

PREVALENCE OF SENSORINEURAL HEARING LOSS AMONG PATIENTS WITH HYPOTHYROIDISM: A CROSS-SECTIONAL COMPARATIVE STUDY.

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ABSTRACT:

Background: Hearing is vital for communication, and sensorineural hearing loss (SNHL) can result from inner ear or nerve damage. Hypothyroidism, a condition with low thyroid hormone levels, may be a contributing factor to SNHL. This study compares SNHL prevalence between hypothyroid and non-hypothyroid patients.

Methodology: A cross sectional comparative study, among 40 hypothyroid patients were compared with 40 age controls for their hearing acuity was conducted at tertiary care hospital, Sullia between March 2025 and august 2025 to evaluate prevalence of SNHL among hypothyroid patients visiting the outpatient department of ENT and/MEDICINE/GENERAL SURGERY.

Results: The majority of participants were women (77.5%), mostly aged 30–40 years. Among hypothyroid patients, 60% had normal hearing, while 40% had SNHL, compared to 77.5% and 7.5% respectively in controls. Conductive and mixed hearing losses were less common, with most cases showing mild hearing loss.

Conclusion: Hypothyroid patients showed a predominance of sensorineural hearing loss, followed by conductive and mixed types, mostly of minimal to mild severity. Severity increased with longer disease duration, highlighting the need for early detection. Pure tone audiometry is recommended to raise awareness and support early diagnosis and prevention.

Keywords: Sensorineural hearing loss, Hypothyroidism, Pure tone audiometry.

INTRODUCTION:

In the general population, thyroid diseases are a prevalent clinical issue. They can be hyperthyroid or hypothyroid with clinical manifestations involving all systems.¹ Hypothyroidism is a condition where there is a decrease in serum concentration of thyroid hormones that leads to elevated serum TSH concentration and hyperthyroidism is characterized by a low serum level of TSH and increased serum thyroid hormone concentration. The normal range of FT₃, FT₄ and TSH serum levels is 0.2-0.5 ng/dL, 0.7-2.5 ng/dL and 0.4-4.2 mU/L respectively.²

In hypothyroidism there is reduction in cell energy production, compromising the microcirculation and consequently, oxygenation and the metabolism of the involved organs. The intricate development and physiology of the cochlea depend on thyroid hormone, which has a particularly strong effect on hearing function. Individuals with hypothyroidism often experience auditory dysfunction, with sensorineural hearing impairment varying from mild to severe degree.³

Hypothyroidism reduces the synthesis of cell energy, impairs microcirculation and as a result, oxygenation, and alters the metabolism of the organs involved, which leads to anomalies in the vestibular and auditory systems, according to clinical and laboratory evidence.

Pure-tone audiometry done between frequency range 250 Hz – 2000 Hz alone has shown that the incidence of hearing loss in hypothyroidism ranges from 11.5% to 85% of patients according to the study done by V. T. Anand et al.⁴

Studies by Vent Hoff, Rubein stein M et al (1947) and Anand V T et al (1989) have reported an significant improvement in hearing in 73% cases following thyroxine therapy.⁴

The need of screening for hearing loss in patients with hypothyroidism will be clearer once the prevalence of hearing loss in these individuals is thoroughly established.

The aim of the study is to establish relationship between hypothyroidism and hearing loss as there are less studies supporting this existing relationship.

MATERIALS AND METHODS:

Research design- With our institutional ethics board approval (IEC), a pilot study was carried out on 40 patients of age group above 20 years, for a duration of 6 months from March 2025 to August 2025, who are willing to give written informed consent and are clinically confirmed cases of hypothyroidism visiting the outpatient department of ENT and/MEDICINE/GENERAL SURGERY at KVG Medical College and Hospital, Sullia, Dakshina Kannada, Karnataka.

