



Characteristics of Asphyxia Neonatorum in Luwuk, Banggai Regency, Indonesia

Erni Yusnita Lalusu*

Faculty of Public Health, Tompotika University, Luwuk Central Sulawesi, Indonesia

Email: erni.lalusu33@gmail.com

Abstract

This study aims to describe characteristics of neonates with asphyxia (used APGAR Score Indicators) in Luwuk, Banggai Regency. Describe the characteristics of asphyxia neonatorum was conducted using observation technique in 53 neonates. The data were collected through observations neonates conditions and interviews about the characteristics (sex, birth weight) and maternal characteristics (Level education, working status, income, weight gain during pregnant, nutrition status, quality of Antenatal Care (ANC), physical activity, smoking exposure). *Data describe with univariate and bivariate tabulatoin*. The result shows that there was about 57% female of neonates, 42% babies with low birth weight and increased to 50% in cases of severe asphyxia. For the mother characteristics: about 51% mother whose Asphyxia neonates with low level of education, 77% was not working, and 55% with low level of income. About 28% mother whose weight gain below than 10 kg, and this proportion increased in the case of severe asphyxia into 80%. There was 32% thin mother who delivered asphyxia babies. Most of mothers (87%) had inadequate antenatal care visits. Percentage of smoking exposure (active and passive smoker) and excessive physical activity were 77% and 87%, consecutively. All babies (100%) with severe asphyxia were delivered by mother with excessive physical activity. It is important to give more attention to the determinant of these factor, for instance: economy, environmental, and maternal behavior.

Keywords: Asphyxia; Birth weight; Ante Natal Care; Nutrition status

* Corresponding author.

E-mail address: erni.lalusu33@gmail.com.

1. Introduction

Neonatorum Asphyxia is the failure of spontaneously and regularly breathe soon after birth. Identification can be done through observation health condition of newborn immediately after birth, using the APGAR method. Assessment APGAR scores include: skin color (Appearance), pulse (Pulse Rate), reaction to stimulant (Grimace), muscle tone (Activity), and breathing effort (Respiration) [1]. This assessment is necessary to determine whether the infant is suffering asphyxia or not. Scores 0-3 at minute 5 shows the condition of severe asphyxia in infants and in more severe conditions can lead to death and the other complication such as hipotermia [2].

Asphyxia is one of the neonatal mortality determinant. In 29 countries there was 75% neonatal mortality rate among mother and newborn babies in the first week of their life. Preterm birth, infection, and asphyxia are the direct factors for neonatal death. Birth weight under 1500 g, gestational age under 31 weeks and APGAR Score below than 5 at the first fifth minutes of life are strongly contribute to the perinatal morbidity and mortality rate [3].

Condition of the new born baby can be affected by many factors, they might be a giving birth problem, maternal and fetus characteristics [4,5]. Level of education had a strong association with reproduction behavior, birth, child and infant mortality, morbidity, and family health awareness [6,7]. The lancet report that income and Neonatal Mortality Rate (NMR) worldwide were inversely associated [8]. Nobile et al in 2007 investigated the impact of maternal characteristics and social factor on low birth weight in Italy, they found that younger, smoking mother, inadequate ANC visit more likely to deliver Low Birth Weight (LBW) and the other health problem of baby [9-11]. Working woman had less time and more physical activity, so they tend to get more risk in pregnancy complication [12].

Almost a half of birth number experienced Asphyxia in Indonesia¹. Low birth weight case of Banggai in 2011 was about 0.74% and placed in the fourth ranked. It was higher than average of low birth weight cases in Central Sulawesi. It was in line with the increase of Asphyxia cases. Asphyxia case (APGAR Score below than 7 in the first fifth minutes of life) rose in 2012. There were 62 in 2011 and went up to 83 Asphyxia cases in 2012. However, the mortality rate declined. It was 13 cases in 2011 and 9 cases in 2012 [13].

Neonates case is still a problem in Indonesia, especially in Banggai Regency, Central Sulawesi. It will be solved effectively by using evidence based information about characteristics of Asphyxia.

2. Material and Method

2.1 Location and Study Design

This study has been conducted in Luwuk City. Observational Survey was used as the design of this study.

2.2 Population and Sample of Study

Population of this study was the babies who were born in Luwuk City in 2013. Sample of this study was about 53 new born babies. Sampling method was Accidental Sampling, it took two months to collect the data from 53 sample.

2.3 Data Collection

Data were collected by observing the babies and interview. Babies were observed to get APGAR Score. Characteristics of Asphyxia: birth weight, sex, education, job, income, nutritional state, pregnancy weight gain, quality of ANC, physical activity, and smoking exposure.

2.4 Data Analysis

After data collection, the next step was data analysis. Univariate and bivariate (cross tabulation) were performed.

3. Results

The study was conducted for two months, observation and APGAR assessment (asphyxia indicator) has been done. The baby got asphyxia if the APGAR Score below than 7.

