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The Association of Diabetes and Sensory Neural Hearing Loss in a Tertiary Care Centre: A Prospective Study

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Abstract
The hearing loss associated with diabetes is sensorineural type and it account for about 90% of patients. The term sensorineural hearing loss (SNHL) used to indicate that there is either a cochlear or retro cochlear lesion. Sensorineural hearing loss is more common in diabetics than non-diabetics and severity of hearing loss seemed to correlate with progression of diabetes mellitus. Aim of the study was to find the correlation between diabetes and hearing loss. The present study was a cross sectional study. It was conducted for a period of one year from February 2023 to January 2024. The study was comprised of 100 type 2 DM diagnosed patients. They were subjected to thorough audiological evaluation In our study Patients with poor glycemic control HbA1c levels >8% showed higher levels of hearing loss (31%), while patients with good glycemic control had either normal hearing or mild hearing loss (37%). This study concludes that the diabetics are at definite risk of developing auditory dysfunction, therefore it is recommended that all newly diagnosed diabetic patients should undergo a complete audiological evaluation at the time of diagnosis and a regular half yearly or yearly follow up is warranted for early detection of damage to auditory function.

INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both[1]. It can cause dysfunction of multiple target organs, including the eyes, kidneys and heart, leading to diabetic retinopathy, diabetic nephropathy and diabetic cardiomyopathy. The inner ear is also one of the affected organs, with patients presenting with varying degrees of hearing loss. However, due to its insidious onset, patients may not be aware of this diabetes-related complication until their deafness becomes severe[2].

The hearing loss associated with diabetes is sensorineural type and it account for about 90% of patients. The term sensorineural hearing loss (SNHL) used to indicate that there is either a cochlear or retrocochlear lesion[3]. Sensorineural hearing loss is more common in diabetics than non-diabetics and severity of hearing loss seemed to correlate with progression of diabetes mellitus. Women seem to be at greatest risk as do certain ethnic groups such as south Asians, pacific islanders, Latinos and Native Americans[4-6].

Histopathological studies have shown damage to the nerves and vessels of the inner ear of the individuals with diabetes[7]. These vascular changes have been theorized to be an important causative factor for neuronal degeneration in the auditory system[4]. Few studies implicated diabetes mellitus as independent causative factor of sensorineural hearing loss[2]. Many different types of hearing loss has been found in diabetic patients, one of them is progressive, gradual bilateral sensorineural loss, affecting especially high frequencies and the elderly[8]. It would be similar to presbycusis, but with more severe losses than those expected by aging.

Identification of SNHL is usually made by performing pure tone audiometery (PTA) in which bone and air conduction thresholds are measured. PTA is the main hearing test used to identify hearing threshold levels of an individual, enabling determination of the degree, type and configuration of hearing loss and thus providing a basis for diagnosis and management. PTA is described as the gold standard for assessment of hearing loss[9].

MATERIALS AND METHODS

The present study was a cross sectional study. It was conducted for a period of one year from february 2023 to january 2024 at Department of ENT, Sree Mookambika Institute of Medical Sciences kulasekharam. The study was comprised of 100 type 2 DM diagnoised patients. They were subjected to thorough audiological evaluation.

Inclusion Criteria:

- Known cases of Diabetes mellitus.
- Age-group >30 years to <50 years.
- Both genders.

Exclusion Criteria:

- Individuals' other systemic illness or metabolic disorder, gestational, patients on ototoxic drugs or any ear surgery done/occupational exposure to noise, noise induced hearing loss.
- patients with CSOM and CHL and patients.

RESULTS AND DISCUSSIONS

In this study, analysis of 100 patients diagnosed mellitus was done in the Department of E.N.T, Sree Mookambika Institute of Medical Sciences kulasekharam over a period of one year from february 2023 to january 2024 to determine the incidence of hearing loss as a complication of diabetes mellitus. Detailed evaluation of each case was done comprising of the history, clinical examination including otoscopic examination with otoscopic and pure tone audiometry. (Table 1) shows the Gender distribution.out of 100 patients with DM 54 patients was females and 46 patients males. (Table 2) shows distribution of study population according to Age the highest level is seen at the age group of 51-60 (53%) followed by 41-50 (37%). (Table 3) demonstrates the distribution of study sample according to severity of SNHL and reveals that highest percent of cases have mild type of SNHL (24%) and lowest have the profound type of hearing loss (2%) 28% patients who are diabetic had normal hearing threshold in PTA. (Table 4) demonstrates the association of SNHL with levels of HBA1c and illustrates that diabetic patient with HBA1c <7 are 37%and between 7-8 is 32% more than 8 are 31%.

