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RESEARCH ARTICLE

RISK FACTORS OF HEARING LOSS IN CHILDREN UNDER 10 YEARS OF AGE - A CLINICAL STUDY IN A TERTIARY CARE CENTRE

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Abstract

Background: Hearing impairment in children constitutes a particularly serious obstacle to their optimal development. Early detection of hearing impairment is vital since early intervention including hearing aids and speech therapy can be initiated at the earliest. The aim of the study was to determine the risk factors associated with children with hearing loss and to assess degree of hearing loss using BERA.

Materials and methods: 50 patients below 10 years of age attending ENT OPD with h/o hearing loss were taken for the study from January 2021 to January 2022 and were subjected to detailed history taking and clinical examination. Then the patients were subjected to BERA and the results were analysed.

Result: The most common risk factor for hearing loss in this study is h/o consanguinity (40%) followed by birth asphyxia(9%) and then hyperbilirubinemia(8%). The other risk factors include h/o ototoxic drug intake(5%), low birth weight(4%), h/o intracranial infections(3%) and family h/o congenital hearing loss(1 %)

Conclusion: Newborn screening is mandatory to identify hearing loss in the prelinguistic period to reduce the burden of handicap in the society. BERA should be carried out as a routine procedure to detect hearing impairment in high risk children and rehabilitative measures should be started as early as possible.

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Introduction:-

Hearing is the deepest, most humanizing philosophical sense man possesses. Sense of hearing is important during the early years of life for the development of speech, language and cognition. Losses in either partial or total hearing may lead to poor language and speech productivity. Hearing loss and deafness are global issues that affect at least 278 million people worldwide.

Hearing loss in infants should be recognized in time and appropriate otological and audiological interventions and rehabilitation should be instituted early to take advantage of the developing sensory system. So early detection of hearing loss in children and providing hearing devices help to develop speech, language and listening skills needed for oral communication.

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Hearing loss commonly goes undetected until it affects the child's communication in the form of speech and language. So in this study, children with severe hearing loss will be evaluated with the very sensitive tool called Brain Stem Evoked Response Audiometry and the risk factors associated with hearing loss are analysed. So that the high risk infants and children can be screened early thereby preventing the childhood handicap and the its burden in large developing countries like India, where there is a need to address this issue.

Methods:-

This cross-sectional study was conducted in the outpatient Department of ENT, Gadag Institute of Medical Sciences, Gadag comprising of 50 patients below 10 years of age with h/o hearing loss who comes to Department of ENT and Paediatrics, GIMS Gadag. The period of study was one year from January 2021 to January 2022. The consent was taken regarding participation in this study. A careful history was taken and full routine clinical examination carried out and points will be noted in proforma. After proper history and clinical examination patients will be subjected to BERA.

Past history of prolonged medical illness, ototoxic drug intake, seizure, meningitis, head trauma, fever with rashes, noise exposure has to be taken. Antenatal history like maternal health during pregnancy, previous history of abortion, maternal age, drug intake during pregnancy, radiation exposure, any illness will be asked. Perinatal history regarding term or pre term birth, mode of delivery, birth trauma, asphyxia, weight of child, cry at birth, neonatal intensive care unit admission, neonatal jaundice, seizure, congenital anomaly, immunization history will be asked. History of deafness in family members and relatives will be asked.

Inclusion Criteria

1. Children below 10 years of age
2. Children who born out of high risk pregnancy

Exclusion Criteria

Parents who refuse to give consent for BERA.

Results:-

Table 1:- Age wise distribution of patients.

Age group	No. of patients	% of patients
< 1yr	12	24
1-2yrs	2	4
3-4yrs	14	28
5-6yrs	10	20
7-8yrs	8	16
9-10yrs	6	12

Out of 50 patients with hearing loss majority of the patients (28%) were aged between 3 and 4 years, 24% were aged < 1year, 20% were aged between 5 and 6 years, 16% were aged between 7 and 8 years, 12% were aged between 9 and 10 years, 4% were aged between 1-2 years.

