



## ETIOLOGICAL ASSESSMENT OF SUDDEN SENSORINEURAL HEARING LOSS: A PROSPECTIVE OBSERVATIONAL STUDY IN KASHMIR

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### ABSTRACT

**Background:** Sudden sensorineural hearing loss (SSNHL) is defined as sensorineural hearing loss of 30 dB or more over at least three consecutive audiometric frequencies that occurs within a 72-hour period.

Even though there are several potential causes of SSNHL, however, the majority of patients do not have well established etiology. **Methods:** The present prospective observational study was conducted in the Post Graduate Department of Otorhinolaryngology and Head and Neck surgery (ORL AND HNS), Government SMHS Hospital Srinagar, which is the associated Hospital of Government Medical College Srinagar & caters patients from whole of the Kashmir division. A total of 115 patients who gave the consent & fulfilled the inclusion criteria were taken into the study. **Results:** When the subjects were stratified based on severity of the disorder, ~70% subjects reported mild to moderate SSNHL, while as the rest reported severe forms of SSNHL with ~10% reporting profound SSNHL. Most of cases were idiopathic (57%). Nearly 11% subjects had diabetes mellitus, ~8% had hypertension and an even less number had infectious cause. History of Meiners's Disease was reported in ~4% of subjects and history of fractured temporal bone was presented in ~2% of subjects. **Conclusion:** The etiology of SSHNL is heterogenic, with majority of cases as idiopathic. For practitioner pinpointing the exact etiology is equally all the more important for targeted treatments. We recommend large sample comprehensive extended studies to further investigate the possible cases associated with this disease.

**KEYWORDS :** Etiology, sudden sensorineural hearing loss, evidence-based medicine.

### INTRODUCTION

The ear is a marvelously sensitive and complicated organ. Unfortunately, the ear can get damaged due to disease, physical harm, prolonged exposure to loud noises, certain medicines, or even the natural ageing process. A degree of deafness is typically the result of malfunction. In the field of audiology and otolaryngology, sudden sensorineural hearing loss (SSNHL) is frequently observed. The most prevalent definition of SSNHL is a sensorineural hearing loss of 30 dB or more over at least three consecutive audiometric frequencies that occurs within a 72-hour period. Idiopathic sudden sensorineural loss is defined as SSNHL with no identifiable cause in spite of thorough investigation. Even though there are several potential causes of SSNHL, however, the majority of patients do not have well established etiology. Sudden sensorineural hearing loss (SSNHL) is an otological emergency for which a definitive aetiology and treatment remains controversial, but prompt recognition and management have been shown to improve hearing outcomes and quality of life.<sup>1-3</sup> Over the years, there has been significant discussion about the aetiology, proper assessment, and therapy of this prevalent illness. This is demonstrated by the fact that more than 100 etiologies have been presented for this condition.<sup>1</sup> The estimated annual incidence is 5-30 per 100000 persons 2-5 and 99% of cases are unilateral.<sup>4</sup> In a typical otologic practice, this may account for 2% to 3% of unselected outpatient visits. Any age group can be affected, but the peak incidence seems to be in the sixth decade. The male/female distribution is essentially equal.<sup>5</sup> Bilateral involvement is rare, and simultaneous bilateral involvement is very rare.<sup>6</sup> In general, the causes of SSNHL can be conveniently broken down into infectious, neoplastic, traumatic, ototoxic, immunologic, vascular, developmental, psychogenic, and idiopathic etiologies. Despite a thorough search for an etiology, most cases remain idiopathic. Considerable debate continues as to the pathogenesis of the disease in these patients. Principal theories include viral infection, vascular occlusion, intracochlear membrane breaks, and autoimmunity. Consequently, the objective of our study is to ascertain the prevalence and contributing factors of hearing impairment in Jammu and Kashmir.

### MATERIAL AND METHODS

The present prospective observational study was conducted in the Post Graduate Department of Otorhinolaryngology and Head and Neck surgery (ORL AND HNS), Government SMHS Hospital Srinagar, which is the associated Hospital of Government Medical College Srinagar & caters patients from whole of the Kashmir division. The study was done for a period of 18 months from May 2020 up to October 2021. First 15 months for data collection and the last 3 months for data analysis & write-up. Study Participants: All the patients attending the OPD of the Department with complaint of sudden hearing loss during the study period. Following criteria was adopted for the inclusion of cases:

#### Inclusion criteria:

- Patients with recent history of sudden onset hearing loss and confirmed by PTA to be sensorineural type of hearing loss.
- Patients with longstanding sudden hearing loss and confirmed by PTA to be sensorineural type of hearing loss.
- Patients of all age groups & both sexes.
- Patients previously diagnosed and treated for SSNHL and have again developed sudden onset hearing loss which is diagnosed as sensorineural type of hearing loss.