Methodology- Data collection began after IEC approval and included the clinical findings of hypothyroid patients which were compared to 40 normal patients of same age group. Detailed history of the patient including age, gender, occupation, duration of newly diagnosed hypothyroidism with/without thyroid swelling were obtained. History of associated dysphagia, breathlessness, cold intolerance, hair loss, easy fatigability, weight gain, loss of appetite, constipation, if female then menstrual irregularities etc... will be taken. This will be followed by detailed clinical examination which includes systemic, otorhinolaryngological including neck examination is done and correlated with thyroid profile test of the patients. Whenever necessary further investigations like ultrasound and FNAC of thyroid swelling will be done. After the diagnosis of the hypothyroidism, those who satisfied inclusion and exclusion criteria and gave a consent to participate in research were subjected to pure tone audiometry. The patient was asked to follow up after 6 months for repeat thyroid profile and repeat pure tone audiometry every year. Each patient was explained about the pure tone audiogram and the frequencies (in Hz) tested were 250, 500, 1K, 2K, 4K, and 8K. The average of the three frequencies i.e., 500, 1K, 2KHz were taken to be the pure tone average. The hearing loss was then classified as per latest WHO guidelines.⁸ All the patients were further referred to an endocrinologist for a detailed work-up and treatment.

| Hearing loss | Values in decibel |
|---------------------------------|-------------------|
| Normal hearing | 0-25 dB HL |
| Mild hearing loss | 26-40 dB HL |
| Moderate hearing loss | 41-55 dB HL |
| Moderate to severe hearing loss | 56-70 dB HL |
| Severe hearing loss | 71-90 dB HL |
| Profound hearing loss | > 90 dB HL |

Inclusion criteria:

1. All newly diagnosed hypothyroid patients, who are visiting ENT OPD or of various departments and are willing to give written informed consent.
2. Both male and female patients above 20 years.
3. Patients with hypothyroidism on treatment with/without thyroid swelling.

Exclusion criteria:

1. Both male and female patients above 60 years.
2. Patients with history of loud noise exposure.
3. Patients on ototoxic drugs.
4. Patients with history of any ear disease, ear trauma and ear surgeries.
5. Patients developing hypothyroidism following medical/surgical management .
6. Patients with mental illness or altered state of mind.

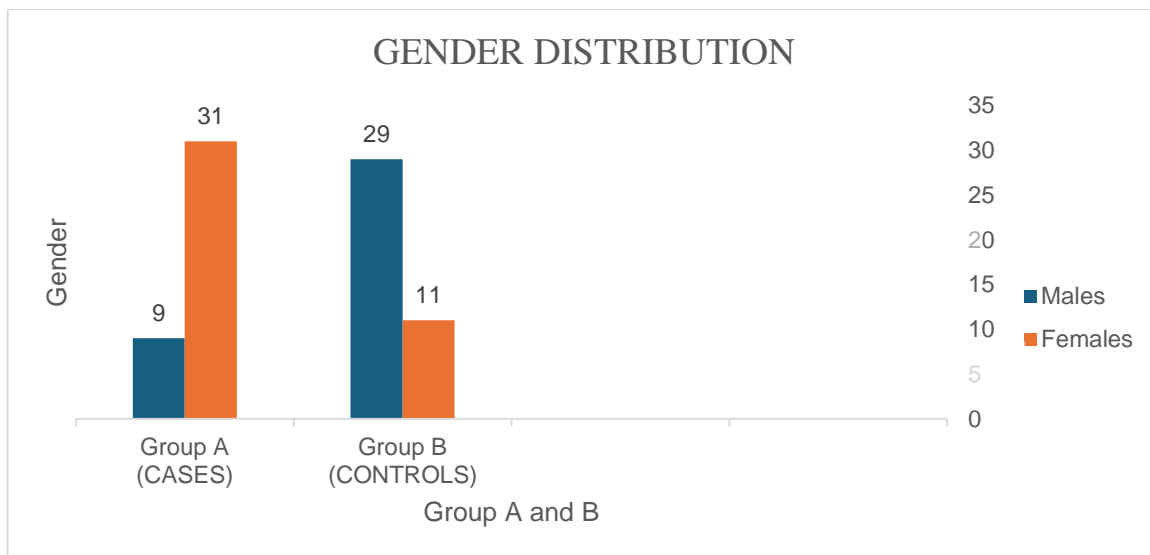
7. Patients with family history of deafness.
8. Patients with goitre with euthyroid status.

