

## A Hospital Based Cross-Sectional Assessment of the Risk Factors of Hearing Loss in Systemic Hypertension Patients

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### Abstract

**Background:** To find out risk factors of hearing loss in systemic hypertension patients.

**Methods:** This is a hospital based cross-sectional study conducted at Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India, for 1 year. A sample of 100 hypertensives were studied. They were subjected to pure tone audiometry after detailed history and physical examination including recording of blood pressure.

**Results:** Out of the 100 hypertensives, 60 patients were detected to have sensorineural hearing loss. In our study, age, stage of systemic hypertension and duration of systemic hypertension were the risk factors found to be associated with sensorineural hearing loss.

**Conclusions:** In our study we have identified a high prevalence of sensorineural hearing loss in patients with systemic hypertension. Age, duration and stage of systemic hypertension were found to be risk factors for hearing loss in the study population.

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### Introduction

Hearing loss hurts the quality of life in a big way. People who have trouble hearing have trouble communicating, which can lead to social isolation, being looked down on, and falling behind in school. In India, about 63 million people have trouble hearing. [1]

With the world's population getting older quickly and lifestyle diseases like high blood pressure getting worse, this has a big effect on hearing. Some authors have found a positive link between the two, while others haven't found any link at all. Agarwal et al. did a case-control study on

people 45–64 years old who had high blood pressure and people who didn't have high blood pressure. They found a statistically significant link between high blood pressure and hearing loss. [2] Several possible reasons why people with systemic hypertension might lose their hearing have been put forward in the literature. It was found that hypertension speeds up the loss of hearing that comes with getting older. Microcirculatory insufficiency happens with age, and it could be made worse by vascular occlusion caused by an embolus,

vasospasm, or bleeding from high blood pressure. [3,4]

But because there haven't been many studies done in Bihar and a lot of people there have systemic hypertension, this study is important. The goals of the study are to find out how common sensorineural hearing loss is in systemic hypertensives between the ages of 45 and 60, and to find out what makes hypertensives more likely to have sensorineural hearing loss.

### Methods

This is a cross-sectional study conducted during the period of 1 year aimed at finding out the prevalence of sensorineural hearing loss and the risk factors related to hearing impairment among systemic hypertensives at Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India.

100 people who met the inclusion and exclusion criteria and went to the outpatient departments of general medicine were recruited for the study. Any patient with systemic hypertension between the ages of 45 and 60 with a systolic blood pressure of more than 140 mmHg or a diastolic blood pressure of more than 90 mmHg at the time of the examination or a self-reported history of high blood pressure who was taking antihypertensive medication was included in the study. Patients who had chronic noise exposure, middle ear disease, diabetes, a head injury, or a stroke were not allowed to take part. The people who take part in the study will be asked for their "informed consent." Using a semi-structured form that had already been tested, relevant information was gathered.

After that, a general examination, a local examination of the ear, and tuning fork tests were done.

Blood pressure of the study population at the time of examination was recorded in the left upper limb in sitting position using a mercury sphygmomanometer.

Pure tone audiometry was done using GSI 61 clinical audiometer. It measured the hearing thresholds at frequencies including 250, 500, 1000, 2000, 4000 and 8000 Hz. The hearing loss was then measured from the audiogram by taking the average thresholds of hearing at frequencies of 500, 1000 and 2000 Hz in each ear. Hearing loss in individual frequencies were also noted individually in each ear. Degree of hearing loss was then classified according to WHO classification (1980). [5]

Data was entered using Microsoft excel software and was analyzed using SPSS (Statistical package for social sciences software). The prevalence of sensorineural hearing loss in the sample was calculated. The associations were determined using chi square ( $\chi^2$ ) test and the significance ascertained by the p. A p value less than 0.05 was considered significant.

### Results

We selected 100 hypertensives who met the inclusion criteria for the study. All the subjects were in the 45-60 age group. Maximum participants were in the 55-60 age group (49%). Female participants predominated in our study (60%). Out of the 100 hypertensives, 60 patients were detected to have sensorineural hearing loss.

**Table 1: Prevalence of hearing loss in individual frequencies**

	Sensorineural hearing loss-right ear		Sensorineural hearing loss-left ear	
	N	%	N	%
<b>250</b>	60	60	51	51
<b>500</b>	45	45	50	50
<b>1000</b>	41	41	40	40
<b>2000</b>	45	45	40	40

<b>4000</b>	59	59	60	60
<b>8000</b>	80	80	81	81

When hearing thresholds at individual frequencies were noted, in the right ear 60 patients had hearing loss at 250 Hz, 45 patients had hearing loss at 500 Hz, 41 patients had hearing loss at 1 kHz, 45 patients had hearing loss at 2 kHz, 59 patients had hearing loss at 4 kHz and 80 patients had hearing loss at 8 kHz.

