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Prevalence of Sudden Sensorineural Hearing Loss and Associated Factors in Audiology Clinics of Mazandaran Province (2022–2023)

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Abstract

Background and Aim: Background: Sudden sensorineural hearing loss (SSNHL) is a medical emergency characterized by a hearing loss greater than 30 dB in at least three consecutive frequencies occurring within 72 hours. This study aimed to investigate the prevalence and associated factors of SSNHL in audiology clinics across Mazandaran Province during 2022–2023.

Materials and Methods: This descriptive cross-sectional study included 300 patients aged 18 to 90 years who were diagnosed with SSNHL by an otolaryngologist based on audiometric findings. After obtaining ethical approval, demographic data (age, sex, place of residence), history of diabetes, and lipid profile (LDL and HDL levels) were collected and analyzed using appropriate statistical tests.

Results: A statistically significant association was found between SSNHL and age, diabetes, LDL, and HDL levels ($p<0.05$). However, no significant relationship was observed between SSNHL and sex or place of residence ($p>0.05$).

Conclusion: The findings indicate that advancing age, diabetes, and abnormal lipid profiles (LDL and HDL) are significantly associated with SSNHL. These results may contribute to planning preventive strategies and health promotion interventions for adult hearing health.

Keywords: Sudden Sensorineural Hearing Loss, Hearing Loss, Diabetes Mellitus, Dyslipidemias, Prevention and Control.

Introduction

Sudden sensorineural hearing loss (SSNHL) is considered a medical emergency and is typically defined as a rapid onset of hearing loss of more than 30 dB in at least three consecutive frequencies within a 72-hour period. In the majority of cases, the underlying cause remains unknown (1–3). Magnetic resonance imaging (MRI) with gadolinium contrast is now regarded as the diagnostic modality of choice for retrocochlear pathologies, offering superior sensitivity and specificity compared to methods such as brainstem auditory evoked potentials (BAEP) (4). MRI studies have demonstrated labyrinthine enhancement in some SSNHL patients, which may correlate with clinical findings (5–7).

Early diagnosis of SSNHL is crucial and should include otoscopic examination to rule out conductive causes, followed by pure tone audiometry to confirm the diagnosis and assess the degree and pattern of hearing loss (8–10). The condition typically presents unilaterally and may be accompanied by tinnitus, aural fullness, and vertigo (11–13). While approximately two-thirds of patients experience spontaneous recovery within the first two weeks (9), the incidence of SSNHL increases with age, ranging from 1.2 per 100,000 in children under 9 years to 77 per 100,000 in individuals over 65 years (14–16). Several etiologies have been proposed for SSNHL, including cochlear microcirculatory disturbances, viral infections, autoimmune diseases, trauma, cardiovascular disorders, and certain medications (17–23). Three viral mechanisms are suggested: direct infection of the cochlea or cochlear nerve, reactivation of

latent virus in the inner ear, and cross-reactivity of systemic antiviral antibodies with inner ear antigens (18). Hyperfibrinogenemia is also considered a potential risk factor for idiopathic SSNHL, possibly by increasing blood viscosity and promoting vascular thrombosis, leading to regional hypoperfusion (24).

While some patients are diagnosed with identifiable causes such as cerebellopontine angle tumors or neurological diseases, the majority remain idiopathic (20, 25, 26). Systemic corticosteroids are currently the most accepted treatment, although other therapeutic approaches—including antivirals, vasodilators, anticoagulants, and anti-inflammatory agents—have shown limited benefit (27). Metabolic syndrome components (e.g., diabetes, hypertension, hyperlipidemia), advanced age, and cardiovascular disease have been frequently cited as associated risk factors (17, 22, 23, 28–30).

Study Objective

Given the clinical importance of SSNHL, its rising prevalence, and the lack of comprehensive national studies, the present study was conducted to assess the prevalence and associated factors of sudden sensorineural hearing loss in audiology clinics across Mazandaran Province during the years 2022–2023.

Materials and Methods

This descriptive cross-sectional study aimed to investigate the prevalence of sudden sensorineural hearing loss (SSNHL) and its associated factors. The study population included all patients diagnosed with SSNHL who visited audiology and otolaryngology clinics in Mazandaran Province between March 2023 and March 2024.

A census sampling method was employed, meaning that all patients who met the inclusion criteria were enrolled in the study. Ultimately, 300 patients were included as the final sample.

