



ASSOCIATION OF DYSLIPIDEMIA IN SENSORINEURAL HEARING LOSS: A STUDY CONDUCTED IN A TERTIARY HEALTH CARE CENTRE

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ABSTRACT

Aim- To study the association of Blood Lipid Profile with Sensorineural Hearing Loss (SNHL). **Methodology-** The patients were diagnosed with SNHL via PTA and were tested with Blood Lipid Profile by estimation of blood Cholesterol, VLDL, HDL & LDL levels. **Results-** The study shows significant association of Blood Lipid Profile with SNHL & its pattern of involvement of both ears & moderate to moderately severe hearing loss in middle frequencies. **Conclusions-** The study can benefit the patients with early SNHL to be detected with associated comorbidity of deranged blood lipid profile to get early treatments.

KEYWORDS: Audiometry, SNHL, Blood Lipid Profile.

INTRODUCTION

Hearing has a great impact on every human's quality of life. Hearing loss can be of two types, Conductive and Sensorineural and both of these can be associated with other comorbidities. Hearing may be worsened by some medical conditions such as hypothyroidism, diabetes and Dyslipidemia.^[1] Dyslipidemia is associated in many cases with SNHL in patients.^[2,3,4] Hearing loss is such a kind of health issue which can deprive the patients emotionally, behaviorally and impair their social function and their quality of life. Moreover, Hearing loss is associated with an increased risk of dementia^[5] and mortality.^[6] SNHL can occur due to loss of blood supply to inner ear structures like cochlea and in nowadays world several studies shows that dyslipidemia is associated with atherosclerosis of blood vessels and reduced blood flow.^[7] So it can be easily assumed that SNHL can have an association with deranged Blood lipid Profiles in humans. There are other several studies regarding this issue, However, the findings were inconsistent between the studies and the relation between the role of dyslipidemia and SNHL still remains unclear.^[8,9,10,11,12] Therefore, we have conducted this study in our tertiary care hospital and we also evaluated the factors that may modify the relation between SNHL and Dyslipidemia.

MATERIALS AND METHODS

A Prospective Cohort study was taken up in the Department of Otorhinolaryngology & Head and Neck surgery, Department of Medicine, Tripura Medical College & Dr BRAM Teaching Hospital for 1.5 years (March 2022- August 2023). In our study, total 90 number of patients with SNHL were registered. Simple random sampling was done for the present study to select eligible cases. 90 healthy persons of age and sex matched have been selected from normal population and their blood was also examined and this group was marked as control subjects.

Inclusion criteria

- All patients with sensorineural hearing loss attending at TMC & Dr BRAM Teaching Hospital along with their consents.
- Patients with Tuning Fork Tests or Pure Tone Audiometric diagnosis of SNHL.
- All patients more than 15 years of age and less than 65years of age.

Exclusion criteria

- Patients who are not willing to participate.
- Patients with history of trauma to ear.
- Patients with Conductive Hearing Loss.
- Patients having multiple comorbidities like Diabetes Mellitus, Hyperthyroidism along with Dyslipidemia.
- Patients with history of chronic exposure to noise.

- (f) Patients with cerebrovascular accident or any brain cancer.
- (g) Patients with history of treatment with ototoxic medications.

Study procedure

Patients with complaints of hearing loss were assessed with tuning fork tests & sent for PTA after taking informed consent. The hearing thresholds were examined for both air and bone conduction at frequencies 250, 500, 1000, 2000, 4000 and 8000 Hz using an audiometer in a double walled sound booth, in accordance with guidelines for pure tone averages (PTA). The thresholds obtained were used for the quantitative assessment of degree of hearing loss based on standard ISO (26-40dB as mild, 41-55dB as moderate, 56-70dB as moderately severe, 71-90dB as severe). The threshold of both ears were used for analysis. The patients with SNHL variety of hearing loss were included under our study via inclusion criteria.

Blood samples were drawn from all the patients after a minimum of 8 hours of fasting. About 5ml of venous blood was collected after proper aseptic and antiseptic measures in sterile vials for estimation of lipid profile. The sample blood, after being clotted was allowed to centrifuge at 3000 rpm for 10 minutes. The supernatant

clear serum was then collected were analyzed on the same day.

Following investigations were done to assess the lipid profile level in patients with SNHL and their correlation with various degree of hearing loss.

1. Serum Total Cholesterol by CHOD/PAP method.
2. Serum VLDL concentration is approximated by dividing plasma triglyceride by 5.
3. Serum Triglyceride by GPO/PAP method.
4. Serum HDL Cholesterol by PEG/CHOD-PAP method.
5. Serum LDL-Cholesterol by using standard WHO approved Friedwald's formula.

