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Study of Incidence and Type of Deafness in Children With delayed and Non Development of Speech in a Pediatric Tertiary Health Care Centre Among 5500 Children over 5 Years

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ABSTRACT

Introduction: Childhood deafness is a multifaceted disability which affects a child's ability to hear and delays the speech development and language learning skill. Thus results in cognitive impairments in these children including lower IQ scores, slower information processing skills and poorer literacy skills.

Aim of the Study: To find the incidence and pattern of deafness in children with non and delayed development of speech and to look for the risk factors associated with this.

Study Type: Retrospective, observational and analytical.

Methods and Discussion: 5504 deaf children of 0 – 12 years attended OPD of Department of ENT Dr. B.C. ROY from June, 2014 – June, 2019. We have examined, taken detailed history, done audiological tests and assessed after dividing the children in three age groups. Children were subdivided according to the severity of deafness and relation of each kind of deafness with non and delayed development of speech were assessed. Associated risk factors were also looked for at each stage of study.

Results: Highest number (3328) of deaf children were found in 0-3 years of age. 1502 deaf children were found in 3-7 years age group and 674 deaf children were found in 7-12 years age group. Speech and language development was significantly not developed in patients with profound and severe deaf children.

Conclusion: Highest number of deaf children were found in 0-3 years of age group. Among the major risk factors that were identified during the study in this group were prematurity, LBW, HIE, neonatal jaundice and consanguineous marriage. While in 3-7 years and 7-12 years age groups, otitis media was seen to cause hearing loss more than the other etiologies.

Key Words: Leading, Around, Congenital

INTRODUCTION

According to WHO (2016) around 360 million people (5% of the world's population) live with hearing loss, out of these nearly 32 million are children. In India, 63 million people (6.3%) suffer from significant hearing loss. Four in every 1000 children suffer from severe to profound hearing loss. Yearly more than 100,000 babies are actually born with

hearing deficiency. Out of every 1000 children born in India, there may be 5–6 such children who cannot hear properly. Because of lack of visual indicator, most hearing impaired children who are not screened at birth are not identified until between 1½ and 3 years of age, which is actually well beyond the critical period for healthy speech and language development. The prevalence of speech and language delay was found to be 27% under 3 years of age. Exact figures of

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delayed or non development of speech under 12 years were not studied because it was difficult to determine. Overall 3% to 10% of children are affected by speech delay. Boys are 3 to 4 times affected more than girls. Hearing, Speech and language disorders needs early intervention. Hearing disability along with delay in speech and language skills results in cognitive impairments including lower IQ score, slower information processing skills and poorer literacy skills like reading and spelling. Thus leading to psychosocial deficits in these children which is persisting till adulthood. However, with the help of newborn hearing screening, early detection of hearing loss and speech delay, a hearing-impaired child can be identified and treated early.

As per WHO(2016), while the most obvious impact of childhood hearing loss is on language acquisition, it also adversely affects literacy of the child along with the development of social skills and attitudes mainly self-esteem. Untreated hearing loss is often associated with academic underachievement which can lead to lower job performance and fewer employment opportunities later in life. For a child, difficulties in communication may result in feelings of anger, stress, loneliness and emotional or psychological consequences which may have a profound effect on the family as a whole. In low-resource settings in which a child would already be at higher risk of injury, hearing loss can place a child in unsafe situations due to decreased alertness.

Indian Census 2011(<http://censusindia.gov.in>) shown that, India has 19 % population with hearing disability. This census revealed number of disabled persons is highest in the age group 10-19 years (46.2 lakhs). In this group 20% are having hearing disability followed by 18% having visual disability and rest 9% with multiple disabilities. The estimated prevalence of adult deafness in India is 7.6% and while childhood onset deafness is 2%. Out of total 48.6 % disable population of west Bengal, 9.2% have speech disability.

Speech and language development is a useful indicator of a child's development and cognitive ability. Identification of children at a risk for developmental delay or related problems may lead to intervention and assistance at a young age, when the chances for improvement are the best.

OBJECTIVE

Primary Objective

To assess

- (a) the incidence of deafness and type of deafness of children from day 0 to 12 years of age and
- (b) the prevalence of speech and language delay in children less than three years of age using the Language Evaluation Scale Trivandrum (LEST 0-3)

Secondary Objective:

To study the risk factors for deafness and speech delay in children less than 12 years of age.