Table 1: Distribution of Respondents based on APGAR Score and Asphyxia Category

APGAR Score*	Frequency	Asphyxia Category
1	1	Severe
3	9	Severe
4	13	Mild
5	11	Mild
6	19	Mild
7	22	Normal
8	44	Normal
9	34	Normal
10	6	Normal

*) the score of APGAR that measure the 5th minutes after birth. The low value is nul (0) for the for the worst condition and the high value is two (2) for the good condition of any item that assessed.

Asphyxia is classified based on APGAR score: APGAR score around 4 to 6 is mild asphyxia, APGAR Score around 0 to 3 is severe asphyxia. There were 53 of 159 babies with APGAR Score below than 7, and the rest had APGAR score 7 or more. This study also found ten (10) babies with severe asphyxia.

Cross Tabulation

The characteristics of mother and baby in this study were collected and shown in Table 2. Information collected from the baby about their characteristics were sex and birth weight. While mother characteristics were: education, job, income, nutritional state, pregnancy weight gain, quality of ANC, physical activity, and smoking exposure.

Table 2: Characteristics of Asphyxia Neonatorum in Luwuk, Banggai Regency between April and May 2013

Factors	Asphyxia		
	Total (n = 53)	Mild (n = 43)	Severe (n = 10)
Sex [n (%)]			
Female	30 (57)	26 (60)	4 (40)
Male	23 (43)	17 (40)	6 (60)
Birth Weight ^a [n (%)]			
Normal	31 (58)	26 (60)	5 (50)
Low	22 (42)	17 (40)	5 (50)
Level of Education ^b [n (%)]			
High	26 (49)	22 (51)	4 (40)
Low	27 (51)	21 (49)	6 (60)
Working Status [n (%)]			
Working	12 (23)	8 (15)	4 (40)
Not Working	41 (77)	35 (85)	6 (60)
Level of Income ^c [n (%)]			
High	24 (45)	20 (46)	4 (40)
Low	29 (55)	23 (54)	6 (60)
Pregnancy Weight Gain ^d [n (%)]			
Normal	38 (72)	36 (84)	2 (20)
Low	15 (28)	7 (16)	8 (80)
Nutritional State ^e [n (%)]			
Normal	36 (68)	29 (67)	7 (70)
Wasting/Thin	17 (32)	14 (33)	3 (30)
Quality of ANC ^f [n (%)]			
Adequate	7 (13)	5 (12)	2 (20)
Inadequate	46 (87)	38 (88)	8 (80)
Physical Activity ^g [n (%)]			
Enough	7 (13)	7 (16)	0 (0)
Excess	46 (87)	36 (84)	10 (100)
Smoking Exposure ^h [n (%)]			

Not Exposure	12 (23)	9 (21)	3 (30)
Exposure	41 (77)	34 (79)	7 (70)

^{a)} Birth weight are classified to normal (≥ 2500 g) and low (< 2500 g).

^{b)} Level of education are classified to high (lowest educated high school) and low (educated under the high school).

^{c)} Level of income are classified to High (more than Minimum Wage IDR 1.500.000) and Low (under Minimum Wage).

^{d)} Pregnancy Weight Gain which normal are had increase weight 10-15 g during pregnant. The Low Weight Gain is conversaly.

^{e)} Nutritional state is used Body Mass Index (BMI) indicators. Normal is BMI 18,5g and more. the Wasting is low than 18,5g

^{f)} Quality of ANC assessed on the frequency and standard of ANC. There are classified to adecuate (at least 4 visits and get at least seven standard ANC).

^{g)} The physical activity are enough and excess. Aktivitiy up to 40 hour/day is classified to enaugh and more than that is excess.

^{h)} Smoking eksposure include active and passive smoker.

The result shows that there was about 57% female of neonates, 42% babies with low birth weight and increased to 50% in cases of severe asphyxia. For the mother characteristics: about 51% mother whose Asphyxia neonates with low level of education, 77% was not working, and 55% with low level of income. About 28% mother whose weight gain below than 10 kg, and this proportion increased in the case of severe asphyxia into 80%. There was 32% thin mother who delivered asphyxia babies. Most of mothers (87%) had inadequate antenatal care visits. Percentage of smoking exposure (active and passive smoker) and excessive physical activity were 77% and 87%, consecutively. All babies (100%) with severe asphyxia were delivered by mother with excessive physical activity.

This study also investigated the risk of severe asphyxia in Table 3. Based on *Chi-square test*, pregnancy weight gain was the only one factor which was statistically significant ($p < 0,05$) associated with severe asphyxia. Those who got pregnancy weight gain under 10 kg twenty times ($OR = 20,5$) more likely to deliver baby with neonatorum asphyxia.

4. Discussion

Table 2 shows the trend of asphyxia on low birth weight baby, low level of economy status (low level of

education, income and not working). Nutritional state, weight gain during pregnancy were asphyxia characteristics, especially for severe asphyxia. Another significant factor for asphyxia were physical activity and smoking exposure.

