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PREVALENCE OF HEARING IMPAIRMENT IN HIGH RISK NEWBORN BABIES ADMITTED TO A SEMI URBAN TERTIARY CARE CENTER IN KERALA

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ABSTRACT

INTRODUCTION: Significant hearing loss if undetected at birth, it will impede speech, language and cognitive development. It is important to monitor hearing loss in high risk patients in Neonatal ICU.
AIM: To know the prevalence of hearing impairment in high risk newborns admitted in the Newborn ICU in a tertiary care centre in Kerala.
MATERIALS AND METHOD: Clinical cross sectional study ,conducted in Department of Otorhinolaryngology and in new born intensive care unit (NBICU) of Government Medical College Hospital, Thrissur, from July 2014 to June 2016. 350 High risk babies were studied. The demographic data and detailed clinical history were also collected.
Infants were screened with Oto Acoustic Emissions(OAE). Retest with OAE was done for infants with refer OAE result after one month. Babies whose result was refer again , had undergone BERA(Brainstem Evoked Response Audiometry) diagnostic test 1 month later. Datas' were coded and entered in MS Excel and analyzed using Epi info7 software.
RESULTS: The prevalence of Permanent Childhood Hearing Impairement (PCHI) with hearing loss exceeding 40dB in our study is 1.8%.
DISCUSSION: The prevalence of hearing impairment in high risk new borns it is 2-4% by previous studies. Our results paralleled with previous studies. Among the risk factors, hyperbilirubinemia and antenatal infections were found to have a strong association.
CONCLUSION: In our study,1.8% had hearing impairment. Hence, there is an urgent need to incorporate universal neonatal hearing screening in all the neonatal health care facilities in India.

KEYWORDS

hearing impairment, high risk newborn , Oto Acoustic Emission, BERA

INTRODUCTION

Hearing is one of the most important senses, as it serves as the basis of communication and is the first step towards learning a language. Significant hearing loss if undetected at birth will impede speech, language and cognitive development.The most critical period of language development is between 0 to 3 years[1].

Hearing loss in infants if gone undetected, the lack of stimulation will damage and prevent the proper development of the central auditory nervous system. Ideally, the diagnosis of hearing impairment by 3rd month and auditory intervention should begin before six months of age depending upon the diagnosis.It is an established fact that if hearing loss is present it should be detected and remediated before the age of 6 months.[2,3].

Significant bilateral hearing loss is present in 1 to 3 per 1000 newborn infants in the well baby nursery population and in 2 to 4 per 100 infants in the intensive care unit(ICU) population [4,5].It is important to monitor hearing loss in high risk patients in Neonatal ICU.

Oto acoustic Emission (OAE) which measures sounds generated by the cochlear outer hair cells, and Brainstem Evoked Response Audiometry (BERA) is, an electro physiological test procedure which studies the electric potential generated at the various levels of the auditory system starting from cochlea to cortex; are the diagnostic auditory assessments in infant hearing screening[6]

AIM:

The aim of this study is to know the prevalence of hearing impairment in high risk newborns admitted in the Newborn ICU in a tertiary care centre in Kerala.

MATERIALS AND METHOD

This clinical cross sectional study was conducted in Department of Otorhinolaryngology and new born intensive care unit (NBICU) of Department of Pediatrics in Government Medical College Hospital, Thrissur, from July 2014 to June 2016. Using the formula $z\alpha^2 xpq/d^2$, sample size was calculated as 350 infants.

Inclusion Criteria

High risk babies admitted to NBICU like those with craniofacial abnormalities, low birth weight, preterm, low APGAR score and in ventilator, hyperbilirubinemia, family history of hearing loss, babies with intra uterine infections with Rubella, Cytomegalovirus, Syphilis, Toxoplasma, and babies with other stigmata/syndromes associated with hearing loss.

Exclusion Criteria

Low risk babies and babies with parents not giving consent for the study were excluded.

METHODOLOGY AND DATA ANALYSIS

All the parents were explained and participated to collect the demographic data and detailed clinical history on a predesigned proforma. General, systemic and ENT examination findings also recorded.

Infants were screened with Oto Acoustic Emissions(OAE). Retest with OAE was done for infants with refer OAE result after one month. Babies whose result was refer again , had undergone BERA(Brainstem Evoked Response Audiometry) diagnostic test 1 month later. Babies with absent wave 5 at 40 dB taken as refer were referred for evaluation and proper intervention. Parents of infants with normal OAE test were asked to observe them for any delayed onset of hearing loss.

Datas' were coded and entered in MS Excel and analyzed using Epi info7 software and variables association were analyzed using proportion and chi-square test , p value significant when <0.05.

