IOSR Journal Of Pharmacy
(e)-ISSN: 2250-3013, (p)-ISSN: 2319-4219
Volume 10, Issue 4 Series. I (April 2020), PP. 01-04
www.iosrphr.org

A Study on Hearing Screening Among Patients with Neonatal Asphyxia in a Rural Tertiary Care Hospital

Swati Mondal[1], Ganesh Chandra Gayen[2], Ritam Ray[3]
[1](*Postgraduate student, Dept. of ENT, Burdwan Medical College & Hospital, Burdwan, West Bengal, India)*
[2](*Associate professor, Dept. of ENT, Burdwan Medical College & Hospital, Burdwan, West Bengal, India)*
[3](*Assiatant professor, Dept. of ENT, Burdwan Medical College & Hospital, Burdwan, West Bengal, India)*
Corresponding Author: Ganesh Chandra Gayen
Received 07 April 2020; Accepted 22 April 2020

Abstract:
Objectives: To screen neonates with neonatal asphyxia for assessment of early hearing loss
Materials and Methods: Prospective study over a period of 1 year (January, 2017 to December, 2017). 100 term birth asphyxiated hypoxic ishchemic encephalopathy stage I, II, III infants attending well baby clinic of Otorhinolaryngology department & Paediatrics department of Burdwan Medical College &Hospital, Burdwan for hearing assessment were assessed audiologically.
Results: 100 patients attended our ENT OPD for audiological assessment of hearing from January, 2017 to December, 2017. 56 infants passed at 1st OAE test and declared normal. At 2nd OAE, 37 out of those 44 infants were declared normal. BERA confirmed hearing loss due to hypoxic brain damage in only 1 infant.
Conclusion: Early detection of this hearing loss in extremely important for early institution of appropriate management to minimize morbidity in those affected and reduce the burden of this disability in our community. Screening tests like Otoacoustic emmision test is important tools to identify this hearing loss at the earliest subjected to confirmation by BERA.
Key words: Hearing loss; Neonata asphyxia; Otoacoustic Emission; Brainstem Evoked Response Audiometry

I. INTRODUCTION

Despite advances in neonatal care in past decades, perinatal asphyxia has an incidence of 1 to 6 per 1000 live full term births [1] and represents the third most common cause of neonatal morbidity and mortality (23%) after preterm birth (28%) and severe infection (26%) [2]. Severe birth asphyxia (Apgar < 7 at the 5th minute of birth) is recognized as hearing risk factor by the joint committee on infant hearing (JCIH) [3]. About half of the newborns with hearing loss do not indicate any sign and risk factor for hearing loss at birth [3].Early detection of hearing loss especially in high risk babies by screening at or shortly after birth and appropriate interventions are critical to speech, language and cognitive developments [3].

Babies with neonatal hypoxia who are diagnosed and rehabilited sooner, demonstrated better language and behaviour skills at the age of five rather than children diagnosed late [4]. In the present study the screening of sensorineural hearing loss in patients of clinically proven term neonatal asphyxia (hypoxic ischaemic encephalopathy stage I, II, III) is assessed among a population of rural West Bengal.

II. MATERIALS AND METHODS

After getting Institutional Research Ethics Committee clearance, 100 clinically proven neonatal asphyxia babies attending well baby clinic of Otorhinolaryngology & Paediatric Department of Burdwan Medical College & Hospital, Burdwan over a period of 1 year (January, 2017 to December, 2017) were selected for this study. Written consent was taken from all parents of patients after proper explanation of study. The enrolled patients were assessed thoroughly on the following pattern: detailed history, clinical examination, relevant investigations and otological assessment. External ear, external auditory canal, tympanic membrane were assessed to exclude any external ear pathology. Tympanometry was done to rule out middle ear pathology.

Then hearing assessment was done in three stages. In first and second stage, hearing screening was done by using Transient Otoacoustic Emission (OAE), by a highly reliable instrument and in third stage ,hearing thresh hold were estimated by using Brainstem Evoked Response Audiometry. OAE screening was performed by Sentiero TE machine (Path Medical) that uses Transient Evoked Otoacoustic Emission. Children with a normal OAE were discharged , but in case with abnormal OAE (unilateral or bilateral) were referred for second OAE. Second OAE were performed after 4 weeks. In case of abnormal OAE in second step, neonates were referred for diagnostic BERA by RMS MK II ABR for confirmation of hearing loss. Hearing thresholds were estimated and recorded as per norms guided by American Speech and Hearing Association.

