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Factors related to neonatal asphyxia at Adjidarmo Hospital Rangkasbitung Lebak Banten

Shinta Novelia*, Yenny Aulya, Syifa Aulia Rahmawati

Fakultas Ilmu Kesehatan Universitas Nasional
*Corresponding author. E-mail: shinta.novelia@civitas.unas.ac.id

Abstract

Background: According to who the infant mortality rate in Indonesia ranks fourth highest. The highest contributor to neonatal mortality is 335 per 1,000 live births. One of the complications of Neonatal death is due to Asphyxia.
Purpose: To determine the factors associated with the occurrence of asphyxia neonatorum at Dr. Adjidarmo Hospital
Method: An analytical survey research design with cash control approach. The sample in this study is 119 case respondents (asphyxia) and 119 (without asphyxia). The sampling technique is simple random sampling. The instrument is a medical record which records the secondary data.
Results: Univariate analysis found that 149 respondents (62.6%) does not face Premature Rupture of Membrane (PROM), 172 infants are not low birth weight (72.3%), 174 respondents (73.1%) are not prolong labour an delivery 192 infants (80.7 %) are not premature, 134 respondents are (56.3%) not preeclampsia, 126 respondents (52.9%) are Cesarean Section women, and 185 respondents (77.7%) are not anemic. The results of the chi-square test showed that all independent variables had a relationship with the incidence of neonatal examination including premature rupture of membranes ($p = 0.011$), LBW ($p = 0.000$), prolonged birth ($p = 0.009$), preeclampsia ($p = 0.037$), type of birth ($p = 0.009$), premature ($p = 0.001$), and anemia ($p = 0.019$).
Conclusion: There is a relationship between PROM, LBW, prematurity, prolonged birth, preeclampsia, type of delivery, and anemia with the incidence of neonatal asphyxia. It is recommended that pregnant women carry out pregnancy screening and routine ANC to detect early possible neonatal asphyxia.

Keywords: Neonatal Asphyxia; Premature rupture of membranes; Low birth weight; Premature; preeclampsia; Anemia.

INTRODUCTION

Sub-Saharan Africa had the highest neonatal mortality rate in 2018 with 28 deaths per 1,000 live births, followed by Central and South Asia with 25 deaths per 1,000 live births. The majority of all neonatal deaths (75%) occur during the first week of life, and approximately 1 million newborns die within the first 24 hours. Premature birth, intrapartum-related complications (birth asphyxia or lack of breathing at birth), infections and birth defects accounted for the majority of neonatal deaths in 2017 (World Health Organization, 2018).

Ensuring healthy lives and promoting well-being for all Ages is the third goal of the *Sustainable Development Goals* (SDGs) which is a set of targets related to future international development. Globally, 23% of neonatal deaths are associated with asphyxia neonatorum. The third SDGs goal is regarding health and well-being, the first target is to reduce maternal mortality to below 70 per 100,000 live births (LB) and the second

target is to end infant and under-five mortality, by reducing the neonatal mortality rate to 12 per 1000 KH by 2030, (Barudin, 2016; Bangun, Abdiana, & Edison, 2019)

The survey results show the Neonatal Mortality Rate is 15 per 1,000 live births. Neonatal Mortality Rate (NMR) is the number of deaths of infants aged less than 28 days (0-28 days) pier 1,000 live births within one year. The number of neonatal deaths in Banten Province in 2016 was 874 per 1,000 live births. The district/city with the highest number of neonatal deaths was Lebak, which was 335 per 1,000 live births, followed by Pandeglang with 200 per 1,000 live births, and Serang Regency at 141 per 1,000 live births. Complications that are the biggest cause of neonatal death are asphyxia, low birth weight babies and infections (Pemerintah Daerah Khusus Ibukota Jakarta, 2017).

Asphyxia is a condition of newborns who fail to breathe spontaneously and regularly immediately after birth, so that the baby cannot breathe oxygen and cannot excrete carbon dioxide in his body, so that it can reduce O2 (oxygen) and increase CO2 (carbon dioxide). can have bad consequences in later life (Ningtyas, 2011 ; Dewi, 2010).

Asphyxia neonatorum, in addition to its high prevalence, also causes abnormalities in physical and mental development in later life, such as cerebral palsy, mental retardation, epilepsy and learning disabilities. To prevent asphyxia in infants, it is hoped that health workers will improve services by performing intrauterine resuscitation such as positioning the mother on her left side, giving oxygen, infusion with glucose fluid for additional maternal energy (Aisyiah, Lubis, & Kurnia, 2014; Ekasari, 2015) .

