INTERNATIONAL JOURNAL OF HEALTH & MEDICAL RESEARCH

ISSN(print): 2833-213X, ISSN(online): 2833-2148

Volume 04 Issue 03 March 2025

DOI : 10.58806/ijhmr.2025.v4i3n09

Page No. 165-168

Screening and Follow-up Babies with Hearing Impairment

Nyilo Purnami[1], Makhmudyah Indri Cahyani[1], Yolanda Prisita Wardhani[2], Verliana Floyani Uly[2], Nanik Putri Setyowati[1]

[1] Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine, Universitas Airlangga - Dr. Soetomo General Academic Hospital, Surabaya, Indonesia

[2] Resident Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine, Universitas Airlangga - Dr. Soetomo General Academic Hospital, Surabaya, Indonesia

ABSTRACT:

Background: Hearing loss in newborns or congenital deafness can be caused by failure to develop one or more parts of the auditory system or cessation of the development process at a certain stage.

Method: This research is included in the type of analytical observational research using a cross-sectional study design. The research was conducted at Audiology Outpatients, Dr. Soetomo Academic Hospital Surabaya. The parents of the baby agreed that their child would be included in the research (informed consent). Meanwhile, the exclusion criteria were external and middle ear disorders, OAE, AABR and BERA examinations could not be carried out due to non-technical factors, the patient's condition was unstable, and the results of the first examination showed PASS.

Results: Based on gender, the majority were boys with 18 babies (60%) compared to girls with 12 babies (40%). The most common hearing loss screening results were Pass, namely 23 people (76.7%) in the right ear and 24 people (80%) in the left ear. The history of disease which is a risk factor is asphyxia, namely 26 people (87%) and 4 people (13%) with jaundice.

Conclusion: Our research revealed that there were still patients with Refer results. Therefore, screening and follow-up for babies at risk of hearing loss.

KEYWORDS: Sensorineural hearing impairment, genetic mutation, GJB gene, non-syndromic, Human and Health.

INTRODUCTION

Hearing loss in newborns or congenital deafness can be caused by failure to develop one or more parts of the auditory system or cessation of the development process at a certain stage. Apart from that, there are also several factors that can cause the degeneration of the hearing development mechanism (Arpino et al., 2010). Hearing impairment or deafness is a disability that is difficult to detect early on, for this reason we need an examination method that is easy and fast to carry out so that the disorder can be recognized early so as not to cause delays in the development of speech, language and cognitive abilities (HTA Indonesia, 2010).

Hearing screening is very important because 50% of newborns with risk factors experience hearing loss from birth. Based on these considerations, efforts to carry out early detection of hearing loss in babies have been established through the Newborn Hearing Screening (NHS) program. Otoacoustic Emission (OAE) and Automated Auditory Brainstem Response (AABR) examinations are the gold standard for early detection of hearing loss in babies (Suwento, Zizlavsky & Hendarmin, 2007). So far, it has only reached the screening stage, not yet at the follow-up stage.

Judging from the prevalence in 2019, losses due to untreated hearing loss reached around 1 trillion international dollars. If it is not addressed immediately, the number of sufferers will continue to increase (WHO, 2021c). The prevalence of hearing loss in the world in 2019 was around 1.5 billion people, with 430 of them experiencing moderate to severe impairment (WHO, 2021c). There are 34 million child sufferers (WHO, 2021a). According to the results of Basic Health Research (Riskesdas) by the Ministry of Health's Health Research and Development Agency (Balitbangkes) in 2018, 0.11% of children aged 24-59 months in Indonesia experienced congenital hearing loss (Pusdatin, 2019).

Early detection of hearing loss in children is important, however there are problems, namely parents sometimes do not realize that their child has hearing loss and assume their child is autistic or hyperactive because they often do not respond to what their parents say, so the child's actions are difficult to control. Parents only become aware when their child does not respond to loud sounds or is late in speaking (Jauhari, 2020). A study in India explained that congenital sensorineural hearing loss could only be detected and observed by parents when children were 6-12 months old, even though interventions using cochlear implants had better results if

carried out before the age of 12 months (Shrivastava and Gupta, 2018; The Joint Committee on Infant Hearing, 2019).
As a preventive measure, WHO recommends screening for newborns and infants in order to detect congenital hearing loss early, so that management can be carried out as soon as possible (WHO, 2021c). The Joint Committee on Infant Hearing (JCIH) introduced the Universal Newborn Hearing Screening (UNHS) program and the "1-3-6 Plan" format which means that all babies born, both with and without risk factors, will be screened before being discharged from the hospital and no later than 1 month of age, receive confirmation of hearing loss no later than 3 months of age, and must receive intervention no later than 6 months of age (Joint Committee on Infant Hearing, 2007).
Based on the above, this research was carried out to determine the importance of screening and follow-up of babies with a high risk of hearing loss at the Audiology Polytechnic of Dr. RSUD. Soetomo Surabaya.