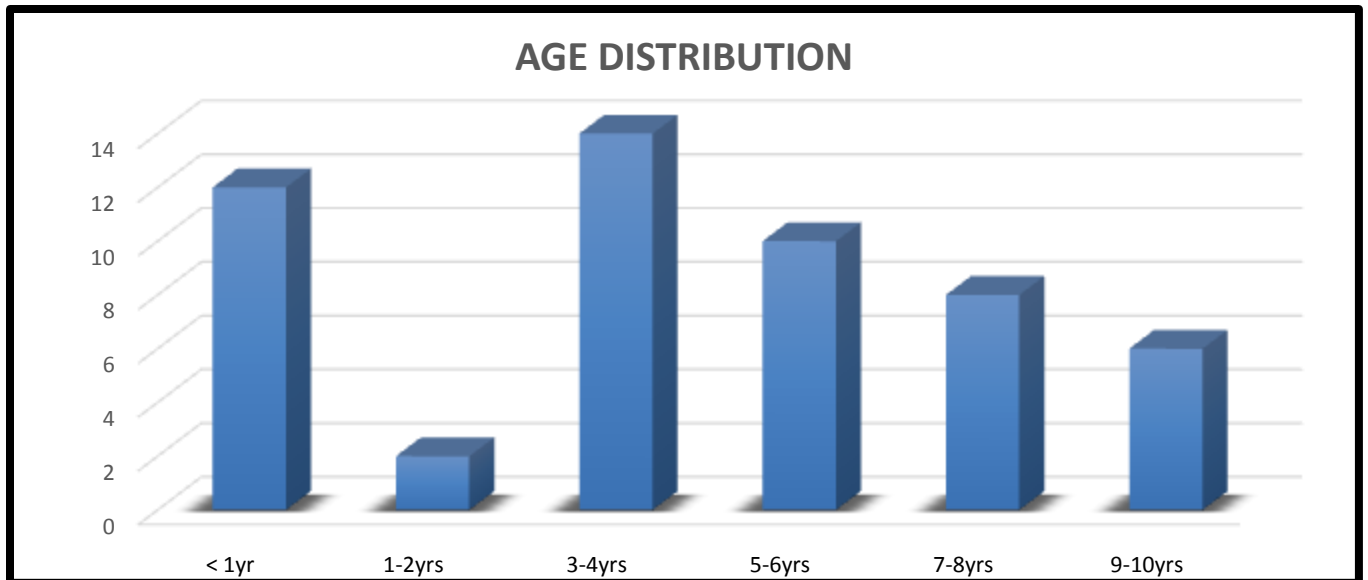


Figure 1:- Age Distribution of study population.

Table 2:- Gender wise distribution of patients.

Gender	No. of patients	% of patients
Male	28	56
Female	22	44
Total	50	100

In the study 56% were males and 44% were females

Table 3:- Risk factors in children.

Risk factors	No. of patients	% of patients
Consanguinity	20	40
Birth asphyxia	9	18
High bilirubin	8	16
Low birth weight	4	8
Ototoxic drug intake	5	10
H/O intracranial infections	3	6
F/H Congenital hearing loss	1	2

