Relationship Between Parity with Neonatal Asphyxia in Wangaya General Regional Hospital Denpasar

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Abstract: *Background: Asphyxia is still the third lead cause of neonates mortality according to World Health Organization (WHO). There are some risk factors of asphyxia, one of them is the mother's parity. Objective: To investigate the relationship between parity and neonatal asphyxia at Wangaya General Hospital. Methods: A case control study was conducted from January 2019 to April 2019 by using the consecutive sampling methods with gestational age as the matching variable. The subjects were inpatient babies atPerinatology ward and Neonatal Intensive Care Unit (NICU) who was born atWangaya Hospital. The data of this study were collected from medical report. Will be done the bivariate analysis with McNemar using SPSS 24 for Macbook. Result: Among 86 subjects who are 43 subjects in each group study. Bivariate analysis show that parity was significantly correlates with neonatal asphyxia (p value 0.005; CI 95% 0.224; OR 3.28) in neonates at Wangaya Hospital. Conclusion: There is a relationship between parity with neonatal asphyxia at Wangaya Hospital. The risk of asphyxia will be 3.28 times greater at a risky parity (primipara and grandemultipara) than a parity without risk (multipara).*

Keywords: parity, neonates, asphyxia, neonatal asphyxia

1. Introduction

Mother and infant mortality remains as the main health problem. Several medical efforts have been performed to improve children's health. Neonatal Mortality Rate (NMR), Infant Mortality Rate (IMR), and Toddler Mortality Rate (TDR) are indicators related to the health status in Indonesia. Based on the result of Demographic and Health Survey of Indonesia (SDKI) of 2017, Neonatal Mortality Rate (NMR) was 19 per 1000 live birth in 2012 and decreases to 15 per live birth in 2017. Neonates mortality is one of SDGs targets with the decrease target to 12 per 1000 live birth in 2030. 60% of infant mortality occurs at the age of 0 month, and 80% of toddler mortality occurs at the age of 0-11 months. The main cause of neonatal mortality in the first week of 0-6 days is respiratory obstruction/asphyxia (36%), premature/BBLR (32.4%) and sepsis (12%), while at age of 7-28 days with sepsis (22%). Statistical report of Millennium Development Goals (MDGs) of 2017 showed that in 2015 the neonatal mortality rate Indonesia was 22 per 1000 live birth from the target of 23 per 1000 live birth. [1-3]

According to Public Health Office of Bali Province in 2017, the highest Neonatal Mortality Rate (NMR) in Jembrana regency was 6.95 per 1000 live birth, while the lowest was in Denpasar city with 0.58 per 1000 live birth. This is caused by neonatal mortality due to relatively high BBLR and Asphyxia Neonatorum.[4]

According to Pediatrician Association of Indonesia (IDAI), neonatal asphyxia is a respiratory failure spontaneously and regularly at birth or just after birth indicated by hypoxemia, hypercarbia and acidosis.[5,6]

According to WHO, 4 million deaths a year occur due to asphyxia, 38% of all under 5 years old child deaths. In low-income country, 23% of the total neonate mortality is caused by asphyxia.[7] Approximately, 40% of all toddler mortality occurs in neonate period in 2008.[8] Prenatal asphyxia incident is 1-6 per 1000 live birth and ranked third as the cause of neonate mortality.[9] According to the annual report of Sanglah Hospital Denpasar, the percentage of asphyxia in 2010 (8.6%), in 2011 (9.3%), in 2012 (11.6%), in 2013 it decreased (8.3%), and in 2014 it increased again (11.31%).[5]

There are some factors of asphyxia cause, one of which is the parity number in mother. Based on the study conducted by Tandu et al in 2014, it was obtained that pre-pregnancy non-pathological risk factor affecting the pregnancy result among others is parity (primipara and multipara), the age of 18 or more than 35 years old, height <150 cm, and the behavior such as smoking and drug or alcohol intake.[10] In the study conducted by Herianto et al in 2012 and the study conducted by Gerugan JC et al in 2013 as well as study conducted by Aisyah et al in 2014, it was found that parity is the risk factor for neonatalasphyxia.[11-13] However, different result was obtained from study conducted by Eksari WU in 2015, Widiani NNA et al in 2015, Fajarriyanti IN in 2016, study byNuryanti PD in 2016, who found that parity is not the risk factor for neonatal asphyxia.[14-17]

Due to the frequent case of asphyxia found and the result of several studies that are inconsistent, therefore the writer was interested to conduct a study on the relation of parity and neonatal asphyxia in Wangaya Hospital.

2. Methods

A retrospective case control study aims to investigate the relationship between parity with neonatal asphyxia at Wangaya General Regional Hospital Denpasar was conducted from January 2019 to April 2019.

