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Retrospective Study in Diabetic and Normal Patients to Evaluate Sensorineural Hearing Loss

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Abstract
The association between sensorineural hearing loss and Diabetes Mellitus has been explored for more than 150 years. The pathophysiological elucidation for diabetes-related hearing loss is speculative. Usually, hearing loss is bilateral, gradual onset, affecting higher frequencies.
The diabetic patients admitted to Patna Medical College and Hospital was considered in the study. The approval of the Ethical Committee is taken from the Hospital. The written consent also obtained from the patients. The total 50 diabetic patients were included in the study.
It is concluded that the prevalence of sensor neural hearing loss is considerably 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.
Keywords: *Sensorineural hearing loss, diabetes mellitus.*

Introduction

The common metabolic disease Diabetes mellitus (DM) is responsible for the various injuries of the body systems. As diabetes mellitus transpires most recurrently in general population. The properties caused by it on various organs of the body assume greater prominence. One of the recognized impediments of DM is hearing impairment, exclusively hearing loss and tinnitus [1-3], which symptomatic of a reduced quality of life among those pretentious [4].

Since the 1857 the consequence of diabetes mellitus on hearing is known. The Jordao [5] firstly showed hearing loss in a patient with incipient diabetic coma. The association between diabetes mellitus and hearing function has been studied for a long time. Currently there is no suitable harmony on this area.

There are total 220 million diabetics worldwide. WHO had given the alertness that the existence level would be 5.4% in 2025. In developing countries preponderance of diabetics, are in the creative period of their lives, which has a major allegation in respect to health care needs. The objective of present medicines is prevention and control of DM. This also helps in the refining the quality of life of persons and complete mankind.

The Sensorineural hearing loss (SNHL) is a type of hearing loss, or deafness. In this type of deafness origin source lies in the inner ear or sensory organ (cochlea and linked structures) or the vestibulocochlear nerve (cranial nerve VIII) or neural part. Out of total hearing loss 90% of reported cases are of Sensorineural hearing loss. Sensorineural hearing loss is commonly interminable and can be mild, moderate, severe, profound, or total. Numerous other indicators are high frequency, low frequency, U-shaped, notched, peaked or flat depending on the shape of the audiogram and the degree of hearing.

As a significance of damaged or deficient cochlear hair cell function Sensory hearing loss can be occurred. The hair cells may be atypical at birth, or damaged during the lifetime of an individual. The external causes of damages includes noise trauma and infection. The intrinsic abnormalities includes deafness genes. A conjoint cause in sensory hearing loss is extended acquaintance to environmental noise. This type of noises includes, existence in a loud workplace without wearing protection, or having headphones set to high volumes for a long period. The noise-induced hearing loss is caused by exposure to very high noise such as caused by bomb blasts.

Because of damage to the cochlear nerve (CVIII) Neural, or 'retrocochlear' hearing loss is arose. This injury may disturb the beginning of the nerve impulse in the cochlear nerve. Also it may affect the broadcast of the nerve impulse along the nerve into the brainstem.

Most cases of SNHL present with a regular worsening of hearing thresholds stirring over years to decades. The loss may eventually affect large portions of the frequency array. It may be attended by other symptoms such as ringing in the ears (tinnitus), dizziness or light headedness (vertigo). SNHL can be genetically inherited or assimilated as a result from external causes like noise or disease. It may be congenital (present at birth) or develop later in life. The maximum common kind of sensorineural hearing loss is age-related (presbycusis), followed by noise-induced hearing loss (NIHL).

Common indications of SNHL are loss of perception in distinguishing focus voices against noisy backgrounds, difficulty accepting on the telephone. There are some types of sounds apparent unreasonably loud or shrill (recruitment). The difficulty in understanding some parts of speech (fricatives and sibilants), loss of directionality of sound, esp. high frequency sounds, perception that people mumble when speaking, and difficulty understanding speech. Comparable indications are also accompanying with other kinds of hearing loss; audiometry or other diagnostic tests are necessary to distinguish sensorineural hearing loss.

Identification of sensorineural hearing loss is usually made by performing a pure tone audiometry (an audiogram) in which bone transmission thresholds is recorded. There is no established or suggested action or cure for SNHL. The managing of hearing loss is usually by hearing approaches and hearing aid. In cases of profound or total deafness, a cochlear implant is a specialised hearing aid which may restore a functional level of hearing. SNHL is at least partially preventable by avoiding environmental noise, ototoxic chemicals and drugs, and head trauma, and treating or inoculating against certain triggering diseases and conditions like meningitis.