MATERIALS AND METHOD

Place of study: Department of ENT, at Dr. B.C. ROY, PGIPS, Department of ENT at a Tertiary Pediatric health care center in Kolkata (W.B.).

Study period: June, 2014 – June, 2019.

Study sample: Five thousand five hundred and four (5504) children (age group 0 – 12 years) attending the out-patient department. Children are subdivided in three age groups -

- (a) Group A – 0 to 3 years(3,328 Patients),
- (b) Group B – 3 years 1 month to 7 years (1502 Patients) and
- (c) Group C – 7 years 1 month to 12 years(674 Patients).

INCLUSION CRITERIA

- A) Neonates with routine neonatal hearing screening-
 - a) Low birth weight baby, b) babies with neonatal asphyxia, c) neonates with respiratory distress syndrome and d) neonates with prolonged(more than 3 weeks) SNCU and NICU admission,
- B) Children with complaints deafness or of decreased hearing or no response to sound stimuli and c) children with non and delayed development of speech are included in this study.

EXCLUSION CRITERIA

- a) Children with congenital anomaly b) children with syndromes and c) children with mental retardation and cerebral Palsy.

Study type: Retrospective, observational, analytical study.

Ethical clearance: Institutional ethics committee clearance was taken prior to the commencement of the study.

STUDY METHOD

After a thorough clinical history was obtained from each patient consisting of 10 questionnaire of prenatal, perinatal and post natal period. History obtained from mother regarding gestational drug intake, diabetes, hypertension or any other illness. Then all risk factors of infant hearing loss and progressive or late onset hearing loss are screened. The following tests were advocated:

(A) Group A(0-3 years):

- 1) BERA 2) OAE (transient evoked) 3) language evaluation scale Trivandrum (LEST 0-3) and 4) home screening questionnaire (HSQ) by NIDCD (National Institute of Deafness

and Communication Disorder).

(B) Group B (3-7 years):

(1) BERA, (2) behavioral conditioned play audiometry (CPA) and (3) home screening questionnaire (HSQ) by NIDCD (National institute of deafness and communication disorder).

Group C (7-12 years):

1) BERA, 2) PTA and Impedance and 3) Home Screening Questionnaire (HSQ) by NIDCD(National Institute of Deafness and Communication Disorder).

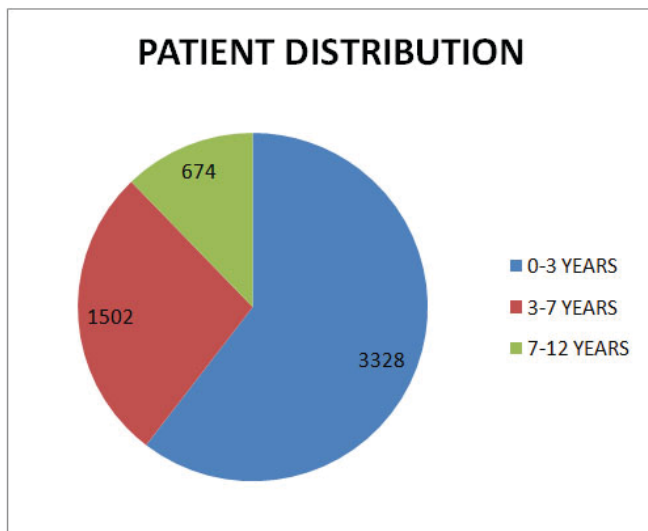
From our study, it was seen that in 0-3 years of age group, 1467 kids were having profound SNHL,879 children had severe SNHL,667 had moderate SNHL while only 315 children had mild SNHL.

