

## Study of Hearing loss in Diabetes Mellitus in Maharashtra Population

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### Abstract

**Background:** High blood glucose levels are found to derange the vessels found in the stria vascularis and adjacent nerves thus it results into diminished ability to hear Early diagnosis and treatment can prevent the severity or permanent hearing loss.

**Method:** 40 adult patients aged between 30 to 50 years were studied by pure tone audiometry. By audiometry the degree, type and configuration of hearing was assessed. Ear examination was done by otoscopy followed by pure tone audiometry.

**Results:** 20 (50%) patients had moderate, 12 (30%) had moderate severe, 8 (20%) severe hearing loss. The associated clinical manifestations were 13 (32.5%) parasthesia, 10 (25%) skin disease, 8 (20%) visual problems, 9 (22.5%) lack of sleep.

**Conclusion:** This pragmatic study with different degree of hearing loss will be helpful to ENT surgeon to assess the severity and treat efficiently to prevent the complications of hearing loss.

**Keywords:** Otoscopy, Audiometry, HbsA<sup>1c</sup>, Maharashtra

### Introduction

As per WHO, 5% of the world population (360 million) of Diabetes Mellitus (DM) is suffering with hearing loss. It is also reported by WHO that, half of the hearing loss is preventable <sup>(1)</sup>. The pioneer to associate between DM and hearing loss was Jardo in 1857. He observed hearing loss in Diabetic patients. He concluded loss of hearing is one of the symptom of DM <sup>(2)(3)</sup>. It is reported that DM has adverse effect on hearing. It varies from 13.3 to 60% globally <sup>(4)</sup> <sup>(5)</sup>. Pathogenesis of hearing loss in DM is due to mitochondrial mutation derangement, neuropathy,

microangiopathy. DM complications are associated with abnormal serum cholesterol and serum creatinine which impairs the vascularity to vestibulo-cochlear apparatus and leading to hearing loss in DM patients.

Moreover in diabetic microangiopathy diffuse thickening of basal membrane endothelium is considered to be the one of causal factor that leads to hearing loss. It is also reported that hyperglycemias result in to myelinic degeneration and axonal damage of nerves related to auditory apparatus may lead hearing loss in DM patients <sup>(6)</sup>, but these

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factors are still un-clear to illustrate the facts due to variable hyperglycaemic parameters. Hence attempt was made to rule out the severity and associated clinical scenario in these DM patients having hearing problems.

### Material and Methods

40 adult patients aged between 30 to 50 years regularly visiting to ENT department Vedantaa Institute of Medical Sciences Dahanu, Palghar (dist)-401606 were studied.

**Inclusive Criteria:** Patients having hearing loss having DM, diagnosed as per the national diabetes data group and WHO (world health organisation) diagnostic criteria.

**Exclusion Criteria:** The patients having history of Noise induced hearing loss and history of cognitive function disability, meniere's disease, labyrinthitis, immune- compromised patients were excluded from study.

**Method:** Two methods were used for hearing assessment (1) Ear examination, (2) Pure tone audiometry. By audiometry the degree, type and configuration of hearing loss was documented. Otoscopy was used for general ear examination. This was followed by pure tone audiometry, in which manual audiometry was used. The instrument was made to deliver the pure tone of different variable frequency and various intensity using ear phones.

Duration of study was March-2020 to September-2022

**Statistical analysis:** Various grades of hearing loss and associated clinical manifestations were classified with percentage. The statistical analysis was carried out using SPSS software. The ratio of male and female was 2:1.

### Observation and Results

**Table-1:** Classification based on hearing threshold 26-40 decibel mild, 41-55 decibel Moderate, 56-70 decibel moderately severe, 71-90 decibel severe, >91 is profound.

**Table-2:** Distribution of patients with hearing loss - 20 (50%) moderate, 12 (30%) moderately severe, 8 (20%) severe

**Table-3:** Associated clinical manifestations hearing loss in DM patients- 13 (32.5%) parasthesia, 10 (25%) skin disease, 8 (20%) visual problems, 9 (22.5%) lack of sleep.

**Table 1: Classification based on the hearing threshold**

SI No	Decibels	Degree of hearing loss
1	26-40	Mild
2	41-55	Moderate
3	56-70	Moderately severe
4	71-90	Severe
5	> 91	Profound

**Table 2: Distribution of patients with hearing loss (No. of patient: 40)**

SI No	Detail of degree of hearing loss	No. of patients	Percentage (%)
1	Moderate	20	50
2	Moderate severe	12	30
3	Severe	08	20

**Table 3: The associated clinical Manifestations in hearing loss in DM patients**

SI No	Details of Clinical Manifestations	No. of patients (40)	Percentage (%)
1	Parasthesia	13	32.5
2	Skin disease	10	25
3	Visual problems	8	20
4	Lack of sleep	9	22.5

### Discussion

In present study of hearing loss in DM patients of Maharashtra 20 (50%) had moderate, 12 (30%) were moderately severe, 8 (20%) had severe hearing loss (Table-2). The associated clinical manifestations were 13 (32.5%) had parasthesia, 10 (25%) had skin diseases, 8 (20%) had visual problems 9 (22.5%) had lack of sleep (Table-2). These findings are more or less in agreement with previous studies <sup>(7)(8)(9)</sup>.

Skin disease observed in the present study involved prurits, urticaria, angioderma, dermatitis etc. The visual problem included blurred vision due to increased intra-ocular pressure; sleep disorders included difficulty in falling asleep, early awake (or rise) in the morning.

Hearing loss in DM patients due to micro-vascular insufficiency of the cochlea, like sclerosis of internal auditory artery, thickened vessel walls of stria vascularis basilar membrane, damage to outer sheath of cochlear nerve and atrophy of spinal ganglion<sup>(10)</sup>. It was reported that, there is a significant correlation between hearing loss and hyperglycemias. The hearing impairment is sensorineural type because hearing loss was found in both air and bone conduction. Since sensorineural hearing loss is a gradually progressive and the threshold for hearing was greater in higher frequency. Duration of DM also increases the severity of sensorineural hearing loss. Moreover age is also confounding factor, but DM is alone responsible for loss of hearing in young and adult patients.

It was also reported that majority of hearing loss patients with DM had renal and Urinary tract infection complication<sup>(11)</sup>.

In the DM patients due to hyperglycaemia there is increased viscosity in blood flow that leads to ischemia, infarction to the respective organs. There is ischemia or infarction to cochlear apparatus which contains endolymph and perilymph, which are vital part of auditory pathway.

Although presbycusis is observed in elderly patients but bilateral hearing loss was observed in DM patients because physiological degeneration becomes accelerated in DM patients. Hence hearing loss problems in the elderly patients has to be investigated for type-II DM and the severity of hearing can be easily assessed.

### Summary and Conclusion

Present study of hearing loss in Maharashtra population. It is mandatory for every clinician to explain the consequences and risk factors of DM, if any onset of hearing loss among DM patients. Detailed history of central nervous system, ear examination has to done along with related blood examination in DM patients having hearing loss. This study demands further hormonal, genetic, nutritional, immunological studies, as DM is a hormonal disease. The quantum of release of hormone, duration of release of hormone is yet to be known; hence pathogenesis of DM is still un-clear.

**Limitation of study:** Due to tertiary location of research centre, small number of patients, lack of latest technologies we have limited findings and results.

This research work is approved by Ethical committee of Vedantaa Institute of Medical science, palghar (dist), Dahanu, Maharashtra-401606.

**Conflict of Interest:** No

**Funding:** No

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