METHODS

This research is included in analytical observational research using a cross-sectional study design. The research was conducted at Audiology Outpatients, Community ENT Division, Department of Health Sciences, ORL-HNS Dr. Soetomo Academic Hospital Surabaya. Data collection will begin in November 2023 and continue until the sample size is met.
The research samples were babies at the Audiology Outpatient, Community ORL-HNS Division, ORL-HNS Health Sciences Department, Dr. Soetomo General Academic Hospital Surabaya, which has met the research criteria. The inclusion criteria were high-risk babies in the Audiology outpatient, Community ORL-HNS Division, ORL-HNS Dr. Soetomo Surabaya. The parents of the baby agreed that their child would be included in the research (informed consent). Meanwhile, the exclusion criteria were external and middle ear disorders, OAE, AABR and BERA examinations could not be carried out due to non-technical factors, the patient's condition was unstable, and the results of the first examination showed PASS.
Research samples were taken by consecutive sampling until the minimum sample size was met. The ethics committee, RSUD Dr. Soetomo Surabaya, has tested this research for ethical suitability with ethical number 1066/KEPK/VII/2024.

RESULT

The research results aim to determine the importance of screening and follow-up for babies with a high risk of hearing loss at the Audiology Polytechnic of Dr. Soetomo Hospital, Surabaya. The results of calculations and observations of all parameters studied are presented in the form of a table below:

Table 1. Characteristics of Sex

Sex	n (frequency)	Percentage (%)
Male	18	60 %
Female	12	40 %
Total	30	100 %

Characteristics of 30 babies who underwent screening and follow-up examinations at high risk of hearing loss. Based on gender, the majority were boys with 18 babies (60%) compared to girls with 12 babies (40%) (Table 1)

Table 2. Distribution of OAE examination

OAE examination	AD	AS
Pass	23 (76.7%)	24 (80 %)
Refer	7 (23.3%)	6 (20%)
Total	30 (100 %)	30 (100 %)

Based on the data above, the most common hearing loss screening results were Pass, namely 23 people (76.7%) in the right ear and 24 people (80%) in the left ear (Table 2).

Table 3. Distribution of Disease History

History of diseases	n (frequency)	Percentage (%)
Asfiksia	26	87 %
Ikterus	4	13 %
Total	30	100 %

Based on the data above, the history of disease which is a risk factor is asphyxia, namely 26 people (87%) and 4 people (13%) with jaundice (Table 3).

DISCUSSIONS

Hearing loss in children needs to be detected as early as possible considering the important role of hearing function in the process of speech development. Identify hearing loss early by observing the child's reaction to sounds or testing hearing function using simple methods and equipment. Hearing tests on children cannot be postponed just because the child's age does not allow for a hearing test. Without a hearing screening program, hearing loss is only discovered at the age of 18 – 24 months (Hieber, 2013).

Ideally, a hearing screening program is carried out on all babies and children, whether they have risk factors for hearing loss or not (Universal Newborn Hearing Screening). The gold standard in the hearing screening program is through OAE (Otoacoustic Emission) and BERA (Brainstem Evoked Response Audiometry) examinations. The condition of the inner ear, especially the hair cells in the cochlea, is a very important organ in the hearing process. So the modality that can be used to find out is OAE. If abnormal OAE results are obtained during the examination, the examination can be continued with BERA, until finally objective results are obtained regarding the hearing condition of the baby/child (Wiryadi et al., 2019).

Many factors can cause hearing loss and can occur in all age groups, including babies and children. Babies with asphyxia and neonatal jaundice are at greater risk of hearing loss. Sometimes hearing loss in infants and children can be accompanied by mental, emotional or developmental fascial disorders, which will have an impact on hampering the child's cognitive, emotional and social communication development (Susyanto et al., 2015; Girsang et al., 2022). Decreased hearing ability or deafness in babies/children will cause an inability to hear with or without loudspeakers, so it can have a big impact on the child's development (Susyanto et al., 2015). To minimize the effects of hearing loss on children's development and educational attainment, it is very necessary to carry out early detection and intervention for this condition (Nugraha et al., 2022).

Based on several studies, it is said that half of cases of hearing loss can be avoided through primary prevention. Hearing loss in children can generally cause speech and language disorders (Nugraha et al., 2022). Therefore, early detection, especially at 6 months of age, followed by appropriate intervention within 2 months, provides better results in language, speech and social emotional development. Early habilitation is also highly recommended considering that the best brain development in children occurs at the age of 2-4 years (Girsang et al., 2022).