Statistical analysis- Data was entered in an MS Excel spreadsheet, and descriptive analysis, such as proportion, mean, standard deviation, etc. was used. Statistical tests to detect significant differences or associations, such as the T and chi-square tests, were used and analyzed using SPSS trial version-22 software.

RESULTS:

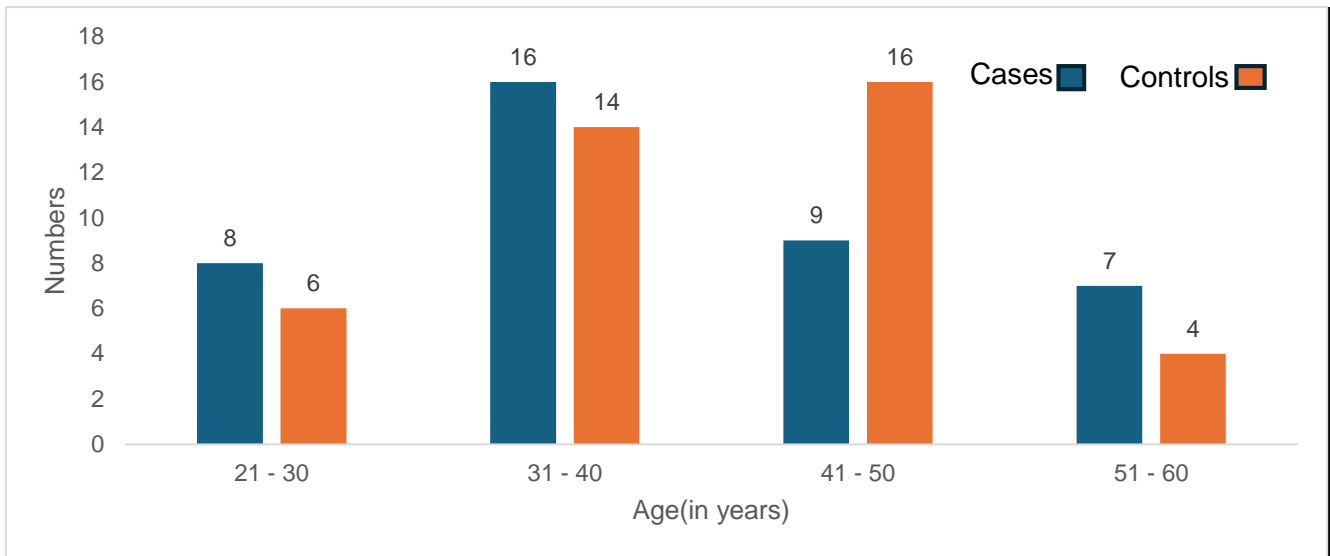
The total number of patients included in the study was 80 and was equally divided into group A(cases) 40 and group B(controls) 40. Among them in group A(cases) 9 (22.5%) were males and 31 (77.5%) were females and in group B(controls) 29 (72.5%) were males and 11 (27.5%) were females (Figure 1).

