ORIGINAL RESEARCH PAPER

Otorhinolaryngology

A CROSS- SECTIONAL STYDY OF HEARING IMPAIRMENT AND TYMPANIC MEMBRANE STATUS AMONG HYPERTENSIVE PATIENTS OF AGE GROUP 45-64 YEARS

KEY WORDS:

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ABSTRACT

AIM - Study the prevalence, type, degree of hearing impairment among hypertensives (age group 45-64yrs). correlate duration of hypertension, and degree of hearing impairment in the hypertensives (age group 45-64yrs). Methodology:- Study was carried out in 200 patients attending medicine opd of JAH gwalior based on inclusion and exclusion criteria. All the patients undergone complete history taking, BP Measurement and complete ENT clinical and otoscopic evaluation of ear and pure tone audiometry. Results& conclusion :- Age group showing maximum propensity to hearing loss was 56-60 years of age{ 37 patients (56.1%)} Most common group showing patients with hearing loss is 6-10 years of hypertension{29 patients (78.4%)} Most common complaint was self- reported hearing loss{ 59 patients (93.7%)}, followed by Tinnitus{ 48 patients (85.7%)}. Of patients with systemic hypertension showing hearing loss at higher frequencies. . Prevelnce of sensorineural hearing loss is 42.8% ie 86 patients .Patients who had uncontrolled Hypertension has more prevelnce of sensorineural hearing loss as compared to controlled hypertension patients.(Stage 1 – 19.8 %, Stage 2 -.56.3 % , Hypertensive crisis – 87.5%)

INTRODUCTION:

According to World health organization (WHO), a person who has hearing thresholds of 25db or more in both ears is said to have hearing loss or impairment.1 According to data from the ASHA (American speech-language-hearing association): 4.6% of the individuals between 18-44yrs of age group have hearing loss, while 14% of age group 45-64yrs and 54%of the population above 65yrs have some hearing loss.2 Any degree of hearing loss will affect communication and this will lead to a reduced quality of life. It has psychosocial effects, like low self-esteem, isolation, depression and irritability.

Grade of impairment	Audiometric ISO value
0 - No impairment	25 dB or better (better ear)
1 - Slight impairment	26-40 dB (better ear)
2 - Moderate impairment	41-60 dB (better ear)
3 - Severe impairment	61-80 dB (better ear)
4 - Profound impairment including deafness	81 dB or greater (better ear)

Hypertension

In people with hypertension early presbycusis can set in at an early decade which can become worse by added factors like noise pollution and vascular pathologies.

Hypertension is defined as systolic blood pressure more than or equal to 140 mmHg and or diastolic blood pressure more than or equal to 90 mmHg, readings taken at least in three different settings or use of prescribed antihypertensive medication3. WHO/ISH divides it into three grades, as shown below4;

Blood pressure	Elevated	Stage 1	Stage 2	Hypertensive crisis
SBP mmHg	120-129	130-139	> 140	≥180
DBP mmHg	<80	80-89	> 90	≥120

Hearing is affected in hypertensive in the following manner:
In hypertensive patients due to rapid flow of blood there is no proper exchange of oxygen and nutrients, so they depend on the integrity of the heart and blood vessels. The circulatory system pathology can also affect the hearing directly by Increase in blood viscosity.[5,6]

High pressure in the vascular system may cause inner ear hemorrhage, which is supplied by the anterior inferior cerebellar artery, which supports the inner ear artery and is divided into cochlear artery and anterior vestibular artery, which may cause progressive or sudden hearing loss[7].

Hypertension causes increased blood viscosity, leading to reduced blood flow through capillaries, and tissue hypoxia. This affects the supply of oxygen and nutrients. Hypertension, which predisposes to atherosclerosis, compromises the caliber of blood vessels[8].

The estimated prevalence of adult-onset deafness in India was found to be 7.6%.9

The present study emphasizes periodic early screening for hearing loss in hypertensive Patients (age group 45-64yrs) can improve their quality of life.

