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Hearing Screening in Infants in the Work Area Community Health Center

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Abstract

The objectives of this study include, 1. Knowing the description of the results of OAE examination in babies born at Padanglampe Health Center, Pangkep Regency based on the sex of the baby. 2. Knowing the description of the results of OAE examination in babies born at Padanglampe Health Center, Pangkep Regency based on the age of the baby when they came for the examination. The subjects of this study were infants aged less than 24 months who were born at the Padanglampe health center, Pangkep district and met the inclusion criteria that had been set. The data collection method was in the form of hearing measurements using an OAE device to determine the presence of hearing disorders. The results obtained, there were research subjects consisting of 4 male people (44.44%) and 5 female people (55.55%). The age of the respondents who participated was less than 12 months as many as 8 people and more than 12 months as many as 1 person. The conclusion obtained, there was 1 child who had a referral result in the examination using OAE from a total of 9 people who were examined. The age range of children who had referral results was less than 3 years with female gender. The age of the babies who were examined varied, including 3 children aged less than 3 months, 1 child aged 3 months to less than 6 months, 4 children aged 6 months to less than 12 months, and 1 child aged 12 months to less than 24 months.

Introduction

Data from the World Health Organization (WHO) in 2007, showed differences in the percentage of hearing loss in East Asia. Indonesia has the smallest percentage of 4.2%, Sri Lanka 9%, Thailand 13.3%, and Nepal 16.6%. Based on this data, there are more than 100 million people suffering from hearing loss in East Asia. The cause of hearing loss, 50% genetic factors, the remaining 50% is caused by environmental factors such as diseases suffered by the mother before or after giving birth, or diseases of unknown cause (Purnami et al., 2018; Kochhar et al., 2007; Brookhouser, 1996; Brent, 2004).

The incidence of hearing loss in neonates ranges from 1-6 per 1000 live births. The 1994-1996 Hearing Health Survey reported an incidence of hearing loss since birth of 0.1%. The incidence increases 10 to 50 times in high-risk neonates. High-risk neonates have one or more risk factors as a cause of hearing loss such as a family history of congenital deafness or deafness since birth, a history of congenital or perinatal infection such as TORCH infection (Choe et al., 2023; Raeisi et al., 2022), prematurity, very low birth weight (VLBW) <1500 grams, hyperbilirubinemia, a history of late-onset sepsis and meningitis, asphyxia, a history of respiratory distress, use of breathing aids, use of ototoxic drugs, such as gentamicin antibiotics for more than 5 days with or without a combination of furosemide, a history of recurrent or

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persistent ear infections, a history of trauma or temporal bone fractures, a history of measles and mumps infections (Uleng et al., 2015).

At Wahidin Sudiro Husodo General Hospital, South Sulawesi Province, it was found that 39 babies treated in the NICU who underwent hearing screening received a referral examination result (44.32%) and 12 babies treated in the perinatology room received a referral examination result (36.37%) out of a total of 88 babies who underwent examination (Hall & Antonelli, 2001).

Otoacoustic Emission was introduced by Kemp in 1997 as the gold standard for newborn screening (Nozza, 2001; Anil, 2019). The vibration of the tympanic membrane produces an OAE signal, which can be measured with a microphone. The amplification produced by the movement of OHCs in the cochlea is 50 dB, then the residual energy reaching the ear canal is 0-15 dB (Perhati-KL, 2019). According to data released by the Indonesian ENT-KL specialist doctor association in 2019, it was noted that of the medical devices available in a number of hospitals in Indonesia, both central and regional, OAE devices were not all available in hospitals that had ENT-KL specialist doctors (Olusanya, 2015; Sarah, 2017).

A child is known to have hearing loss by his family when he is late in speaking compared to children his age (Appelbaum et al., 2018; Magnuson & Hergils, 2000; Hamzah et al., 2021). If it is known too late, of course the obstacles that will be faced will be greater. Hearing loss or deafness from birth will cause speech, language, cognitive, and academic development disorders (Kumar et al., 2017; Lieu, 2013; Lang-Roth, 2014; Brookhouser, 1996).