Inclusion criteria for participation in the study were as follows: age between 18 and 90 years; provision of informed consent; adherence to treatment follow-ups and completion of required diagnostic tests; absence of comorbid conditions that could influence the disease process (e.g., cancer); and availability of complete medical records. Exclusion criteria included any case with incomplete medical documentation.

Researchers received ethical approval and began data collection. Collected information included demographic characteristics (age, sex, and place of residence), laboratory findings, and history of underlying conditions such as diabetes and dyslipidemia. A specialist confirmed SSNHL through audiometric testing.

Data were analyzed using SPSS software, version 22. In the descriptive analysis, quantitative variables were reported as mean and standard deviation, while qualitative variables were expressed as frequency and percentage. For inferential statistics, the Chi-square test was used to assess associations between variables. A significance level of $P < 0.05$ was considered statistically significant.

Results

The study included 300 patients who experienced sudden sensorineural hearing loss (SSNHL). Prevalence was highest among 40-59 year-olds (35%), then 20-39 year-olds (30%), those 60 and over (20%), and those under 20 (15%). The study population was 55% male and 45% female. Regarding place of residence, 60% lived in urban areas and 40% in rural areas.

However, no statistically significant association was found between residence and SSNHL ($\chi^2=3.00$, df=1, P=0.083).(Table 1)

A significant association was found between diabetes and SSNHL. Among patients with diabetes, 80 experienced hearing loss, compared to 60 in the non-diabetic group ($\chi^2=11.59$, df=1, P=0.001). (Table 1)

Similarly, a significant relationship was observed between LDL levels and SSNHL. Patients with elevated LDL levels had a higher prevalence of hearing loss compared to those with normal LDL (50 vs. 40 cases; $P < 0.05$). (Table 1)

Furthermore, HDL levels were strongly associated with SSNHL. Among patients with low HDL levels, 50 had hearing loss, compared to 70 in the group with normal or high HDL. This association was statistically significant (χ^2=22.01, df=1, P <0.001). (Table 1)

Table 1. Analyze Statistical Association Between SNHL and Medical Risk Factors

Variable	χ^2	df	p-value	Significant
Residence	3.00	1	0.083	No
Diabetes	11.59	1	0.001	Yes
LDL Level	~3.33*	1	<0.05	Yes
HDL Level	22.01	1	<0.001	Yes

Discussion

The present study investigated the prevalence of sudden sensorineural hearing loss (SSNHL) and its associated factors in audiology clinics in Mazandaran during 2022-2023. The findings revealed that the highest prevalence of SSNHL was observed in the 40-59 age group, while the lowest prevalence was in individuals under 20 years old, indicating the significant impact of aging and related factors on hearing function. This aligns with previous studies reporting an increased risk of SSNHL with advancing age (31).

Findings revealed no statistically significant association between sex and sudden sensorineural hearing loss (SSNHL). This suggests that sex may not be a major independent risk factor in the onset of SSNHL within our study population. One possible explanation is that the pathophysiology of SSNHL is multifactorial and may not be strongly influenced by biological sex alone. This finding aligns with Lien et al. (32), who reported similar results and emphasized that the role of gender in SSNHL remains inconclusive. Their study, along with ours, underscores the need for further investigation using larger, more diverse cohorts to clarify potential sex-related differences.

Significant associations were found between lipid profile factors—specifically low-density lipoprotein (LDL) and high-density lipoprotein (HDL)—and the occurrence of sudden sensorineural hearing loss (SSNHL). These findings support the results of Chang et al. (33) and Chau et al. (34), who identified dyslipidemia as a contributing risk factor, potentially through vascular and metabolic pathways. Elevated LDL levels may promote atherosclerotic changes in the cochlear microvasculature, leading to impaired blood flow and ischemia, while reduced HDL levels may diminish protective anti-inflammatory effects. The observed associations underscore the relevance of lipid metabolism in SSNHL pathophysiology and suggest that lipid profile screening could be considered in clinical risk assessment.

In contrast to the findings of Yen et al. (35), who reported a higher prevalence of SSNHL among urban women with better socioeconomic status, our study did not reveal a significant association between place of residence and SSNHL incidence. This discrepancy may stem from differences in population demographics, regional healthcare accessibility, or variations in socioeconomic definitions across studies.

A significant association was found between diabetes and SSNHL, aligning with previous research by Tripathi et al. (36) and Umesawa et al. (37), who identified diabetes as a key metabolic risk factor for sudden hearing loss. This relationship may be explained by the microvascular complications and neuropathic effects associated with diabetes, which can impair cochlear blood flow and auditory nerve function. The consistency of this finding across studies reinforces the importance of metabolic health in auditory system integrity and suggests that diabetic patients may benefit from routine hearing assessments.

