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DESCRIPTION OF DISEASES SUFFERED BY MOTHERS AND CHILDREN AT THE AGE OF 0-3 YEARS WITH HEARING LOSS AT MARGONO SOEKARJO PURWOKERTO HOSPITAL

GAMBARAN PENYAKIT YANG DIDERITA IBU DAN ANAK PADA USIA 0-3 TAHUN DENGAN GANGGUAN PENDENGARAN DI RSUD MARGONO SOEKARJO PURWOKERTO

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ABSTRACT

Hearing loss is difficult to detect in infants and children. It can inhibit cognitive, emotional, language, and communication development. Therefore, hearing loss needs to be immediately examined to minimize its impacts. It is essential to recognize the disease suffered by infants and children, especially those with a history of hearing loss during the pranatal, perinatal, and postnatal periods for early examinations. This study aimed to evaluate diseases characteristic suffered by children with hearing loss aged 0-3 years at RSUD Margono Soekarjo, Purwokerto. This research was descriptive, using secondary data. The analysis used was univariate. Hearing loss in children during; the pranatal (15.4%) could be caused by a family history of the disease, TORCH infection, and preeclampsia; during the perinatal (70,3%) could be caused by low birth weight, prematurity, hyperbilirubinemia, and neonatal asphyxia, and; during the postnatal period (14.3%) could be caused by the use of mechanical ventilators and febrile seizures. The disease character in children aged 0-3 years with hearing loss at RSUD Margono Soekarjo Purwokerto are disease during pranatal, perinatal, and postnatal periods.

Keywords*: hearing loss, disease overview, pranatal, perinatal, postnatal*

ABSTRAK

Gangguan pendengaran sulit dideteksi pada bayi dan anak-anak. Ini dapat menghambat perkembangan kognitif, emosional, bahasa, dan komunikasi. Oleh karena itu, gangguan pendengaran perlu segera diperiksa untuk meminimalisir dampaknya. Penting untuk mengenali penyakit yang diderita bayi dan anak, terutama yang memiliki riwayat gangguan pendengaran pada masa pranatal, perinatal, dan pascanatal untuk melakukan pemeriksaan dini. Penelitian ini bertujuan untuk mengevaluasi karakteristik penyakit yang diderita anak gangguan pendengaran usia 0-3 tahun di RSUD Margono Soekarjo, Purwokerto. Penelitian ini bersifat deskriptif dengan menggunakan data sekunder. Analisis yang digunakan adalah univariat. Gangguan pendengaran pada anak selama; pranatal (15,4%) dapat disebabkan oleh riwayat penyakit dalam keluarga, infeksi TORCH, dan preeklampsia; pada masa perinatal (70,3%) dapat disebabkan oleh berat badan lahir rendah, prematuritas, hiperbilirubinemia, dan asfiksia neonatal, dan; selama masa nifas (14,3%) dapat disebabkan oleh penggunaan ventilator mekanik dan kejang demam. Karakter penyakit pada anak usia 0-3 tahun dengan gangguan pendengaran di RSUD Margono Soekarjo Purwokerto adalah penyakit pada masa pranatal, perinatal, dan postnatal.

Kata Kunci: gangguan pendengaran, gambaran penyakit, pranatal, perinatal, postnatal

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INTRODUCTION

Hearing loss is one of the problems that is difficult to notice in the first place in infants and children. In the period of neonates up to the age of two years is an important period of hearing development. Hearing loss, especially during neonates, can cause problems, especially children's development, both cognitive, communication, language, and emotions. Early detection is carried out to minimize the consequences of disorders that can appear in children (Susyanto, 2015).

The World Health Organization (WHO) said that about 5.3% of the world's population or about 360 million people suffer from hearing loss. In addition, WHO data shows that 3.4 million children (2%) in the Asia Pacific region, including Indonesia, experience hearing loss (Rahayuningrum, 2016). Based on Riskesdas data in 2013, the incidence of congenital deafness occurred in 1-2 births which are generally sensorineural ranging from mild to very severe degrees (Ministry of Health, 2019).

The first three years become an important and critical process in the child's hearing development. This is based on maximum brain plasticity in the first 1000 days of life will develop faster than the aftermath which becomes a golden period for hearing screening

(Amalia, 2018). The majority of parents come to check their children because they suspect that there is a delay in speech in their children when the child is over two years old which is the phase when the child starts to string words together (Rahayuningrum, 2016).

