Title: Comparative Analysis of Sudden Hearing Loss and Sensorineural Hearing Loss: Insights from TrinetX Data

Author(s) and Affilitations: Claire Larson, BS[1]; Huseyin Isildak, MD[1 2]
[1]Renaissance Stony Brook Medicine at Stony Brook University, [2]Stony Brook University Hospital

Faculty Mentor: Huseyin Isildak, MD

Background: Sudden sensorineural hearing loss is an acute loss of hearing that is independent of normal aging. While its pathology is well-characterized, there is limited population-based research on how sudden sensorineural hearing loss compares to sensorineural hearing loss. This study aims to investigate differences in demographics, biochemical markers, and comorbidities between patients with sudden hearing loss and those with sensorineural hearing loss (SNHL) within the age range of 30 to 60 years.

Methods: A retrospective meta-analysis was conducted using TriNetX, a national database. One cohort consisted of patients diagnosed with SNHL (n=215,354). The second cohort consisted of patients diagnosed with SSHL (n=25,056). Patient data was filtered to yield results between 30 and 60 years old. T-tests were performed to compare laboratory values and comorbidities, whereas p-values and effect sizes were calculated for significant results.

Results: The study analyzed a total of 215,354 patients with SNHL (F: 50.27%, M: 47.44%) and 25,056 patients with sudden sensorineural hearing loss (F: 50.96%, M: 47.49%). A significant difference in ethnicity was observed, with Asian patients constituting 3.98% in the SNHL cohort compared to 18.4% in the sudden hearing loss cohort ($p < 0.001$). Biochemical markers, including Natriuretic Peptide B ($p < 0.001$), Natriuretic Peptide B Prohormone N-Terminal ($p < 0.001$), Parathyrin ($p < 0.001$), Hepatitis B virus surface antibody ($p = 0.023$), and Oxygen Saturation ($p = 0.048$), demonstrated significant differences between the groups. Inflammatory markers, including anti-nuclear antibody ($p = 0.012$), anti-dsDNA antibody ($p=0.029$), IgA ($p < 0.001$), leukocytes ($p < 0.001$), and neutrophils ($p < 0.001$) also demonstrated significant differences. Conversely, no significant differences were identified for biomarkers such as Troponin I ($p \approx 0.45$), Thyrotropin ($p \approx 0.10$), and Rheumatoid factor ($p \approx 0.10$). No significant cerebrovascular diseases in the groups were noted.

Conclusions: Significant differences in biochemical markers such as Natriuretic Peptide B, Natriuretic Peptide B Prohormone N-Terminal, and oxygen saturation indicate chronic cardiac stress, resulting in eventual ischemia of small vessels within the affected ear. Hepatitis B virus surface antibody was high in sudden HL patients, suggesting viral infection. Significant elevations in inflammatory markers such as anti-nuclear antibody and anti-dsDNA antibody among sudden HL patients support an autoimmune component to sudden HL.

Monitoring these biomarkers could enhance risk assessment and management strategies in the patients. By recognizing the significant biochemical markers and demographic differences, healthcare providers can develop tailored monitoring and intervention strategies, potentially improving patient outcomes.