This study aims at evaluating the prevalence of sensorineural hearing loss in type 2 diabetes mellitus and to figure out a relation between age, sex, duration of diabetes.

Methodology

The diabetic patients admitted to Patna Medical College and Hospital was considered in the study. The approval of the Ethical Committee is taken from the Hospital. The written consent also obtained from the patients. The total 50 diabetic patients were included in the study.

Following is the inclusion and exclusion criteria for the both study group.

Inclusion Criteria

- Type 2 diabetic patients on oral hypoglycemic agents
- Patients of both gender in age group 20-60 years
- Without any other systemic illness (hypertension, coronary artery disease, thyroid disorders)
- Willing to undergo investigations

Exclusion Criteria

- Patients with type 2 diabetes less than 20 years and more than 60 years of age
- Patients on insulin treatment
- Patients on dialysis
- History of hearing loss prior to onset of diabetes
- History of ear discharge
- Patients with history of head trauma, radiotherapy, ototoxic drug intake, noise exposure

Results & Discussion

The data from the 30 patients from each group were collected and presented as below. Group A consist of diabetic patients and group B patients included normal sensorinural hearing loss patients.

Table 1: Age of the patients in both study group

Age in years	Total Diabetic patients	Sensorineural Hearing Loss
20-30	8	6
31-40	10	7
41-50	15	9
51-60	17	12
Total	50	34

The data in the table 1 indicates the maximum Sensorineural Hearing Loss patients are seen in the age group of above 41to 60 years. Similarly diabetic patients were seen in the same age group.

Table 2: Male & Female Ratio

Gender	Total Diabetic patients	Sensorineural Hearing Loss
Males	27	22
Females	23	12
Total	50	34

The current study report that out of 27 diabetic males 22 report the Sensorineural Hearing Loss. However out of 23 diabetic females 12 reports the Sensorineural Hearing Loss.

Table 3: Hearing loss at Different Blood Glucose levels

Diabetes Type	Glucose Level	Total Diabetic patients	Sensorineural Hearing Loss
Controlled Diabetes	80-140mg/dl	25	17
	140-200mg/dl	13	7
Uncontrolled Diabetes	201-300mg/dl	5	3
	301mg/dl &above	7	7
Total		50	37

The table 3 indicates the Hearing loss at Different Blood Glucose levels. The Controlled diabetes having 80-140mg/dlglucose level had 25 diabetic patients out of that 17 patients were suffered from Sensorineural Hearing Loss. Out of 13 Diabetic patients having glucose level of 140-200mg/dl includes 7 Sensorineural Hearing Loss patients. The uncontrolled diabetes having glucose level more than 200 mg/dl also reported the Sensorineural Hearing Loss patients.

Table 4: Hearing loss in accordance with duration of Diabetes

Duration of diabetes in year	Total Diabetic patients	Sensorineural Hearing Loss
Less than 5 years	23	18
5-10 years	20	15
More than 10 years	7	4
Total	50	37

Results of the present study revealed that Diabetic patients have significantly higher incidence of sensorineural hearing loss compared to non-diabetic control subjects. In similar studies carried out in Type 2 DM patients Rajendran et al [8] and Jankar et al [9] 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 41-60 years.

In a retrospective data base review Kakarlapudi et al [10] observed that sensorineural hearing loss was more collective in diabetics than non-diabetic patients and the occurance of hearing loss was reported to correlate with progression of the disease as reflected in serum creatinine.

The diabetic subjects had higher hearing threshold with bilateral mild to moderate degree sensorineural hearing loss. Age, gender of diabetic patient and duration of diabetes had no significant correlation with hearing loss. Since blood glucose level and diabetic complications had strong association with sensorineural hearing loss. Diabetic patients with poor control of blood glucose level have increased risk of hearing loss and may be an under diagnosed complication of diabetes. While considering sensorineural hearing loss to be a consequence of diabetes, a metabolic assessment may be useful for patients presenting with hearing loss so as to reduce the high rate of undiagnosed diabetes mellitus in the community. On the other hand, routine screening for hearing loss in diabetes patients may also be helpful to diminish comorbidities among them and improve their quality of life.

Conclusion

From the data interpreted in the present study it is concluded that the incidence of sensorineural hearing loss is pointedly high in Diabetes mellitus patients as related to non-diabetic controls. However, there is a need for further studies with larger sample size in order to find relation with the observed sensorineural hearing loss in these patients.

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