Early detection of hearing loss events is very important to do. According to Tanuwijaya et al. In 2020, the risk factors for hearing loss in infants in general can be divided into prenatal, perinatal, and postnatal factors. The percentage of prenatal risk factors obtained in the study was a family history of hearing loss (1.8%), TORCH infection in the mother (23.2%), preeclampsia (15.3%), and gestational diabetes (3.9%). Perinatal or natal risk factors for patients were prematurity (63.6%), low birth weight (BBLR) (67.7%), asphyxia (18.7%), and hyperbilirubinemia (36.9%). Postnatal risk factors were the use of mechanical ventilation (1.8%) and the incidence of febrile seizures in infants (5.5%).

Hearing loss should be watched out for from the initial examination both before birth, at birth and post-birth. The American Academy of Pediatrics (AAP) recommends that for all neonates, especially those with hearing loss risk factors, screening should be carried out with a method that can detect all babies with bilateral hearing loss (Rundjan et al., 2016). Generally, hearing loss in infants is a sensorineural type and is bilateral with the majority of disorders having severe to very severe degrees (Jauhari, 2020).

Early detection is carried out with the right methods and tools so that it can indicate the presence of hearing loss. Some of the auditory checks that can be done on babies include Otoacoustic Emission (OAE) and Auditory Brainstem Responses (ABR)/ Brainstem Evoked Response Audiometry (BERA). The choice of method is because both have the advantages of being fast and easy to do, not invasive, sensitif detecting hearing loss and not expensive. (Ferdiansyah, et al,2014).

The search for risk factors with early detection is important because the auditory function has an important role in the child's developmental stage, especially in the speech process and supporting other developmental processes. Early detection and search for risk factors can minimize the incidence of hearing loss (Azwar, 2013). Based on this, researchers are interested in conducting research on the picture of diseases suffered by mothers and children at the age of 0-3 years with hearing loss at Margono Soekarjo Purwokerto Hospital.

METHODS

This study is an observational descriptive study that aims to determine the frequency distribution of disease data suffered by mothers and children with hearing loss at the age of 0-3 years. The research data was obtained from secondary data in the form of medical records of patients who were examined for hearing loss at Margono Soekarjo Regional Hospital. Sample selection using the total sampling method in patients who were examined and met the inclusion and exclusion criteria that had been determined in the period January 2021 to December 2022 with a total of 42 subjects. Hearing loss is measured using BERA or OAE examination and disease data is obtained from the patient's medical records. The results of the study were processed using frequency distribution tables and histograms using statistical SPSS applications.

RESULTS

This research has received approval from the FK Unsoed Research Ethics Commission as stated in the Ethics Research Approval with number 012 / KEPK / PE / IX / 2022. Research data collection has been carried out in December 2022 at the ENT Poly (Throat Nose Ear) and medical records of Margono Soekarjo Purwokerto Hospital. The subjects were obtained from patients who were subjected to hearing examination with a

total of 42 people. The data obtained in this study are presented in the form of univariate analysis which includes the distribution of age frequency, sex, and disease picture with the percentage of each variable.

Table 1. distribution of sex recurrence

Gender	Frequency (n)	Percentage (%)
Men	20	47,6
Woman	22	52,4
Total	42	100

(Source: Primary Data)

The study data was taken from 42 people with sex distribution according to table 1 which showed that the number of female patients was more, namely 22 people (52.4%) and male patients by 20 people (47.6%).

Table 2. distribution of age recurrence

Age	Frequency (n)	Percentage (%)
0 – 28 Days	0	0
1 – 11 Months	23	54,7
12 – 36 Months	19	45,3

(Source: Primary Data)

Table 2 shows that the patients examined are divided according to the age division criteria according to Permenkes number 25 of 2014 concerning child health efforts. The table shows the age of 0-28 days and no data on patients who conducted examinations at that age (0.0%). The most age group in this study was 1-11 months of age as many as 23 people (54.7%). The age group of 12-36 months amounted to 19 people (45.3%).