Factors causing neonatal asphyxia are: a) prenatal factors such as: maternal age, preeclampsia and eclampsia, socioeconomic, history of previous birth asphyxia, b) intranatal factors such as fetal presentation, delivery by cesarean section, general anesthesia during cesarean delivery sectio, delivery, vacuum extraction, forceps, umbilical cord prolapse, and premature rupture of membranes, c) Infant factors, including low birth weight, prematurity, expiration date, polyhydramnios, and intrauterine growth retardation (IUGR) (Aslam et al, 2014; Putri, Kurniati & Novelia, 2020; Novelia, Sia & Songwathana, P, 2017).

RESEARCH METHOD

The descriptive analytic survey or research to identify how and why health phenomena occur. Then analyze the dynamics of the correlation between phenomena or between risk factors and factors effect. The research design by case-control is an analytical study using a retrospective approach. The sample was taken of 238 cases by randomly selected, babies who had the experience of asphyxia and without experience asphyxia, also their mother medical record at Dr Adjidarmo Hospital, conducted in October–December 2019.

Shinta Novelia*, Yenny Aulya, Syifa Aulia Rahmawati

Fakultas Ilmu Kesehatan Universitas Nasional
*Corresponding author. E-mail: shinta.novelia@civitas.unas.ac.id

RESULTS

Table. Distribution of Demographic Characteristics N= 238

Variable	Asphyxia	Without Asphyxia	p-value	CI 95%
Mothers Age (Mean±SD)(Range) (Years)	(24.98±4.957) (18 - 36)	(25.18±4.737)(18-35)	0.000	0.268
Mothers Education (n/%)				
College	(13/11)	(12/10)	0.045	1.118
High School	(31/26)	(46/38.6)		
Junior High School	(47/39.5)	(43/36.2)		
Elementary School	(28/23.5)	(18/15.2)		
Mothers Employment (n/%)				
Civil Servants	(13/11)	(19/16.1)	0.019	1.243
Self-employed	(31/26)	(37/31.1)		
Laborers	(42/35.3)	(32/26.8)		
Housewives	(33/27.7)	(31/26)		
Economic Status (n/%)			0.041	2.349
Upper Class	(66/55.5)	(58/48.8)		
Middle Class	(31/26)	(29/24.4)		
Lower Class	(22/18.5)	(32/26.8)		
Mothers Diseases (n/%)				
Hypertension	(28/21.4)	(23/19.3)	0.005	0.768
Asthma	(14/8)	(19/16)		
Diabetes	(19/10.9)	(30/25.2)		
Etc	(58/59.7)	(47/39.5)		
Premature Rupture Of Membranes (n/%)				
PROM	(54/45.4)	(35/29.4)	0.011	1.994
Non PROM	(65/54.6)	(84/70.6)		
Low Birth Weight (n/%)				
Low Birth Weight	(51/42.9)	(15/12.6)	0.000	5.200
Not Low Birth Weight	(68/57.1)	(104/87.4)		
Birth (n/%)				
Prolonged Birth	(41/34.5)	(23/19.3)	0.009	2.129
Not Prolonged Birth	(78/65.5)	(96/80.7)		

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*Corresponding author. E-mail: shinta.novelia@civitas.unas.ac.id

Premature (n/%)				
Premature	(33/27.7)	(14/10.9)	0.001	3.129
Not premature	(86/72.3)	(106/89.1)		
Preeclampsia (n/%)				
Preeclampsia	(60/50.4)	(44/37)	0.037	1.733
Not preeclampsia	(59/49.6)	(75/63)		
Type of birth (n/%)				
Normal	(46/38.7)	(66/55.5)	0.009	0.506
sectio caesarea	(73/61.3)	(53/44.5)		
Anemia (n/%)				
Anemia	(34/28.6)	(19/16)	0.019	2.105
Not anemia	(85/71.4)	(100/84)		

Results Bivariate analysis is used to find the relationship between the independent variable and the dependent variable based on $p - value < 0.05$ (α) and displays an analysis of the value, percentage of $p - value$ and odds ratio (OR) on each variable.