III. OBSERVATION

Total 100 infants were included in the study of whom 2 were dropped out in different phases of the study. Age distribution [Chart 1] of the study subjects at the first OAE i.e. point of inclusion in the study showed majority i.e. 38% from age group 3-6 months followed in order age groups 7-9 months, <3 months and 10-12 months respectively. Mean age of the study population is 6.18 months. Study population consisted of majority of male infants (56%) whereas female infants only constituted 44% [Chart 2].

Majority of study infants suffered mild Hypoxic ischemic enchephalopathy (59%) whereas moderate and severe HIE sufferers were 31% and 10% respectively in the study population. 56 infants passed at 1st OAE test [Table 1] and declared normal i.e. incurred no hearing loss due to hypoxia whereas 44 infants failed the 1st OAE test and hence referred for 2nd OAE. At 2nd OAE, 37 out of those 44 infants passed the test [Table 2] and declared normal, 6 infants failed the test and referred for confirmation of hearing loss by BERA. 1 infant dropped out at this stage. BERA confirmed hearing loss due to hypoxic brain damage in only 1 infant from these 6 infants, 4 infants were declared having no hearing loss [Table 3]. 1 infant again dropped out at this stage.

Out of 56 males, none suffered from hearing loss due to hypoxia at birth whereas one female out of 44 suffered hypoxic hearing loss. Hearing loss by BERA showed no statistically significant association with severity of Hypoxic Ischemic Encephalopathy. No statistically significant association was found between HIE and hearing loss.

IV. DISCUSSION

Neonatal asphyxia can complicate both term as well as premature birth and is a recognised cause of hearing loss. Early detection of hearing loss in those at risk neonates and infants helps in early institution of appropriate management and there lies the clinical importance of screening tests like Otoacoustic emission (OAE) response. Otoacoustic Emission is method of choice for determining hearing impairment besides being fast, non-invasive, easy to use, sensitive, cost effective in neonates. It offers the clinician in monitoring of outer hair cell function.

This study focused to screen hearing loss in term infants exposed to neonatal asphyxia i.e. hypoxic ischemic encephalopathy (HIE) attending our institute and to find out any association between them. This study included 100 infants with minimum age of 1 month to maximum age of 12 months in the population. Mean age in the distribution was 6.18 months. 2 infants dropped out from the study. Of the study subjects 56% were male and 44% were female. In this study distribution 59% infants suffered mild HIE, 31% suffered moderate HIE and the rest 10% suffered severe HIE.

56% infants passed and 44% infants failed at first otoacoustic emission test. Of these 44 infants, 37 infants i.e. 37% of the study population passed at 2nd OAE test and the rest 6% unsuccessful infants presumed to have hearing loss were referred for confirmation by BERA.

In our study, BERA confirmed hearing loss in only one infant, who was a girl, and the rest 4 infants were declared normal. 1 infant dropped out. Therefore at the end of the study, only 1% infant with neonatal hypoxic encephalopathy found to have hearing loss. No statistically significant association was found between Hypoxic Ischemic Encephalopathy and Hearing loss ($P = 0.349$) in our study (by one way ANOVA test).

The JCIH stated that all infants with hearing loss should be identified as early as possible before 3 months of age and receive intervention by 6 months of age, no more than 12 months. Adequate oxygenation and perfusion are essential for inner ear function [5] and studies shows that neonatal asphyxia can cause inner ear degeneration, disappearance of outer and inner hair cells, degeneration of spiral and vestibular ganglion cells [6], resulting in hearing loss.

Children with impaired hearing, present delays in language learning and general development [7]. Children with congenital hearing loss may not have immediate access to language and thus may differ from their normal hearing peers in their language development and in their facility with communication as learning of language is primarily an auditory event. Thus deficit in communication function interferes with language, reading skills, writing skills and that may lead to poor academic performance, lower self esteem, breakdowns in family communication, social isolation and significant economical burden.

V. CONCLUSION

Hypoxic ischemic encephalopathy at birth is an important risk factor of hearing loss in the affected child in later months of age. Early detection of this hearing loss in extremely important for early institution of appropriate management to minimize morbidity in those affected and reduce the burden of this disability in our community. Screening tests like Otoacoustic emmision test is important tools to identify this hearing loss at the earliest subjected to confirmation by BERA.