Table 3. Distribution of Disease Description Recurrence

Description of the disease		Frequiency (n)	Percentage (%)
Prenatal	Family History of Disease	1	1.1
	TORCH infection	10	11.0
	Pre Eclampsia	3	3.3
	Total	14	15,4
Perinatal	Prematurity	17	18.7
	Low Birth Weight	21	23.1
	Hyperbilirubin	16	17.6
	Neonatal Asphyxia	10	11.0
	Total	64	70,3
Postnatal	Use of Mechanical Ventilators	8	8.8
	Febrile Seizures	5	5.5
	Total	13	14,3

(Source: Primary Data)
Description: n = Number of risk factors, % = cumulative percentage

The description in Table 1 shows that the prenatal disease picture occurred in 14 cases (15.4%) consisting of a family history of 1 case (1.1%), preeclampsia 3 cases (3.3%), and the most was TORCH infection with 10 cases (11%). The picture of perinatal disease

is the most numerous, namely 64 cases (70.3%) consisting of 17 cases of prematurity (18.7%), hyperbilirubinemia 16 cases (17.6%), neonatal asphyxia 10 cases (11%), and the most is low birth weight which is 21 cases (23.1%). The picture of postnatal disease is the least common disease in the subject, namely 13 cases (14.3%) consisting of the use of mechanical ventilators in 8 cases (8.8%) and febrile seizures in 5 cases (5.5%). Based on these results, it was found that low birth weight was the most common disease, namely 21 cases (23.1%).

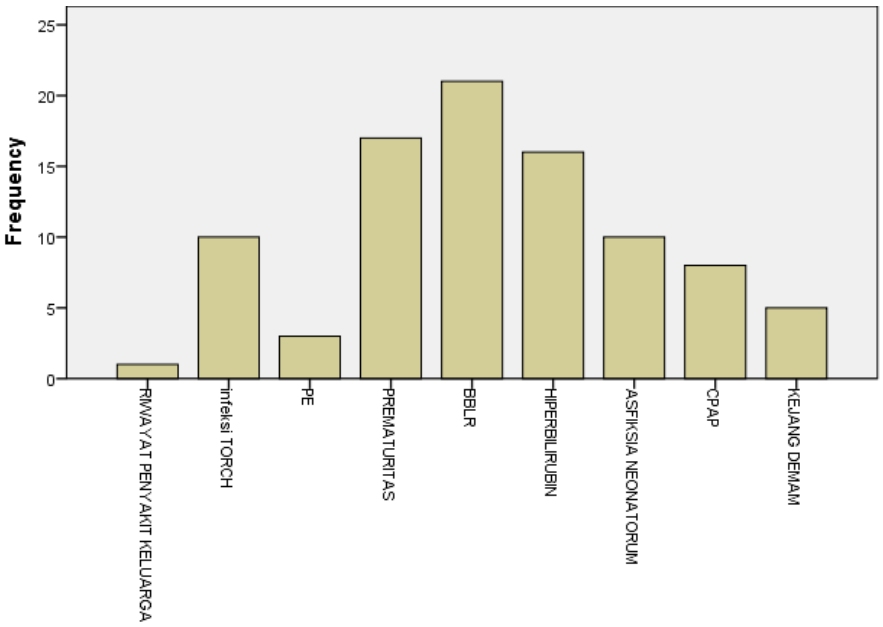

Figure 1. Histogram of disease picture frequency (Source: Primary Data)

DISCUSSIONS

This research is a study on the picture of diseases that occur in children both before birth, at birth, and after birth. The picture of the disease in children 0-3 years old can be divided into prenatal, perinatal and postnatal. Descriptions of diseases in the prenatal period include a family history of hearing loss, TORCH infection, and preeclampsia. Descriptions of diseases in the perinatal period include prematurity under 32 weeks of age, jasteric or hyperbilirubinemia, neonatal asphyxia and low birth weight (BBLR) with a body weight below 2000 grams. The picture of the disease in the postnatal period is the use of mechanical ventilation and febrile seizures. Description of the most common diseases that occur in children with hearing loss due to perinatal disorders in neonates (Tanuwijaya, *et al*, 2020).

The characteristics of patients according to gender found that the female sex was most found in this study by 22 people (52.4%). This is in line with research conducted by Xuewen in 2021 that the prevalence of hearing loss is more prevalent in female subjects than men (Xuewen & Gao, 2021). In contrast to the study conducted by Rahayuningrum conducted in 2016 which stated that the prevalence of hearing loss is higher in patients with the male sex. However, there was no significant association between sex and hearing loss. This happens because there are still unknown differences in ear anatomy and genetics between men and women (Rahayuningrum, 2016).

