Medworld –asia International Publishers
Applied Physiology and Anatomy Digest [P ISSN: 2456 – 4095]
March 2018 (2) 04, 17-20

Original research article

Relation of gender and family history with neonatal hearing loss

[1]Dr.Santhi R Nath, [2]Dr.Shrinidhi, [3]Dr. Suja P, [4]Dr. Bishara Lal,[5] Dr. Rameedha

[1,3,4,5] Dept. of Physiology, Malabar Medical College, Modakkallur, Atholi, Kozhikode
[2]Dept. of Physiology, Kanachur Institute of Medical Sciences, Natekal, Mangalore – 575018
Corresponding author: Dr.Shrinidhi

ABSTRACT

Objective: To study the relation of gender and family history with hearing loss in neonates.

Materials and Methods: This is a prospective cohort studyconducted in the Audiology clinic in the Department of otorhinilaryngology. 100 neonates in NICU were taken as cases and 50 neonates in Neonatology ward as controls. Neonates with active upper respiratory tract infection and middle ear disease were excluded. Family history, prenatal, perinatal, and postnatal histories were collected from parents or guardian using a peer reviewed standard questionnaire. Screening for hearing loss was done by using to Acoustic Emission (OAE) and later by Auditory Brainstem Response (ABR). All neonates were screened by OAE initially and after 1 month repeat OAE was done for those who failed in the first test. Then for those who failed in the second test, ABR was done. Association of parameters with hearing loss was determined using Pearson Chi-square test.

Results: In the study population, there were 72 male and 78 female neonates. Out of these, 10 male & 15 female neonates were found to have hearing loss. It was found that sex had no significant association (p value = 0.380) with hearing loss in neonates. 3 neonates had family history of hearing loss. It has a significant relation (p value= 0.000) with hearing loss.

Conclusion: In the present study conducted among 150 participants, 10 male and 15 female neonates had hearing loss. There is no significant relation between sex and hearing loss in neonates. Hence we recommend a further detailed study in this area with higher sample size for a long duration.Family history is found to have significant relation with hearing loss in neonates.

Keywords: Hearing loss, neonates, gender, family history

INTRODUCTION:

Hearing loss is one of the most common treatable diseases of childhood.The incidence of hearing loss in neonates is 2- 4 per 1000[1] livebirths.Four types of hearing loss[2] are there: conductive, sensorineural, mixed and central. Conductive loss is due to problemsin the outer or middle ear. Sensorineural type is caused by problems in the inner ear or auditory nerve. Mixed loss includes both conductive and sensorineural types. Central hearing loss is rare and involves problems in auditory pathway or brain. Above 50% of congenital sensorineural hearing loss is due togenetic problems[3]. If hearing loss is not identified early in life, it can cause negative impact[5] on child's speech, language, and cognitive development. Yoshinaga-Itano et al[4] suggested that early identification & intervention of the problem by universal hearing screening by OAE & ABR before 6 months of age improves the psychosocial, educational and linguistic development of infants and children. This study is done to find out the role of gender and family history in neonatal hearing loss.

MATERIALS AND METHODS:

This is a prospective cohort study conducted at Audiology clinic in the Department of Otorhinolaryngology, Malabar Medical College Hospitalfrom April 2014 to April 2017. 100 neonates in NICU were taken as cases

and 50 neonates in Neonatology wardas controls. All of them were within 28 days of age. Neonates with active upper respiratory tract infection and middle ear disease were excluded from the study.Family history, prenatal, perinatal, and postnatal histories were collected from parents or guardian using a standard peer reviewed questionnaire in order to determine the risk factors for the congenital hearing loss. The study was approved by the Institutional Ethical Committee. The parents and guardians were informed about the study and their consent was obtained. The screening programme[3] consisted of:

1. 1st screening test by Oto Acoustic Emission (OAE) at postnatal age of up to 28 days in term neonates or at a post conceptional age of 37 - 41 weeks in preterm neonates.
2. Re-testing in cases of lack of response (fail 1) is done 1 month after 1st testby OAE.
3. Auditory Brainstem Response (ABR) testing within 1 month of retesting in cases of lack of response (fail 2)

All tests were done free of cost for the subjects. Association of qualitative variables with hearing loss was determined using Pearson Chi-square test.

RESULT:

Table 1: Percentage of hearing loss in relation to gender

Sex	Hearing loss		Total
	Present	Absent	
Male	10 (13.9%)	62 (86.1%)	72 (100.0%)
Female	15 (19.2%)	63 (80.8%)	78 (100.0%)
Total	25 (16.7%)	125(83.3%)	150 (100.0%)

Table 1 shows percentage of hearing loss in relation to sex of the subjects. Out of 150 subjects, there were 72 males and 78 females. Out of 72 males, 10 were found to have hearing loss. Out of 78 females, 15 had hearing loss. It was found that sex had no significant association (p value = 0.380) with hearing loss in neonates.

