

## Research Article,

# “Clinical Profile & Prognostic Factors In Patients with Sudden Sensorineural Hearing Loss”

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### Abstract

**Introduction:** Idiopathic sudden sensorineural hearing loss (ISSNHL) is an emergency disease requiring immediate diagnosis and treatment. The incidence of ISSNHL in the Western countries' population was estimated to 5–20 per 100,000 inhabitants. The etiology of ISSNHL remains unknown. Its pathogenesis is most often suggested to be due to a disturbed microcirculation and infection.

**Objective:** To study the clinical profile & prognostic factors in patients with sudden sensorineural hearing loss.

**Material and Methods:** A retrospective study was carried out from patients of sudden sensorineural hearing loss (SSNHL) presenting to ENT Department of Northern Private Medical College, Rangpur, Bangladesh from January to June-2020. All patients were given intravenous steroids as treatment modality for 14 days and pure tone audiogram was done every 3 days during hospital admission. It was followed by oral steroids in tapering dose for further 14 days. After 1 month, audiogram was done again. After 1 month if hearing threshold was decreased by more than 50% of presenting one, then it was labeled as improved.

**Results:** Total 51 patients (55 ears) with age ranging from 6-70 years (average-38.5 years) were included. Three fourth were male. Presentation was 1-14 days after onset of hearing loss (average- 3.7 days) with pure tone audiogram (PTA) of 38-117 dB (average 83.1 dB). The flat audiogram (62.3%) was most common type. Smoking was present in 14 patients and tinnitus in 30 ears. Hemoglobin ranged from 7.3-18.7 gm % (average- 15.3 gm/dl). PTA post treatment was 8-73 dB (average- 56 dB). Average age of improved patient was 39.8 years which was lower than non-improved patients (42.3 years). In improved patients, average PTA at presentation was 77.9 dB while it was 86.6 dB in non-improved patients.

**Conclusion:** Our study demonstrates that the age distribution and clinical characteristics of ISSNHL patients vary according to levels of hearing loss. Moreover, ISSNHL patients with vertigo tend to suffer from a more severe hearing loss. Further studies are needed to obtain better knowledge about the etiopathogenesis of SSNHL. SSNHL is more commonly seen in male patients with polycythaemia and is commonly presented in winter season and is frequently associated with tinnitus. Young age and lower audiogram threshold at presentation favor prognosis.

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**Keywords:** Sudden Sensorineural Hearing Loss, Pure tone audiogram, Steroids.

### Introduction:

Idiopathic sudden sensory neural hearing loss (ISSNHL) is characterized as an abrupt hearing loss of more than 30 dB in three contiguous frequencies within 72 hours<sup>1</sup>. An earlier study reported that the incidence of ISSNHL in the Western countries' population was estimated to 5–

20 per 100,000 inhabitants<sup>2</sup>. More recent investigations showed the annual incidence of SSNHL to be 27 per 100,000 in the United States and 2.4 per 100 000 in western China, respectively<sup>3,4</sup>. Regarding age distribution, Rauch demonstrated that ISSNHL most frequently occurred in 43 to 53 years old patients<sup>5</sup>. On the

other hand, a Japanese survey showed that ISSNHL was the most prevalent among patients aged 60–69 years old, and the hearing loss was the most severe in patients aged under 16 and over 65 years of age<sup>6</sup>. Lack of a universally accepted definition of sudden sensorineural hearing loss, insufficient knowledge of pathogenesis, lack of a standard method for evaluating the patients in addition to a high spontaneous recovery rate all complicate the study of sensorineural hearing loss and the investigation of different treatment modalities<sup>7,8,9</sup>. Regarding its etiopathogenesis exact cause is not known in most of the cases making “idiopathic” (ISSNHL) as usual prefix in diagnosis. However known local and systemic causes that can result SSNHL are always looked upon. Impaired cochlear blood circulation has been suggested to cause sudden hearing loss. [7, 8] But the lack of clear relationships between SSHL and other vascular risk factors suggests multifactorial disease profile.<sup>10,11</sup> Also, hyperfibrinogenemia has been assumed as a risk factor to ISSNHL, and the relationship between hyperfibrinogenemia and ISSNHL has been emphasized in several clinical and animal experiments<sup>12,13</sup>. To explanation of this association is that an elevation of fibrinogen can increase blood viscosity and generate vascular thrombosis, leading to an impaired regional blood

