

NEONATAL HEARING SCREENING IN A NICU – A RURAL MEDICAL COLLEGE EXPERIENCE

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ABSTRACT: OBJECTIVE: To determine the incidence of Auditory impairment in the population of New born infants in a Neonatal intensive Care unit of a Tertiary Care centre using Oto-Acoustic Emissions. **METHODS:** 648 Newborn infants admitted to NICU in paediatric dept between June 2011 to May 2012 were taken as subjects for the study. OAE testing was done using a Portable OAE device. Each ear was tested separately and interpreted as Pass/Fail depending on the OAE response. **RESULTS:** Out of 648 infants 613 infants passed the OAE test after the second screening which takes the sensitivity of the test to 94.59%. Out of the 82 infants who failed the test, 22(26.8%) were preterm with Hyperbilirubinemia, 14(17.07%) were preterm with respiratory distress, 17 (20.73%) were preterm only and 29(35.36%) were term babies. **CONCLUSION:** Transient Otoacoustic Emissions are a very quick and Noninvasive technique, and suitable for hearing screening in infants. Two-stage screening for hearing improved identification of newborns with hearing loss in a cost effective manner.

KEY WORDS: TOAE, Neonatal screening

INTRODUCTION : Bilateral permanent childhood hearing impairment is an important health problem because of its adverse effect on a child's language and communication skills, social and emotional development and educational achievement.¹ The prevalence of Bilateral permanent childhood hearing impairment of moderate or greater degrees is about 1.2 per 1,000 live births.² The majority of hearing loss is present at birth.² It is believed that the first six months of life is the critical period for language skill acquisition.⁴ Initial evidence, which shows that identification and habituation prior to the age of 6 months improves language and communication,⁵ has to be to be further substantiated by good quality studies.¹

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MATERIAL AND METHODS: 648 Newborn infants admitted to NICU in paediatric dept from June 2011 to May 2012 were taken as subjects for the study. OAE testing was done using a Portable OAE device. Each ear was tested separately and interpreted as Pass/Fail depending on the OAE response. Infants who failed the initial test were called for follow up to repeat testing for the second time within 3 months. Infants who failed second test were referred for detailed Audiological evaluation.

RESULTS: 648 high risk infants were screened at the NICU, out of which 370 (57%) infants were male and 278 (43%) were females. 525(81%) infants were born Preterm with LBW, 29(4.5%) infants were preterm with Hyperbilirubinemia, 23(3.5%) babies had respiratory distress and remaining 71(11%) were term babies with high risk.

566(87.3%) infants passed the test in the first visit (refer Table 1) and 82(12.7%) babies failed to respond to OAE screening who were given a date for follow up within the next 3 months.

Out of the 82 infants who failed the test, 22(26.8%) were preterm with Hyperbilirubinemia, 14(17.07%) were preterm with respiratory distress, 17(20.73%) were preterm only and 29(35.36%) were term babies.

In 82 infants about 56(68.29%) turned up for second visit of which 47% (57.31%) passed the test and 9 (10.9%) infants did not respond and they were referred for further Audiological evaluation. 26(31.70%) infants were lost in the follow up for second visit.

So, out of 648 infants 613 infants passed the OAE test after the second screening which takes the sensitivity of the test to 94.59%.

DISCUSSION: With the advent of easy-to-use electro-physiological screening methods like otoacoustic emission (OAE) and auditory brainstem response, hearing status of very young, or even newborn babies, can be predicted accurately. These neonatal hearing screening tests have higher sensitivity and specificity than infant Distraction Test.⁹ OAEs are sounds generated by outer hair cells housed in the cochlea and can be measured in the external ear canal. Detection of OAEs can be hampered by obstructions in the external ear canal and middle ear. Detectable OAEs, therefore, reflect normal function of the auditory pathway as far as the level of the outer hair cells of the cochlea. This technology can be used to detect sensory hearing loss but not retro-cochlear neural dysfunctions.¹⁰ The technology of OAE has been found to be an effective tool in universal newborn hearing screening.¹¹ Since the 1990s, using OAE as newborn hearing screening has become popular in Europe and USA, mainly in birthing hospitals. To date, more than half of the states in the USA have legislation mandating universal hearing screening as a public health programme.¹²

Limitations of OAE Screening

When applied to the newborn, the OAE technique has two major limitations. Firstly, it assesses the hearing pathway as far as the cochlea and any retro-cochlear pathology will be missed. However, retro-cochlear pathologies are expected to be rare in the low-risk babies and therefore the benefit of early detection is uncertain. We therefore consider the OAE technique adequate for routine use in population.

It is well documented that OAE testing has a high false positive rate (up to 15.6%) in the first 24 hours of life, falling to about 4% by 72 hours.^{5,6} Although some of this is related to middle ear effusion and debris in the external ear canal, it may also be related to neurological immaturity.

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CONCLUSION: Transient Otoacoustic Emissions are a very quick and Noninvasive technique, and suitable for hearing screening in infants. Two-stage screening for hearing improved identification of newborns with hearing loss in a cost effective manner.

OAE test is an objective, valid and easy-to-use hearing screening tool. It can be performed by enrolled nurses after brief training. This study showed that hearing screening by OAE yielded better results in terms of lower repeat and refers rates as well as a higher yield of the target condition.

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Table: 1

TEST	No of infants	Percentage
PASS	566	87.3%
FAIL	82	12.7%

Table: 2

Condition	No of infants	Percentage
Preterm with Hyperbilirubinemia	22	26.8%
Preterm with Respiratory distress	14	17.07%
Preterm/LBW	17	20.73%
Term	29	35.36%