Table 3: Risk Factors for Severe Asphyxia Analysis

Factor ^{*)}	p-value	Adjusted OR (CI 95%)
Sex	0,241	2,3 (0,563-9,351) ^{**}
Birth Weight	0,545	1,5 (0,384-6,092) ^{**}
Level of Education	0,525	1,6 (0,388-6,368) ^{**}
Working State	0,145	0,3 (0,078-1,506)
Level of Income	0,709	1,3 (0,322-5,289) ^{**}
Pregnancy Weight Gain	0,000	20,5 (3,581-118,174) ^{***}
Nutritional State	0,876	0,8 (0,199-3,960)
Quality of ANC	0,481	0,5 (0,086-3,211)
Physical Activity	0,171	1,2 (1,097-1,488) ^{**}
Smoking Exposure	0,537	0,6 (0,133-2,879)

^{*)} Factor: Sex (Female, Male); Birth Weight (Normal, Low); Level of Education (High, Low); Working State (Working, Not Working); Level Income (High, Low); Pregnancy Weight Gain (Normal, Low); Nutritional State (Normal, Wasting/Thin); Quality of ANC (Adequate, Inadequate); Physical Activity (Enough, Excess); Smoking Exposure (Not Exposure, Exposure). ^{**}) The risk is not significant. There is a value below 1 of Interval Confidence, and the p-value > 0,05. ^{***}) The risk factor of severe asphyxia. No value below 1 of Interval Confidence, and the p-value < 0,05

This study revealed that pregnancy weight gain was the only one factor which was statistically significant associated with severe asphyxia. Calory and micronutrient intake during pregnancy have impact on new born baby condition. About three-fourth (3/4) of all neonates mortality could be prevented if the mother feed enough nutrition and experience adequate care during pregnancy, in and post partum [1,14]. Dietary pattern and nutritional state during pregnancy were affected by local culture (food taboo). In Banggai Regency, there was a custom which is avoid certain food during pregnancy. It is believed that the food will impact on delivering baby process, it was a misconception. In fact, that food enriched with nutrients.

Maternal health and care before, in and post partum intrinsically related to of neonates morbidity and mortality [15-17]. This study suggested that most of severe asphyxia experienced by those with inadequate ANC, 80% of mother who did not utilize Antenatal Care regularly had asphyxia baby. It was support by study of Wahjoeningsih, it reported that lower APGAR score was found in mother with lower systolic (90 – 100 mmHg) for 15 minutes. Hipotency duration was more likely to cause problem than level of blood pressure, notabily for mother with diabetes [18]. This problem can be avoided by regular care during pregnancy.

Health service accessibility or dietary pattern also associates with economy and social state. Family income has

main role in family life. Family income increase impact on a better health and family life, and finally lead to a better nutritional state. Qiu, et al found that socioeconomic state was an important predisposition factor on low birth weight (LBW) and the other congenital problem [19].

Environmental factor, such as smoking an alcohol exposure has impact on perinatal outcomes. The greatest risk of IUGR (OR 4,5; 95% CI 3.1 to 6.7) was among women who continued to both drink and smoke [20]. In this research, most of mother (77%) who delivered asphyxia baby were exposed by smoke during pregnancy. The same condition was same with severe asphyxia. Tobacco in cigarette might reduce ascorbat acid concentration. It is important in triple collagen structure. Moreover, cadmium in tobacco could cause metallothenein patch on trophoblast, degradation of amnion extensibility as a result of this situation. Amnion is one of the fetal membrane important part. Amnion extensibility problem was the cause of fetal membrane discomfort and resulting in Premature Rupture of the Membrane (PROM). Amniotic fluid also has role in Ascenden Vaginal protection from infection, fetal movement, positioned placenta in order to prevent placenta compression, placenta compression might block blood stream, which is contained oxygen, from mother to fetus. This situation might lead to fetal distress and neonatorium asphyxia as a consequence of this. In addition, amnion fluid condensation might cause chest pressed and baby would experience respiration problem. Hypoplasia pulmonary reached Pulmonary Atelectasis and will end up with Neonatorum Asphyxia [1].

Working mother had less time to relax, so they more likely to get risk on pregnancy complication, for instance placenta detachment. It will restrict blood stream and nutrition supply for fetus and directly related to low birth weight and the other congenital problem¹⁸. Mother's physical work also relate to socioeconomy state. Mother who were from family with lower income, mostly involve in physical works. This study shows the trend the lower income the higher physical work would be done. This investigation revealed a consistent result where Asphyxia more likely happen to those were burdened physical activity with lower income.

5. Conclusion

Based on the result of this study, it can be concluded that pregnancy situation and health service utilization during pregnancy were the main cause of Neonatorum Asphyxia, in particular for Severe Asphyxia. It is important to give more attention to the determinant of these factor, for instance: economy, environmental, and maternal behavior.

Acknowledgements

We thank to Banggai Hospital and Clinical "Sayang Ibu" as a reaserch site, the participants and the enumerators (Fani ayu, Lidya and miftah) for important contribution to this work.

References

[1] Depkes RI. Prevention and Management of Neonatorium Asphyxia. Health Technology Assessment Depkes RI. 2008

- [2] Lunze et al. The global burden of neonatal hypothermia: systematic review of a major challenge for newborn survival. *BMC Medicine* 2013; 11:24
- [3] Souza et al. The world health organization multicountry survey on maternal and newborn health: study protocol. *BMC Health Services Research* 2011; 11: 286.
- [4] Mayile et al. