

Neonatal hearing screening, need of the hour in India, a secondary hospital experience

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Abstract: Hearing loss is a devastating condition, lack of hearing leads to lack of development of higher functions. Detecting loss early enough can prevent the social and financial burden to the society. This study is designed to look at formulating and executing a feasible protocol for screening that can be used as a model to smaller hospitals and remote areas. Easily and effectively screenable test of DPOAE is used in this study. Every born child is subjected to non invasive screening process and re screening depending on the results. A descriptive study conducted from July 2015 to December 2017 screening 2092 neonates who were born were screened for hearing loss, a total number of 136 were detected to have hearing loss and needed further evaluation, we also had 54 neonates lost to follow up.

Key words: neonatal screening, OAE.

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I. Introduction

Hearing loss is one of the silent debilitator in every society. Loss of hearing is considered as sign of reduced intelligence. Neonatal hearing screening is our institutional policy and every baby born here is screened for hearing before they are discharged. There are numerous risk factors that may have causal association with neonatal deafness. It is well established that hearing loss in children leads to inadequate social, intellectual and emotional growth. Their optimal capacity or intellectual functionality of an individual is not attained due to this. Social acceptance of the individual is not optimum with hearing impairment. Hearing screening is mandatory in western world as protocol from 1999. The screening programmes which can detect hearing loss prior to 6 months of age and initiation of treatment before 1 year of life can give normal life to the child; however it will limit the disability and improve social acceptance. The screening programmes in place are not able to prevent the development of disability. There are identifiable established risks to the fetus in literature. They are from ante nate infections like maternal rubella, herpes zoster, cytomegalovirus infections being the major ones. Syndromes like Penred, Alport's, Hurler and Kippel fiel are proven syndromes with hearing loss. Gene mutation like GJB2, ECHOS1, PDS gene mutations are currently established causes for congenital and childhood onset hearing loss. As the incidence of congenital hearing loss is only upto 1 to 5 per 1000 live births, there should be continuous vigil and scrutiny of data for the benefit of future generations to come. So it is our social responsibility to carry forward this research.

Distortion product otoacoustic emission (DPOAE) is currently accepted, physiological and non invasive method of assessing hearing. distortion product is produced by merging two frequencies whose ration is between 1.1 to 1.3. the frequencies employed is called F1 and F2 and the intensities L1 and L2. Clinically used is cubic distortion product which is 2F1-F2. protocol of unequal intensities L1>L2 is better for identifying hearing defect. Sound to noise ratio (SNR) reduction causes, less reliable results in F2 of 1 khz and responses in 2 khz 3 khz and 4 khz are usually robust in neonates. Even though the protocol has been there for many years in India, there aren't enough published data for the country.

It is seen in different studies over time, that the incidence of hearing loss in 1000 live births is 1 to 5 for bilateral hearing impairment and 1 to 8 per 1000 for unilateral affection. The current burden of hearing loss is seen in the National sample survey office (NSSO) survey in 2002 that 6.3% of Indians suffered from significant hearing loss; of which majority were in rural area than urban. In pilot project of NPPCD (National program for prevention and control of deafness) screening program was started in 2006 and now it is expanded to 200 districts but yet to cover the whole country. In various studies for detection of hearing impairment, it was found to range from as high as 1% to low as 0.047%.

Listing an analysis of the studies done in India so far, shows the massive void in data about neonatal hearing loss and its possible causes.

II. Material And Methods

This prospective comparative study was carried out on patients of Department of Neonatology and ENT at Believers Church Medical College hospital, Thiruvalla, Kerala, from July 2014 to December 2017. A total 2092 neonates were screened in this study

Study Design: Prospective open label observational study

Study Location: This was a secondary care teaching hospital based study done in Department of Believers Church Medical College hospital, Thiruvalla, Kerala

Study Duration: July 2014 to December 2017.

Sample size: 2092 patients.

Subjects & screening method:

- 1) All new born babies would have been examined by both physical examination and OtoAcoustic Emission screener at bedside.
- 2) If the child had failed to pass the test in either of the ear, tests would have been repeated in audiology room (soundproof).
- 3) A failed test would have been repeated at 3 months of age.
- 4) Medical records of all babies born and mothers in this hospital whose screening was failed for hearing loss are reviewed.
- 5) if the repeat test is also failed, then the child is referred for BAER/ ASSR.

Statistical analysis

Data was analyzed using microsoft excel

III. Results

Every baby born in our institution are screened for hearing loss before their discharge, as it is our institutional policy. A total of 2092 neonates born between July 2015 to December 2017, were screened for hearing deficits. Out of these 2092, 1078 were male (51.52%), 1013 were female (48.42%) and 1 was transgender. The gender distribution is depicted as in the figure 1

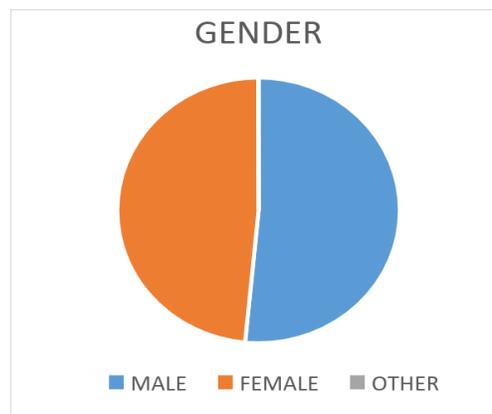


Fig: 1

FIRST SCREENING RESULT

During the First screening, 222 neonates (10.6%) failed the test, out of which 122 were male (54.96%) and the rest 100 were female (45.04%). Unilateral hearing loss was noted in 157 babies (7.5% in total of 2092 and 70.72% out of 222) and 65 infants had bilateral hearing loss (3.1% in a total of 2092 and 29.28% out of 222). Left sided hearing deficit was noted in 58 neonates(26.13%) and right sided hearing loss was noted 99 neonates(44.59) and 65 neonates were found to have bilateral hearing deficit (29.28%)- out of which 41 were male and 24 were female.

Year	Number			Refer	Category					
	Total	Male	Female		Left		Right		Bilateral	
2015	30	14	16	1	0		0		1	
2016	1111	565	546	45	10		18		17	
					M - 4	F-6	M - 11	F-7	M - 10	F - 7
2017	944	499	451 Trans - 1	177	48		81		48	
					M - 2 5	F-23	M - 41	F-40	M - 31	F-17
TOTAL	2092	1078	1013 + 1	222	58		99		65	
					M - 29	F - 2 9	M - 52	F - 4 7	M - 41	F - 24

Table: 1

All the 222 neonates who were referred after the first screening were asked to come for the second screening after 3 months. Among the 222 babies, only 168 came for follow up screening (75.68%). Remaining 54 neonates lost follow up (24.32%) despite sending repeated reminders to the families. Among the 168 babies who underwent confirmatory screening, 136 were confirmed to have hearing loss (80.95). Unilateral hearing loss was seen in 113 neonates and 55 babies were confirmed to have bilateral hearing deficit.

SECOND SCREENING RESULTS:

Total Number- 168		Lost follow up - 54	
No: of neonates with confirmed hearing loss- 136			
Unilateral :113		Bilateral:55	
Left : 35	Right:78		
Male :19 Female:16	Male :43 Female:35	Male :38 Female: 17	

Table: 2

Fig: 2 (flow chart of methodology)

Thus among the 2092 babies screened, 136 were confirmed to have hearing deficits (6.5%) – 113 babies with unilateral hearing loss (5.4%) and 55 babies with bilateral hearing loss(2.6%).

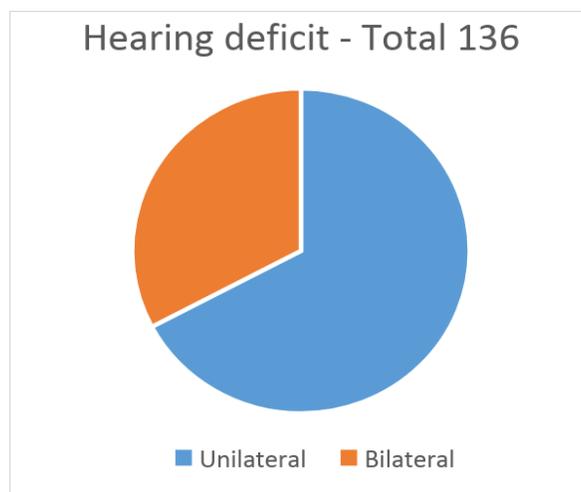


Fig: 2 (hearing deficit unilateral and bilateral distribution)

IV. Discussion

Hearing loss of a child is only established or suspected only with delay in development of milestones of communication. It was considered adequate hearing by startle reflex is adequate for hearing and is discouraged by elders to go forward with further assessment for hearing, however, when the milestones are delayed, due to neural plasticity, the faculty of hearing is lost permanently, either fully or partially. In some cases of delayed detection, it is sometimes picked up from the school as poor scholastic performer. Based on numerous studies that demonstrated early intervention in hearing impaired children leads to normal development⁷, Universal screening program was started by WHO¹⁵.

In India the penetration of universal screening program is not widespread. Looking at the publications in this field till now shows the paucity of data in the same². Even though the right is guaranteed by people with disabilities act, lack of awareness in public about the hearing screening program and its necessity is not highlighted enough. An early detection will enable a more multidisciplinary family centered approach to the problem.

In a secondary level hospital in Kerala, setting up a protocol and implementation is needed to bring forward the early identification and thereby helping the family as a whole. OAE is an established screening method for cochlear function, which is a portable device that can be taken to the bedside of the newborn and examined. Once the protocol is established, periodic entry is made to the register and maintenance of register is done by the audiologist or a trained person. Once the initial screening is started and identified the child has to be under the care of an ENT/ Pediatric person, who is part of the team for hearing screening.

Delay in testing for confirmation is a difficult as such facilities are not very common and patients may be lost to followup.

V. Conclusion

The time of hour is to educate and inculcate the screening program to each and every hospitals in the country. Our study showed 2.6% newborns having hearing loss, which is higher than the other studies, which can be seen as rising trend, however it needs to be established by continuing the study for a longer period.

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