In our study total of 100 diabetes mellitus patients were studied. Diabetes mellitus has been implicated as independent causative factor of sensorineural hearing loss. Diabetes has harmful effects on almost the entire body systems including vestibular and cochlear systems, its mechanisms, patho-physiology and characteristics of the cochlear system unfortunately are not completely determined.

The distribution of study sample according to the gender showed the predominance for females as illustrated in table (1) (males46 %, females54 %).

SNHL found frequently among females as shown in a prospective observational study of incidence of sensory neural hearing loss in DM patients was carried out in 100 patients with known case of diabetes at least for 3 years, in Department of ENT, Government Medical College, Bhavnagar [38] where 52 (52%)

Table 1: Gender distribution.

Gender	No.	Percentage
Male	46	46
Female	54	54
Total	100	100

Table 2: Age distribution.

Age (in years)	No.	Percentage
31-40	10	10
41-50	37	37
51-60	53	53

Table 3: Distribution of hearing loss among study participants.

PTA	No	Percentage
Normal	28	28
Minimal SNHL	18	18
Mild SNHL	24	24
Moderate SNHL	21	21
Severe SNHL	7	7
Profound SNHL	2	2

Table 4: Distribution of HBA1c among study participants.

HBA1c	No.	Percentage
<7	37	37
7-8	32	32
>8	31	31

females and 48 (48%) males. Similar study observed by Taylor and Irwin (1978) states that female patients with diabetes had significantly greater hearing loss when compared with male patients with diabetes.

In our study maximum hearing loss was seen in the age group 51-60(53%) followed by 41-50 (37%). Rajendran *et al.* conducted a similar study in the age group 40-50 years and found that number of people affected with SNHL among the diabetes is 73.3%.

In our study, 24% of individuals with diabetes were noted to have mild sensorineural hearing loss, followed by 21% with moderate sensorineural hearing loss.18% had minimal hearing loss and 7% has sever hearing loss. Only 2% had profound hearing loss. A study conducted by Rajendran *et al.* showed a result similar to our study. The diabetic individuals showed significant high frequency, mild to moderate sensorineural hearing loss.

In our study Patients with poor glycemic control HbA1c levels >8% showed higher levels of hearing loss (31%), while patients with good glycemic control had either normal hearing or mild hearing loss (37%).

CONCLUSIONS

This study concludes that the diabetics are at definite risk of developing auditory dysfunction, therefore it is recommended that all newly diagnosed diabetic patients should undergo a complete audiological evaluation at the time of diagnosis and a regular half yearly or yearly follow up is warranted for early detection of damage to auditory functions.

REFERENCES

1. Cullen, R and N.J. Cinnamond, 1993. “Hearing loss in diabetes”, J. laryngol, otol., 107: 179-182.
2. Lasisi, O.A., O.G.B. Nwaorgu and A.F. Bella, 2003. Cochleovestibular complications of diabetes mellitus in ibadan, Nigeria. Int. Congress Ser., 1240: 1325-1328.
3. Tay, H.L. N. Ray and R. Ohri, 1995. “Diabetes mellitus and hearing loss”, Clin. otolaryngol., 20: 130-134.
4. Widmaier, R. Hershel. T. Kevin, Strang, 2004. The mechanisms of body function 9 Edn., McGraw-Hill, New York, New York, United States, ISBN-14: 978-0072880748, Pages: 825.
5. Allen, G. Kerr, S. Dafydd, 1997. Scott -Brown’sOtolaryngology 6th Edn., Hodder Education Publishers, London, England, United Kingdom ., ISBN-14: 978-0750605960, Pages: 640.
6. Fukushima, H., S. Cureoglu, P.A. Schachern, M.M. Paparella, T. Harada and M.F. Oktay, 2006. Effects of type 2 diabetes mellitus on cochlear structure in humans. Arch. Otolaryngology–Head and Neck Surg., Vol. 132 .10.1001/archotol.132.9.934.
7. WHO., 2001. Mental health., New Understanding, New Hope, Geneva WHO., Geneva, Switzerland, ISBN-10: 9241562013, Pages: 1085.
8. WHO., 1985. Diabetes mellitus. WHO., Geneva, Switzerland, ISBN-10: 9241207272, Pages: 727.
9. SAVAGE, P.J., L.J. BENNION and P.H. BENNETT, 1979. Normalization of insulin and glucagon secretion in ketosis-resistant diabetes mellitus with prolonged diet therapy. The J. Clin. Endocrinol. and Metab., Vol. 49.10.1210/ jcem-49-6-830.