

Invited Commentary

Early Detection and Management of Neonatal Hearing Loss; Its Relevance and Feasibility in Present Indian Health Scenario

Anjali Lepcha

Professor and Head, Dept of ENT, Unit 4 (Otology, Neurotology & Cochlear Implant)
Christian Medical College, Vellore, Tamil Nadu



Dr Anjali Lepcha is the Professor and Head of Department of ENT at Christian Medical College, Vellore. She has done clinical work and research in Audiovestibular diseases and Implant Otology with more than 30 research publications in both national and international peer reviewed journals. She is a mentor and thesis guide to undergraduate medical students/post graduates in ENT and post- doctoral fellows in the unit. She has been running the Post-doctoral fellowships in Implant Otology and Audiovestibular Diseases, both accredited with the Tamil Nadu Dr MGR Medical University, Chennai

Corresponding author : [Dr Anjali Lepcha \(anjalilepcha@gmail.com\)](mailto:anjalilepcha@gmail.com)

Chettinad Health City Medical Journal 2020; 9(3): 146 - 148

DOI: [https://doi.org/10.36503/chcmj9\(3\)-01](https://doi.org/10.36503/chcmj9(3)-01)

The prevalence of neonatal hearing loss is more than twice the number of other neonatal disorders that are amenable to screening. Other newborn disorders that are screened regularly at birth include congenital hypothyroidism, phenylketonuria, congenital heart defects and severe combined immunodeficiency syndrome Fig.1. There are no methods to screen for hearing loss in the antenatal period. In India, neonatal hearing loss is estimated to be around 5/1000 live births, much more than western estimates (1-3/1000). This may be due to lack of access to antenatal care, consanguineous marriages in some communities in India and prevalence of infections in early pregnancy that can lead to hearing loss in the neonate.

The late detection and therefore management of hearing loss in the infant results in poor language skills, academic delays, social and emotional problems and therefore inadequate integration into society.

The CDC (Center for Disease control and Prevention, USA) recommends detection of hearing

loss by 1 month of age, definitive diagnostic tests to be completed by 3 months of age and initiation of appropriate treatment by 6 months of age. Unfortunately, congenital hearing loss is almost always irreversible- exception being auditory neuropathy spectrum disorder (ANSD), a condition which may be reversible in certain cases. There is no medical treatment for this as of now and hearing aids/cochlear implants may be used for children with hearing loss.

The critical period of a child's language development is from birth up to 3 years. The earlier the hearing loss is treated the better the speech and language acquisition. A child who has bilateral profound hearing loss, fails to develop language and speech if treated inadequately. If a child does not acquire language (does not speak) up to 5 years of age, then his/her language skills may never match those of a normal hearing child even with proper intervention thereafter. A child with hearing loss has poor reading skills (poor vocabulary and syntax), forms shorter and simpler sentences than a normal hearing peer.

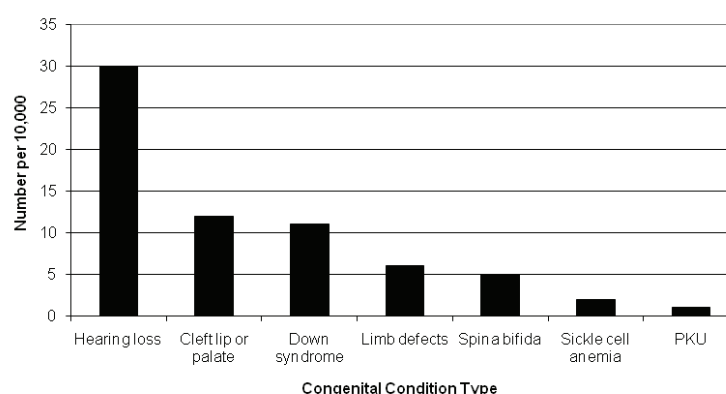


Figure 1: Graph showing congenital disorders and their incidence

The universal neonatal hearing screening or the early hearing detection and intervention (EHDI) programme is adopted in many developed and developing countries as recommended by the WHO. All newborn babies are screened for hearing loss and when diagnosed, managed appropriately and followed up. This programme followed the earlier high-risk neonatal hearing screening where only babies that were considered high risk for hearing problems were actively screened. These were babies in the neonatal intensive care unit or those with other risk factors for hearing loss. This selective high-risk infant screening can miss up to 50% of babies with hearing loss.

Early screening and detection of hearing loss has reduced the age of detection of hearing loss in developed countries from around 24 months when the child was evaluated for language delay, to 3 months. Following a detailed diagnostic audiological testing, fitting of hearing aids and cochlear implant surgery is now carried out at 5-6 months of age and before the first birthday respectively. This is not the situation in India where we still do not have a national universal neonatal hearing screening programme.

