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Original Research Article

A Comparative Study Of Hearing Screening Using Otoacoustic Emissions In Newborns Delivered By Normal Vaginal Route And By LSCS (Lower Segment Cesarian Section).

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Abstract: The present study was undertaken to assess the prevalence of congenital hearing loss in neonates born at SSG Hospital Vadodara using otoacoustic emissions. The present study was prospective observational study, which was carried out in the Department of Otorhinolaryngology and Head-Neck Surgery, Medical College and S.S.G Hospital, Baroda from December 2014 to December 2016. Informed written consent about study was taken from either parent of each newborn before enrolling them in to study. Neonates were selected by simple random sampling. Primary data was collected by conducting DPOAE and BERA tests. Total 709 Newborn babies were included in this study. These 709Newborn babies were subjected to 2 stages DPOAE (Distortion Product Otoacoustic Emissions).Newborn babies were subjected to 1st DPOAE screening within first week of life. While those Newborn babies who were admitted in NICU for more than 5 days were examined after being discharged from NICU. For those babies who pass 1st DPOAE, no further testing was done. For those babies who refer 1st DPOAE, repeat DPOAE testing was done after 15 days, failing which such newborn baby was subjected to BERA (Brainstem Evoked Response Audiometry testing to confirm hearing loss). The results were obtained by simple mathematical methods of comparison. The study revealed that Out of 709 newborns, 690 newborns were passed 1st OAE test and 19 newborns were refer the 1st OAE test. Amongst these 19 newborns 16 were delivered normally while 3 were delivered through LSCS. Out of 19 newborns that were refer the 1st OAE test, 17 were passed 2nd OAE test and 2 newborns were refer. Amongst these 2 newborns, 1 was delivered normally while another one was delivered through LSCS mode. Out of 2 newborns that were refer the 2nd OAE test, 1 newborn was found bilateral hearing loss by the BERA test & was delivered through LSCS.
Keywords: Distortion product otoacoustic emission (DPOAE), Newborn Hearing Screening, Otoacoustic Emissions (OAE)

INTRODUCTION:

Congenital hearing loss has recently been recognized as one of the most common birth defect present in newborns, with a prevalence of permanent hearing loss ranging from 2-3/1000 live births[1].The reported prevalence of permanent bilateral hearing loss identified by newborn hearing screening programs was1.61/1000 of at-risk infants in India, & 1.83/1000 in USA (Washington DC)[2].

Congenital Cholesteatoma, Ossicular discontinuity, fluid in the middle ear are causes for congenital conductive Hearing Loss**.** Sensor neural hearing loss is divided into Non syndromic Sensor neural Hearing Loss and Syndromic Sensor neural Hearing Loss. Two third of the congenital hearing loss are non syndromic. Non syndromic SNHL is further classified by the mode of inheritance. Rare modes of transmission include X-linked and mitochondrial transmission, which account for the remaining 2% of hearing impairment.

Alford's syndrome Branchio-oto-renal syndrome, Jervell and Lange-Nielsen syndrome, Pendred's syndrome, Stickler's syndrome, Teacher Collins, Usher' syndrome, Warrensburg's syndrome, &

Congenital Rubella Syndrome are causes of Syndromic Sensor neural Hearing Loss.

Prenatally acquired causes for hearing loss include Hyper bilirubinemia, Ototoxic Drug Usage, Meningitis, Hypoxic Encephalopathy, Sepsis, Head Trauma, Mechanical Ventilation and Extra Corporal Membrane Oxygenation[3].

JCIH recommended that the hearing of all infants should be screened at no later than 1 *month of age*, those that do not pass screening should have a comprehensive audio logical evaluation at no later than *3 months of age. They had also recommended that* Infants with confirmed hearing loss should receive appropriate intervention latest by *6 months of age.* Regardless of previous hearing-screening outcomes, all infants with or without risk factors should receive ongoing surveillance of communicative development beginning at 2 months of age during well-child visits in the medical home[4,5,6].

METHODOLOGY:

The present study was prospective observational study, which was carried out in the Department of Otorhino laryngology and Head-Neck Surgery, Medical College and S.S.G Hospital, Baroda from December 2014 to December 2016. Approval from Scientific and Ethical Research Committee, Medical College Vadodara was taken and informed written consent about study was taken from either parent of each newborn before enrolling them in to study. All parents were provided information about disease, treatment modalities, and importance of regular follow up in their local language. Total of 336 Newborn babies were included in our study which is source of Primary data. The method of selection was stratified random sampling.

Inclusion criteria:

1. Babies who, delivered in S.S.G. Hospital and required intensive care management were included in the study during the acute phase. They were included after stabilization or before discharge.
2. Babies whose parents gave written and informed consent.