The age group of patients in this study was most commonly found in the age group of 1-11 months, namely 23 people out of 42 people (54.7%). Another age group obtained in this study was 12-36 months, namely 19 people (45.3%). This is different from the research conducted by Purnami in 2018 which found that the age group of 12-36 months was more likely to reach 62.86% of the subjects studied at RSUP dr. Soetomo (Purnami, 2018). Meanwhile, according to the Indonesian Pediatric Association, babies with high risk are made efforts to anticipate hearing loss. Early detection of hearing loss is carried out in two stages, namely the first 48 hours of life when the newborn uses OAE and at the age of 3 months, OAE diagnostic and BERA are carried out. Hearing loss examination in Indonesia in all newborns either with high risk or without risk cannot be done due to limited facilities (Grentina, 2016).

The examination of hearing loss in children in Indonesia is widely carried out in children who are starting to enter the age of speech. The majority of pediatric patients who come to have a hearing examination have experienced speech and language impairment. This is due to the lack of knowledge of parents and health workers in early recognition of signs and indications for hearing loss examinations. Examination and early recognition of hearing loss can prevent worsening speech and language development in children (Dewi, 2011).

The standard age for optimal hearing loss diagnosis according to the *Joint Committee on Infant Hearing* (JCIH) should have been carried out at less than three months of age with rehabilitation efforts starting at 6 months of age. In this study, it was found that the majority of patients had been examined in the age group of 1-11 months (54.7%) which was close to the optimal standard set (*Joint Committee on Infant Hearing,* 2019). If an early diagnosis is not possible, hearing loss can experience poor progressivity as the child ages. This will complicate the development of speech and language skills in children (Centers for Disease Control, 2022).

The results showed that the picture of the disease that occurred during the perinatal period was the highest disease picture with 64 cases (70.3%). This is in line with Tanuwijaya's research in 2020 which stated that the picture of perinatal disease is a picture of the disease with the highest cases in pediatric patients in the poly audiology of RSUP dr Soetomo. The description of perinatal disease has the highest proportion due to the high cases of prematurity, BBLR, hiperbilirubinemia, and neonatal asphyxia compared to cases in diseases in the prenatal and postnatal period (Tanuwijaya, *et al*, 2020).

Based on univariate analysis, the disease with the highest number of diseases was obtained, namely low birth weight of 21 cases (23.1%). This is in line with Rahayuningrum's research in 2016 which stated that low birth weight weighing less than 2500 grams is the most common disease in pediatric patients with hearing loss at Kariadi Hospital Semarang. Patients with low birth weight can cause inability to develop organs optimally, especially in the organs of hearing so that it can cause hearing loss (Rahayuningrum, 2016).

The disease in the perinatal period with the second highest number of all diseases found in this study was prematurity with 17 cases (18.7%). In this study, it was found that the average age of prematurity was around 33 weeks of gestation. Children with prematurity have suboptimal levels of auditory maturity in peripheral pathways and neural pathways. The auditory neural pathway develops at 20-33 weeks gestation. So that children with prematurity can experience hearing loss caused by the inadequacy of cochlear hair

cells both anatomically and physiologically (Marliyawati, 2021). Hearing loss in infants with prematurity is often associated with other diseases such as low birth weight, craniofacial abnormalities, and the use of mechanical ventilation for a minimum of 5 days (Wroblewska-Seniuk, *et al*, 2017).

Hyperbilirubinemia is a disease in the perinatal period with a total of 16 cases (17.6%). According to Sarosa's research in 2016 Hyperbilirubinemia increases the risk of hearing loss events. This occurs due to the susceptibility of auditory nerves to high exposure to bilirubin toxin in neonates with levels of more than 12 mg / dL. Hyperbilirubinemia can result in bilirubin crossing the blood brain barrier so that it can cause kernicterus and interfere with the cochlear and vestibular nucleus (Sarosa, 2016).

The disease in the perinatal period with the least number found is neonatal asphyxia with a total of 10 cases (11%). According to Sarosa's research in 2016, it is stated that the incidence of severe asphyxia with an apgar score of less than four is a factor that affects the incidence of hearing loss in infants age less than one month. neonatal asphyxia can be associated with hearing loss because lack of oxygenation and tissue perfusion in patients can cause cochlear damage. This damage is caused by the process of cell death through the mechanism of *selective neuronal necrosis* and apoptosis of hair cells, spiral ganglion cells, and marginalis cells of the vascular stria (Sarosa, 2016).

