

## CLINICAL STUDY OF SUDDEN SENSORINEURAL HEARING LOSS, ITS ETIOLOGY AND OUTCOME AFTER STEROID TREATMENT

### ENT

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### ABSTRACT

Sudden sensorineural hearing loss (SSNHL) is commonly encountered in audiologic and otolaryngologic practice. SSNHL is most commonly defined as sensorineural hearing loss of 30dB or greater over at least three contiguous audiometric frequencies occurring within a 72-hr period<sup>1</sup>. Sudden hearing loss can be frightening and frustrating for the patient and his or her physician.

Approximately 15,000 new cases of sudden hearing loss (SHL) occur annually worldwide. Although prevalence studies do not necessarily distinguish between idiopathic and acquired SHL, most cases of spontaneous SHL have no identifiable cause<sup>2</sup>.

Factors impacting hearing recovery include age of onset, severity of hearing loss, presence of vertigo, and time between onset of hearing loss and visit with the treating physician. The present study is focused on various causes of SSNHL and outcome after treatment with steroids.

### KEYWORDS

SSNHL, SNHL, Sensorineural, ITDA, HDPT

#### AIMS AND OBJECTIVES

- To study the etiology of sudden sensorineural hearing loss.
- To study the outcome after steroid treatment in patients of sudden sensorineural hearing loss.

#### PATIENTS AND METHODS:

##### Source of data:

Study group included 30 patients presenting with complaint of sudden sensorineural hearing loss who were treated at department of ENT, Government General Hospital, Kakinada between 2014 to 2016. A prospective study was done to evaluate hearing outcomes in SSNHL patients treated with corticosteroids.

##### Inclusion Criteria:

- Patients presenting with SSNHL of 30db or greater than 30db.
- PTA showing loss over 3 contiguous speech frequencies.
- Patients between 10 and 60 years of age.

##### Exclusion Criteria:

- Patients below 10 years of age and above 60 years of age.
- Patients who did not give consent for the study.

##### Methods of collection of data:

Patients treated were subjected to comprehensive history, clinical evaluation, tuning fork tests, audiology and other investigations.

- Haematological investigations: Complete blood picture, bleeding time, clotting time, Prothrombin Time /INR, Random blood sugar, serum creatinine.
- Urine examination and microscopy
- Lipid profile, Thyroid function test.
- Radiological investigations: X-ray of mastoids, CT temporal bones with contrast.
- Pure tone Audiometry (PTA), Impedance audiometry.

All patients with tinnitus and vertigo were further evaluated.

**Therapeutic Interventions:** Oral and intratympanic steroids were administered. Oral prednisolone of 20 days course was given in the form of high dose prednisolone taper [HDPT]. 80mg for 5 days followed by 60mg for next 5 days followed by 40mg next 5 days and 20mg for following 5 days. Proton pump inhibitors were also

administered to prevent peptic ulceration produced by oral steroids. Intra tympanic dexamethasone administration [ITDA] was done under local anaesthesia (2% lidocaine), an injection was given in posterior-inferior quadrant with 26 gauge needle. Steroid dexamethasone (25mg/mL) 0.4 to 0.6 ml was administered with patients head tilted 45 degrees away and allowed to perfuse through middle ear by holding position for 30 minutes. Steroid administration was done for 4 separate occasions 10 to 14 days apart. Hearing was assessed by pure tone audiometry 2 weeks after therapy.

**Study Pattern:** Longitudinal prospective study depending upon history, clinical features and PTA findings.

#### OBSERVATIONS AND RESULTS

##### TABLE – 1

##### Age and sex wise distribution of cases

AGE IN YEARS	MALE		FEMALE		TOTAL	
	No	%	No	%	No	%
11 - 20	4	20.0	1	10.0	5	16.67
21 - 30	4	20.0	2	20.0	6	20.0
31 - 40	6	30.0	4	40.0	10	33.33
41 - 50	3	15.0	2	20.0	5	16.67
51 - 60	3	15.0	1	10.0	4	13.33
<b>TOTAL</b>	<b>20</b>	<b>100</b>	<b>10</b>	<b>100</b>	<b>30</b>	<b>100</b>

Mean age and SD of males is 33.75±12.97

Mean age and SD of females is 38.50±12.54

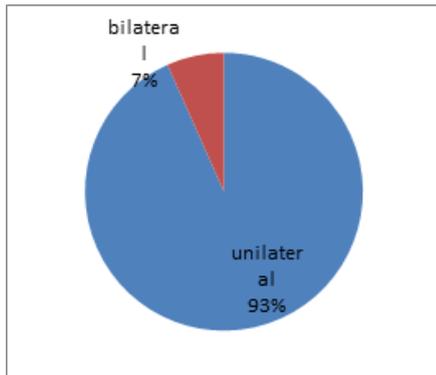
Mean age and SD for all cases is 35.53±12.04

p>0.05 non significant.