### **Materials and Methods:**

A retrospective study was carried out from patients of sudden sensorineural hearing loss presenting to ENT Department of Northern Private Medical College, Rangpur, Bangladesh from January to June-2020. Records of patient with SSNHL fulfilling Wilson’s criteria and who were admitted in hospital for intravenous steroid therapy were studied. Their age, sex, occupation, duration of illness, side involved and date of admission were recorded. The associated complaints like tinnitus, vertigo, history of smoking was recorded and they underwent thorough systemic and ENT examinations. All patients underwent pure tone audiogram at the time of admission. From the audiogram pure tone average, threshold at 8 KHz and audiogram pattern were recorded. Every patients underwent investigations for hematological, biochemical (including lipid profile, thyroid function test), serological (ELISA HIV, HBsAg, HCV; RA factor, ANA, VDRL) study. All patients were given intravenous steroids in

supply, and consequently an increase of the possibility of onset of ISSNHL. There is lack of high quality evidence on the effectiveness of any specific treatment. Hence there are numerous drugs and therapies as options to use in ISSNHL. Example: steroid, antioxidant, vasodilators, plasma expanders, anti-coagulants, and carbogen inhalations, etc. Treatment outcome is measured by Wilson’s criteria<sup>14</sup>. According to this criteria if threshold is <10dB it is labeled as “complete recovery”. If threshold improves by 50% of initial threshold it is labeled “partial recovery”. If improvement is <50%, then it is called “no recovery”. Approximately 50% of patient experiences complete recovery in most of literatures. It is very difficult to predict recovery in sudden sensorineural hearing loss (SSNHL) though a number of speculations and hypothesis are given regarding the factors affecting disease course. Some factors have been well established regarding prognostic implications. We also examined the prevalence of comorbidities and abnormal laboratory test results and its relationship to age distribution and audio logical results. Finally, we investigated the incidence of associated symptoms in ISSNHL patients and possible etiological factors that may cause ISSNHL.

hospital for 14 days and pure tone audiogram was done every 3 days during hospital admission. It was followed by oral steroids in tapering dose for further 14 days. After 1 month, audiogram was done again. After 1 month if hearing threshold was 50% or less than the presenting one, then it was labeled as improved. If patients had recovery before 14 days or they wanted to take their medications at home, then equivalent prednisolone dose was given and called for follow up after 1 month of illness. Patients with incomplete records and patients who denied steroid treatment before recovery were excluded. Improvement percentage was calculated. Comparison between patients with >50% improvement and those with less than that was done. Data were analyzed using SPSS 21 software.

### **Results:**

Total 51 patients (55ears) with complete records and follow up at 1 month was found and they were included. The age ranged from 6-71 years (average-38.5 years). Three fourth were male.

Presentation was 1-14days after onset of hearing loss (average- 3.72days). People with different occupation were involved. Most of them were involved in some sort of business or worked in an office. (Fig 1) We also noted the month of presentation (Fig. 2) and 28.2 % presented in month of January and February. There were 48 patients who had hearing loss in right ear and 35 in left. Only 2 patients had bilateral involvement at presentation.

The profile of patients who improved by more than 50% was compared with that of those who improved by less than 50% (Table 2). Average age of improved patient was 39.8years which was lower than non- improved patients (42.38years). In improved patients, average PTA at presentation was 77.94dB while it was 86.64dB in non-improved patients. Days of presentation were almost similar in both groups (Table 2). There were 14 patients with history of smoking and two patients had past history of SNHL in other ear. Recent history of Mumps was found in 3 patients. Hypothyroidism was found in 2 patients one of

them was a known case and was under treatment. Out of 49 patients who underwent lab investigations 2 were having positive RA factor and one had positive HBsAg. Hypertension was present in 19 patients and 9 were diabetic. There were 31 patients with fasting blood sugar between 110 and 125mg/dl. Tinnitus was complained in 58 years (66.6%) while only 20 patients had vertigo or dizziness. ESR ranged from 2 to 55 mm in first hour with an average of 14.97mm in first hour. Hemoglobin estimation ranged from 7.3gm/dl to 18.7gm/dl with an average of 15.36gm/dl. Fourth percent of patient had hemoglobin more than 16 gm/dl. Intravenous high dose hydrocortisone therapy was taken from 3 to 14 days with an average of 9.9 days. Those who didn't completed Intravenous therapy were kept in equivalent prednisolone therapy. Post treatment pure tone average was 8-73dB (average- 56dB,) while for 8 KHz it was 10-110dB (average- 61dB). Average percentage of improvement in pure tone average was found to be 39.25% while only 25.4% had improvement in 8 KHz frequency.

