

# To Study the Prevalence of Hearing Impairment in a Population of at Risk and Not at Risk Infants Born at a Tertiary Level Hospital in Kashmir

Owais Makhdoomi<sup>1</sup>, Yasir Abbas Khan<sup>2</sup>, Huzaifa Makhdoomi<sup>3</sup>

<sup>1</sup>Medical Officer in the Department Of Health Services

<sup>2</sup>Post Graduate in the Department of ENT&HNS Government Medical College, Jammu, India

<sup>3</sup>Post Graduate in the Department of Pediatrics Government Medical College, Srinagar, India

**Abstract:** ***Introduction:** The purpose of our study was to find the prevalence of hearing impairment in a population of at risk and not at risk infants born in tertiary care hospitals of Kashmir. **Methodology:** This prospective study took place in the Department of Otorhinolaryngology and Head & Neck Surgery at Govt. Medical College, Srinagar, J&K. Subjects included neonates born and admitted in LD hospital Srinagar and GB Pant Hospital tertiary care centers. Thus a total of 1800 neonates were recruited for the study with prior informed verbal consent obtained from the parents. These patients were screened using otoacoustic emissions during first week and followed up accordingly and then evaluated further using BERA. **Conclusion:** Our study showed that early identification of newborn infants for hearing impairment can help in early rehabilitation.*

**Keywords:** BERA, Hearing Loss, NICU

## 1. Introduction

Hearing loss is one of the most common congenital anomalies, occurring in approximately 2 - 4 infants per 1000 (1, 2, 3). Hepper and Shahidullah (4) have shown that the fetus reacts to sound before birth. Babies learn the specific sounds of the language to which they are exposed during the first 6 months of life (5). It was observed that children whose hearing loss was observed and managed before 6 months of age had higher scores of vocabulary, better expressive and comprehensive language skills than those diagnosed and managed after 6 months of age emphasizing the importance of early identification and treatment (6). Hearing impairment is classified into three groups (7, 8).

- **Conductive hearing impairment:** This occurs when the sound conducting mechanism of the ear is defective. The lesion could be anywhere from the external auditory canal to the footplate of stapes.
- **Sensorineural hearing impairment:** This type of deafness is due to abnormality in the cochlea, auditory nerve, neural pathway or their central connections with auditory cortex.
- **Mixed hearing impairment:** It denotes that both conductive and sensorineural abnormality is present.

## 2. Material and Methods

This prospective study took place in the Department of Otorhinolaryngology and Head & Neck Surgery at Govt. Medical College, Srinagar, J&K. Subjects included neonates born and admitted in LD hospital Srinagar and GB Pant Hospital tertiary care centers. Thus a total of 1800 neonates were recruited for the study with prior informed verbal consent obtained from the parents. Initial Screening - All newborns enrolled into study were screened by TEOAE within first 7 days of life.

- 1) First follow - up Screening was done at 4 to 6 weeks of age by TEOAE for -
  - a) All babies of "At risk" group
  - b) Babies of "No risk" group who failed the first test screening ("refer" category)
- 2) Second follow - up Screening was done at 3 months age to confirm the hearing impairment by ABR/ BERA test for -
  - a) All babies of "At risk" group
  - b) Babies of "No risk" group who failed the first follow - up screening ("refer" category)

After confirmation of hearing impairment with above mentioned investigations

## 3. Results

**Table 1**

Sex	No of babies	Percentage
Female	962	53.4
Male	838	46.6
Others	1800	100.00

Majority of the infants in our study were females 53% and males constituted 47%

**Table 2**

Risk	No of babies	Percentage
At risk	1365	75.8
High risk	435	24.2
Total	1800	100.0

In the present study 24.2% of the infants were at high risk for hearing loss.

**Table 3**

High risk factor	No of babies	Percent
Family history	11	2
ICU > 5 days	382	72.9
Assisted ventilation	35	6.6
Ototoxic drugs	16	3
Hyperbilirubinaemia	21	4
Meningitis	9	1.7
In - utero infection	15	2.8
Crainiofacial Anomalies	29	5.5
Syndromestimata	6	1.1

NICU stay >5days was the most common (72.9%) risk factor present among the high risk infants of our study.

**Table 4: OAE I**

Findings	No. of neonates	Percent
PASS	1642	91.2
REFER	158	8.8
Total	1800	100

In the present study 91.2% of the neonates had bilaterally present OAE whereas 8.8% had absent OAE either unilaterally or bilaterally on initial screening.

**Table 5: OAE II**

Findings	No. of neonates	Percent
PASS	471	98.5
REFER	7	1.5
Total	478	100

98.5% of the infants had bilaterally present OAE whereas 1.5% had absent OAE either unilaterally or bilaterally on first follow up screening.

**Table 6: BERA**

	No of babies	Percent
B/L PSNHL	7	1.9
Normal	370	98.1
Total	377	100

In the present study 1.9% of the infants who underwent BERA were found to have bilateral hearing impairment.

**Table 6**

High Risk Factor	BERA	
	Abnormal	Normal
Yes	3	370
No	4	1341
Total	7	1711
<b>P Value</b>	<b>0.2221</b>	

In the present study prevalence in high risk group was found to be 8.04per 1000 screened & in not at risk group 2.97 per 1000 screened.

#### 4. Discussion

Early identification and appropriate treatment of hearing loss in children is critical for normal development. The period from birth to 3 years of life is critical for the development of speech and language, therefore, there is need for early identification and assessment of hearing loss and early rehabilitation in infants and children. The ultimate goal of

early screening and diagnosis is early intervention. This prospective study was conducted in the department of Otolaryngology head & neck surgery, Government Medical College Srinagar. A total of 1800 neonates born and admitted in LD hospital and GB Pant Hospital were screened for hearing impairment with prior informed verbal consent obtained from the parents. Initially a comprehensive clinical history and detailed head to toe examination was done. A two stage OAE protocol was used, wherein neonates were subjected to 2 rounds of Otoacoustic emission recording, one of which was performed by first week of birth and the other was conducted in those who had failed the first screening programme or had high risk factors which were followed by BERA. This protocol was put forward by the Joint committee of Infant Hearing and was also followed by Jhonson JL et al (9), Finitzo T et al (10), Arehart KH et al (11), Berg A et al (12), Mehl AL et al (13), Aciorba, S Haztopoulos et al (14), Prieve et al (15), B De Capua (16), Kai Uus et al (17), Papadouri et al (18), Tasci Y et al (19). The prevalence of hearing loss in not at risk neonates was 2.97 per 1000 screened with a 95% confidence interval of 1.15 to 7.62 and prevalence of hearing loss in high risk group was 8.04 per 1000 screened with a 95% confidence interval of 2.74 to 23.38. The combined overall prevalence was found to be 4.07 per 1000 screened. Comparing the prevalence of hearing loss in these two groups the difference is statistically insignificant ( $p=0.221$ ) and thus it can be deduced that applying high risk strategy for neonatal hearing screening can miss significant number of children with hearing loss among not at risk population.

Thus there is need for urgent implementation of UNHS of all the neonates which can be implemented efficiently.

#### Disclosure

This paper has been never published and is not currently under evaluation in any peer - reviewed publication.

#### Conflict of Interest:

The Authors have no financial disclosure or conflict of interest.

**Ethical approval:** All authors are hereby declared that all the experiments have been examined and approved by the appropriate ethics committee and therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

**Informed Consent:** All authors declare that written informed consent was obtained by the patients for the publications of outcome of this study copy of written consent may retrieve from us. If required.

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