OBSERVATIONS AND RESULTS:

Out of 380 children included in our study 27 lost follow up and 3 were died.

Table.1. Age Distribution

Age of Baby	Frequency	Percent
0-7 days	117	33.43%
8-14 days	99	28.29%
15-21 days	82	23.43%
22-28 days	52	14.86%
TOTAL	350	100%

Among 350 infants, 54% were males and 46% were females. 2% had family history of SNHL and 2.29% were with craniofacial anomaly. 56% had very low birth weight (< 1500g) and 43.7% infants were born before 37 weeks. 10% babies had hyperbilirubinemia (bilirubin level >14mg/dl).

During ICU stay, 77.43% were administered ototoxic drugs like Amikacin/Gentamicin for life saving purpose. 25.1% had APGAR score <4 at 1 minute (Severe Asphyxia).22.86% were ventilated for more than 5 days. 1.14% babies suffered bacterial meningitis and 2.29% had syndromes associated with hearing loss. 6.9% had hypoglycemia. 10.3% were born in multiple pregnancies. Out of 350 mothers, 5.7% were of 16-20 years of age, 70.9% between 21-30 years, 22.6% between 31-40 years and 0.9% was above age 40 years. 41.4 % mothers were primi gravida, 44.3 % 2nd gravida, 11.4% 3rd gravida and 2.9% were 4th and above. 2.86% babies were born of consanguineous marriage and 2.57% mothers had antenatal infection. Among this, there were 4 Varicella Zoster, 2 CMV infections, 2 Toxoplasma and 1 Measles. 57.43% of mothers had bad obstetric history and 83 had comorbidities like hypertension, diabetes mellitus and hypothyroidism.

TEST RESULTS:

OAE1

Out of 350 babies, 147 i.e.42% gave refer result in right or left ear and 186 babies with refer result in either one or both ears were referred for repeat OAE.

OAE2

8.61% gave refer result for repeat OAE.

BERA showed wave 5 at 60-100dBHL in 7 babies for left ear and 6 for right ear out of 20 repeat OAE refer results. As per BERA, hearing impairment found in 7 out of 350 babies studied.

Table 2: Association Of Various Risk Factors With Hearing Loss

Risk Factors		Hearing Impairment		Total	p Value	Significance
		Present	Absent			
Gender	Male	5 (2.65%)	184(97.35%)	189 (100%)	X^2= 0.304, p=0.581	Yes
	Female	2 (1.24%)	159(98.76%)	161 (100%)		
Antenatal infection	Present	2(22.22%)	7(77.78%)	9(100%)	X^2=10.138 p=0.001	Yes
	Absent	5 (1.47%)	336(98.53%)	341 (100%)		
Craniofacial anomalies	Present	1(12.5%)	7 (87.5%)	8(100%)	X^2=0.754 p=0.385	No
	Absent	6(1.75%)	336(98.25%)	344 (100%)		
Birth weight	<1500 g	6(3.06%)	190(96.94%)	196 (100%)	X^2=1.476 p=0.224	Yes
	>1500 g	1(0.65%)	153(99.35%)	154 (100%)		
Gestational age	Pre-term	5(3.25%)	148(96.73%)	153 (100%)	X^2=1.476 p=0.224	No
	Term	2(1.02%)	195(98.98%)	197 (100%)		
Hyper-bilirubinemia	Present	6(17.14)	29(82.86%)	35(100%)	X^2=37.317 p=0.000	Yes
	Absent	1(0.32%)	314(99.68%)	315 (100%)		
Ototoxic drugs	Not given	2(2.53%)	77(97.47%)	79 (100%)	X^2=0.005 p=0.941	No
	Given	5(1.85%)	266(98.15%)	271 (100%)		
APGAR score	4 at 1 min	3(3.41%)	85(96.59%)	88(100%)	X^2=0.424 p=0.514	No
	10 at 1 min	4(1.53%)	258(98.47%)	262 (100%)		
Ventilated for >5 days	Yes	3(3.75%)	77(96.25%)	80(100%)	X^2=0.669 p=0.413	No
	No	4(1.48%)	266(98.52%)	270 (100%)		
Other	Present	1(12.5%)	7(87.5%)	8(100%)	X^2=0.754	No
syndromes	Absent	6(1.75%)	336(98.25%)	342 (100%)	p=0.385	
Hypo-glycemia	Present	1(4.17%)	23(95.83%)	24(100%)	X^2=0.000 p=0.975	No
	Absent	6(1.84%)	320(98.16%)	326(100%)		

DISCUSSION

The causes of permanent childhood hearing impairment (PCHI) may be congenital or acquired. Congenital hearing loss may be genetic (autosomal dominant, recessive, x-linked or mitochondrial) or non-genetic (infectious, radiation or drug induced). The acquired hearing loss may be due to hypoxia, hyperbilirubinemia, low-birth weight, meningitis, convulsions, ototoxic drugs trauma, and idiopathic.In large population studies, at least 50% of congenital hearing loss has been designated as hereditary.