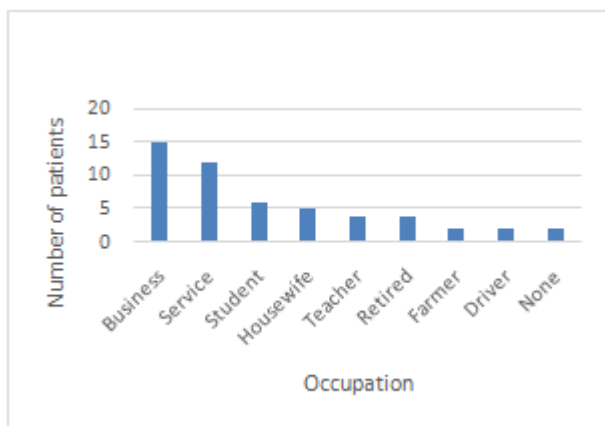


Fig-1: Occupations of patients presented with SSNHL (N=51)

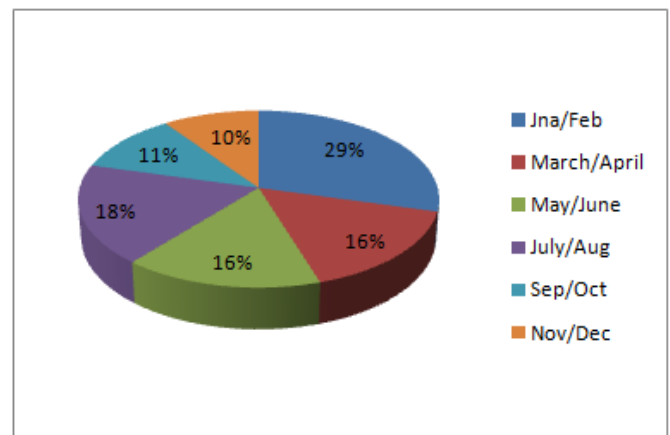


Fig-2: Month of presentation.

Tab-1: Audiogram pattern at presentation (N=51)

Audiogram Pattern	Number
Flat	33
Upsloping	6
Down sloping	8
Inverted V shaped	1
'U' or 'V' shaped	3

Audiogram showed that pure tone average (PTA) ranged from 38dB to 117dB (average 83.16dB). While threshold for 8 KHz ranged from 20dB to 110 dB with an average of 84.3dB. The pure tone audiogram pattern was mostly flat (62.3%) involving all the frequencies (Table 1).

Tab-2: Comparing improved patients with non-improved patients (N=51)

Features	Patient with <50% improvement (n=30, ears=31)	Patients with 50% recovery (n=19, ears=20)	Total
Age	39.8yrs	42.38yrs	41.35yrs
Duration at presentation	3.65days	3.76days	3.72days
Tinnitus	19	10	29
Vertigo	5	3	8
Smoking	7	7	14
Hb	15.0gm%	15.58gm%	15.36gm%
HTN	4	15	19
DM	3	6	9
Presenting PTA average	77.94dB	86.64dB	83.16dB
Type of audiogram			
Flat	13	21	33
Upsloping	3	3	6
Downsloping	4	4	8
Inverted V shaped	0	1	1
‘U’ or ‘V’ shaped	1	1	3

The profile of patients who improved by more than 50% was compared with that of those who improved by less than 50% (Table 2). Average age of improved patient was 39.8years which was lower than non-improved patients (42.38years). In improved patients, average PTA at presentation was 77.94dB while it was 86.64dB in non-improved patients. Days of presentation were almost similar in both groups (Table 2). There were 14 patients with history of smoking and two patients had past history of SNHL in other ear. Recent history of Mumps was found in 3 patients. Hypothyroidism was found in 2 patients one of them was a known case and was under treatment. Out of 49 patients who underwent lab investigations 2 were having positive RA factor and one had positive HBsAg. Hypertension was present in 19 patients and 9 were diabetic. There were 31 patients with fasting blood sugar between 110 and 125mg/dl. Tinnitus was complained in 58 years (66.6%) while only 20 patients had vertigo or dizziness. ESR ranged from 2 to 55 mm in first hour with an average of 14.97mm in first hour. Hemoglobin estimation ranged from 7.3gm/dl to 18.7gm/dl with an average of 15.36gm/dl. Fourth percent of patient had hemoglobin more than 16 gm/dl. Intravenous high dose hydrocortisone therapy was taken from 3 to 14 days with an average of 9.9 days. Those who didn't completed Intravenous therapy were kept in equivalent prednisolone therapy. Post treatment pure tone average was 8-73dB (average- 56dB,) while for 8 KHz it was 10-110dB (average-61dB). Average percentage of improvement in pure tone average was found to be 39.25% while only 25.4% had improvement in 8 KHz frequency.