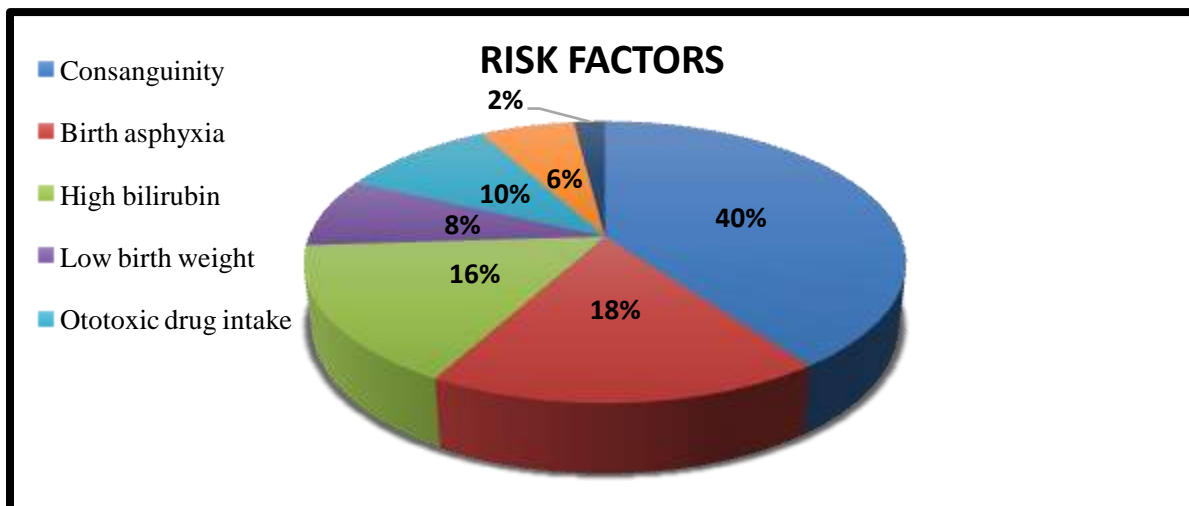


Figure 3:- Risk Factors in study population.

In this study 20% had h/o consanguinity, 9% had h/o birth asphyxia, 8% had h/o hyperbilirubinemia, 5% had h/o ototoxic drug intake, 4% had h/o low birth weight, 3% had h/o intracranial infections, 1% had family h/o congenital hearing loss

Table 4:- Distribution of cases according to degree of hearing loss.

Degree of hearing loss	<1 years of age	1-5 years of age	6-10 Years of age	Total(%)
Profound	3	8	7	18(36%)
Severe	1	6	8	15(30%)
Moderate	1	4	7	12(24%)
Mild	1	4	0	5(10%)
total	6	22	22	50(100)

In the present study, most of the patients are having profound hearing loss(36%), severe (30%), moderate(24%), mild(10%)

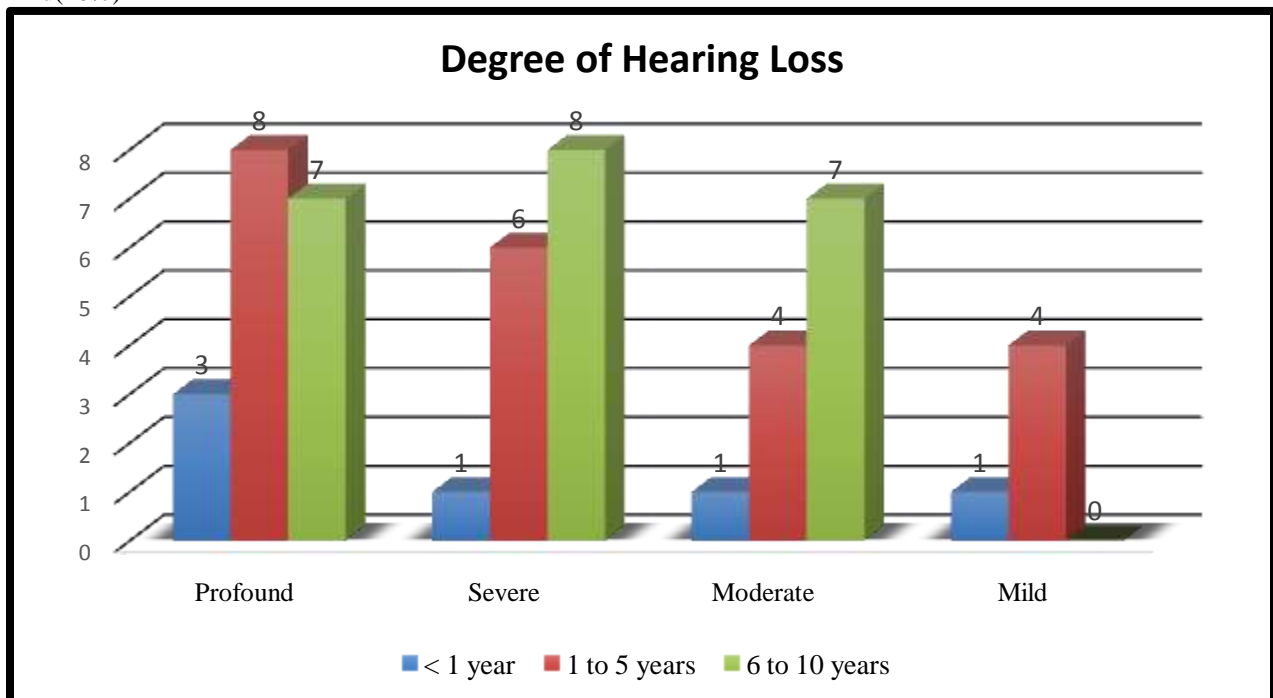


Figure 4:- Degree of hearing loss according to age.