In our study total 30 patients were enrolled, out of them 20 were males and 10 females. The age ranging from 11 to 60 years maximum age incidence was between 31 to 40 years.

##### TABLE – 2 Percentage of unilateral and bilateral cases

	Number of cases	percentage
Unilateral	28	93.33%
Bilateral	2	6.67%
<b>TOTAL</b>	<b>30</b>	<b>100%</b>



Bilateral sudden hearing loss is a very rare incidence among the population. The occurrence of hearing loss in left ear is more than right ear. In our study out of 30 cases 28 cases (93.33%) had unilateral hearing loss and only 2 cases (6.67%) had bilateral hearing loss.

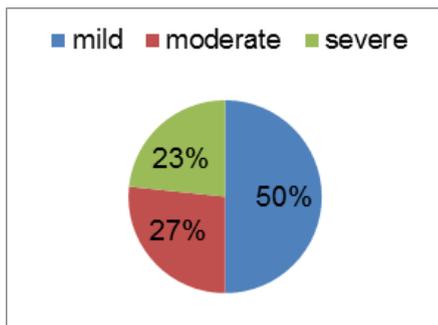
**TABLE – 3 Associated symptoms with sudden hearing loss**

Symptoms	Number of patients	Percentage
Vertigo	10	33.33%
Tinnitus	10	33.33%
Aural fullness	6	20.00%
No symptoms	4	13.33%
<b>Total</b>	<b>30</b>	<b>100%</b>

The most common associated symptom was vertigo and tinnitus in 10 patients each (33.33%), aural fullness in 6 patients (20.00%). 4 patients (13.33%) did not show any symptoms.

**TABLE – 4: Table showing degree of hearing loss**

Degree of hearing loss	No. of patients	Percentage
mild	15	50.0%
moderate	8	26.6%
severe	7	23.33%
<b>Total</b>	<b>30</b>	<b>100%</b>



**Pie chart showing degree of hearing loss**

**TABLE – 5 Etiology of sudden hearing loss among different cases.**

Etiology	Number of patients	Percentage
Diabetes mellitus	4	13.33%
Hypertension	6	20.00%
Head injury	4	13.33%
Anaemia	4	13.33%
Viral infection	2	6.66%
Typhoid fever	2	6.66%
No cause identified	8	26.66%
<b>Total</b>	<b>30</b>	<b>100%</b>

In majority of the patients definite cause was not known Idiopathic (26.66). 4 patients (13.33%) had diabetes mellitus, 6 patients (20%) had hypertension, 4 patients (13.33%) head injury, 4 patients (13.33%) had vascular diseases, 4 patients (13.33%) with typhoid fever and 2 patients (6.66%) with viral infection developed SSNHL.

**TABLE – 7**

**Table showing improvement in hearing after administration of steroid**

	Oral prednisolone [HDPT]		Dexamethasone [ITDA]		Total	Percentage
	No	%	No	%		
Complete recovery	4	26.6%	3	20%	7	24.0%
Partial recovery	6	40%	5	33.3%	11	34.0%
No recovery	5	33.3%	7	46.6%	12	42.0%
<b>Total</b>	<b>15</b>	<b>100%</b>	<b>15</b>	<b>100%</b>	<b>30</b>	<b>100%</b>

In our study 15 patients (50%) received prednisolone and 15 patients (50%) received dexamethasone. Among 15 patients administered prednisolone, 4 patients (26.6%) of them showed complete recovery, 6 patients (40%) showed partial recovery and remaining 5 patients (33.3%) showed no improvement.

Among 15 patients who received dexamethasone, 3 patients (20%) showed complete recovery, 5 patients (33.3%) showed partial recovery and 7 patients (46.6%) showed no recovery. Out of all the 30 patients in study group, 7 patients (24%) showed complete recovery and 12 patients (42%) showed no recovery. The remaining 11 patients (34%) showed partial recovery. Patients receiving prednisolone [HDPT] had better results compared to those receiving dexamethasone [ITDA].

**Table - 9 Hearing results in different age groups**

Age group	Improvement	No Improvement	Total
11 - 20 yrs	4	1	5
21 - 30 yrs	5	1	6
31 - 40 yrs	8	2	10
41 - 50 yrs	1	4	5
51 - 60 yrs	0	4	4
<b>Total</b>	<b>18</b>	<b>12</b>	<b>30</b>

In our study younger patients had better results, among 6 patients between 21 to 30 years of age group 5 patients (83.3%) showed improvement when only one of the patients from 41 to 60 years showed improvement.