#### Exclusion criteria:

- Patients with sudden hearing loss of mixed nature.
- Patients who refused to participate

#### Sample Size:

Patients presenting with idiopathic sudden hearing loss to the OPD services of the concerned Unit of Department during the study period were considered for study. After taking an informed written consent, such cases were screened for inclusion and exclusion criteria. Only those patients who gave the consent & fulfilled the criteria were taken into the study. Thus, a total of 115 patients were taken for the study.

The patients were carefully examined after consent was obtained from them in the native tongue. The patients provided a complete history about the many aspects of hearing loss, such as its onset, duration, related symptoms,

etc. A thorough general physical examination and an ENT examination were performed on every patient. The Ethical Clearance was obtained from the Institutional Ethical Committee of Government Medical College Srinagar before initiating the study. Relevant investigations were carried out to assess these patients.

**Statistical Analysis**

Data was collected, put into an Excel spreadsheet, and exported to the Statistical Package for Social Sciences data editor (SPSS Ver. 23). Frequencies and percentages were used to characterise categorical variables. Mean and standard deviation were used to characterise continuous variables. The T-test was used to compare two continuous variables, while the chi square test was used to examine the connection between two categorical variables. To describe and present the data, appropriate graphics such as pie charts, bar charts, and box plots were used. Statistical significance was defined as a p value 0.5. SPSS was used for the analysis.

**RESULTS**

In the current study, we recruited 115 subjects presenting Sudden Sensori-neural Hearing Loss (SNHL) at a tertiary care hospital in Kashmir. The mean age of all the cases was 38.6 (±10.7). We found a male predominance in the current study (58% vs. ~42%) with a male to female ratio of 1.4: 1.

**Table 1: Distribution of study participants according to area of residence.**

Area	Frequency	Percent
Urban	42	36.52
Rural	73	63.48
Total	115	100.0

When the subjects were stratified based on the district of residence more subjects were from rural areas, even though overrepresentation of cases was from Srinagar. A greater number of cases recruited in the current study had constant (96%) and unilateral hearing loss (78.3%) that affected their daily routine work. Duration of the hearing loss remained for days (77%) in a greater number of cases. While as only 4% subjects reported that their hearing loss lasted for years. Among the total subjects recruited, only 24% of subjects had family history of hearing loss. A greater number of cases recruited in the current study had constant (96%) and unilateral hearing loss (78.3%), that affected their daily routine work.

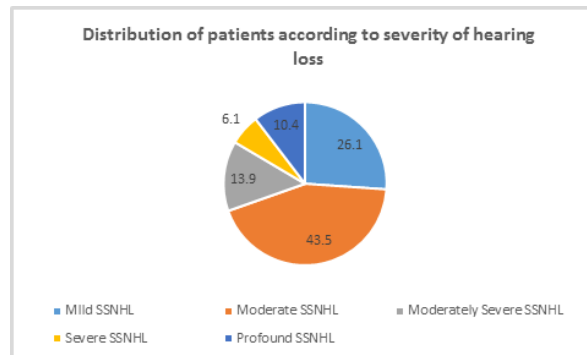
**Table 2: Distribution of Baseline Parameters of Hearing Loss.**

Parameter	Type	Frequency (No of subjects)	Percent
Laterality of Hearing Loss	Unilateral	90	78.3
	Bilateral	25	21.7
Pattern of Hearing Loss	Fluctuating	5	4.3
	Constant	110	95.65
Duration of Hearing Loss	Days	89	77.4
	Months	21	18.3
	Years	5	4.3
Hearing loss affects daily work	Yes	94	81.73
	No	21	18.26
Family History of Hearing Loss	Yes	28	24.34
	No	87	75.65

When the subjects were stratified based on severity of the disorder, ~70% subjects reported mild to moderate SNHL, while as the rest reported severe forms of SNHL with ~10% reporting profound SNHL.

Although etiology of SNHL is not clearly understood, however, we evaluated our patients based on the presence/exposure of probable etiologic factors. We found that most of cases were idiopathic (57%). Nearly 11% subjects had diabetes mellitus, ~8% had hypertension and an even less number had

infectious cause. History of Meiners's Disease was reported in ~4% of subjects and history of fractured temporal bone was presented in ~2% of subjects.



**Table 3: Distribution of patients according to probable etiology.**

Etiology of SNHL	Frequency (No of subjects)	Percentage
No cause found	66	57.39
Diabetes Mellitus	12	10.43
Hypertension	9	7.83
Infectious Causes	7	6.09
Hypothyroidism	5	4.35
History of Ototoxic Drugs	3	2.61
Meiners's Disease	5	4.35
History of Fracture Temporal Bone	2	1.74
Multiple Sclerosis	2	1.74
Dyslipidemia	2	1.74
Rheumatoid Factor positive	2	1.74
Total	115	100.00