From table, it is found that the demographic data of the respondents there are 238 people with the age range of respondents from 18-35 years. Respondents whose babies were affected by asphyxia from university education were 13 people (11%), high school 31 people (26%), junior high school 47 people (39.5%), and elementary school 28 people (23.5%), while respondents whose babies were not affected by asphyxia, from college education 12 people (10%), high school 46 people (38.6%), junior high school 43 people (36.2%), elementary school 18 people (15.2%), with p-value = 0.045, OR = 1.118. Occupation of respondents whose babies are affected by asphyxia, 13 civil servants (11%), 31 entrepreneurs (26%), 42 workers (35.3%), household workers 33 people (27.7%), and occupation of respondents whose babies are not affected by asphyxia, civil servants 19 people (16.1%), Entrepreneurs 37 people (31.1%), Labor 32 people (26.8%), household members 31 people (26%), with p-value = 0.019, OR = 1.243. Economic status of respondents

whose babies are affected by asphyxia, upper class 66 people (55.5%), middle class 31 people (26%), lower class 22 people (18.5%), and baby respondents who are not affected by asphyxia, upper class 58 people (48.8%), Middle class 29 people (24.4%), Lower class 32 people (26.8%), with p-value = 0.041, OR = 2.349. Congenital diseases of respondents whose babies were affected by asphyxia, hypertension 28 people (21.4%), asthma 14 people (8%), diabetes 19 people (10.9%), other 58 people (59.7%), and baby respondents who were not affected by asphyxia, Hypertension 23 people (19.3%), Asthma 19 people (16%), Diabetes 30 people (25.2%), Other 47 people (39.5%), with p-value = 0.005, OR = 0.768.

From 149 respondents (62.6%) who did not experience premature rupture of membranes, most of the respondents, namely 84 people (70.6%) were not asphyxiated. Of the 89 people (37.4%) who experienced premature rupture of membranes, most of the respondents, namely 54 people (45.4%) had neonatorum asphyxia. Based on the statistical test *Chi Square test* was obtained $p\ value = 0.011$ (*p-value* <0.05), it can be concluded that there is a significant correlation between the incidence of premature rupture of asphyxia neonatorum. From the analysis, the OR

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Fakultas Ilmu Kesehatan Universitas Nasional
*Corresponding author. E-mail: shinta.novelia@civitas.unas.ac.id

value was 1.994, meaning that mothers who experienced premature rupture of membranes had a 1.994 times greater chance of developing neonatal asphyxia than mothers who did not experience PROM.

Of the 172 respondents (72.3%) who did not experience LBW, most of the respondents, namely 104 people (87.4%) were not asphyxiated. Of the 66 respondents (27.7%) who experienced LBW, most of the respondents, namely 51 people experienced asphyxia. Based on the statistical Chi *Square test obtained p value* = 0.000 *(p-value <0.05)*, it can be concluded that there is a significant relationship between low birth weight infants with neonatal asphyxia. From the analysis, the OR value of 5.2 means that infants with LBW have a 5.2 times greater chance of developing asphyxia neonatorum compared to infants who do not have LBW.

Of the 174 respondents (73.1%) who did not experience prolonged birth, most of the respondents, namely 96 people (80.7%) were not asphyxiated. Of the 64 respondents (26.9%) who experienced prolonged birth, most of the respondents, namely 41 people (34.5%) experienced asphyxia. Based on the statistical Chi *Square test obtained p value* = 0.009 *(p-value <0.05)*, it can be concluded that there is a significant relationship between prolonged birth and the incidence of asphyxia neonatorum. From the analysis, it was found that the OR value was 2.194, meaning that mothers who experienced prolonged birth had a 2,194 times greater chance of developing neonatal asphyxia than mothers who did not experience prolonged birth.

Of the 192 respondents (80.7%) who were not premature, most of the respondents, namely 106 people (89.1%) were not asphyxiated. Of 46 respondents (19.3%) who experienced premature death, most of the respondents, namely 33 people (27.7%) experienced asphyxia. Based on the statistical test *Chi Square test* was obtained *p value* = 0.001 *(p-value <0.05)*, it can be concluded that there is a significant association between preterm with events asphyxia neonatorum in dr

Adjidarmo Rangkasbitung in 2019, of the analysis obtained OR value of 3129 means that the baby Those born prematurely have a 3,129 times greater chance of experiencing asphyxia neonatorum compared to non-premature babies.

Of the 134 respondents (56.3%) who did not have preeclampsia, most of the respondents were 75 (63%) who were not asphyxiated. Of the 104 respondents (43.7%) who had preeclampsia, most of the respondents, namely 60 (43.7%) had asphyxia. Based on the statistical test *Chi Square test obtained p value* = 0.037*(p-value <0.05)*, it can be concluded that there is a significant relationship between the incidence of preeclampsia with asphyxia neonatorum. From the analysis, the OR value was 1.733, meaning that mothers who had preeclampsia had a 1.733 times greater chance of developing neonatal asphyxia than mothers who did not have preeclampsia.