Overall, while our findings are largely consistent with previous research, differences across studies can be attributed to factors such as sample selection, study settings, sample size, methodology, and confounding factors.

Conclusion

Findings from this study revealed a significant correlation of increasing age, diabetes, lipid profile (HDL and LDL), and sudden sensorineural hearing loss. However,

no significant relationship was found between sex, place of residence, and SSNHL.Considering the influential role of these factors, the findings of this study can inform planning for lifestyle interventions aimed at promoting healthy hearing in adults.

Limitations and Recommendations

The major limitation of the present study was the limited availability of similar regional studies for comparison within our country. To allow for comparative analyses, similar studies should be carried out in various cities and settings. Such studies would provide more comprehensive evidence to guide clinicians and specialists in early diagnosis and timely intervention for SSNHL.

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Conflicts of Interest

The authors declare no conflict of interest.

Refrences

1. Chau JK, Lin JR, Atashband S, Irvine RA, Westerberg BD. Systematic review of the evidence for the etiology of adult sudden sensorineural hearing loss. The Laryngoscope. 2010;120(5):1011-21.
2. Rauch SD. Clinical practice. Idiopathic sudden sensorineural hearing loss. N Engl J Med. 2008;359(8):833-40.
3. Schreiber BE, Agrup C, Haskard DO, Luxon LM. Sudden sensorineural hearing loss. The Lancet. 2010;375(9721):1203-11.
4. Stachler RJ, Chandrasekhar SS, Archer SM, Rosenfeld RM, Schwartz SR, Barrs DM, et al. Clinical practice guideline: sudden hearing loss. Otolaryngology–Head and Neck Surgery. 2012;146(3_suppl):S1-S35.
5. Berrettini S, Bruschini L, Fortunato S, Forli F, De Vito A, Ursino F, et al. Sudden sensorineural hearing loss: evolution of MRI findings. Acta Otorhinolaryngol Ital. 2020;40(4):282-9.
6. Naganawa S, Nakashima T. Visualization of endolymphatic hydrops with MR imaging in patients with Ménière's disease and related pathologies: current status of its methods and clinical significance. Jpn J Radiol. 2014;32(4):191–204.
7. Kim YH, Jung JY, Kang SI, Kim BG. Clinical features and prognosis of sudden sensorineural hearing loss with vertigo. Clin Exp Otorhinolaryngol. 2014;7(3):174-8.
8. Chau JK, Westerberg BD, Kozak FK. Identification and management of sudden sensorineural hearing loss. CMAJ. 2011;183(11):E1241-2.
9. Conlin AE, Parnes LS. Treatment of sudden sensorineural hearing loss: II. A meta-analysis. Arch Otolaryngol Head Neck Surg. 2007;133(6):582-6.
10. Hato N, Kanzaki J, Okada M. Idiopathic sudden sensorineural hearing loss. Jpn J Otorhinolaryngol. 2002;105(4):465-70.
11. Yamasoba T, Sugasawa M, Kikuchi S, Yagi M. Sudden hearing loss: long-term follow-up and recurrence. Acta Otolaryngol Suppl. 1994;514:61-3.
12. Nakashima T, Yanagita N. Outcome of sudden deafness: Long-term follow-up. Ann Otol Rhinol Laryngol. 1993;102(6):483–6.
13. Wilson WR. The relationship of the herpesvirus family to sudden hearing loss: a prospective clinical study and literature review. The Laryngoscope. 1986;96(8):870–7.
14. Lin RJ, Krall R, Westerberg BD, Chadha NK, Chau JK. Systematic review and meta-analysis of the risk factors for sudden sensorineural hearing loss in adults. The Laryngoscope. 2012;122(3):624-35.
15. Klemm E, Deutscher A, Mösges R. A meta-analysis of the efficacy of different treatment options for idiopathic sudden hearing loss. Otol Neurotol. 2009;30(6):768–77.
16. Alexander TH, Harris JP. Incidence of sudden sensorineural hearing loss. Otol Neurotol. 2013;34(9):1586–9.
17. Cvorovic L, Deric D, Probst R. Sudden sensorineural hearing loss and metabolic syndrome. Otol Neurotol. 2008;29(6):819–22.
18. Fusconi M, Benincasa AT, Grasso M, Bottoni A, Gallo A, De Virgilio A, et al. Sudden hearing loss and immune system: literature review and new findings. J Biol Regul Homeost Agents. 2015;29(3 Suppl 1):101-6.