The minimal sample of this study are 86 subjects (43 subjects for each group study) selected by using the consecutive sampling methods who meets the inclusion and

exclusion criteria. The inclusion criteria for case group are neonates who was born and inpatient in Perinatology ward and Neonatal Intensive Care Unit (NICU) with asphyxia at Wangaya Hospital and the inclusion criteria for control group are neonates who was born and inpatient in Perinatology ward and Neonatal Intensive Care Unit (NICU) without asphyxia at Wangaya Hospital. For the exclusion criteria are babies with congenital abnormalities, babies from hypertension or preeclampsia mother, patient with incomplete data in medical record. The characteristics of subject such as gender, weight birth, length birth, head circumference, chest circumference, gestational age, parity and type of labor will be noted.

The available data will be processed and analyzed by using *Statistical Product and Service Solution* (SPSS) 24 for Macbook. Univariate analysis is used to describe the characteristics of subjects in this research. Bivariate analysis is used to rate the relationship between parity with neonatal asphyxia by using McNemar for hypothesis test. The relation of parity with neonatal asphyxia stated in odds ratio (OR) with confidence interval 95% and level of significance 5%.

This study had received approval from Health Research Ethics Committee of Wangaya General Hospital Denpasar No.30/KOM-ETIK/X/2019.

3. Result

From January 2019 to April 2019, have found 86 neonates for total who 43 for case group and 43 for control group who meets the inclusion and exclusion criteria. In this study, gestational age was performed as the matching variable.

Table 1: Comparability of gestational age in case and control group

Gestational Age	Asphyxia n (%)	Non-asphyxia n (%)	P value
At Risk (<37 weeks and >42 weeks)	21 (48.8%)	21 (48.8%)	1.000
Not at risk (37-42 weeks)	22 (51.2%)	22 (51.2%)	

Table 2: Subject's characteristic

Variable		Asphyxia (n=43)	Non-asphyxia (n=43)
Gender	Boy	27 (62.8%)	21 (48.8%)
	Girl	16 (37.2%)	22 (51.2%)
Birth weight	Mean	2319.77 gram	2708.14 gram
Birth length	Mean	45.95 cm	47.58 cm
Birth head circumference	Mean	30.86 cm	31.58 cm
Birth chest circumference	Mean	29.26 cm	30.93 cm
Parity	At risk (primiparity and grandemultiparity)	27 (62.8%)	11 (25.6%)
	Not at risk (multiparity)	16 (37.2%)	32 (74.4%)
Birth labor	Spontaneous	16 (37.2%)	14 (32.6%)
	SC	27 (62.8%)	29 (67.4%)

From table 2, we can see that boys more frequently found in case group (62.8%) than in control group (48.8%). The girls are 37.2% in case group and 51.2% in control group. Mother at risk parity more frequently found in asphyxia babies (62.8%) than in babies without asphyxia (25.6%). The birth labor in case and control group were found more frequent in SC (sectiocaesaria); 62.8% in case group and 67.4% in control group.

Birth weight, birth length, head circumference and chest circumference were written as mean for each variable. Mean of birth weight in case group was 2319.77 gram whereas in control group was 2708.14 gram. Mean of birth length for asphyxia babies was 49.95 cm whereas non-asphyxia babies was 47.58 cm. Mean of head circumference of case group was 30.86 cm whereas control group was 31.58 cm. Chest circumference's mean in asphyxia babies was 29.26 cm and for non-asphyxia babies was 30.93 cm.

The analyzed relationship of parity with neonatal asphyxia
From this study, were found 43 babies with asphyxia as case group and 43 babies without asphyxia as control group. Table 3 will be performed bivariate analysis hypothesis test result with McNemar test, with p value was 0.005. Because of p value <0.05, statistically stated that there is significantly relationship between parity and neonatal asphyxia in neonates in Perinatology ward and Neonatal Intensive Care Unit (NICU) at Wangaya Hospital.

Table 3: Relationship analyzed between parity and neonatal asphyxia

Variable		Control		Total	CI 95%	P value
		At Risk Parity	Not at Risk Parity			
Case	At Risk Parity	4 (9.3%)	23 (53.5%)	27 (62.8%)	0.224 (0.052-0.953)	0.005
	Not at Risk Parity	7 (16.3%)	9 (20.9%)	16 (37.2%)		
	Total	11 (25.6%)	32 (74.4%)	43 (100%)		

Performed calculation of Odds Ratio (OR):
OR = B/C
= 23/7 = 3.28

The odds ratio (OR) performed to find out the magnitude of the relationship.From the calculation of odds ratio (OR), was found OR > 1 which is parity was risk factor or impact neonatal asphyxia. In at risk parity, the risk factor to occur the incidence of asphyxia 3.28 bigger than parity without risk.

Table 3 shows the result of bivariate analysis hypothesis test by using McNemar, p value of this study is 0.005 with confidence interval (CI 95%) 0.052-0.953 doesn't include number 1 which means p value is meaningful.