Procedure of the test:

Intramural High Risk New-borns were identified using simple random sampling.

The parents were counseled regarding congenital hearing loss and the need for early diagnosis and intervention prior to the test.

Written informed consent was obtained from the parents.

The babies underwent a routine ENT examination consisting of inspection of the pre-aural, pinna, and post aural region.

Occluding wax or debris were gently cleaned using cotton tipped swab and otoscopic examination of the tympanic membrane was conducted using Heine 3000 series otoscope with plastic speculums and findings were noted in predesigned proforma containing newborn's details (gestational age, birth weight, date of birth, Duration of labour, Presentation, Mode of delivery, APGAR Score, Me conium aspiration, NICU Admission, Post Natal infections, CNS Diseases, Hyper bilirubinemia, Birth Trauma) as well as mother's details (H/O anaemia, Diabetes Mellitus, Thyroid Dysfunction, HIV, VDRL, TORCH, PIH, Hydramnios, Chorioamnionitis).

2 stage OAE done on the newborns with 2, 3, 4, and 6 kHz frequency in both ears.
Newborns who refer 1st OAE in any ear were examined for 2nd OAE in both ear.
Newborns who refer 2nd OAE were examined for BERA.

Testing environment

The babies were then tested in a sound treated room in the audiology department.
The babies were tested in a supine position, preferably on the guardian's lap and preferably when the child was asleep. The test was conducted by a qualified audiologist.

Instrumentation:

The machine used for this test was of Otodynamics Company with model DPECO Port and software containing ILO292USB. The software was connected to a computer for data collection and data analysis.

Sequence of the testing:

The first test was done using distortion product otoacoustic emissions. The probe was fitted with a standardized infant ear tip kit. These probes are made of soft rubber.

The ear tip was gently inserted into the right ear by a gentle traction on the pinna in a backward and downward direction. Once the probe tip was in place the test was started. First the probe fit and seal was checked followed by any extrinsic noise levels in a systematic computerized manner preloaded in the software.

Procedure:

The test was carried out in a sound treated room (Audiology Room, Ward 19, Department of Otorhino laryngology and Head & Neck Surgery). The baby was observed for a short period prior to the presentation of the stimulus. All the newborns were checked with DPOAE. Those newborns that responded favorably to DPOAE testing were labeled as normal hearers but those who failed, underwent a 2nd DPOAE testing after 15 days. New borns that responded positively to 2nd DPOAE testing were labeled as normal hearers. Those babies who failed a second DPOAE underwent confirmative BERA test. All results were recorded in proforma and were analyzed.

STUDY RESULTS AND DISCUSSION:

In this study male 376 (53.03%)and female 333 (46.97%)gender distribution was almost equal.

In this study most of the newborns (66.99 %) were having weight between 2 to 3 kg followed by 1 to 2 kg (16.93%), 3 to 4 kg (15.51%) and 0 to 1 kg as well as 4 to 5 kg (0.28%).

In this study most of the newborns (80.54%) were having full term gestation.

In this study most common high risk factor (42.26%) was low birth weight (<2.5 kg) followed by (30.05 %) low birth weight along with preterm delivery followed by others (i.e. Maternal Anemia, Maternal Thyroid Dysfunction, Maternal PIH, Maternal Hydramnios, CPD, Maternal Hydramnios, Maternal HIV , Maternal Herpes ,cervical polyp, Me conium Aspiration, Neonatal Hyper bilirubinemia, Neonatal Respiratory Distress, Neonatal Phylogenic Meningitis).

In this study difference between modes of deliveries, High Risk Factors (224 normal & 112 LSCS) and Non High Risk factors (205 normal & 168 LSCS), is insignificant.

Out of 709 newborns, 690 newborns were passed 1st OAE test and 19 newborns were refer the 1st OAE test.

Out of 19 newborns that were refer the 1st OAE test, 17 were passed 2nd OAE test and 2 newborns were refer.

Out of 2 newborns that were refer the 2nd OAE test, 1 newborn was found bilateral hearing loss by the BERA test.

Out of 19 newborns that were refer the 1st OAE test, 16 were delivered by normal vaginal delivery & 3 were delivered through LSCS.

Out of 2 newborns that were refer the 2nd OAE test,1 was delivered by normal vaginal delivery & remaining one by LSCS.

A Newborn that found bilateral hearing loss by the BERA test was delivered by LSCS.

CONCLUSION:

Out of study population of 709 newborns 1 was detected and confirmed for congenital hearing loss. It was also found that the prevalance of congenital hearing loss is more in newborns delivered by LSCS.

To conclude, it is necessary to secure holistic development of the child by detecting hearing loss at birth and providing remedial measures at the earliest. In developing country like India, atleast the newborns who delivered through LSCS should be assessed for congenital hearing loss.

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