

## Effect of chronic disease diabetes and hypertensive on prevalence of sensorineural hearing loss

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### ABSTRACT

**Background:** Hearing is an essential part of how we communicate with others and become aware of sounds that happen in our immediate environment. The present study was conducted to assess sensorineural hearing loss in diabetes and hypertensive patients.

**Materials & Methods:** 120 subjects of both genders were divided into 3 groups. Group I had diabetics, group II had hypertensive and group III had control subjects. General ear examination was done using otoscopy. Hearing function, degree, form, and configuration of any hearing loss, were determined through a general ear examination and Pure Tone Audiometry.

**Results:** Group I had 22 males and 18 females, group II had 16 males and 24 females and group III had 15 males and 25 females. Normal hearing loss was observed in 25% in group I, 26% in group II and 85% in group III, mild hearing loss was observed in 75% in group I, 50% in group II and 15% in group III and moderate hearing loss was observed in 24% in group II. The difference was significant ( $P < 0.05$ ).

**Conclusion:** There was more hearing loss in diabetics and hypertensive subjects as compared to healthy individuals.

**Key words:** diabetics, hypertensive, hearing loss

### Introduction

Hearing, also known as auditory perception, is the ability to sense vibrations and changes in the surrounding medium's pressure overtime via an organ such as the ear.<sup>1</sup> Hearing is an essential part of how we communicate with others and become aware of sounds that happen in our immediate environment. Hearing loss, also known as hearing impairment, is a partial or total inability to hear. Hearing loss is any degree of impairment of the ability to comprehend sound.<sup>2</sup> Acquired hearing loss is defined as a loss of hearing function due to nongenetic causes, for example, triggered by environmental agents such as chemicals, drugs and noise. Damage of the auditory hair cells, supporting cells, spiral ganglion cells, and other cell types may arise from a variety of factors.<sup>3</sup>

Recent epidemiologic studies have demonstrated an increased risk for sensorineural hearing loss in patients with diabetes. This condition is mostly sub-clinical and generally involves the high-frequency tones.<sup>4</sup> This relationship, however, is still a matter for debate because

previous clinical evidence has been limited to small studies or large epidemiologic studies, in which confounders such as age, exposure to excessive noise, ototoxic drugs, presbycusis, and atherosclerotic disease have not been taken into account; thus, the establishment of a potential association has been complicated.<sup>5</sup> No published studies have addressed the prevalence of auditory impairment in patients who were diagnosed with T2DM at an early age (early-onset T2DM).<sup>6</sup> The present study was conducted to assess sensorineural hearing loss in diabetes and hypertensive patients.

### Materials & Methods

The present study comprised of 120 subjects of both genders. They were included in the study once they gave their written consent.

Data such as name, age, gender etc. was recorded. Patients were divided into 3 groups. Group I had diabetics, group II had hypertensive and group III had control subjects. General ear examination was done using otoscopy. Hearing function, degree, form, and configuration of any hearing loss, were determined through a general ear examination and Pure Tone Audiometry. The HbA1c levels of all diabetic subjects were then calculated. Normal laboratory procedures were used to draw 5ml of blood for the study of HbA1c concentration in the serum. Blood pressure was measured with a proper cuff and mercury gauge manometer. Results of the study was compiled and subjected to statistical analysis. P value less than 0.05 was considered significant.