AIMS AND OBJECTIVES

- To Study the prevalence, type and degree of hearing impairment among hypertensive patients (age group 45-64yrs).
- To correlate the duration of hypertension, and degree of hearing impairment in the hypertensive patients (age group 45-64yrs).

MATERIAL AND METHODS

Study carried out in 200 patients based on inclusion and exclusion criteria, complete history taking, blood pressure measurement (home BP and ambulatory BP monitoring) and complete ENT clinical examination, tuning fork test followed by otoscopic evaluation of ear and pure tone audiometry.

INCLUSION CRITERIA:

- Patients in the age group of 45 to 64 years of both sexes.
- Hypertensive patients on medications as well as newly diagnosed patients based on digital BP machine & sphygmomanometer reading.
- Patients on only hypertensive medication.

EXCLUSION CRITERIA :

- Family history of deafness
- Congenital deafness
- Noise induced hearing loss

- Previous otological surgery
- Pregnant and lactating mothers
- Patients with renal disorders
- Patients with diabetes
- Patients taking drugs for other associated illness with possible ototoxic effects.

Questionnaire:

1. Do you have high blood pressure? ( ) yes ( ) no
2. Have you had your blood pressure measured recently? ( ) yes ( ) no
3. When was the last time you measured your blood pressure?
4. What has been your blood pressure recently? SP X DP
5. Which physician or Health Care facility controls your blood pressure?
6. Do you usually take medication to control your blood pressure?

( ) yes ( ) no

7. Which medication (s) do you take?

- Investigations:
- Routine :
- Complete blood count-hemoglobin, total leucocyte count, differential count, platelet count.
- Random blood sugar
- Blood urea and serum creatinine

Special investigations

- Table 8 : B.P. by digital B.P. machine/sphygmomanometer
- Tunning fork tests : Rinne's test
- Weber's test
- Absolute bone conduction test
- Otoscopic examination of ear
- Pure tone audiometry (PTA)

RESULTS:

Table 1: Age and sensorineural hearing loss

Age	Sensorineural hearing loss				Total	
	Present		Absent			
	N	%	N	%	N	%
45 – 50	22	32.4	46	67.6	68	100
51 – 55	14	37.8	23	62.2	37	100
56 – 60	37	56.1	29	43.9	66	100
61-64	13	43.3	17	56.7	30	100
Total	86	42.8	115	57.2	201	100

There is a statistically significant association between age and sensorineural hearing loss (p value = 0.043).

Table 2 : Self-reported hearing loss and sensorineural hearing loss

Self-reported hearing loss	Sensorineural hearing loss				Total	
	Present					
	N	%	N	%	N	%
Present	59	93.7	4	6.3	63	100
Absent	27	19.6	111	80.4	138	100
Total	86	42.8	115	57.2	201	100

x2 = 96.981 df = 1 p = <0.0001

There is a statistically significant association between Self-reported hearing loss and Sensorineural hearing loss (p value = 0.043).

Table 3: Tinnitus and sensorineural hearing loss

Tinnitus					Total	
	Present		Absent			
	N	%	N	%	N	%
Present	48	85.7	8	14.3	56	100
Absent	38	26.2	107	73.8	145	100
Total	86	42.8	115	57.2	201	100

There is a statistically significant association between tinnitus and sensorineural hearing loss (p value < 0.001).

Table 4: Duration of systemic hypertension and sensorineural hearing loss

Duration of systemic hypertension					Total	
	Present		Absent			
	N	%	N	%	N	%
Newly detected	4	15.4	22	84.6	26	100
<= 1year	9	18	41	82	50	100
1 – 5 years	27	40.3	40	59.7	67	100
6 – 10 years	29	78.4	8	21.6	37	100
>10 years	17	81	4	19	21	100
Total	86	42.8	115	57.2	201	100

There is a statistically significant association between duration of systemic hypertension and sensorineural hearing loss (p value < 0.001). Longer the duration of illness, higher the chance of having sensorineural hearing loss.

