

## ORIGINAL ARTICLE

# Frequency of Sensorineural Hearing Loss among Children with Bacterial Meningitis

FAIZA GOHAR<sup>1</sup>, SYED SAJID MUNIR<sup>2</sup>, SAMI UL HAQ<sup>3</sup><sup>1</sup>Medical officer, Pediatric Deptt. Liaqat Memorial Teaching Hospital for Women And Children, Kohat<sup>2</sup>Associate Professor, Pediatric Deptt. Liaqat Memorial Teaching Hospital for Women And Children, Kohat<sup>3</sup>Associate Professor, Pediatric Deptt. Bannu Medical College, Bannu

Correspondence to Dr. Syed Sajid Munir, Associate Professor

## ABSTRACT

**Aim:** Frequency of sensorineural hearing loss among children presenting with acute bacterial meningitis.**Study design:** Pediatric wards of Khyber Teaching Hospital, Peshawar with the help of audiology department of Khyber teaching hospital, Peshawar**Study design & duration:** Descriptive cross sectional study. 5 months from 23/10/2018 to 23/03/2019.**Sample size:** Sample size was 149 using 44.4% proportions SNHL among children with bacterial meningitis, 95% confidence level and 8% absolute precision using WHO sample size calculations.**Methodology:** 149 cases i.e. 90 males and 59 females were included with age of 02 to 144 months. All were with diagnosis of bacterial meningitis. Lab tests and CSF examination was performed. The assessment of hearing was done before discharge in the form of BERA and PTA. All findings of hearing assessment was entered in Performa.**Results:** In the study, mean $\pm$  SD of age was 28 $\pm$  35.7. Moreover, 60.4% were males and 39.6% were females. 10(6.7%) of the 149 cases have sensorineural hearing loss while 139(93.3%) were having normal on hearing assessment.**Conclusion:** Sensorineural hearing loss in patients with bacterial meningitis was 6.7%.**Keywords:** Sensorineural Hearing Loss, Meningitis, Bacterial Meningitis.

## INTRODUCTION

S. pneumoniae and Neisseria meningitidis is main cause of bacterial meningitis in children >1 month of age in the USA. Bacterial meningitis has reduced in developed countries since the introduction of immunization at 2 months of age<sup>1</sup>. Lack of immunity to specific pathogens associated with young age is major risk factor. Other factors are recent colonization with pathogenic bacteria, close contact with household, daycare centers, college dormitories, military barracks, crowding, poverty, black or native American race, and male gender<sup>2</sup>.

The objective of the study was to find frequency of sensorineural hearing loss among children presenting with acute bacterial meningitis.

## METHODOLOGY

This descriptive cross sectional study was conducted in the Department of Pediatrics Khyber Teaching Hospital, Peshawar with the help of audiology department of Khyber teaching hospital for a period of 5 months from 23/10/2018 to 23/03/2019 after permission from Ethical Committee. Sampling technique used was non-probability sampling. Sample size was 149 using 44.4% proportions SNHL among children with bacterial meningitis, 95% confidence level and 8% absolute precision using WHO sample size calculations.

**Inclusion Criteria:** All children with acute bacterial meningitis with either sex and age of 2 to 144 months.

**Exclusion Criteria:** Children with congenital malformations of the ear on history and medical records, received ototoxic drugs, with H/O moderate to severe jaundice or kernicterus in neonatal life, with H/O severe head trauma and children

with family H/O deafness (Alport syndrome) were excluded from the study.

**Data collection procedure:** After approval from hospital ethical committee, patients presenting to the OPD and fulfilling the inclusion criteria for meningitis were selected. Written and informed consent was taken from patients. Data was collected on a predesigned Performa. All the cases were taken history, clinical examination and lumbar puncture. Children with meningitis were examined for the sensorineural hearing loss by brainstem evoked response audiometry (BERA) or pure tone audiometry (PTA).

An effective method of evaluating the auditory pathway from the peripheral end organ through the brain stem is BERA. This test was carried out in the children between 2 months to 36 months of age. The findings were recorded in the form of abnormal waves. These abnormalities included prolonged latency, unilateral absent response, bilateral absent response and prolonged inter wave interval. All the collected data was analyzed in SPSS version 23. Mean $\pm$ SD were calculated for numerical variables like age. Frequencies and percentages were calculated for categorical variables like gender and sensorineural hearing loss. Sensorineural hearing loss was stratified with age and gender to see the effect modification. Post stratification chi square test was used.

## RESULTS

The detail of results is given in tables 1,2,3,4,5,6,7

Table 1: Age distribution

Age(months)	n	%age
02-36 months	110	74%
37-144 months	39	26%
Total	149	100

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Table 2: Gender distribution

Gender	n	%age
Male	90	60.4
Female	59	39.6
Total	149	100.0

Table 3: Frequency of sensorineural hearing loss

SNHL	n	%age
Yes	10	6.7%
NO	139	93.3%
Total	149	100

Table 4: SNHL with respect to age

SNHL	2-36 Months	37-144 Months	Total
Yes	3 (30%)	7 (70%)	10
No	107(70%)	32 (30%)	139
Total	110	39	149

Table 5: SNHL with respect to gender

SNHL	Male	Female	Total
Yes	6(60%)	4 (40%)	10
No	84 (56%)	55 (37%)	139
Total	90	59	149

Table 6: Age with BERA and PTA

BERA Frequency	2-36 Months	PTA Frequency	37-144 Months	Total
Yes	3 (30)%	Yes	7 (70)%	10
No	0	No	0	0
Total	3	0	7	10

Chi square test was applied and P value was 0.01

Table 7: Gender with BERA and PTA

BERA Frequency	Male	Female	PTA Frequency	Male	Female	Total	P Value
Yes	2 (20%)	1 (10%)	Yes	4 (40%)	3 (30%)	10	0.05
No	0	0	No	0	0	0	
Total	2	1		4	3	10	

Chi square test was applied and P value was 0.05

## DISCUSSION

In this study, 6.7% cases were with sensorineural hearing loss having bacterial meningitis. There is no association between severities of hearing loss to the male gender. 90 (60.4%) children were males, while 59(39.6%) were females. One study showed that male was a significant risk factor for hearing loss with 3% cases of hearing loss<sup>3</sup>.

In one study, it is seen that early age is a significant risk factor for loss of hearing. Cases having meningitis with age <12 months developed significant hearing loss as compared to older age children. This is in accordance with another study<sup>4</sup>.

Regarding coma, one study showed that 13(15.7%) cases had coma scores of <8 on admission and all developed loss of hearing and seizures occurred in 84 (78%) cases<sup>5</sup>.

In a study by Woolley et al<sup>6</sup>, 26% cases developed seizures and in cases with hearing loss, 32% developed seizures having 24% without loss of hearing. Another study showed 6% cases developed a cranial nerve neuropathy and all had hearing loss<sup>3</sup>.

## CONCLUSION

Frequency of sensorineural loss of hearing in subjects having bacterial meningitis was 6.7%. Associated risk

factors for loss of hearing were coma, seizures, cranial nerve neuropathy, and fever >38.7°C.

**Conflict of interest:** Nil

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