Figure 1: Gender distribution of the study



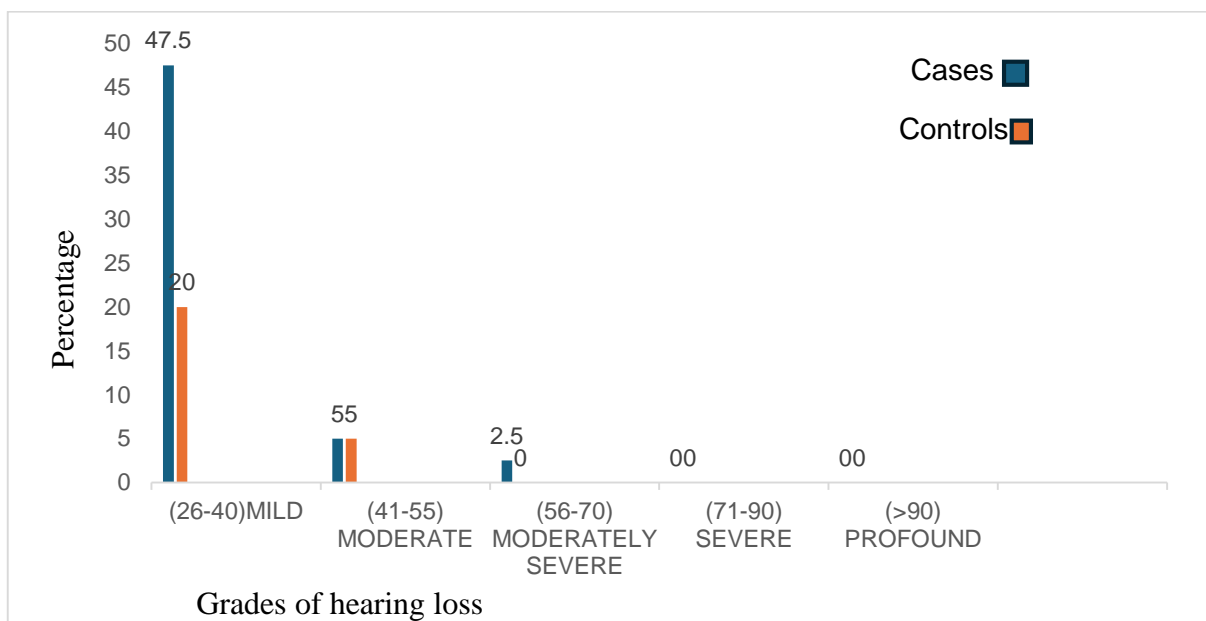
In our study majority of group A(cases) belonged to female gender (77.5%) and in group B(controls) belonged to male gender (72.5%) (Figure 1).

Figure 2: Age distribution of the study



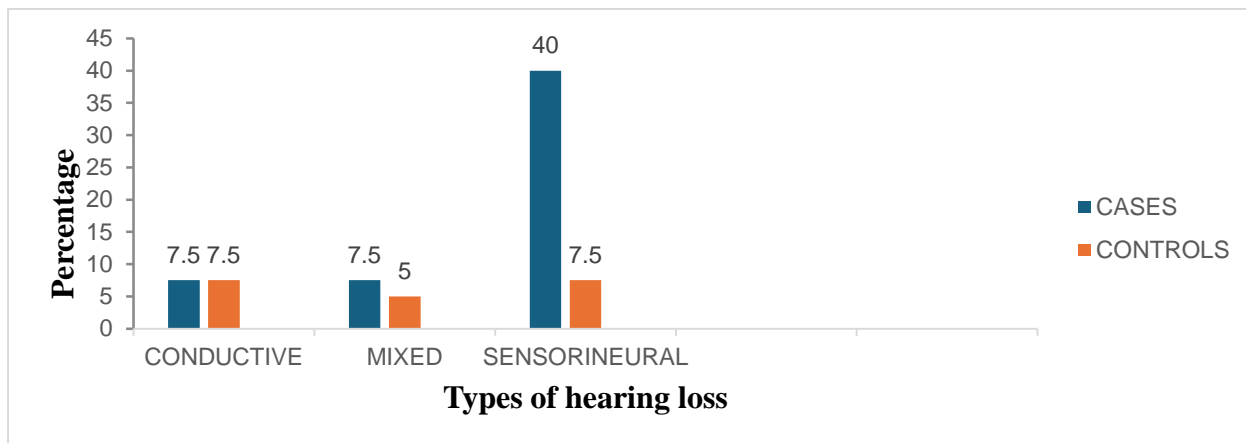
In both groups A and B the age ranges between 20 to 60 years (mean = 36) (Figure 2).

Figure 3: Graph depicts grades of Sensorineural hearing loss in both groups



Above graph states that mild type of Sensorineural hearing loss noted in majority of group A (cases) i.e., 19 (47.5%) than in group B (controls) in 9 (20%).