Table 5: Stage of systemic hypertension and sensorineural hearing loss

Stage of systemic hypertensi					Total	
	Present		Absent			
	N	%	N	%	N	%
Stage 1	16	19.8	65	80.2	81	100
Stage 2	63	56.3	49	43.8	112	100
Hypertensive Crisis	7	87.5	1	12.5	8	100
Total	86	42.8	115	57.2	201	100

There is a statistically significant association between stage of systemic hypertension and sensorineural hearing loss (p value < 0.001).

Table 6: History of furosemide use and sensorineural hearing loss

History of furosemide use	Sensorineural hearing loss				Total	
	Present		Absent			
	N	%	N	%	N	%
No	70	37.8	115	62.2	185	100
Yes	16	100	0	0	16	100
Total	86	42.8	115	57.2	201	100

There is statistically significant association between history of furosemide use and sensorineural hearing loss (p value = <0.0001).

Table 7: Frequency wise distribution of hearing threshold

	Right				Left			
	≤ 25 dB		> 25 dB		≤ 25 dB		> 25 dB	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
250 Hz	121	60%	80	40%	133	66%	68	34%
500 Hz	131	65%	70	35%	139	69%	62	31%
1000 Hz	140	70%	61	30%	147	73%	54	27%
2000 Hz	136	68%	65	32%	141	70%	60	30%
4000 Hz	109	54%	92	46%	113	56%	88	44%
8000 Hz	75	37%	126	63%	81	40%	120	60%

The inference from these results is that a greater number of patients with systemic hypertension had sensorineural hearing loss at high frequencies.

Table 8: Prevalence of sensory neural hearing loss

	Frequency	Percent
≤ 25 dB	115	57.2
> 25 dB	86	42.8
Total	201	100.0

DISCUSSION

In our study, there were 42.8% of patients with systemic hypertension who had sensorineural hearing loss. This is consistent with the results of Saurabh et al10 and Yikawea S et al[11].

Maximum no of patients suffered from mild sensorineural hearing loss (26-40dB) in both right and left ear(34 patients, 17.1%) (These findings are consistent with those of Saurabh et al).

Patients who had high blood pressure for more than 10 years had an average of 17 patients (81%) with hearing loss, as opposed to 4 patients (19%) who did not.) Hearing loss accelerates with a prolonged duration of systemic hypertension.This was confirmed by Chen et al12.
There is statistically significant association between history of furosemide use and sensorineural hearing loss (p value = <0.0001) which is also supported by study conducted by Lin BM et al [13].

Maximum patients were in the age group of 45-50 years of age , but most common age group showing maximum propensity to hearing loss was 56-60 years of age.

Maximum no. of patients belongs to the group , having duration of hypertension for 1-5 years but most common group showing patients with hearing loss is 6-10 years of hypertension .

- Maximum no. of patients were already on antihypertensive medication (75.6%)
- Most common complaint was self- reported hearing loss in 31.3% patients , followed by Tinnitus in 27.9% patients.
- 16 patients who were having history of furosemide use ,, all (100%) of them showing the disease (hearing loss).
- Among hypertensives maximum number of patients belongs to stage 2 Hypertension.
- 100% patients having an intact and normal Tympanic membrane,so no conductive component of hearing loss seen only sensorineural type of hearing loss seen .
- Maximum no. Of patients with systemic hypertension showing hearing loss at higher frequencies.
- Maximum no of patients suffered from mild sensorineural hearing loss (26-40dB) in both right and left ear.
- Prevelnce of sensorineural hearing loss is more common in Right side (33%) as compared to left side (31%).
- Patients who had uncontrolled Hypertension has more prevelnce of sensorineural hearing loss as compared to controlled hypertension patients.

CONCLUSION:

Patients with and hypertension may benefit from routine hearing tests to reduce co-morbidities and enhance their quality of life. Another crucial component is the prevention of hypertension by dietary and lifestyle changes. On the basis of this investigation, we advise the following:

1. All hypertensive patients should undergo routine pure tone audiometry, especially if they report having hearing loss, tinnitus,
2. The identification of hearing loss in hypertensives rehabilitation should be done in all hypertensive patients on a regular basis. This will allow us to provide early hearing and stop the hearing loss from getting worse.

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