4. Discussion

It has been known that neonatal asphyxia case is still often found in newborn baby. Various factors may cause neonatal asphyxia, one of which is the parity number of mother. High parity may cause in pregnancy and labor complication which may results in the obstruction of O2 transport from mother to the fetus that will cause asphyxia.[18] In the first pregnancy, the stiffness of muscle or rigid cervix provides bigger resistance and can prolong the labor, while the fourth or later child there is an elasticity deterioration of tissue since it is repeatedly stretched due to pregnancy, so that the contraction produced will decrease hence it prolongs the labor process. Long labor process can increase the risk of asphyxia.[19]

In this study, there is significant relationship between parity with neonatal asphyxia (p value 0.005 and OR 3.28). it has the similar result with previous study by Herianto et al on 2012 with p value 0.001 and OR 3.49. The similar result also found in study by Gerungan JC et al on 2013 with p value 0.036; also similarly with study by Aisyah et al on 2014 with p value 0.032 and OR 3.92.[11-13] But the study by Ekasari WU on 2015, had different result that revealed there is no relationship between parity and neonatal asphyxia with p value 0.149. The study by Widiani NNA et al on 2015 also found that there is no relationship between parity and asphyxia with p value 0.431 and OR 1.36.[14-15]

Parity at risk in asphyxia group was found at 62.8% while in non-asphyxia group at 25.6%. These numbers are lower than the study conducted by Harianto et al who found that parity at risk in asphyxia is 66.7% and in control group is 36.5%. In the study of Aisyah et al it was obtained higher number of 78.3% in case group and 47.8% in control group.[11, 13] Parity at risk in case and control groups in this research have lower numbers due to shorter period of time and lesser sample number.

Boy babies are discovered with asphyxia at 62.8% than those without asphyxia at 48.8%. Whereas the remaining babies are female with 16 (37.2%) samples of asphyxia and 22 (51.2%) samples without asphyxia.

The average birth weight of asphyxia baby in this research is 2319.77 gram meaning that their birth weight is low (BBLR) while baby without asphyxia is 2708.14 gram meaning that their birth weight is normal. This is in line with the literature who said that the lower the gestation period and the smaller the baby then the higher their morbidity and mortality the lower the baby's birth weight, the higher the possibility of asphyxia and respiratory obstruction syndrome.[20]

In this study, gestational age was made as the matching variable since according to some literatures, gestation age is highly influential to asphyxia. In the study conducted by Nurjayanti PD said that gestation age is one of asphyxia factors, with the value of p 0.012 and OR 2.97.[17] In another study conducted by Ekasari Wu, concluded that gestation age has significant effect on neonatal asphyxia with the p value 0.001.[14] From study conducted by Gerungan JC et al, they concluded that gestation age affects asphyxia case with p value 0.023.[12] Literature mentioned that the younger the gestation age at the time of labor the higher the risk of asphyxia, since premature baby born at the pregnancy age of 37 weeks has vital organs specifically lungs that are not ready and cannot perform gas exchange effectively which then will result in asphyxia in newborn baby.[20] So as the mother with post mature pregnancy age may increase asphyxia incident by 3.811 greater. This is caused by placenta aging so that food and oxygen supply from the mother to the fetus is decreased. Low function of placenta is related to the increase of fetal distress by the risk of 3 times higher.[21]

Labor type in asphyxia and non-asphyxia babies are equally found in the labor by SC (sectiocaesaria) with 27 (62.8%) samples with asphyxia and 29 (67.4%) samples in babies without asphyxia. For spontaneous labor, was found 16 (37.2%) samples in asphyxia babies and 14 (32.6%) samples in babies without asphyxia. According to the study result conducted by Sitepu in 2011, the type of labor by action has 5.471 higher risks in asphyxia neonatorum compared to normal labor.[22] A literature said that the babies born by sectiocaesaria have more fluid and less air in their lungs for the first 6 hours after birth. Thoracic compression along with pervaginam birth and expansion following birth might be one of the supporting factors in respiration initiation. The use of excessive anesthetic/analgesic drug during operation process for mother may directly cause fetal respiratory center depression.[23]

The shortcomings in this research are the data used were secondary data, short period of sample collection, and there are many other risks have not observed yet and less variative subject since it was only taken from one hospital which makes it cannot be generalized. So, need further study to know the risk factors of neonatal asphyxia with wider population and longer time.

5. Conclusion

There is a significant relationship between parity with neonatal asphyxia in inpatient babies in Perinatology ward and Neonatal Intensive Care Unit (NICU) who were born at Wangaya Hospital and there is 3.28 times bigger risk factor of neonatal asphyxia in at risk parity (primiparity and grandemultiparity) than parity without risk (multiparity).

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