Figure 4: Types of hearing loss among group A (cases) and group B (controls) based on Pure tone audiometry



Above graph shows a higher prevalence of sensorineural hearing loss in group A (cases) were 40% compared to group B (controls) were 7.5%. This difference was statistically significant. The conductive hearing loss among group A and group B were equal (7.5%) and mixed hearing loss in group A (cases) were 7.5% and group B (controls) were 5%.

There is a statistically significant association between Hypothyroidism and Sensorineural hearing loss ($p= 0.006$).

DISCUSSION:

Majority of the patients in the present study from group A and B were in 30-40 years of age. 77.5% of group A (cases) were females, which was similar to other studies conducted by Trivedi B et al., Anand et al. and Malik et al.^{4,6,8} The Myxoedema Committee of the clinical society of London (1880) reported that the disease affects women much more frequently than men, and the subjects were of middle age group.⁶

Hearing is vital for communication, and hearing loss in hypothyroid patients can result from lesions at multiple sites viz. in the middle ear, and at cochlear and retrocochlear sites. Functionally, the hearing loss had conductive, neural and central components.⁴

The conductive hearing impairment in these patients occur as a result of reduced compliance or abnormal negative middle ear pressure due to hypertrophy and oedema of eustachian tube leading to eustachian tube catarrh. The sensorineural hearing loss occurs as a result of low levels of thyroid hormone affecting different components of cochlea, where as mixed hearing loss is either due to lesion at cochlea/retrocochlear site.⁶

In our study we found 22.5% group A (cases) had subjective hearing loss. This corresponds with the findings of Anil et al., who reported subjective hearing loss in 30% of hypothyroid patients.⁵ Subjective hearing loss may be either due to actual conductive or sensorineural hearing loss or during hypothyroid state may be interpreted by the patients as hearing loss as suggested by MC Mohan (1947).⁹ In our study tinnitus

was present in 5 (16.66%) of group A (cases), and in 2 (6.66%) of the group B (control). The incidence of dizziness in literature has been reported to be as low as absent to as high as 75% by different studies. Bhatia et al. showed dizziness was present in 6.66%.¹⁰ However studies conducted by Howarth AF et al., reported that no patients complained of vertigo.¹¹ In our study dizziness was not present in study groups.

The present study found a significantly higher prevalence of high frequency mild sensorineural hearing loss among group A(cases) in 40% compared to group B(controls) in 7.5%. Study conducted by Anil et al.,⁵ found similar result i.e, 28.33% in group A(cases) had mild sensorineural hearing loss. Trivedi B et al.,⁸ reported the incidence of moderate sensorineural hearing loss in group A(cases) in 10%.

The prevalence of conductive hearing loss, mixed hearing loss, SNHL amongst the group A(cases) in our study were 7.5%, 7.5% and 40% respectively.

Pure tone audiometry (PTA) revealed that 16/40 group A(cases) had sensorineural type hearing loss with mild grade in 13 ears (81.25%), 2 (12.5%) had moderate grade and only 1 (6.25%) had moderately severe hearing loss. Where as among group B(control) 3/40 had sensorineural type hearing loss with mild grade in 1 ear (2.5%) and 2 (5%) had moderate grade. Severe and profound grade of hearing loss was not found in both groups which is similar to study conducted by Malik et al.⁶

CONCLUSION:

This study demonstrates a significantly higher prevalence (40%) of mild sensorineural hearing loss in hypothyroid patients compared to euthyroid individuals, detected with audiometric findings, particularly at high frequency threshold. This difference is statistically significant ($p= 0.006$).

Since the hearing loss is present at higher frequencies ($>2000\text{Hz}$), it often goes unnoticed by patients and hence fail to be diagnosed and treated. The findings in this study highlight the need for regular audiological evaluation in hypothyroid patients for early detection, prevention and treatment. Further research should focus on elucidating the underlying pathophysiological mechanisms and long-term impact of hypothyroidism on auditory function.

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