CONCLUSION

Our research revealed that there were still patients with Refer results. Therefore, screening and follow-up for babies at risk of hearing loss at the Audiology Outpatients of Dr. Soetomo Hospital, Surabaya, are very much needed as a preventive measure.

REFERENCES

1) Arpino C, Compagnone E, Montanaro ML, Cacciatore D, De Luca, A, Cerulli A, *et al.*, 2010. Preterm birth and neurodevelopmental outcome: a review. Childs Nerv. Syst, vol. 26, pp. 1139–1149.
2) HTA Indonesia, 2010. Skrining pendengaran pada bayi baru lahir. Dalam Kelompok studi THT Komunitas PERHATI-KL (Suwento R, Zizlavsky S, Airlangga T, Suardana W, Anggraeni R, Purnami N, dkk., eds). HTA Indonesia, Skrining pendengaran pada bayi baru lahir. DITJEN YANMEDIK SPESIALITIK DEPKES RI 2006, Edisi Revisi 2010. Jakarta: Kementerian Kesehatan RI, hal. 1-36.
3) Suwento, Zizlavsky & Hendarmin, 2007. Gangguan pendengaran pada bayi dan anak. Buku Ajar Ilmu Kesehatan Telinga Hidung Tenggorok Kepala & Leher Edisi ke Enam. Jakarta: Fakultas Kedokteran Universitas Indonesia
4) World Health Organization (WHO). Global Tuberculosis Report 2021. France: World Health Organization; 2021.
5) Pusdatin Kemenkes RI. (2019). InfoDatin Glaukoma 2019.pdf (pp. 1–9). Kementerian Kesehatan RI.
6) Jauhari, M. T. 2020. Karakteristik Orang Tua Dan Pola Makan Anak Usia Sekolah Dasar Negeri. VOLUME 3 NOMOR 2
7) Gupta A, Verma S, Kushwaha P, Srivastava S. Quantitative Estimation of Asiatic Acid, Asiatikosida and Madekasosida in Two Accessions of Centella asiatica (L) Urban for Morpho-Chemotypic Variation. J Pharm Educ Res. 2014;48(3):75–8.
8) Joint Committee on Infant Hearing. 2019. Newborn Hearing Screening Dallas: USA
9) Bieber, S.D. & Himmelfarb, J. 2013.Hemodialysis. In: Schrier's Disease of the Kidney. 9th edition. Coffman, T.M., Falk, R.J., Molitoris, B.A., Neilson, E.
10) Wiryadi, I.M.R, dan Wiranadha, I.M. 2019. Gambaran hasil skrining pendengaran pada pasien dengan keterlambatan bicara & bahasa di poliklinik THT-KL RSUP Sanglah periode Januari-Desember 2017. Medicina. 50(3), hal, 452-456
11) Susyanto, B. E., dan Asti, W. 2015. Faktor Risiko Gangguan Pendengaran pada Skrining Pendengaran Bayi Baru Lahir di Rumah Sakit PKU Muhammadiyah Yogyakarta. Mutiara Medika. 15(1), hal, 30-36.
12) Girsang, J. A., Safrianto, Yuliani, M. L., Sri, W. N. 2022. Gambaran Hasil Pemeriksaan Otoakustik Emisi (OAE) Sebagai Skrining Awal Pendengaran Pada Bayi Baru Lahir di RSU Royal Prima Medan. Jurnal Darma Agung. 30(2), hal, 793 – 802.
13) Nugraha, R. P., Wiwik, W., Mitra, H. 2022. Pemeriksaan Skrining Pendengaran Pada Anak Dengan Gangguan Bicara. Jurnal Inovasi & Terapan Pengabdian Masyarakat Politeknik Aisyiyah Pontianak. 2(1), hal, 77- 83.
14) Babu S, Lee KJ, 2012. Congenital Hearing Loss. In (Lee KJ, Chan Y, Das S, eds). Essential Otolaryngology Head & Neck Surgery 10th ed. New York: Mc Graw Hill, pp. 117-143

15) Weber PC, Khariwala S, 2014. Anatomy and Physology of Hearing. In (Newlands SD, Pitman KT, Ferguson BJ, Ryan MW, Eibling DE, Amin MR, *et al.*, eds). Bailey's Head and Neck Surgery-Otolarungology. 5th ed. Philadelphia: Lippincott Williams &. Wilkins, a Wolters Kluwer business, vol.2, no. 141, pp. 2253-73.