNHL with increasing age. Whereas there was no such pattern among diabetic cases, suggesting that diabetes may be responsible for the prevalence of SNHL among diabetic cases and not the age (Table 2).

33 out of 50 diabetic patients had hearing loss and rest 17 diabetic patients were having normal hearing. The type of hearing loss was determined with the help of Audiogram. All 33 patients had bilateral symmetrical sensorineural hearing loss. In comparison 11 of 50 non-diabetic controls were having SNHL. Prevalence of 66% of sensorineural hearing loss was found among diabetic patients compared to 22% among non-diabetic control group (Table 3).

The degree of hearing loss as observed among 33 diabetic patients who had hearing loss, is predominantly of mild degree (45%) followed by moderate degree (24%), moderately severe and severe being 15% and 12% respectively (Table 4).

Table 1: Prevalence of SNHL in diabetic cases and non-diabetic controls according to gender distribution

Gender	DM with SNHL	Non DM with SNHL	Total
Male	10	4	14
Female	23	7	30

Table 2: Prevalence of SNHL in diabetic cases and non-diabetic controls according to age group

Age	Cases with SNHL	Controls with SNHL
31-40	6	1
41-50	11	2
51-60	9	3
61-70	7	5

Table 3: Prevalence of SNHL in diabetic cases and non-diabetic controls

	SNHL present	SNHL absent	Total
DM	33	17	50
Non DM	11	39	50

Table 4: Degree of hearing loss in diabetes mellitus patients

Degree	Diabetics with SNHL
Mild	15
Moderate	8
Moderately Severe	5
Severe	4
Profound	1
Total	33

HbA1c value is a measure of control of diabetes. The results of this study show that the percent proportion of SNHL among diabetes patients with HbA1c more than 8% is highest (92%) followed by patients with HbA1c between 7-8% (62.5%) and the least was seen among diabetes patients with HbA1c less than 7% (29.4%) (Table 8).

Moderately severe degree SNHL exclusively and moderate degree SNHL predominantly found in patients with HbA1c more than 8% and Mild degree of SNHL was also commoner in this group. Patients with HbA1c<7% had only mild SNHL (Table 6).

Table 5: HbA1c and percent proportion of SNHL

HbA1c	No. of diabetic cases	Cases with SNHL
HbA1c<7	17	5
HbA1c7-8	8	5
HbA1c>8	25	23

Table 6: HbA1c and degree of SNHL

HbA1c	No. of diabetic cases	Cases with SNHL	Mild SNHL	Mod SNHL	Mod Sev SNHL	Profound
HbA1c<7	17	5	4	1	0	0
HbA1c7-8	8	5	2	3	0	0
HbA1c>8	25	23	13	5	4	1
Total	50	33	19	9	4	1

Discussion

Diabetes is one of the most common endocrinal disorders. It is a disease of multifactorial etiology with a heterogenous clinical presentation and a susceptibility to complications with a variable response to treatment. Relationship between DM and SNHL is complex. In our study incidence of

hearing loss in patients with diabetes mellitus was seen. It was observed in our study that 66% patients with diabetes had sensorineural hearing loss which was similar to study conducted by Taylor et al. who reported that almost 70% of their adult diabetics had hearing impairment. Similar findings were seen in the study conducted by Rajendran in 2011 who observed 73% diabetic patients having SNHL.^[8] Weng et al in 2005 reported a series of 68 sudden onset of SNHL in diabetes.^[10] This study shows presence of only insidious onset SNHL in diabetes. In our study females were seen more affected than males in patients having diabetes. This was not seen in accordance with the study conducted by Vaughn N et al. in whom only 27 women out 694 had SNHL with diabetes.^[11] In our study, most common age group involved was between 41-50 years followed by 61-70 years of age which was not in accordance with the study conducted by Harner SG in whom sensorineural hearing loss was seen with increasing age in diabetics.^[12] Similarly, in a study conducted by Dalton DS et al., no significant difference was seen among age groups.^[13]

In our study hearing loss was seen more in diabetics as compared to non diabetics. This was in accordance with the study conducted by Kakarlapudi V et al.^[14] Similar findings were seen in the study conducted by Harner SG in 200 patients.^[13] Tiwari A et al. also in his study found prevalence of sensorineural hearing loss more in patients having diabetes than in non diabetics.^[15] In our study, there was direct correlation seen between HbA1c level and sensorineural hearing loss. This was in accordance with the study conducted by Chavadaki JA et al.^[16] Dalton DS et al., also in his study showed that the incidence of hearing loss was seen more in patients with diabetes as compared to non diabetics.^[13] Tay HL et al. also concluded that diabetic patients had worse hearing threshold as compared to non diabetics.^[17] Wackym PA also in his study concluded that diabetes mellitus patients had significantly more hearing loss than normal.^[18]

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