Of the 126 respondents (52.9%) who gave birth by sectio caesarea , most of the respondents, namely 73 people (61.3%) experienced asphyxia. Of the 112 respondents (47.1%) who gave birth normally, most of the respondents, namely 66 people (55.5%) did not experience asphyxia. Based on the statistical test *Chi Square test* was obtained *p value* = 0.009*(p value <0.05)*, it can be concluded that there is a significant relationship between the type of delivery with the incidence of asphyxia neonatorum in dr Adjidarmo Rangkasbitung in 2019, of the analysis obtained OR value of 0506 means that the mother who gave birth by cesarean section had a 0.506 times greater chance of developing asphyxia neonatorum compared to mothers who gave birth normally.

Of the 185 respondents (77.7%) who did not have anemia, most of the respondents were 100 people (84%) who were not asphyxiated. Of the 53 respondents (22.3%) experienced anemia, most of the respondents, namely 34 people (45.4%) had asphyxia. Based on the statistical test *Chi Square test* was obtained *p value* = 0.019*(p-value <0.05)*, it can be concluded that there is a significant relationship between anemia and the incidence of asphyxia neonatorum in dr Adjidarmo

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Fakultas Ilmu Kesehatan Universitas Nasional
*Corresponding author. E-mail: shinta.novelia@civitas.unas.ac.id

Rangkasbitung in 2019, of the analysis obtained OR value of 2.105 means that the mother Those with anemia had a 2.105 times greater chance of developing asphyxia neonatorum compared to mothers who did not have anemia.

DISCUSSION

The results showed that there was a significant relationship between premature rupture of membranes and the incidence of asphyxia neonatorum. The results showed that most of the babies with asphyxia were born to mothers with premature rupture of membranes with a percentage of 38 people (74%). And the results of the *chi-square test statistical test* obtained *p*-value = 0.008 (*p value* <0.05), so the hypothesis is accepted, that there is a relationship between premature rupture of membranes and the incidence of asphyxia in newborns at Bahteramas General Hospital in 2016 (Rahmawati & Naningsih 2017) . This is reinforced by the theory which states that premature rupture of membranes (PROM) affects asphyxia due to oligohydramnios which compresses the umbilical cord so that the umbilical cord is constricted and the blood flow that carries oxygen from the mother to the baby is blocked, causing asphyxia or hypoxia. There is a relationship between the occurrence of fetal distress and the degree of oligohydramnios, the less amniotic fluid, the more serious the fetus (Prawirohardjo, 2016).

The results of the analysis based on infant weight concluded that there was a significant relationship between low birth weight and the incidence of asphyxia neonatorum. Infants with low birth weight have the opportunity to experience neonatal asphyxia with an OR value of 5,200 times greater than infants with low birth weight. This is reinforced by the theory which states that one of the complications of infants with LBW is neonatal asphyxia. Babies who have low birth weight (LBW) are more likely to have problems with body systems, due to unstable body conditions (Proverawati, 2016). Low birth weight babies have problems, among others: the respiratory control

center and digestive organs are not perfect, the ability to heat metabolism is still low so that it can result in asphyxia, acidosis and easy infection. This is in line with research which found that there was a significant relationship between low birth weight and the incidence of asphyxia (Wati, 2017).

The results of the analysis based on prolonged parturition concluded that there was a significant relationship between maternal mothers who experienced prolonged birth and the incidence of asphyxia neonatorum. Women in birth who experienced prolonged birth had the opportunity to experience asphyxia neonatorum with an OR value of 2,194 times greater than mothers who did not give birth. These results are in accordance with the theory which states that asphyxia in newborns occurs in mothers who experience prolonged parturition, long second stage can cause fetal hypoxia which results in decreased oxygen content in arterial blood and decreased blood flow to the placenta so that oxygen is available to the fetus is reduced and when the baby is born can cause asphyxia in newborns (Manuaba, 2017). This is in line with the study of newborns with asphyxia as many as 62 (60.78%) mothers who experienced prolonged birth. In this study, the results of the chi square test obtained a p value (value) = 0.001 which means that it shows that there is a relationship between prolonged birth and the incidence of asphyxia in newborns (Nurfina, 2017).

Analysis based on prematurity showed that there was a significant relationship between prematurity and the incidence of asphyxia neonatorum. Babies born prematurely have the opportunity to experience asphyxia neonatorum with an OR value of 3,129 times greater than babies born not prematurely. Premature infants often experience respiratory problems, namely asphyxia. Respiratory disorders often cause severe disease in premature infants. This is caused by a lack of surfactant, immature lung growth and development, weak respiratory muscles and ribs that bend easily, resulting in frequent occurrence of apnea, severe asphyxia and respiratory distress syndrome. In line with the study, data obtained

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Fakultas Ilmu Kesehatan Universitas Nasional
*Corresponding author. E-mail: shinta.novelia@civitas.unas.ac.id

from newborns with asphyxia who were born prematurely were 35 people (28.92%), and the results of the analysis *chi square* obtained *p value* = 0.012 which means that there is a relationship between premature babies and the incidence of asphyxia neonatorum (Barudin, Suryawan, & Permatasari, 2016).