FIGURE 2: Percentage of hearing loss in relation to family history of hearing loss

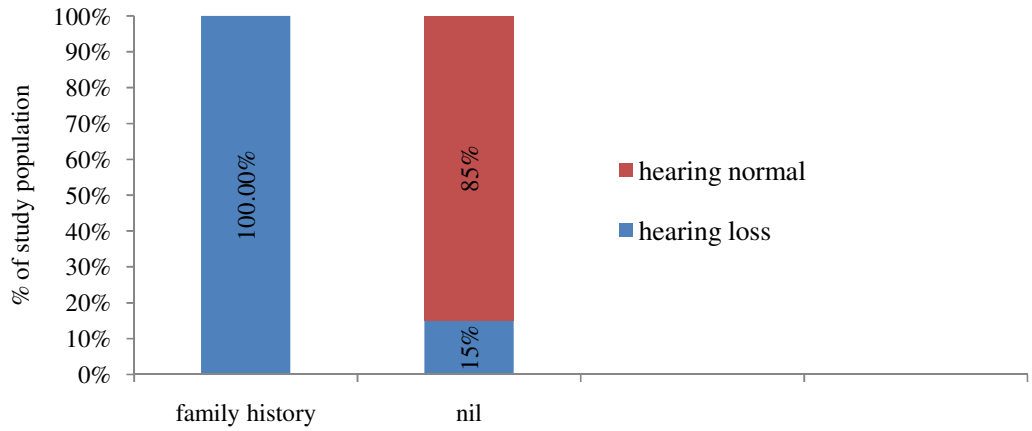

Figure 2 shows percentage of hearing loss in neonates in relation to family history of hearing loss. Out of 25 neonates, 3 had family history of hearing loss which was statistically significant. (P value = 0.000).

DISCUSSION:

Sexdifferences exist throughout the auditory system[6,7,8]. Head size does not contribute to sex differences in hearing sensitivity. This was explained by Durrantet al.[9] and Sabo et al.[10] who found that latency differences persist while comparing males and females of equal head size. Studies by Don etal.[11]in 1993 showed that female hearing is more sensitive than male by observing Transient Evoked Otoacoustic Emissions (TEOAE) results of healthy new-borns and explained by the fact that outer hair cells of female new-borns respond more sensitively than males. Hall et al[12] found that adult males have longer cochlear length than females.Shorter cochlear length results in faster response time and better synchronisation of neural pathways. Studies conducted by Krizmanet al[13] showed a dissimilarity in neural response to the components of speech stimulus between males and females but not in the slower changing, lower frequency stimulus. The present study shows no significant association between gender and hearing loss in neonates. This was supported by McFadden and Mishra experiment in 1993 where a variable related to the cochlear amplifier like number of Spontaneous Oto Acoustic Emissions (SOAEs) was studied.Saunders et al[14]conducted a study among the school aged children in the rural community in Nicaragua. 24% had family history of hearing loss. The inheritance[15] of non syndromal hearing impairment is as follows - autosomal recessive - 83%, autosomal dominant - 10%, and X-linked - 5%. Mitochondrial inheritance contributes to 2% of hereditary deafness. Autosomal-recessive hearing impairment occurs prelingually and is pronounced. Autosomal dominant hearing impairment occurs predominantly postlingually and progressive.

CONCLUSION:

In the present study involving among 150 participants, only 10 male and 15 female neonates had hearing loss. The study concluded with the fact that family history has a significant positive relation with hearing loss in neonates.The study further concluded that is no significant relation between gender and hearing loss in neonates. Hence we recommend a further detailed study in this area with higher sample size for a long duration.

Acknowledgements: The authors acknowledge the support of Malabar Medical College Hospital and the staff of Otorhinolaryngology department there for their help in the study.

REFERENCES:

1. Rehabilitation Council of India. Status of Disability in India - 2000. New Delhi, 2000. pp.172-185
2. American Family Physicians. 2007 May 1; 75(9):1349-1352
3. Dallapiccola B, Mingarelli R, Gennarelli M, Novelli G, Aspettigeneticidellasordita. ActaOtorhinolaryngol Ital 1996; 16:79-90
4. Downs MP, Yoshinaga-Itano C. The efficacy of early identification and intervention for children with hearing impairment. PediatrClin North Am 1999; 46(1):79–87
5. JCIH, Year 2000 position statement, principles and guidelines for early hearing detection & intervention programs.
6. Jerger J, Hall J. Effects of age and sex on auditory brainstem response. Arch Otolaryngol 1980; 106: 387-91.
7. McFadden D. Sex differences in auditory system. Dev Neuropsychol 1998; 14:261-98
8. McFadden D, Martin GK, Stagner BB, Maloney MM. Sex differences in distortion product and transient – evoked otoacoustic emissions compared. J AcoustSoc Am 2009; 125: 239-46.
9. Durrant JD, Sabo DL, Hyre RJ. Gender, head size, and ABRs examined in large clinical sample. Ear Hear 1990;11:210
10. Sabo DL, Durrant JD, Curtin H, Boston JR, Rood S. Correlations of neuroanatomical measures to auditory brain stem response latencies. Ear Hear 1992;13:213-22.
11. Don M, Ponton CW, Eggermont JJ, Masuda A. Gender differences in cochlear response time: An explanation for gender amplitude differences in the unmasked auditory brainstem response. J AcoustSoc Am 1993; 94:2135.
12. Hall, J.W. (2000). Handbook of otoacoustic emissions. San Diego, CA: Singular Publishing Group, INC.
13. Jennifer Krizman, Erika Skoe, Nina Kraus. Sex differences in auditory subcortical function. Clinical neurophysiology 123(2012) 590-597.
14. Saunders JE, Vaz S, Greinwald JH, Lai J, Morin L, Mojica K. Prevalence and etiology of hearing loss in rural Nicaraguan children. Laryngoscope. Mar 2007;117(3):387-98.
15. Shearer AE, Hildebrand MS, Smith RJH. Hereditary Hearing Loss and Deafness Overview. 1999 Feb 14 [Updated 2017 Jul 27]. In: Adam MP, Ardinger HH, Pagon RA, et al., editors. GeneReviews® [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2018.Available from: https://www.ncbi.nlm.nih.gov/books/NBK1434.