The picture of prenatal disease in the form of a family history of hearing loss, TORCH infection, and preeclampsia has a total of 14 cases (15.4%). The incidence of prenatal risk factors shows quite low results. This is in accordance with research conducted by Susyanto in 2015 which stated that the diseases suffered by children in the prenatal period have a fairly small number and are outside of the four most diseases found (Susyanto, 2015). Hearing loss that is suspected to be related to diseases in the prenatal period occurs due to disturbances during the organogenesis process that occurs when the fetus is intrauterine which damages cochlear hair cells so that it can cause hearing loss in children with diseases in the prenatal period (Purnami, 2018).

Family disease history is a disease in the prenatal period with the least number found in this study, which is only 1 case (1.1%). This is in accordance with research conducted by Susyanto in 2015 that family history of disease is also the disease with the smallest percentage found in the study 1.2% of all cases (Susyanto, 2015). This is in contrast to a study conducted by Koffler, *et al* in 2015 which stated that 50% of hearing loss cases in general are caused by a history of These families and the majority of existing cases are from developing countries. Hearing loss due to a family history is caused by mutations and pathological genetic variations both occurring syndromically with other clinical and non-clinical symptoms syndromeic. The most common syndromeic deafness is Pendred and Usher syndromes resulting from the mutation of the SLC26A4 gene. Meanwhile, nonsyndromic deafness is most commonly caused by heredity that occurs autosomally dominant, autosomal recessive, *X linked*, and mitochondrial (Koffler et al, 2015).

TORCH infection was the most common prenatal disease found in this study in 10 cases (11%). TORCH infection can cause inflammation and edema of the corti, cochlea, and spiralis ganglion organs. Such events can cause damage to anatomical structures and malformations of the central nervous system that can affect hearing ability. According to research conducted by Rahayuningrum in 2016 TORCH infection in the prenatal period has no relationship with the incidence of hearing loss (Rahayuningrum, 2016).

Another prenatal disease found in this study was preeclampsia in pregnancy with a total of 3 cases (3.3%). Preeclampsia can cause damage to hair cells in the cochlea

causing hearing loss. This occurs because complex pathogenesis processes including arterial spasm, microthrombus and peripheral tissue ischemia that occur continuously in pregnancy cause a lack of nutrients and oxygen received by the fetus. According to research conducted by Altuntas, *et al* in 2012 the incidence of preeclampsia is not statistically related to the incidence of hearing loss in children born to mothers with preeclampsia (Altuntas, *et al*, 2012).

The picture of the disease in the postnatal period according to the univariate analysis carried out showed the lowest results, namely 13 cases (14.3%). The picture of the disease in the postnatal period consists of the use of mechanical ventilators and febrile seizures with 5 cases (5.5%). This is in accordance with research conducted by Tanuwijaya in 2020 which obtained the results of the disease picture in the postnatal period having the least number (Tanuwijaya, *et al*, 2020)[9]. The results of this univariate analysis are also in accordance with research by Susyanto in 2015 which showed that the use of mechanical ventilation was the case with the highest number of postnatal disease images (Susyanto, 2015).

The highest number of postnatal diseases was the use of mechanical ventilators with 8 cases (8.8%). The use of mechanical ventilators in infants is aimed at patients with pulmonary function that cannot be optimal so that they need treatment with this tool. The use of mechanical ventilation for more than five days is a factor associated with the incidence of hearing loss. Ventilators work by pumping positive pressure air into the lungs at the time of inspiration (Susyanto, 2015). This condition if it occurs for a long time can cause complications in the form of bronchopulmonary dysplasia and respiratory distress which can lead to damage to sensory cells in inner ear due to increasing oxygen levels (Tanuwijaya, *et al*, 2020).

Febrile seizures in this study found a total of 5 cases (5.5%) as a disease in the postnatal period. Febrile seizures can be caused by many factors such as viral or bacterial infections such as meningitis, meningoencephalitis, and sepsis as well as the incidence of brain or metabolic injuries and poisoning. Prolonged febrile seizures can cause complications in the form of epilepsy in a child. This condition can risk nerve damage in the brain specifically in the area of the mesial temporal lobe related to hearing function. This can cause sensorineural hearing loss in children (Tanuwijaya, *et al*, 2020)

CONCLUSION

The description of the disease in mothers and children aged 0-3 years with hearing loss at Margono Soekarjo Hospital which was found was a disease in the prenatal period, namely TORCH infection, preeclampsia, and a family history of disease. Diseases in the perinatal period are low birth weight, prematurity, hyperbilirubinemia, and neonatal asphyxia. Diseases in the postnatal period are the use of mechanical ventilation and febrile seizures.

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