



PROGNOSTIC FACTORS IN SUDDEN SENSORINEURAL HEARING LOSS: A PROSPECTIVE STUDY

ENT

Dr. Ancy T	Junior Resident, Sri Siddhartha Medical College and Hospital, Agalkote, Tumkur, Karnataka-572107
Dr. Vidyashree K M*	Assistant Professor, Sri Siddhartha Medical College and Hospital, Agalkote, Tumkur, Karnataka-572107 *Corresponding Author
Dr. Suni Iqbal	Assistant Professor, Sri Siddhartha Medical College and Hospital, Agalkote, Tumkur, Karnataka-572107
Dr. Jyothi Swarup R	Professor and HOD, Sri Siddhartha Medical College and Hospital, Agalkote, Tumkur, Karnataka-572107

ABSTRACT

Background: Idiopathic sudden sensorineural hearing loss (ISSNHL) demonstrates variable outcomes, with numerous clinical and demographic factors proposed as predictors of recovery. Identification of reliable prognostic indicators is essential for appropriate patient counseling and treatment planning. **Objective:** To prospectively evaluate clinical and demographic factors associated with hearing recovery in patients with ISSNHL. **Methods:** A prospective, single-center study was conducted over an 18-month period, enrolling 33 consecutive adult patients diagnosed with unilateral ISSNHL, defined as a ≥ 30 dB hearing loss across at least three consecutive frequencies occurring within 72 hours. Baseline variables recorded included age, sex, comorbidities (diabetes mellitus and hypertension), presence of vertigo and tinnitus, time from onset of symptoms to initiation of treatment (in days), and initial pure-tone average (PTA, dB). All patients received standard systemic steroid therapy according to institutional protocol. Hearing outcomes were assessed at 1 month using Siegel's criteria and categorized as complete recovery, partial recovery, or no recovery. For analysis, outcomes were dichotomized into Recovered (complete or partial recovery) and No recovery. Univariate and multivariable logistic regression analyses were performed to identify prognostic factors associated with hearing recovery. **Results:** The mean age of the study population was 50 years, and 61% of patients were female. The median time to treatment initiation was 7 days. Complete recovery was observed in 13 patients (39.4%), partial recovery in 15 patients (45.5%), and no recovery in 5 patients (15.2%). On multivariable logistic regression analysis, age greater than 60 years was significantly associated with lower odds of hearing recovery. The presence of vertigo and delayed initiation of treatment beyond 7 days demonstrated clinically relevant trends toward poorer recovery, although these associations did not reach statistical significance. **Conclusion:** In this prospective cohort, advanced age (>60 years) emerged as a significant negative prognostic factor for hearing recovery in ISSNHL. Although not statistically significant, trends toward poorer outcomes were observed in patients presenting with vertigo, greater initial hearing loss, and delayed treatment initiation, findings that are consistent with larger published studies. Despite limitations related to small sample size and single-center design, these results underscore the importance of early intervention and risk stratification. Larger, multicenter prospective studies are warranted to further refine prognostic models and support individualized patient management.

KEYWORDS

Idiopathic sudden sensorineural hearing loss, Hearing recovery, Systemic steroid therapy, Vertigo.

INTRODUCTION

Sudden sensorineural hearing loss (SSNHL) is classically defined as a sensorineural hearing loss of ≥ 30 dB affecting at least three consecutive frequencies within a 72-hour period. In the majority of cases, no definite etiology is identified, and the condition is classified as idiopathic sudden sensorineural hearing loss (ISSNHL). Despite standardized treatment approaches, recovery outcomes remain highly variable.

Several prognostic factors influencing hearing recovery have been described, including age, severity of initial hearing loss, presence of vestibular symptoms, audiometric configuration, and delay in initiation of therapy. However, reported recovery rates and the relative importance of individual predictors vary widely across studies. Identifying reliable prognostic indicators is clinically relevant, as it allows clinicians to provide realistic counseling, stratify risk, and tailor treatment strategies. Recent large cohort studies and prognostic models have emphasized the importance of early intervention, initial hearing severity, and vertigo in predicting outcomes.

The present prospective study was conducted over an 18-month period to evaluate clinical and demographic factors associated with hearing recovery in patients presenting with ISSNHL.

METHODS

Study Design and Participants

This prospective observational study was conducted at the Department of Otorhinolaryngology, Sri Siddhartha Medical College, SSAHE University Tumkur, Karnataka over an 18-month period. Consecutive adult patients (≥ 18 years) presenting with unilateral ISSNHL-defined as a sensorineural hearing loss of ≥ 30 dB in at least three consecutive frequencies occurring within 72 hours-were enrolled.

Patients were excluded if they had evidence of retrocochlear pathology

on magnetic resonance imaging, a history of ear surgery in the affected ear, bilateral SSNHL, or inability to complete follow-up.

Data Collection

Baseline demographic and clinical variables were recorded at presentation, including age, sex, comorbidities (diabetes mellitus and hypertension), presence of vertigo and tinnitus at onset, time from symptom onset to initiation of treatment (days), and initial pure-tone average (PTA 0.5, 1, 2, and 4 kHz). All patients received systemic corticosteroid therapy, with additional therapies administered at the discretion of the treating clinician.

Outcome Assessment

Hearing outcome was assessed at 1 month following treatment initiation using Siegel's criteria, categorizing recovery as complete, partial, or no recovery. For statistical analysis, outcomes were dichotomized into **Recovered** (complete or partial recovery) and **No recovery**.

