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Determinant Analysis of Early Neonatal Mortality at the Datu Beru Takengon General Hospital, Central Aceh Regency, in 2022

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ABSTRACT

Background: Attention to efforts to reduce neonatal mortality is important because neonatal mortality contributes to 74% of under-five deaths in Aceh. Of all neonatal mortality, 81% occurred in the 0-6 day age group (early neonates). This study aims to determine the analysis of the determinants of early neonatal mortality at the Datu Beru Takengon General Hospital, Central Aceh Regency. **Methods:** The research design is an observational case-control approach. 84 case subjects and 84 control subjects were included in this study. Univariate, bivariate, and multivariate data analysis was performed to determine the determinants of early neonatal mortality, $p < 0.05$. **Results:** Asphyxia increases the risk of premature neonatal mortality by 6.8 times. Low birth weight infants increase the risk of early neonatal by 8.4 times. Prematurity increases the risk of early neonatal mortality by 7.1 times. A parity of more than 3 times increases the risk of early neonatal mortality by 8.9 times, and maternal gestational age of fewer than 20 years increases the occurrence of early neonatal mortality by 14.2 times. **Conclusion:** Asphyxia, low birth weight, prematurity, parity with risk, and a young mother's gestational age are risk factors that contribute to early neonatal mortality.

1. Introduction

Early neonatal mortality period is caused by various risk factors, including socioeconomic level associated with the incidence of low birth weight, quality of prenatal care, occupation, maternal age, parity, smoking status in pregnant women, complications during pregnancy, asphyxia, infection, congenital defects, birth trauma, and others.^{1,2} Research related to the determinants of early neonatal mortality has also been carried out, which shows that there are several factors that influence the determinants of early neonatal mortality, namely maternal gestational age, Apgar scores at 1 minute after birth and 5 minutes after birth, and low birth weight.³ The pattern of causes of neonatal mortality in

Indonesia is not much different from the pattern of causes of neonatal mortality in the world, namely due to prematurity and low birth weight 34%, asphyxia 37%, sepsis 12%, hypothermia 7%, blood disorders or jaundice 6%, post maturity 3% and 1% of congenital abnormalities.⁴

The Neonatal mortality rate in Aceh is 7 per 1,000 live births, with the number of neonatal mortality as many as 734 cases. Attention to efforts to reduce neonatal mortality is important because neonatal mortality contributes to 74% of under-five deaths in Aceh.² So, it is necessary to prevent and reduce neonatal mortality through health promotion efforts to pregnant women and couples of childbearing age to

better prepare for their pregnancies so that prevention efforts can be carried out early. This study aims to determine the determinants that affect early neonatal mortality at the Datu Beru Takengon General Hospital, Central Aceh Regency, Indonesia.

2. Methods

The study design is an analytical observational study with a case-control approach. The data used are secondary data obtained from the medical records section of the Datu Beru Takengon General Hospital, Central Aceh Regency, Indonesia. A total of 84 medical records of neonates died, and as a control group, as many as 84 medical records of live neonates, where gender matching was performed. This study was approved by the Health Research Ethics Committee of the Health Polytechnic of the Ministry of Health, Aceh, Indonesia.

Sociodemographic data, history of asphyxia, low birth weight (LBW), prematurity, parity, and maternal age were used as test variables in this study. Asphyxia was determined by using the APGAR score. Low birth weight (LBW) is a infant born weighing less than 2500

grams. Premature is a infant born at less than 37 weeks of gestation. Parity at risk is parity that is more than 3 times. Maternal gestational age is considered young if it is less than 20 years. Data analysis was carried out with the help of SPSS version 25 software. Univariate analysis was carried out to describe the frequency distribution of data from each variable. Then, bivariate and multivariate data were analyzed to determine the risk factors associated with early neonatal mortality, $p < 0.05$.