After collecting data, it was recorded, entered and analyzed with computer using SPSS version 25.0

RESULTS

It was found that 30% of the study population belonged to the age group of 15 to 35 years, 33.33% belonged to 35 to 55 years and 36.67% belonged to 55 years and above.

On the basis of gender distribution of the study population, it was found that the male subjects were 53.33% and females were 46.67%.

Table 1: Table showing Gender wise distribution of Cases and Controls.

Gender	Cases	Controls	p-value
Male	48(53.33)	48(53.33)	>0.05
Female	42(46.67)	42(46.67)	

Gender wise distribution did not show any significant association.

Table 2: Mean and Standard deviation of serum lipid parameters in Cases and Controls.

Lipid Parameters	Case (Mean $\pm$ SD) (mg/dl)	Control (Mean $\pm$ SD) (mg/dl)	P-value
Total Cholesterol	197.02 $\pm$ 7.69	165.82 $\pm$ 19.20	<0.001
S. Triglyceride	160.62 $\pm$ 8.41	98.99 $\pm$ 23.72	<0.001
LDL	126.12 $\pm$ 9.82	101.18 $\pm$ 15.98	<0.001
VLDL	32.34 $\pm$ 1.78	18.92 $\pm$ 4.23	<0.001
HDL	38.12 $\pm$ 11.90	46.22 $\pm$ 6.80	<0.001

Table 2 shows that the level of serum total cholesterol, triglyceride, LDL and VLDL are elevated in cases with various degree of SNHL and serum HDL level is

elevated in control subjects and the results were found to be highly significant with $p < 0.001$.

Table 3: Mean and Standard deviation of lipid profile in various degree of SNHL.

Serum Lipid Parameters in mg/dl (Mean $\pm$ SD)	Degree of SNHL					P - value
	Mild	Moderate	Moderately severe	Severe	Profound	
Total Cholesterol	197.20 $\pm$ 9.43	196.02 $\pm$ 9.38	197.12 $\pm$ 7.06	198.80 $\pm$ 7.01	195.78 $\pm$ 5.02	>0.05
Triglyceride	158.22 $\pm$ 8.48	154.10 $\pm$ 9.21	149.73 $\pm$ 7.81	160.17 $\pm$ 8.19	165.89 $\pm$ 5.36	<0.05
HDL	39.02 $\pm$ 9.99	35.78 $\pm$ 5.98	35.11 $\pm$ 8.61	50.32 $\pm$ 15.74	39.30 $\pm$ 15.78	0.045
LDL	128.22 $\pm$ 9.41	129.37 $\pm$ 9.65	127 $\pm$ 10.55	120.58 $\pm$ 8.42	125.69 $\pm$ 9.59	>0.05
VLDL	31.55 $\pm$ 1.59	30.41 $\pm$ 1.82	29.62 $\pm$ 1.52	31.51 $\pm$ 1.75	32.32 $\pm$ 1.66	<0.05

Table 3 shows that the cases with profound degree of SNHL had the highest serum triglyceride values of 165.89 mg/dl followed by severe group with 160.17 mg/dl. Mean values of serum total cholesterol and LDL shows no correlation with various degree of SNHL ($p > 0.05$). Mean values of VLDL showed significant relationship with various degree of SNHL ($p < 0.05$).

DISCUSSION

Several population studies reported that Hearing Loss is more prevalent in males than in females.^[13] In our study, on the basis of gender distribution of the study population, it was found that the male subjects were 53.33% and females were 46.67%. But gender wise distribution did not show any significant association between hearing loss and dyslipidaemia in our study.

Dyslipidemia contributes to hearing loss by making a main risk factor of atherosclerosis.^[14] Since the cochlear artery supplied by the labyrinthine artery is the only circulation for the cochlea without collaterals, blood viscosity elevation by dyslipidemia may exert significant impact on cochlear microcirculation. Moreover, atherosclerosis may cause accumulation of free radicals, which may further contribute to ischemia induced cochlear injury. In our study the level of serum total cholesterol, triglyceride, LDL and VLDL are elevated in cases with various degree of SNHL.

In our study, serum HDL level is elevated in control subjects and the results were found to be highly significant with $p < 0.001$. The blood HDL level is beneficial to the cardiovascular system because it reduces the formation of atherosclerosis in major arteries. Elevated LDL and decreased HDL characterize coronary artery disease. So similarly in our study, decreased HDL levels in study cases is a significant factor in development of SNHL.

Thus our current study provides proof about the role of dyslipidemia in the development of sensorineural hearing loss.

CONCLUSION

in our study it could be found that the levels of serum total cholesterol, triglyceride, LDL and VLDL are raised in cases of SNHL rather than in the control subjects. Serum HDL level is significantly elevated in the controls. Triglyceride and VLDL levels were increased with the severity of the degree of SNHL among the cases. The present study reveals a significant correlation of dyslipidemia with SNHL and can be used as an indicator of severity of SNHL.

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