

## Auditory Function in Hypothyroidism as Compared to Controls

**Authors :** Mrunal Phatak

**Abstract :** Introduction: Thyroid hormone is important for the normal function of the auditory system. Hearing impairment can occur insidiously in subclinical hypothyroidism. The present study was undertaken with the aim of evaluating audiological tests like tuning fork tests, pure tone audiometry, brainstem evoked auditory potentials (BAEPs), and auditory reaction time (ART) in hypothyroid women and in age and sex-matched controls to evaluate the effect of thyroid hormone on hearing. The objective of the study was to investigate hearing status by the audiological profile in hypothyroidism (group 1) and healthy controls (group 2) to compare the audiological profile between these groups and find the correlation of levels of TSH, T3 and T4 with the above parameters. Material and methods: A total sample size of 124 women in the age group of 30 to 50 years was recruited and divided into the Cases group comprising 62 newly diagnosed hypothyroid women and a Control group having 62 women with normal thyroid profiles. Otoscopic examination, tuning fork tests, Pure tone audiometry tests (PTA). Brain Stem Auditory Evoked Potential (BAEP) and Auditory Reaction Time (ART) were done in both ears, i.e., a total of 248 ears of all subjects. Results: By BAEPs, hearing impairment was detected in a total of 64 years (51.61%). A significant increase was seen in Wave V latency, IPL I-V and IPL III-V, and the decrease was seen in the amplitude of Wave I and V in both the ears cases. A positive correlation of Wave V latency of the Right and Left ears is seen with TSH levels ( $p < 0.001$ ) and a negative correlation with T3 ( $>0.05$ ) and with T4 ( $p < 0.01$ ). The negative correlation of wave V amplitude of the Right and Left ears is seen with TSH levels ( $p < 0.001$ ), and a significant positive correlation is seen with T3 and T4. Pure tone audiometry parameters showed hearing impairment of conductive (31.29%), sensorineural (36.29%), as well as mixed type (15.32%). Hearing loss was mild in 65.32% of ears and moderate in 17.74% of ears. Pure tone averages (PTA) were significantly increased in cases than in controls in both ears. A significant positive correlation of PTA of Right and Left ears is seen with TSH levels ( $p < 0.05$ ). A negative correlation between T3 and T4 is seen. A significant increase in HF ART and LF ART is seen in cases as compared to controls. A positive correlation between ART of high frequency and low frequency is seen with TSH levels and a negative correlation with T3 and T4 ( $p > 0.05$ ). Conclusion: The abnormal BAEPs in hypothyroid women suggest an impaired central auditory pathway. BAEP abnormalities are indicative of a nonspecific injury in the bulbo-ponto-mesencephalic centers. The results of auditory investigations suggest a causal relationship between hypothyroidism and hearing loss. The site of lesion in the auditory pathway is probably at several levels, namely, in the middle ear and at cochlear and retrocochlear sites. Prolonged ART also suggests an impairment in central processing mechanisms. The results of the present study conclude that the probable reason for hearing impairment in hypothyroidism may be delayed impulse conduction in the acoustic nerve up to the level of the midbrain (IPL I-V, III-V), particularly the inferior colliculus (wave V). There is also impairment in central processing mechanisms, as shown by prolonged ART.

**Keywords :** hypothyroidism, deafness, pure tone audiometry, brain stem auditory evoked potential

**Conference Title :** ICBAHS 2025 : International Conference on Biomedical and Health Sciences

**Conference Location :** New York, United States

**Conference Dates :** June 03-04, 2025