3. Results

Table 1 shows the analysis of the determinants of factors that influence early neonatal mortality. Asphyxia increases the risk of premature neonatal mortality by 6.8 times. Low birth weight infants increase the risk of early neonatal mortality by 8.4 times. Prematurity increases the risk of early neonatal mortality by 7.1 times. A parity of more than 3 times increases the risk of early neonatal mortality by 8.9 times, and maternal gestational age of fewer than 20 years increases the occurrence of early neonatal mortality by 14.2 times.

Table 1. Analysis of the relationship between variables with neonatal mortality.

Variable	Neonatal mortality (Frequency (%))	Neonates Alive (Frequency (%))	p-value*	OR (95%CI)*
Asphyxia	18 (21.4)	6 (7.1)	0.001	6.8 (2.3-20.5)
No asphyxia	66 (78, 6)	78 (92.9)		
LBW	23 (27.4)	7 (8.3)	0.000	8.4 (3.1-23.3)
No LBW	61 (72.6)	77 (91.7)		
Premature	12 (14.3)	4 (4.8)	0.003	7.1 (1,9-26.3)
Not Premature	72 (85.7)	80 (95.2)		
Risky parity	21 (25)	6 (7.1)	0.000	8.9 (3.0-26.2)
Parity is not risky	63 (75)	78 (92.9)		
Age of pregnant women < 20 years	10 (11.9)	2 (2.4)	0.001	14.2 (2.8-72.9)
Pregnant women aged 20-35 years	74 (88.1)	82 (97.6)		

*Logistic regression analysis, $p < 0.05$

4. Discussion

Infants are said to be asphyxiated if there are pathological changes caused by a lack of oxygen in the breathing air resulting in hypoxia and hypercapnia. If this process lasts too long, it can result in brain damage and death. Asphyxia can also affect the

function of other vital organs. The incidence of perinatal asphyxia in developed countries ranges from 1.0-1.5%, depending on gestational age and birth weight. Every year about 144/900 infants are born with asphyxia. Infants who experience asphyxia cannot breathe spontaneously and regularly

immediately after birth, and asphyxia usually occurs due to the lack of ability of the infants's organs to carry out their functions, such as the development of the infants's lungs. Asphyxia causes the infants to experience a rapid decrease in heart rate, the body becomes blue or pale, and the reflexes weaken until they disappear slowly and, if not treated quickly and appropriately, will cause death in the infant.⁵⁻⁹

Infants with low birth weight are one of the complications in infants, which, if not handled properly, can cause death. Infants with low birth weight may be dysmatured (LBW is not appropriate for gestational age) and may also be premature or preterm. The survival of infants born in the early neonatal period is closely related to birth weight, and this is related to the growth and maturation of organs and body organs that are not yet perfect. As a result, infants with low birth weight often experience complications that end in death. Infants with premature in addition to organs that have not functioned perfectly, often happen that premature infants are not able to drink properly. This is because the suction reflex is still weak. The suction reflex is obtained after the gestational age reaches 36 weeks. So, premature infants with gestational age under 36 weeks need special care to help their nutritional intake. The higher the parity, the higher the risk of perinatal mortality because, at the time of delivery, the blood vessels in the damaged uterine wall cannot fully recover as before delivery. Therefore, repeated pregnancy and childbirth cause damage to the blood vessels in the uterine wall. And more and more will affect the circulation of food to the fetus and can cause disturbances and obstacles to the growth of the fetus in the womb.¹⁰⁻¹⁵

Pregnant women at a young age in terms of the biological development of reproductive organs are not fully optimized. From a psychological point of view, they are immature in dealing with moral, mental, and emotional burdens. From an economic point of view, they are not ready to be independent, and from a medical point of view, they often have health problems. While in pregnant women with old age, the function of

the reproductive organs has decreased, so it is feared that it will interfere with the condition of the fetus they contain. Maternal age is one of the factors that influence early neonatal mortality.¹⁶⁻¹⁹

5. Conclusion

Asphyxia, low birth weight, premature birth, parity, and maternal age are risk factors that contribute to early neonatal mortality.

6. References

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