**DISCUSSION**

In the current study, we included 115 participants who had recently experienced Sudden Sensori-neural Hearing Loss (SNHL). The mean age of all the cases was 38.6 (±10.7). We found a male predominance in the current study (58% vs. ~42%) with a male to female ratio of 1.4: 1. Although compared to past studies, our ratio is a little higher. But there are some studies that have also noted a male majority in patients presenting with SHNL, which is comparable to our findings.<sup>3,9</sup> Men were also shown to be slightly more impacted by SHNL than their female counterparts in earlier studies, and the findings have consistently been confirmed in more recent research from a variety of ethnic groupings.<sup>4</sup> However, a German research by Klemm et al revealed that their studied group had mostly female participants, with a female-to-male ratio of 1.22:1.<sup>10</sup> It's unknown why this disagreement exists, but cultural and sex-based disparities may have an impact on how likely it is for someone to self-report having an otologic condition.<sup>11</sup> To comprehend the function of gender in determining the susceptibility to developing SHNL, more research with bigger sample sizes from varied ethnicities are required. In the current study, we discovered that more participants were from rural regions. Our findings are consistent with past studies that have reported a link between rural residents with a greater prevalence of hearing loss problems.<sup>12,13</sup> While as it is tempting to speculate that poor health care facilities or exposure to some yet unknown risk factors might be associated with the people residing in the rural areas that might predispose them to SNHL later. Additionally, we must take into account that the majority of people in Kashmir Valley live in rural regions, thus the high percentage of people from rural areas may simply be a reflection of the size of the rural population as a whole rather than an actual role for residency in the disease disorder's cause. Specific epidemiological investigations are required to corroborate these results and clarify the relationship between

location of residence and hearing loss in order to respond to this topic. That might assist in identifying ways to avoid hearing loss.<sup>12</sup> Unlike bilateral presentation, a greater number of subjects reported of unilateral hearing loss in our cohort with almost all reporting constant pattern of hearing loss. The majority of SSNHL cases usually present a unilateral loss of hearing, among which 85–90% are of idiopathic etiology. In contrast, bilateral SNHL accounts for only 0.4–4.9% of all the patients.<sup>14,15</sup> So far, few studies have tried to address the differences in unilateral and bilateral SNHL, however, the findings and the conclusions are still debatable. These authors have arrived at the conclusion that bilateral SNHL can predict severe systemic disorders and is a distinct disease entity when compared to unilateral SNHL.<sup>16-20</sup> The consensus is that this conclusion is debatable as most of the previous studies did not exclude bilateral SNHL patients with known etiology, and they did not adjust for probable confounding effects of differences in demographics. In the current study, we discovered that 70% of participants had mild or moderate SNHL and that 6% of subjects had severe SNHL. SNHL has a complicated and multifaceted cause. Although arterial blockage, membrane breaches, and viral cochleitis have been suggested as possible explanations, further study in this area is necessary to comprehend the pathophysiology of SNHL. We found that most of cases were idiopathic (57%). Nearly 11% subjects had diabetes mellitus, ~8% had hypertension and an even less number had infectious cause (6%). History of Meiere's Disease was reported in ~4% of subjects and history of fractured temporal bone was presented in ~2% of subjects. It is difficult to pinpoint the exact cause of SNHL. Contemporary to our study, numerous authors have reported that majority of individuals who come up with sudden SNHL have idiopathic hearing loss because the cause of their hearing loss is unclear.<sup>4,6,14,16</sup> The heredity as etiology has seldomly been evaluated in investigations. The outcomes nevertheless are contradictory and ambiguous. According to a prior research by Gäckler et al. (2010), reported that individuals with favourable family histories often experience an aggravation of their SNHL.<sup>21</sup> Another study by Binnetolu et al. (2015) confirms the genetic propensity for SNHL, indicating a genetic vulnerability to the illness may help with its early detection, prognosis, and therapy.<sup>22</sup> Family history was most significantly connected with mild to severe age-related hearing loss, according to a 2008 study by McMahan et al.<sup>23</sup> These findings are crucial for identifying those whose auditory system may be genetically vulnerable. In a likewise study by Chau JK (2009) et al; Idiopathic (71.0%), infectious (12.8%), otologic illness (4.7%), trauma (4.2%), vascular or hematologic (2.8%), neoplastic (2.3%), and other causes (2.2%) were commonest etiologies of sudden sensorineural hearing loss in adult patients, similar to our study they also reported idiopathic SNHL as the predominant etiology.<sup>24</sup> It is still difficult to establish a direct causal connection between SSNHL and these etiologies. Diagnostic imaging (MRI) is a valuable and more advantageous method for the identification of temporal bone or intracranial pathology that can present with SSNHL as a primary symptom.

## CONCLUSION

The present study demonstrated that majority of SSNHL cases were from rural areas and males were predominant in comparison to female counter parts. The present study kept the same trend that most of SSNHL cases are idiopathic (57%) in nature. Nearly 11% subjects had diabetes mellitus, ~8% had hypertension and around (6%) had infectious etiology. The etiology of SSNHL is heterogenic, with majority of cases as idiopathic. For practitioner pinpointing the exact etiology is equally all the more important for targeted treatments. We recommend large sample comprehensive extended studies to further investigate the possible causes associated with this disease.

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