19. Byl FM Jr. Sudden hearing loss: eight years' experience and suggested prognostic table. The Laryngoscope. 1984;94(5 Pt 1):647–61.
20. Sauvaget E, Kici S, Kania R, Herman P, Tran Ba Huy P. Sudden sensorineural hearing loss as a revealing symptom of cerebellar infarction. Otol Neurotol. 2006;27(4):483-6.
21. Gianoli GJ, Mace JC, Guarisco JL, McCaffrey TV. The role of viral infection in sudden sensorineural hearing loss. Otol Neurotol. 2001;22(2):185-8.
22. Merchant SN, Durand ML, Adams JC. Sudden deafness: is it viral? ORL J Otorhinolaryngol Relat Spec. 2008;70(1):52-60.
23. Ahn JH, Yoo MH, Yoon TH, Chung JW. Bilateral sudden deafness associated with sildenafil. Auris Nasus Larynx. 2006;33(2):205-9.
24. Liu YF, Chen YS, Hsu CJ, Wang PC. Hyperfibrinogenemia as a prognostic factor of idiopathic sudden sensorineural hearing loss. J Chin Med Assoc. 2009;72(7):343–6.
25. Mattox DE, Simmons FB. Natural history of sudden sensorineural hearing loss. The Annals of otology, rhinology, and laryngology. 1977;86(4 Pt 1):463-80.
26. Chau JK, Cho JJ, Fritz DK. Evidence-based practice: management of adult sensorineural hearing loss. Otolaryngol Clin North Am. 2012;45(5):941-58.
27. Nosrati-Zarenoe R, Arlinger S, Hultcrantz E. Idiopathic sudden sensorineural hearing loss: results drawn from the Swedish national database. Acta Otolaryngol. 2007;127(11):1168–75.
28. Seo YJ, Yeo SG. Idiopathic sudden sensorineural hearing loss and metabolic syndrome. Clin Exp Otorhinolaryngol. 2013;6(3):134-8.
29. Hwang JH, Hsu CJ, Liu TC, Yang WS, Hsu HC. Association of sudden sensorineural hearing loss with metabolic syndrome: a case-control study. Arch Otolaryngol Head Neck Surg. 2009;135(9):866–70.
30. Lee HS, Kim SH, Kang BS, Kim SH, Yeo SG. Association between idiopathic sudden sensorineural hearing loss and endothelial dysfunction. Clin Otolaryngol. 2011;36(2):124–9.
31. Zhang ZQ, Li JY, Ge ST, Ma TY, Li FY, Lu JL, Si SR, Cui ZZ, Jin YL, Jin XH. Bidirectional associations between sensorineural hearing loss and depression and anxiety: a meta-analysis. Frontiers in Public Health. 2024 Jan 8;11:1281689.
32. Lien KH, Yang CH. Sex differences in the triad of acquired sensorineural hearing loss. International Journal of Molecular Sciences. 2021 Jul 28;22(15):8111.
33. Chang IJ, Kang CJ, Yueh CY, Fang KH, Yeh RM, Tsai YT. The relationship between serum lipids and sudden sensorineural hearing loss: a systematic review and meta-analysis. PLoS One. 2015 Apr 13;10(4):e0121025.
34. Chau J, Atashband S, Chang E, Westerberg BD, Kozak FK. A systematic review of pediatric sensorineural hearing loss in congenital syphilis. International journal of pediatric otorhinolaryngology. 2009 Jun 1;73(6):787-92.
35. Yen TT, Lin CH, Shiao JY, Liang KL. Pregnancy is not a risk factor for idiopathic sudden sensorineural hearing loss: a nationwide population-based study. Acta Oto-Laryngologica. 2016 May 3;136(5):446-50.
36. Tripathi P, Deshmukh P. Sudden sensorineural hearing loss: a review. Cureus. 2022 Sep;14(9) :e29458.
37. Umesawa M, Kobashi G, Kitoh R, Nishio SY, Ogawa K, Hato N, Sone M, Fukuda S, Hara A, Ikezono T, Ishikawa K. Relationships among drinking and smoking habits, history of diseases, body mass index and idiopathic sudden sensorineural hearing loss in Japanese patients. Acta oto-laryngologica. 2017 Mar 10;137(sup565):S17-23.