Discussion:-

Early detection of hearing loss and intervention is very important for the development of normal speech and language. Interventions usually vary from sign language to cochlear implantation. In a study by Ramanathan, majority of children with hearing loss belong to age group 1-5 years. Most of the speech and language development occurs between this age group. Hence, early detection by screening the children with high risk factors is important for their early rehabilitation.

Brainstem evoked response audiometry although more time-consuming, is an accurate and reliable test for early detection of neural conduction abnormalities in the auditory pathway from the cochlea till the brainstem. The reported sensitivity of the BERA for hearing assessment was 100% and specificity around 86%.

Earlier perinatal causes like birth asphyxia, hyperbilirubinemia, intrauterine infections were on the rise but recently inherited causes are on the rise specially in developing countries like India. This is probably due to better treatment facilities and referral centres available. In our study the most common risk factor is shown to be consanguineous marriage. 40% of the children in our study were found to have it as a risk factor. This data is consistent with studies

by Ramanathanand Mallikarjunwhere inherited causes were on the rise. The couples tend to come from lower socioeconomic groups, they are mostly uneducated, traditionally religious and thus tend to get married early to their uncles and cousins. Health education is of prime importance to increase awareness of the detrimental health effects of consanguineous marriage. This indicates abnormality at the level of cochlear nucleus and brainstem due to inheritance of abnormal genes.

Next common risk factor in our study is birth asphyxia. Children with birth asphyxia were found to be 18% in our study out of 50 children. A study by Misra et al showing increase in the interpeak latencies of III-V and I-V which is conclusive of dysfunction in the peripheral process in children with h/o birth asphyxia.

In this study 16% of children having a history of raised bilirubin more than 20 mg/dl as per their medical reports. This indicates that raised bilirubin levels is an important risk factor for detecting hearing loss. This is similar to a study by Pramod Sharmaand by other authors in which there was statistically significant correlation in prolongation of latency and the interpeak latencies with serum bilirubin levels more than 25 mg%. In most infants with raised bilirubin levels the values reverted back to normal after treatment indicating that it is a reversible cause and prompt treatment is required. Follow up of infants with raised bilirubin levels having hearing loss is required.

Very low birth weight <1.5 kg was found to be only in 9% of the children. This is in accordance with a study by Anupriya showing low birth weight infants having a higher incidence of hearing loss than normal which can be attributed to many reasons like they are more likely to have suffered episodes of hypoxia, acidosis and hyperbilirubinemia.

A definitive conclusion cannot be made out regarding the outcome of the study but it does suggest that all high risk children will benefit from early detection of hearing loss and rehabilitation through BERA. No child is too young to get a hearing evaluation done. High risk children should be screened in hospital NICUs and immunization clinics particularly around 6 months of age or below one year for timely intervention to avoid delay in speech and language development. A National programme dedicated to detect early hearing loss would help reducing the burden of handicap by avoiding delay in intellectual development of the child. Since, high risk children are more susceptible to hearing loss they should be screened prior to discharge from the hospital using BERA. Brainstem evoked response audiometry though expensive is a safe and accurate procedure to ascertain whether the hearing loss can benefit through common rehabilitative measures like hearing aids or not. Infants with abnormal BERA recordings should be rescreened within 3 months and several times within the first year. If abnormal responses persists immediate intervention to develop speech and language should be undertaken.

Conclusion:-

Among the high risk factors, consanguineous marriage seems to be the most common factor causing hearing loss in children. This factor being a preventable cause as compared to others, incidence of hearing loss can be reduced by premarital genetic counselling and health education in lower socio-economic groups.

The next most common factor in the study is shown to be birth asphyxia. Incidence of hearing loss in children with raised bilirubin >20mg/dl was high. This is proven to be a reversible cause of hearing loss according to some studies. Therefore, early detection, treatment and follow up is very important in such children

BERA is a safe and effective outpatient procedure to be carried out.

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