Analysis based on preeclampsia can be concluded that there is a significant relationship between preeclampsia and the incidence of asphyxia neonatorum. Mothers with preeclampsia have the opportunity to experience neonatal asphyxia with an OR value of 1,733 times greater than women without preeclampsia. This result is in accordance with the theory which states that the majority of mothers who experience preeclampsia give birth to asphyxiated babies. Preeclampsia results in decreased blood flow to the placenta which results in impaired placental function. This condition triggers vasoconstriction of blood vessels, resulting in reduced blood supply to the placenta which results in hypoxia in the fetus (Prawirohardjo, 2016). The result of continued hypoxia in the fetus is the disruption of gas exchange between oxygen and carbon dioxide, resulting in asphyxia. This is in line with research that obtained data on pregnant women who experienced preeclampsia and gave birth to asphyxiated babies as many as 60 people (69%). From the results of statistical tests using the *chi-square test*, a p-value of 0.000 was obtained (*p-value* <0.05), which means that there is a relationship between preeclampsia and the incidence of asphyxia neonatorum (Rahmawati, 2014).

Analysis based on the type of delivery can be concluded that there is a significant relationship between the type of delivery and the incidence of asphyxia neonatorum. Mothers Birth with *giving sectio caesarea* have the opportunity to experience neonatal asphyxia with an OR value of 0.506 times greater than normal delivery mothers. The results of the study are in accordance with the theory which states that neonates who are born with the type of delivery by cesarean section, especially if

there are no signs of birth, do not benefit from expulsion of lung fluid and emphasis on the thorax so that they experience more persistent respiratory disorders (Straight, 2014). Data obtained from 33 mothers who gave birth by *sectio caesarea*, (33.3%) of them experienced asphyxia. And from using the chi square test, *p value* = 0.019> 0.05, which means there is a significant relationship between *sectio caesarea* and the incidence of asphyxia neonatorum. This result is in line with research (Wijayanti, 2018).

Analysis based on anemia can be concluded that there is a significant relationship between anemia and the incidence of asphyxia neonatorum. Mothers who have anemia have the opportunity to give birth to babies with asphyxia neonatorum with an OR value of 2.105 times greater than mothers who are not anemic. This is in accordance with the theory that states that anemia experienced by the mother during pregnancy will affect the fetus she is carrying. In anemia that occurs acutely, patients often experience sudden worsening such as bleeding. Whereas in chronic anemia, worsening is found when there is organ system dysfunction, one of which is heart dysfunction (Pisatwong & Panichkul, 2011). Anemia can cause hypoxia and reduced blood flow to the uterus will cause reduced oxygen flow to the placenta and also to the fetus causing breathing problems in the baby. This is in line with research which found that there was a relationship between maternal anemia status during pregnancy and the incidence of neonatal asphyxia. From the results of bivariate analysis using the chi-square test, the *P-value*: 0.007, which means that there is a significant relationship between anemia and the incidence of asphyxia neonatorum in newborns (Lubis, & Kurnia, 2016).

CONCLUSION

Based on the analysis of research data and discussion, from the results of research on "Factors Associated with the Incidence of Neonatal Asphyxia at Dr Adjidarmo Rangkasbitung Hospital Lebak Banten in 2019" using the *Chi-square test, it* can be concluded that there is a relationship

Shinta Novelia*, Yenny Aulya, Syifa Aulia Rahmawati

Fakultas Ilmu Kesehatan Universitas Nasional
*Corresponding author. E-mail: shinta.novelia@civitas.unas.ac.id

between Premature Rupture of Amniotic fluid, low birth weight, premature birth, prolonged birth, anemia, type of delivery, and preeclampsia with neonatal asphyxia. It is hoped that the Adjidarmo Rangkasbitung Hospital can improve the quality of antenatal care services in order to detect early risk factors that affect the incidence of asphyxia neonatorum. Further researchers are advised to examine other variables that affect the incidence of asphyxia neonatorum.

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Shinta Novelia*, Yenny Aulya, Syifa Aulia Rahmawati

Fakultas Ilmu Kesehatan Universitas Nasional
*Corresponding author. E-mail: shinta.novelia@civitas.unas.ac.id

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Fakultas Ilmu Kesehatan Universitas Nasional
*Corresponding author. E-mail: shinta.novelia@civitas.unas.ac.id