The prevalence of Permanent Childhood Hearing Impairement (PCHI) with hearing loss exceeding 40dB in our study is 1.8%. Reviewing literature the prevalence of PCHI varies widely,as 22% by B vyas[7], 18 % by Chadha and Bais [8] 1% by Nagapoornima et el[9]. In these studies higher incidence may be due to-Screening done only with OAE test (as in study by B Vyas M.P. Shah Medical College, Gujarat[7].

In this study out of 350 children, 189 were boys and 169 were girls. Of 6 babies with bilateral PCHI, 5 were boys. One baby girl was with unilateral hearing loss.

All the parents were explained and participated to collect the demographic data and detailed clinical history. This established the fact that risk factors have a definite role in development of hearing loss (Table2). But the risk factors may have a synergistic effect.

In this study, of 7 neonates with BERA abnormalities ;1 had 6 risk factors, 2 neonates had 5 risk factors and 2 neonates had 4 risk factors and1 had 3 factors. This reflects the fact that multiple risk factors cause HL in these neonates admitted in NICU. BERA abnormality rate increased from 4.2% for one risk factor to 33.3% in neonates with three risk factors. As the number of risk factors per neonate increased, the probability of being hearing impaired also increased which is in accordance with the study conducted by A Zamani et al., [10].

A study by Volpe et el showed as factors like hypoxia, bilirubin, and Aminoglycosides, alone are not sufficient to cause injury [11]. Volpe also stated the possibility of the combined, additive effect of factors resulting in significant injury.

Limitations of this Study: We could not examine 100 % of those infants admitted in the NBICU of our hospital.Ours being a referral hospital, babies are from other districts and they might have attended nearby health care facility for follow up

CONCLUSION

The prevalence of hearing impairment is 1-3 in 1000 newborns. In high risk new borns it is 2-4%. In our study, 2% had hearing impairment. Among the risk factors, hyperbilirubinemia and antenatal infections were found to have a strong association.Hence, there is an urgent need to incorporate universal neonatal hearing screening in all the neonatal health care facilities in India

REFERENCES

1. Yoshinaga-Itano C, Apuzzo ML. Identification of hearing loss after age 18 months is not early enough. Am Ann Deaf 1998 Dec;143(5):380-7.
2. Yoshinaga- Itano C, Sedey AL, Coulter DK,Mehl AL. Language of early- and later-identified children with hearing loss.Pediatrcs.1998 Nov;102(5):1161-71.
3. Joint Committee on Infant Hearing, American Academy of Audiology, American Academy of Pediatrics,American Speech- Language- Hearing Association, Directors of Speech and Hearing Programmes in State Health and Welfare Agencies. Position Statement: Principles and Guidelines for early hearing detection and intervention programmes. Pediatrics. 2000;106:798-817.
4. A. Erenberg, J Lemons, C. Sia, D. tunkel, P.Ziring. Newborn and infant hearing loss; detection and intervention. Pediatrics 1999;103(2):527-530.
5. H. D.Nelson, C. Bougatsos, P.Nygren. Universal newborn hearing screening: systematic review to update the 2001 US Preventive services task force recommendation. Pediatrics 2008 ;122(1):266-276.
6. Paul AK .Early identification of hearing loss and centralized newborn hearing screening facility :The Cochin experience. Indian Pediatr 2011;48:355-359.
7. Sudhir Rughani, Bhadresh Vyas, Vikas Sinha, Maulik Shah, Yamini Kapileshwarkar, Sonal Shah. Hearing screening in new born (A cross-sectional study). World Articles in Ear, Nose and Throat 2011; Volume 4 (1).
8. Chadha S, Bais AS. Auditory brainstem responses in high risk and normal newborns..Indian J Pediatr. 1997 Nov-Dec;64(6):777-84. doi: 10.1007/BF02725499.
9. *Nagapoornima P*, Ramesh A, Srilakshmi, Rao S, Patricia PL, Gore M, Dominic M, Swarnarekha. *Universal hearing screening*. Indian J Paedia. 2007;74:172-85.
10. Zamani A, Daneshju K, Ameni A, Takand J. Estimating the incidence of neonatal hearing loss in high risk neonates. Acta Med Iran 2004;42:176-80.
11. Volpe.*JJ*: *Neurology of the Newborn*, *4th ed*, Philadelphia: 2001, WB Saunders.