Hearing Loss				
	Profound SNHL	Severe SNHL	Moderate SNHL	Mild SNHL
0-3 YEARS	1467	879	667	315
3-7 YEARS	642	233	257	137
7-12 YEARS	194	172	230	78

RESULT AND ANALYSES

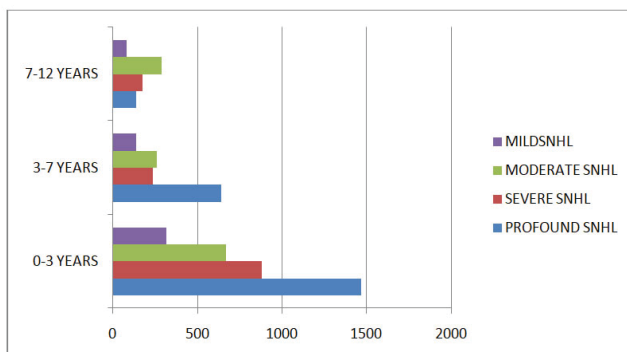
Age Distribution:

It is seen that the highest number of patients screened are of 0-3 years of age. Total 3328 children were evaluated in 0-3 years of age, while in 3.1years-7 years of age total 1502 and in 7.1 years to 12 years of age 674 children were examined.



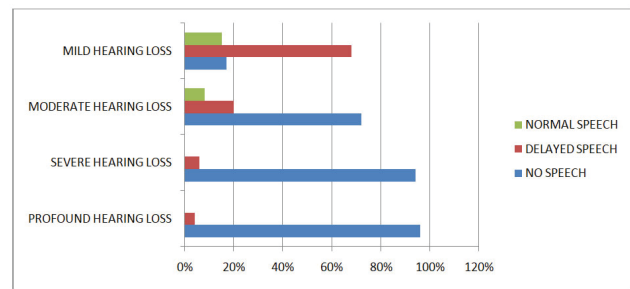
Highest group of deafness was found in 0-3 years of age.

AGE SPECIFIC DISTRIBUTION OF HEARING LOSS



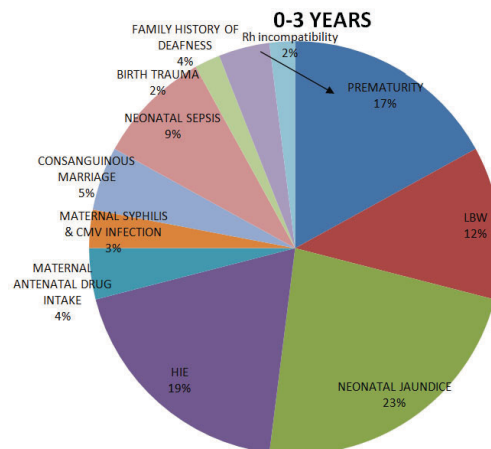
It is the age when hearing screening of all infants and children is most important as screening at this critical developmental stage can prevent or reduce many of these adverse consequences.

SPEECH DEVELOPMENT IN 0-3 of AGE AS PER HEARING LOSS:



Speech was not developed in any child 0-3 years with profound deafness and severe deafness. Normal speech was noted to develop only in 9% children with moderate deafness and 27% children with mild deafness.

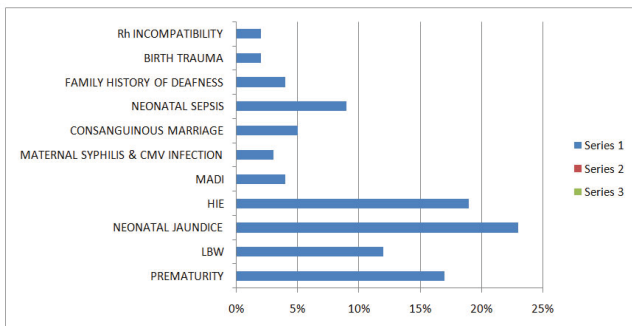
PROBABLE ITIOLOGY OF HEARING LOSS IN 0-3 YEARS OF AGE:



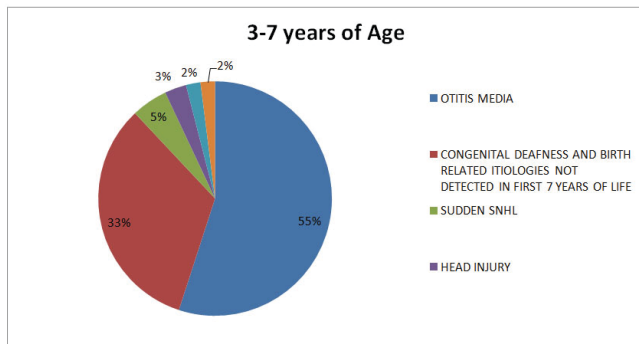
As the result shows, hearing loss was both congenital (present at birth) or acquired (present after birth). 50% of all con-

genital hearing loss is due to genetic factors . Out of these hereditary cases, approximately 30% are classified as syndromic. About 400 named syndromes are associated with hearing loss, the associated auditory features being quite variable – sensory neural or conductive, unilateral or bilateral, and progressive and stable .¹