Statistical Analysis

Continuous variables were summarized as mean $\pm$ standard deviation or median with interquartile range, as appropriate. Categorical variables were expressed as frequencies and percentages. Univariable analyses were performed using Student's t-test for continuous variables and chi-square for categorical variables. Multivariable logistic regression analysis was conducted to identify independent predictors of recovery, age >60 years, initial PTA, presence of vertigo, and treatment delay >7 days. Odds ratios with 95% confidence intervals (CIs) were calculated, and a p-value <0.05 was considered statistically significant.

Results

Baseline Characteristics
Baseline Characteristics

A total of 33 patients with unilateral ISSNHL were included in the analysis. The mean age of the cohort was 47.0 ± 18.0 years (range: 20–79 years), with females accounting for 60.6% of participants. Diabetes mellitus was present in 2 patients (6.1%), while 8 patients (24.2%) had hypertension. Vertigo at presentation was reported by 9 patients (27.3%), and tinnitus was noted in 17 patients (51.5%). The median duration from symptom onset to initiation of treatment was 7 days (IQR: 4–10 days). Audiometric evaluation revealed that most patients had moderate to moderately severe hearing loss, with initial pure-tone average (PTA) values predominantly between 50 and 70 dB.

Hearing Outcomes

At one-month follow-up, 13 patients (39.4%) demonstrated complete recovery, 15 patients (45.5%) showed partial recovery, and 5 patients (15.1%) had no recovery. Overall, 28 patients (84.9%) experienced some degree of hearing improvement.

Univariable Analysis

Patients who recovered tended to be younger than those without recovery. Vertigo and treatment delay beyond 7 days were more commonly observed among patients with poor recovery, showing clinically relevant associations with adverse outcomes.

Multivariable Logistic Regression Analysis

On multivariable analysis, age >60 years was identified as a significant independent predictor of poor hearing recovery (OR: 0.05; $p = 0.038$). The presence of vertigo, higher initial PTA, and delayed initiation of treatment (>7 days) were associated with reduced odds of recovery; however, these relationships did not reach statistical significance.

Table 1: Baseline Characteristics of Patients with ISSNHL (n = 33)

Variable	Value
Mean age (years)	47.0 $\pm$ 18.0
Female sex	20 (60.6%)
Diabetes mellitus	2 (6.1%)
Hypertension	8 (24.2%)
Vertigo	9 (27.3%)
Tinnitus	17 (51.5%)
Median time to treatment (days)	7 (IQR: 4–10)
Initial PTA (dB)	Mostly 50–70 dB

Table 2: Hearing Recovery Outcomes at 1 Month

Outcome	Number (%)
Complete recovery	13 (39.4%)
Partial recovery	15 (45.5%)
No recovery	5 (15.1%)
Any recovery	28 (84.9%)

Table 3: Multivariable Logistic Regression for Predictors of Hearing Recovery

Variable	Odds Ratio	p-value
Age >60 years	0.05	0.038
Vertigo	<1	NS
Initial PTA	<1	NS
Treatment delay >7 days	<1	NS

NS – Not statistically significant

DISCUSSION

In this prospective cohort followed over 18 months, older age (>60 years) was significantly associated with poorer hearing recovery in ISSNHL. Other commonly reported poor prognostic factors—including vertigo, greater initial hearing loss, and delayed treatment—demonstrated clinically meaningful trends but did not achieve statistical significance, reflecting limited statistical power.

These findings align with previously published literature and contemporary prognostic models, which consistently identify age, vestibular symptoms, and early treatment initiation as key determinants of outcome. The relatively high overall recovery rate observed in this study may reflect prompt recognition and standardized steroid therapy.

Strengths and Limitations

The strengths of this study include its prospective design, consecutive patient inclusion, and standardized outcome assessment. Limitations include the small sample size, single-center setting, short follow-up

duration, and potential treatment heterogeneity. Consequently, the findings should be interpreted as hypothesis-generating rather than definitive.

CONCLUSION

In this prospective observational study of ISSNHL patients, age greater than 60 years was independently associated with significantly poorer hearing recovery at one month. Trends toward worse outcomes were observed in patients with vertigo, greater initial hearing loss, and delayed initiation of therapy, consistent with existing literature. Although limited by sample size, these findings reinforce the importance of early diagnosis and treatment and support the need for larger, multicenter prospective studies to refine prognostic models and guide individualized patient counseling and management.

Clinicians should continue to emphasize early evaluation and treatment at presentation and counsel older patients and those with vestibular symptoms that their chance of full recovery may be lower. Prognostic tools developed from larger datasets may aid individualized decision-making and selection for adjunctive therapies (e.g., intratympanic steroids, hyperbaric oxygen) in high-risk patients.

REFERENCES

- Atay G, et al. Prognostic factors in sudden sensorineural hearing loss: a review. *Eur Arch Otorhinolaryngol*. 2016.
- Cho CS, et al. Prognostic factors in sudden sensorineural hearing loss. *Clin Exp Otorhinolaryngol*. 2013.
- Mandavia R, et al. Development and validation of a prognostic model for hearing recovery in idiopathic sudden sensorineural hearing loss. *JAMA Otolaryngol Head Neck Surg*. 2024.
- Chandrasekhar SS, et al. Clinical practice guideline: sudden hearing loss (update). *Otolaryngol Head Neck Surg*. 2019;161(1_suppl):S1–S45. (AAO-HNS guideline – highly cited)
- Wilson WR, et al. The efficacy of steroids in the treatment of idiopathic sudden hearing loss. *Arch Otolaryngol*. 1980;106:772–776. (Classic steroid outcome paper)
- Mattox DE, Simmons FB. Natural history of sudden sensorineural hearing loss. *Ann Otol Rhinol Laryngol*. 1977;86:463–480. (Foundational prognostic study)