**Table - 10 Hearing improvement in both sexes**

RESUL TS	MALE		FEMALE		TOTAL	
	No	%	No	%	Total	%
Recovery	15	75	3	30	18	60
No Recovery	5	25	7	70	12	40
<b>Total</b>	<b>20</b>	<b>100</b>	<b>10</b>	<b>100</b>	<b>30</b>	<b>100</b>

Out of 30 patients in our study 20 were males and 10 were females. Out of 20 male patients, 15 patients (75%) showed better results, when 5 patients (25%) had no recovery. Out of 10 female patients only 3 patients (30%) had hearing improvement and 7 patients (70%) had no improvement. In this study, male patients had better improvement than female.

**DISCUSSION**

In our sample the incidence of SSNHL was high among the age group 31 to 40 years (33.33%) and the average age was 35.5 years. This is different when compared to reports by others which showed higher incidence between 40 to 54 years of age group 14,15. In our study, out of 30 patients, 20 were males (66.66%) and 10 were females (33.33%). The male to female ratio is 2:1. Our study is nearly on par with other studies 16. There was no statistical difference regarding incidence between males and females.

Bilateral involvement of SSNHL is very rare and can be considered as

a negative prognostic factor<sup>16,17</sup>. It varies between 1-5%<sup>16,17</sup>. In present study, the incidence of bilateral hearing loss is 6.67%.

Symptoms associated with SSNHL: Majority of the patients had vertigo(33.33%) and tinnitus (33.33%) and 13.4% patients had no associated symptoms. These findings were similar to other studies<sup>16,18</sup> which show tinnitus in 41% to 90% cases and vertigo in 29% to 56% cases. The patients without vertigo showed better results than those associated with vertigo<sup>19,20</sup>. Although tinnitus was considered as positive prognostic factor in previous reports, it has not been found to be as a prognostic factor in our study.

In our study group 15 patients (50%) had mild, 8 patients (26.66%) moderate and 7 patients (23.33%) had severe hearing loss.

Causes of SSNHL: 26.6% had no definite cause, hypertension and diabetes mellitus were observed in 20% and 13.33% patients respectively. 13.3% of the patients had history of head injury and 20.0% were of infectious etiology (viral and typhoid fever). Drugs like aminoglycosides, salicylates, oral contraceptives, nicotine, tobacco, frusemide, bromocryptine are ototoxic and can cause sudden hearing loss. In this study no patient was using any of these ototoxic drugs.

The etiology of sudden sensorineural hearing loss is multifactorial and in majority cases the exact etiology cannot be identified<sup>2</sup>.

In our series 15 patients (50%) were administered oral prednisolone and 15 patients (50%) were administered IT dexamethasone. Time of onset of therapy was between 6 weeks to 24 weeks. All the patients were subjected to audiometry before and after treatment. 26% had complete recovery, 34% had partial recovery and 40% had no recovery [according to Siegel's criteria<sup>21</sup>]. High dose prednisolone taper [HDPT] was found to be more efficacious than Intra tympanic dexamethasone administration [ITDA].

## CONCLUSION

SSHL is a life altering disorder for patients and challenging for otolaryngologists. This requires early treatment and best form of therapy is steroids. The diagnosis of SSNHL is by audiometry. There are many causes for this disorder like infections and viral, vascular, neurological and traumatic, but the exact etiology often remains unknown despite several investigations.

Identifiable causes are found for 7% to 45% of patients with SSNHL<sup>3</sup>. In a meta-analysis of 23 studies of SSNHL, the most frequent causes identified were infectious (13%) followed by otologic (5%), traumatic (4%), vascular or hematologic (3%), neoplastic (2%), and other (2%)<sup>4</sup>. The etiology remains unknown in the majority of patients who present with SSNHL and therefore their hearing loss is classified as idiopathic<sup>3,4</sup>. The most widely accepted theories for idiopathic SSNHL are vascular compromise<sup>5,6</sup>, cochlear membrane rupture<sup>7,8</sup> and viral infection<sup>9,10</sup>.

Numerous agents have been investigated for the treatment of idiopathic SSNHL including anti inflammatory agents, antimicrobials, calcium antagonists, vitamins, essential minerals, vasodilators, volume expanders, defibrinogenators, diuretics, hyperbaric oxygen, and bedrest<sup>11</sup>. Corticosteroids are thought to improve idiopathic SSNHL by reducing inflammation and edema in the inner ear<sup>12,13</sup>.

Treatment should be started early and unnecessary tests should be avoided. When associated with symptoms like vertigo, and other conditions like cardiovascular diseases, diabetes mellitus, hypertension and flat shape audiogram there is poor prognosis in recovery.

The best form of therapy continues to be steroids and HDPT may be given along with ITDA. However IT steroids may be beneficial and attempted in patients those not responding to oral steroids and contraindicated to intravenous therapy. Hearing graded initially as profound may improve to severe. Appropriate counselling for patients with an audiologist is needed to improve hearing and the ear may be aided by hearing aids and cochlear implants [bilateral loss].

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