The Screening-Re-Screening-Confirmation method has been recommended in Universal Newborn Hearing Screening (UNHS) in a phased manner using OAE and ABR. Screening is done in the first four weeks, then repeated along with the immunization schedule in six months and starting appropriate interventions at the age of six months (Nugraha et al., 2022; Delianti et al., 2023). Hearing screening examinations need to be carried out on infants or children before the age of 2 years so that early detection and intervention can be carried out, considering that the best brain development occurs at the age of 2-4 years (Halim et al., 2021).

Methods

This study is a Cross-sectional Observational Study because the independent variables and dependent variables are taken at one time. The data taken are in the form of a description of the OAE results and respondent characteristic data. This study was conducted at the Padanglampe Health Center, Pangkep Regency, South Sulawesi Province, from January 2021 to December 2021. The target population of this study were infants under 24 months old. The accessible population of this study were infants under 24 months old who came to the Padanglampe Health Center when the study was conducted. Where the sampling time was adjusted to the immunization schedule carried out by the health center. The sample was all accessible populations that met the research criteria with the accidental sampling method. The data that had been collected was then grouped based on the purpose and type of data, then analyzed using a calculator.

Result and Discussion

Table 1. Respondent Characteristics

Gender	**Percentage (n=9)**
Male	44.44% (4)
Female	55,55% (5)
Age	**Percentage (n=9)**
0-12 Months	88.88% (8)
12-24 Months	11.11% (1)

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From the results obtained, there were research subjects consisting of 4 male people (44.44%) and 5 female people (55.55%). The age of the respondents who participated was less than 12 months as many as 8 people and more than 12 months as many as 1 person.

Table 2. Oae Measurement Results

OAE Results	Refer	Pass
Gender		
Male	-	44.44% (4)
Female	11.11% (1)	44.44% (4)
Total	**1**	**8**
OAE Results	**Refer**	**Pass**
Age		
< 3 Months	11.11% (1)	22.22% (2)
3 Months - <6 Months		11.11% (1)
6 Months – <12 Months		44.44% (4)
12 Months – 24 Months		11.11% (1)
Total	**1**	**8**

The results obtained from OAE measurements based on gender are 1 person with female gender has a refer measurement result and 4 other females have pass measurement results. For male research subjects, there are 4 people all have pass measurement results.

For OAE results based on the age of the research subjects, in the age range of less than 3 months there was 1 research subject who had a refer measurement result and 2 people with a pass measurement result. In the age range of 3 to less than 6 months there was 1 research subject who had a pass measurement result. In the age range of 6 months to less than 12 months there were 4 research subjects who had a pass measurement result. In the age range of 12 months to less than 24 months there was 1 research subject with a pass measurement result.

There was 1 child (11.11%) aged less than 3 months who had a referral result. The same thing was also found at the Hearing and Communication Center of the Community ENT Division of the Faculty of Medicine, Airlangga University/ Dr. Soetomo Hospital, Surabaya, identifying outpatients with profound SNHL hearing loss in 2004 aged less than 3 months as many as 191 people and children aged less than 5 months as many as 228 people.

In a study conducted by Rini Andriani in 2010, it was found that the group of subjects who experienced hearing loss were male compared to female with a ratio of 2.5:1, where the majority were under 3 months old (57.1%) and had more than 3 risk factors (85.7%). [(2)]

In a study conducted by Anthony Stephen Halim in 2021, it was found that out of 872 medical records studied, 558 (64.0%) were boys and 314 (36.0%) were girls. The majority (44.8%) of children with speech delays were in the 2-year-old age group. Children with speech delays accompanied by hearing loss numbered 565 (64.8%) people and those without hearing loss were 307 (35.2%). The majority (48.0%) of children with speech delays had profound hearing loss. There was an increase in children with speech delays without hearing loss compared to those with hearing loss from 1:2.04 in 2017 to 1:1.12 in 2020. [(10)]

Conclusion

Conclusion: There was 1 child who had a referral result in the examination using OAE from a total of 9 people who were examined. The age range of children who had referral results was less than 3 years with female gender. The age of the babies who were examined varied, including 3 children aged less than 3 months, 1 child aged 3 months to less than 6 months, 4 children aged 6 months to less than 12 months and 1 child aged 12 months to less than 24 months.

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Suggestion: It is necessary to increase the age of children for sampling and the location of sampling. It is necessary to increase the number of samples and continuous research time for more optimal results.

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