Screening for hearing loss can be performed by detecting otoacoustic emissions (OAE), or automated auditory brainstem responses (AABR) Fig.2. OAE is faster and cheaper, but has the drawback of missing out on a type of hearing disorder called ANSD. They can also give false positive results(15%) in case of noise and in the



Figure 2: Automated auditory brainstem responses (AABR) on a neonate

presence of vernix or debris in the ear canal. AABR is more expensive and time consuming when compared to OAE but it can detect ANSD and is also less affected by noise. Some countries follow a two-stage hearing screening, first screening by OAE followed by an AABR in those who fail the first screening.

Universal neonatal hearing programme is not yet developed and tested at a national level in India, though the National Programme for Control and Prevention of Deafness(NPPCD) (12th 5-year plan) outlines one of the objectives as early detection and prevention of deafness. There is also a plan outlined for high risk newborns to be referred at the district level for hearing screening using an OAE and other diagnostic tests. Implementation of these plans however, is far from satisfactory in most parts of the country. Various medical colleges, private ENT and Hearing & speech centers have begun neonatal hearing screening at their centers, offering counselling and intervention like fitting of hearing aids and cochlear implant surgery for deafness. Kerala may be the only state which has a robust, universal programme for neonatal hearing loss detection and intervention. This was mainly spearheaded by pediatricians when it started in 2006.

At Christian Medical College, Vellore, the relevance of neonatal hearing screening programme was recognized and the screening of high-risk neonates in neonatal ICU was started in 2005. In 2010, with the help of an ICMR grant a universal hospital based neonatal hearing screening programme was established. The feasibility of running it was studied in our center which has around 50-60 deliveries per day. In 2011, this was expanded as a service and now we have over 97% coverage of all deliveries with the help of 4 dedicated neonatal hearing technicians who work all days in shifts, going to 9 wards Fig. 3. We use an AABR called BERAPHONE which gives a PASS/REFER report. The second screening for



Figure 3: AABR in the post-natal ward within 24 hours of birth



Figure 4: Auditory verbal therapy in children post cochlear implant

those ears that are referred are done within a week and the third screening is done at 1 month of age after consultation with a trained ENT surgeon who takes a detailed history and examines the baby. If the baby is referred for a third time then a diagnostic auditory brainstem response audiometry is ordered. Hearing aid fitting is completed by 6 months of age and a cochlear implant surgery is done ideally by 1 year of age for an infant with bilateral profound deafness. Repeated calls and fast tracking of these babies are made to avoid loss to follow up.

The cost of a cochlear implant surgery in India is around Rs. 5 to 15 lakhs for a single ear. There is also the added financial burden of replacing accessories and parts subsequently. The child also needs to undergo a targeted auditory verbal therapy at recognized centers for a few years after the implant surgery till good speech and language development occurs Fig.4. All this is beyond the means of most families, as private insurance companies in India do not cover cochlear implants. There are several states that have government insurance schemes that cover the cost of the implant, surgery and speech therapy for enrolled families. In Tamil Nadu we have the Tamil Nadu Chief Ministers' comprehensive health insurance scheme (TNCMCHIS) that helps cover the cost of implants in profoundly deaf children below 5 years of age. The central government has the Assistance to Disabled persons for purchasing / fitting of aids / appliances (ADIP) scheme which covers for cochlear implant surgeries in select centers.

It is not only diagnosing hearing loss, but the counselling of parents, involvement of other specialists like developmental pediatrics, medical genetics, general pediatrics and ophthalmology which are also important in the management of such infants. Hearing aids should be provided wherever indicated and cochlear implant surgery done for profound hearing loss. Following specific intervention, the child needs aggressive auditory verbal therapy and close follow up; the goal being normal speech and language development and a smooth integration of the child in school and eventually in society.

References

1. www.cmchistn.com
2. A model of two-stage newborn hearing screening with automated auditory brainstem response. Iwasaki S, Hayashi Y, Seki A et al, International Journal of Pediatric Otorhinolaryngology (2003) 67, 1099/1104
3. National Programme for Prevention and Control of Deafness (NPPCD), Operational Guidelines for 12th Five Year Plan, Ministry of Health & Family Welfare Government of India
4. Automated auditory brainstem response: Its efficacy as a screening tool for neonatal hearing screening in the postnatal ward. Rajkumar C, Augustine AM, Lepcha A, Balraj A. Indian J Otol 2016;22:237-42
5. Neonatal Hearing Screening – Experience from a Tertiary Care Hospital in Southern India. Augustine AM, Jana AK, Kuruvilla AK et al, Indian Pediatr 2014;51: 179-183