VI. CHARTS AND TABLES

Chart – 1
Age distribution

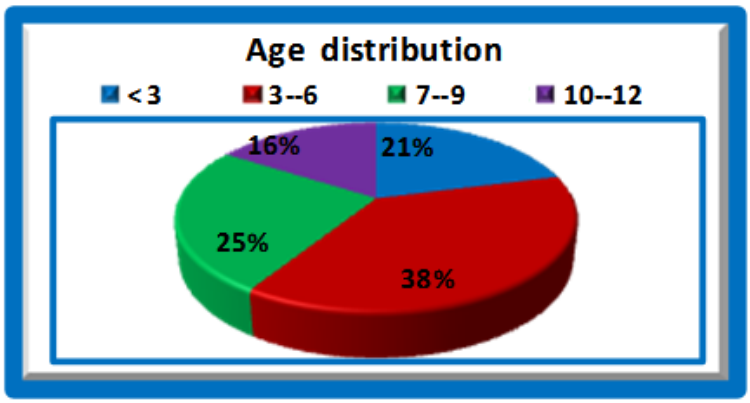

Chart – 1
Gender distribution

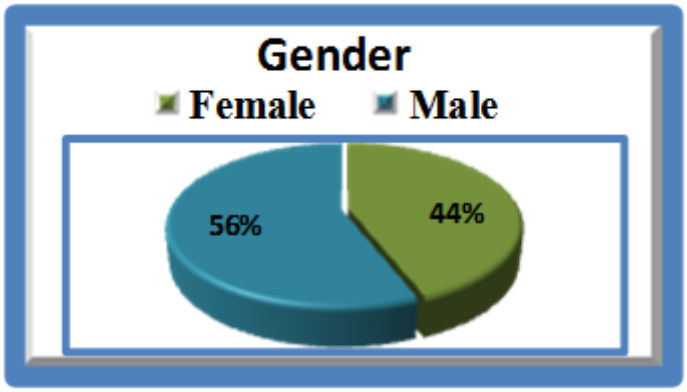

Table – 1
1st OAE result

1st OAE	No of patients	Percentage(%)
Normal	56	56.0
Refer	44	44.0
Total	100	100.0

Table –2
2nd OAE result

2nd OAE (44)	No of patients	Percentage(%)
Drop out	1	1.0
Normal	37	37.0
Refer	6	6.0

Table – 3
BERA result

BERA	HIE						Total	
	Mild		Moderate		Severe			
	No of patients	Percentage(%)	No of patients	Percentage(%)	No of patients	Percentage(%)	No of patients	Percentage(%)
Drop out	2	3.4%	0	0.0%	0	0.0%	2	2.0%
NA	54	91.5%	31	100.0%	8	80.0%	93	93.0%
Normal	3	5.1%	0	0.0%	1	10.0%	4	4.0%
Refer	0	0.0%	0	0.0%	1	10.0%	1	1.0%
Total	59	100.0%	31	100.0%	10	100.0%	100	100.0%
Chi-square value = 13.06 Df = 8 P-value = 0.11								

REFERENCES

[1]. de Haan M, Wyatt JS, Roth S, Vargha-Khadem F, Gadian D, Mishkin M. Brain and cognitive-behavioural development after asphyxia at term birth. Dev Sci. 2006;9:350-8..

[2]. Lawn JE, Cousens S, Zupan J and for the Lancet Survival Steering team. 4 million neonatal deaths: when? where? why? Lancet. 2005;365:891-900.

[3]. Amini E, Farahani Z K, Samani M R, Hamedi H, Zamani A, Yazdi A K et al. Assessment of Hearing Loss by OAE in Asphyxiated Newborns. Iran Red Crescent Med J. 2014 Jan; 16(1): e6812.

[4]. Ohl C, Dornier L, Czajka C, Chobaut JC, Tavernier L. Newborn hearing screening on infants at risk. Int J Pediatr Otorhinolaryngol. 2009;73(12):1691–5. doi: 10.1016/j.ijporl.2009.08.027

[5]. Pourarian S, Khademi B, Pishva N, Jamali A. Prevalence of hearing loss in newborns admitted to neonatal intensive care unit. Iran J Otorhinolaryngol. 2012;24(68):129–34.

[6]. Kilickan L, Gurkan Y, Aydin O, Etiler N. The effect of combined spinal-epidural (CSE) anaesthesia and size of spinal needle on postoperative hearing loss after elective caesarean section. Clin Otolaryngol Allied Sci. 2003;28(3):267–72.

[7]. Ohl C, Dornier L, Czajka C, Chobaut JC, Tavernier L. Newborn hearing screening on infants at risk. Int J Pediatr Otorhinolaryngol. 2009;73(12):1691–5. doi: 10.1016/j.ijporl.2009.08.027.

Swati Mondal,etal. "A Study on Hearing Screening Among Patients with Neonatal Asphyxia in a Rural Tertiary Care Hospital." *IOSR Journal of Pharmacy (IOSRPHR)*, 10(4), 2020, pp. 01-04.