**Discussion:**

Our study corroborates previous findings that the annual incidence of patients with ISSNHL, is 5-20 per 100,000<sup>2</sup>. Their mean age is ranging from 45 to 55 years, there is an overall slight male preponderance, and the highest prevalence of ISSNHL occurs in the age group of 41–50 years<sup>6,15,16</sup>. In our study the age ranged from 6-71 years (average-38.5 years). Three fourth were male. Presentation was 1-14 days after onset of hearing loss (average- 3.72 days). Idiopathic SSNHL being “idiopathic” is the reason of all the controversies and dilemma related to it. As the cause is not known, lot of hypotheses and speculations have been formulated regarding its etiopathogenesis. Multiple hypotheses lead to

multiple mode of treatment, none of which is a well-established one. Diverse clinical conditions resulting sudden hearing loss as a symptom also helps to increase this confusion. Most of the studies are retrospective as one can't predict its onset and there is no defined high prevalence region.<sup>17,18,19,20,21,22</sup> Regarding good sample size; we needed a center where flow of patients for otological service is maximum and that too from different parts of country. Average age of onset (38.5yrs) is comparable to Yantai et al<sup>3</sup> study (43.7yrs) and Cadoni,et al<sup>17</sup> (45.1years). We found 75.3 % male patients unlike Yantai et al (39.3%) and Cadoni et al (41.6%)ISSNHL occurred in different occupations and no clear risk group was found<sup>17</sup>. Most of the patients had the

disease in winter. Bilateral presentation is less common similar to other studies as Yantai al (7.1%)<sup>3</sup> and Fetterman et al (1.7%).<sup>23</sup> Our results showed that the prevalence of mild ascending hearing loss was higher in younger patients, and fat hearing loss was more common among older patients. Regarding these findings one could speculate that the theory of blood circulation disturbance might be the etiology of some cases of ISSHL. A transient reduction in blood pressure values, commonly occurs in young subjects without vascular risk factors, which may cause cochlear ischemia and reversible hearing impairment, and restoration<sup>20,21</sup>. Bilateral simultaneous presentation was found in only 2 patients. One of them had more than 50% improvement in both ears and other had less than that in both ears. Serological positive cases were limited. It seemed to be incidental finding as clinical symptoms in other organs hadn't developed in those cases. Vascular disease risk factors were commonly associated like: smoking (14/51), hypertension (9/51) and diabetes (9/51). Though smoking was commonly found, other studies have shown that it doesn't cause increased incidence.<sup>12,18</sup> It was interesting finding that most of the patients had high hemoglobin level; around 40% had hemoglobin level more than 16gm/dl. This indicates polycythaemia may be having role in etiopathogenesis and justifies use of pentoxifylline. More recent studies applying treatment protocols including vasodilators, plasma expanders, anti-coagulants, and carbogen inhalations have shown no improvement over the rate of spontaneous recovery without therapy.<sup>24</sup> Except in cases of therapy directed toward known predisposing factors, there is insufficient evidence in the literature to support medical treatment for SNHL, although steroid therapy appears to be useful in selected patients. Steroid therapy is most preferred method in treatment of this entity.<sup>25</sup> Though the hospital protocol was to give high dose steroid in tapering dose for 14 days; it was not fulfilled in some cases. Some cases deferred injectable medication and hospital stay and they were discharged with equivalent prednisolone dose. Some cases had rapid improvement and were switched to oral medication when average threshold went below 30dB. Many drugs have been given for SSNHL in different literature, but we focused on high dose steroid only. It is started as early as possible under supervision for possible adverse effects. The

improvement proportion increases with time 24 but follow up after 1 month was not documented in most of the cases. Comparing patients with 50% recovery with less than that revealed that average age of onset was slightly less in recovered group. Hypertension was found in more number of patients who didn't recover well. The study being a secondary data analysis and having objective of evaluating the profile of such patients, statistical tests were not applied. Few studies have shown clinical treatment within the first seven days was the only statistically significantly in patients who improved hearing.<sup>26</sup> This is correlated in our study as well because average time of onset of start of medication is early in improved groups.

### Conclusion:

Our study demonstrates that the age distribution and clinical characteristics of ISSNHL patients vary according to levels of hearing loss. Moreover, ISSNHL patients with vertigo tend to suffer from a more severe hearing loss. Further studies are needed to obtain better knowledge about the etiopathogenesis of SSNHL. So that new therapeutic strategies can be considered in the treatment of this challenging ear disease. But early start of treatment is must in SSNHL as outcome improves with early treatment. Awareness should be spread among health practitioner and general population about urgent need of its treatment.

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