Causes that are not hereditary in nature include illnesses, pre-natal infections and conditions occurring at the time of birth. Hearing loss can also occur after birth, perhaps as a result of a disease, a condition or an injury or environmental factors, like congenital hyper bilirubinemia, ototoxic medication exposure, neonatal hypoxia, viral infections, and meningitis.



PROBABLE ITILOGIES OF HEARING LOSS IN 3-7 years OF AGE :



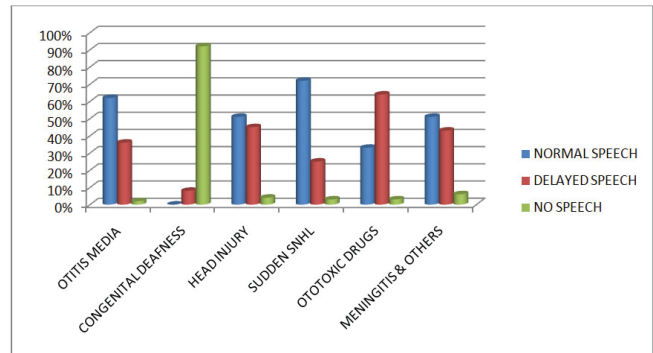
In our experience, 55 % of patients suffered from hearing loss due to otitis media while by the age of 4 years 87% of children had experienced at least one episode of otitis media, while 45% of them had three or more such incidents.

11% kids had with hearing loss in one ear, lags behind in language skills, study finds Washington University school of medicine. By the time they reach school age, one in 20 children have hearing loss in one ear. That can raise significant hurdles for these children, say the results of a new study, because loss of hearing in one ear hurts their ability to comprehend and use language.

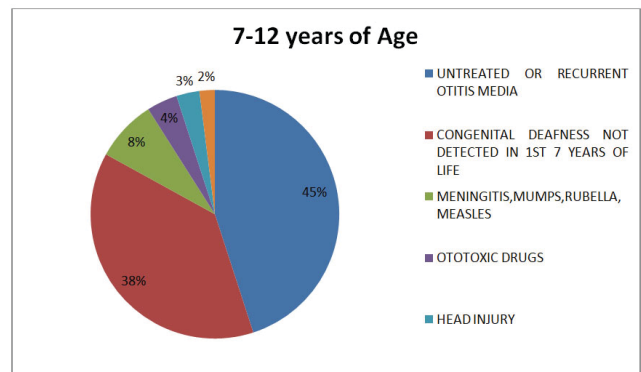
One of the main impact of hearing loss in this developing age is the child’s inability to converse with others. Children with hearing loss often suffered in spoken language development

.Hearing loss and ear diseases such as otitis media can have a significant adverse effect on the education and learning of children. However, if people suffering from hearing loss are provided a chance to communicate they can participate on an equal footing with others.

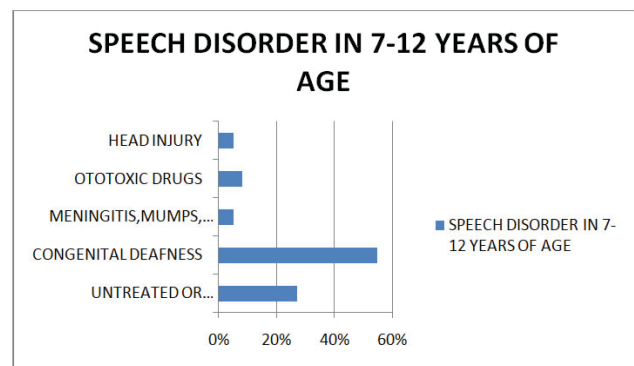
DELAYED AND NON DEVELOPMENT OF SPEECH IN 3-7 YEARS OF AGE



PROBABLE ITILOGIES OF HEARING LOSS IN 7-12 YEARS OF AGE:



DELAYED AND NONDEVELOPMENT OF SPEECH IN 7-12 YEARS OF AGE:



DISCUSSION

Until recently, the problem of hearing loss was not a priority for the Indian Government. However, with the advent of National program for the prevention and control of deafness (NPPCD) there is a renewed interest in this mammoth public health problem. Half of all the cases of deafness and hearing impairment are avoidable through proper prevention, early diagnoses and management. Hearing sense is crucial for the mental and overall development of a child. Identifying the hearing loss early will prevent the problem to magnify. This will also decrease the burden of hearing loss and thus many presumptively productive years lost will not happen. Screening of the newborns and infants is the cost-effective way to reduce the burden of hearing loss. "Catch them young" should be the central theme of any program for the control of deafness. The objective of this paediatric tertiary health care study is to find the status of the childhood deafness in present time and may suggest ways of prevention of childhood deafness and speech delay in the national program. Screening is a very useful and important tool as by only simple screening hearing loss in neonates and infants, can be identified earlier than its usual time of diagnosis. Neonates and infants are not routinely screened for any specific disease in India because of the pressing need to control the infectious causes and deaths due to it. Though, India as a country has been successful in lowering mortality rates, the burden of disability has not come down, in fact, it has risen down the years. Many disabilities can be avoided if we have a proper screening programs as every individual has a right to lead a healthy life. Communication disorder like hearing impairment affects very early part of life. Only through systematic early detection program, infants with hearing loss can be assured of a chance to develop their full potential to have their well deserving active, contributing, and integrated social life. For their sake and ours, we cannot afford to waste any more precious human resources. Regardless of the age of onset, all children with hearing loss require prompt identification and intervention by appropriate professionals.

WHO estimates that about 60% of hearing loss in children under 15 years of age is preventable. In developing countries like ours, children with impaired hearing or deafness rarely receive any schooling. Such children when reach adulthood, because of their hearing loss and speech disorder, they are subjected to higher unemployment rate. Among those who are employed, a higher percentage of people with hearing loss are in the lower grades of employment compared with the general workforce. Whatever may be reason of speech delay in school going children, whether it is SHNL or Mental retardation, or hyperactivity or attention deficit or poor language and language stimulation or brain damage, we should have enough resources to screen them to identify and treat them accordingly.

CONCLUSION

The current study where 5504 deaf children were screened in tertiary pediatric health care setup, only represented a tip of the iceberg of present pediatric deafness scenario. Highest number of deaf children (3328) were found in 0-3 years of age group. They suffered from profound and severe deafness. Among the major risk factors that were identified during the study in this group, the common were prematurity, LBW, HIE, neonatal jaundice and consanguineous marriage. While in 3-7 years and 7-12 years age groups, otitis media was seen to cause hearing loss more than the other etiologies. It was surprising to note from this study that congenital deafness was not detected in significant number of children in first 3 years or even worse in first 7 years of life. Because of non availability of proper screening measures at grass root health care delivery system and lack of concern of family members of young children, diagnosis was often delayed leading into non and delayed speech in these children. In all age groups, children with profound and severe deafness were devoid of normal speech and language development. Children with moderate hearing loss showed a promising speech development but that again was not up to the mark in comparison to normal hearing children. Even the children mild hearing loss showed speech defect and underperformance.

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We expend from our personal account.

Conflict of Interest

There is no conflict of interest from our side for this study.

ABBREVIATIONS:

1. WHO=World health organisation
2. NIDCD=National institute of deafness and communication disorder
3. SNHL=Sensorineural hearing loss (Snhl)
4. PTA= Pure tone audiometry
5. OAE=Oto acoustic emission
6. BERA = Brainstem evoked response audiometry
7. HIE= Hypoxic ischemic encephalopathy
8. LBW=Low birth weight
9. MADI=Maternal entenatal drug intake.
10. HSQ=Home screening questionnaire

11. NPPCD=National program for prevention and control of deafness
12. IQ=intelligent quotient.
13. NICU=Neonatal intensive care unit.
14. PICU=Pediatric intensive care unit.
15. LBW=Low birth weight.
16. HIE=Hypoxic ischemic encephalopathy.
17. CMV=Cytomegalovirus.

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