Similarly, in the left ear, 51 patients had hearing loss at 250 Hz, 50 patients had hearing loss at 500 Hz, 40 patients had hearing loss at 1 kHz, 40 patients had hearing loss at 2 kHz, 60 patients had a hearing loss at 4 kHz and 81 patients had hearing loss at 8 kHz

**Table 2: Association of age with sensorineural hearing loss in hypertension**

	Sensorineural hearing loss present		Sensorineural hearing loss absent	
	N	%	N	%
<b>45-50</b>	9	9	28	28
<b>51-55</b>	5	5	5	5
<b>56-60</b>	30	30	23	23

P value=0.01 (S)

The patients in 56-60 age group had a higher incidence of hearing loss when compared to the remaining study population. In our study we found that increasing age is a risk factor for sensorineural hearing loss in hypertensives.

#### JNC 7 classification of systemic hypertension

	Systolic blood pressure (mmHg)	Diastolic blood pressure (mmHg)
<b>Normal</b>	<120, and	<80
<b>Pre-hypertensive</b>	120-139, or	80-89
<b>Stage 1 hypertension</b>	140-159, or	90-99
<b>Stage 2 hypertension</b>	≥160, or	≥100

**Table 3: Association of stage of systemic hypertension with sensorineural hearing loss**

	Sensorineural hearing loss present		Sensorineural hearing loss absent	
	N	%	N	%
Stage 1	10	11.1	25	27.7
Stage 2	35	38.7	20	22.2

P value=0.001 (S)

Stage of systemic hypertension of 10 patients could not be identified as their blood pressure values prior to initiation of treatment was not known. Among the remaining 90 hypertensives, 10 patients had JNC 7 stage 1 systemic hypertension and 35 patients had JNC 7 stage 2 systemic hypertension (Sensorineural hearing loss present). There is a statistically significant association between stage of systemic hypertension and sensorineural hearing loss ( $p < 0.001$ )

#### Discussion

Hypertension is a disease that affects nearly all of the body's systems. But until now, not much has been known about how it affects hearing. Few studies have been done on how systemic high blood pressure affects the ears. Some of these studies were able to find a statistically significant link between systemic hypertension and hearing loss. Other studies, on the other hand, were not able to find this link. Also,

there aren't many studies done on people in our area. Hypertension is a disease that affects people all over the world and is becoming more common all the time. If it is true that high blood pressure causes hearing loss early on, this has far-reaching effects.

Therefore, in this study we aim to assess the risk factors of sensorineural hearing loss in systemic hypertensives, from a hospital-based population study.

The prevalence of sensorineural hearing loss among patients with systemic hypertension in our study was 60%. This correlates with the findings of Agarwal et al who did a case control study comparing hearing loss among hypertensives and non-hypertensives in a similar age group of 45-64 years, and found out an overall prevalence of 42% among hypertensives. [2] However, studies done by Parving et al and Torre et al were not able to find a positive association between hypertension and hearing loss. [6,7]

In our study, the prevalence of sensorineural hearing loss was noted maximum in high frequencies, followed by the low frequencies and mid frequencies in both ears (8 KHz >4 KHz >250 Hz >500 Hz >2 KHz >1 KHz). This again correlates with the study done by Agarwal et al who in his study found that the mean pure tone thresholds were maximum in high frequencies. [2]

In our study, age proved to be a risk factor for sensorineural hearing loss. Apart from the normal presbycusis, that sets in with advanced age, accelerated loss of hearing seems to be happening in hypertensives. Dubno et al., who did a long-term study to see how age and gender affected speech reception scores, agreed with this. [8] In his study, scores for understanding speech got worse as people got older.

From our study, we learned that having systemic hypertension for a longer time makes hearing loss happen faster. Chen et al. found that the longer someone had

hypertension and the more problems they had with it, the worse their hearing parameters were. [9]

In our study, the stage of systemic hypertension was found to be a risk factor for sensorineural hearing loss, but the control status had no effect on the hearing status. This means that preventing systemic hypertension in the community would be better for preventing its complications than treating the disease once it has set in. [10]

But there are some problems with the study. Even though we have come to some general conclusions based on our results, we cannot say for sure that we have found the exact causes of hearing loss. Since the study was done on people in a hospital, it can't be taken as a true picture of the community as a whole. Also, diseases like diabetes, dyslipidemia, and hypothyroidism that can cause SNHL but were not found may have caused it. Age could have also contributed to higher hearing thresholds, especially at higher frequencies.

## Conclusion

In our study we have identified a high prevalence of sensorineural hearing loss in patients with systemic hypertension. Age, duration and stage of systemic hypertension were found to be risk factors for hearing loss in the study population.

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