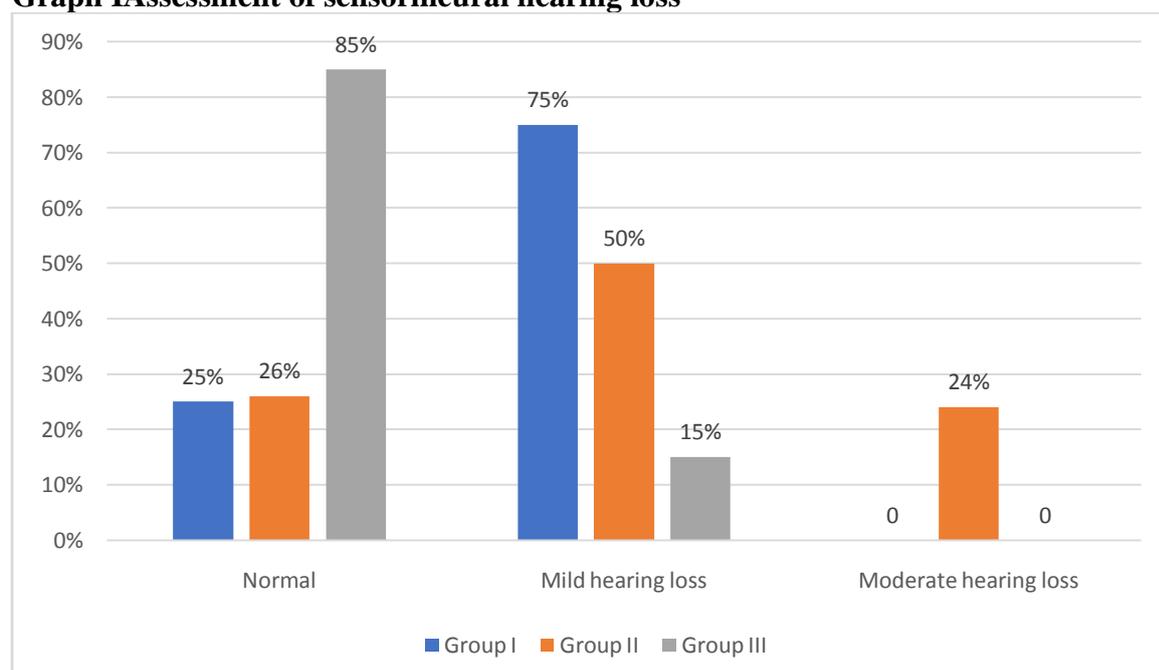
### Results

**Table I Distribution of subjects**

Groups	Group I	Group II	Group III
Male	22	16	15
Female	18	24	25

Table I shows that group I had 22 males and 18 females, group II had 16 males and 24 females and group III had 15 males and 25 females.

**Graph I Assessment of sensorineural hearing loss**



**Table II Assessment of sensorineural hearing loss**

Parameters	Group I	Group II	Group III	P value
Normal	25%	26%	85%	0.02
Mild hearing loss	75%	50%	15%	0.05
Moderate hearing loss	0	24%	0	0.01

Table II, graph I shows that normal hearing loss was observed in 25% in group I, 26% in group II and 85% in group III, mild hearing loss was observed in 75% in group I, 50% in group II and 15% in group III and moderate hearing loss was observed in 24% in group II. The difference was significant ( $P < 0.05$ ).

### Discussion

The hearing loss resulting from the degenerative aging processes is known as presbycusis.<sup>7</sup> It is currently the most frequent sensory impairment observed in the elderly, with a prevalence ranging from 25% in the 70-4 age group, 50% in the elderly aged up to 85 years, and greater than 80% in people over 85 years of age.<sup>8</sup> Presbycusis can cause a reduction in speech perception, psychological changes (such as depression), social isolation, problems related to alertness and defence (ability to hear automotive horns, telephone rings, alarms, etc.), as well as cognitive functions. All these factors have a negative reflect on the elderly's quality of life.<sup>9</sup> Systemic arterial hypertension (SAH) is a multifactorial condition characterized by the presence of elevated blood pressure, associated with metabolic and hormonal changes and trophic phenomena (cardiac and vascular hypertrophy).<sup>10</sup> The present study was conducted to assess sensorineural hearing loss in diabetes and hypertensive patients.

In present study, group I had 22 males and 18 females, group II had 16 males and 24 females and group III had 15 males and 25 females. Kumar et al<sup>11</sup> studied 50 subjects diagnosed with diabetes, 50 subjects diagnosed with hypertension and 50 subjects with both hypertension and diabetes and 50 normal subjects without hypertension and diabetes. All the subjects in the age group of 20-60 years with diagnosed diabetes, hypertension and normal subjects without hypertension and diabetes both males and females are included in the study. Of 100 patients in the study age of the group with the associated disease is statistically higher in the group without the associated disease. It was found that out of 150 cases with hypertension or diabetes or both in the present study 138 were in the age group of 40- 60 and only 12 cases were between ages 20-40. Patients with hypertension (86%) were at a higher risk of developing SNHL when compared to controls (0%).

We found that normal hearing loss was observed in 25% in group I, 26% in group II and 85% in group III, mild hearing loss was observed in 75% in group I, 50% in group II and 15% in group III and moderate hearing loss was observed in 24% in group II. Rolim et al<sup>12</sup> compared the initial audiometry (A1) with a subsequent audiometry (A2) performed after a 3 to 4-year interval in a population of elderly patients with diabetes mellitus and/or systemic arterial hypertension, to verify whether hearing loss in these groups is more accelerated when compared to controls without these clinical conditions. 100 elderly individuals participated in this study. For the auditory threshold assessment, a previous complete audiological evaluation (A1) and a new audiological evaluation (A2) performed 3-4 years after the first one was utilized. The participants were divided into four groups: 20 individuals in the diabetes mellitus group, 20 individuals in the systemic arterial hypertension group, 20 individuals in the diabetes mellitus/systemic arterial hypertension group and 40 individuals in the control group, matching them with each study group, according to age and gender. When comparing the mean auditory thresholds at the first A1 assessment with the second A2

assessment between the groups, considering the mean increase in auditory thresholds per year, it can be observed that there was no statistically significant difference at any frequency for the DM group compared to its control group (Fig. 2); for the AH group, significant differences were observed at 4 kHz ( $p = 0.016$ ); 6 kHz ( $p = 0.013$ ), and 8 kHz ( $p = 0.037$ ) compared to its CG, as well as a non-significant difference at 3 kHz ( $p = 0.060$ ) (Fig. 3); for the DMHA group, significant differences were observed at the frequencies of 500 Hz ( $p = 0.017$ ), 2 kHz ( $p = 0.021$ ) and 3 kHz ( $p < 0.001$ ) between the study group and its control, as well as non-significant differences at 4 kHz ( $p = 0.058$ ) and 6 kHz ( $p = 0.066$ ).

### Conclusion

Authors found that there was more hearing loss in diabetics and hypertensive subjects as compared to healthy individuals.

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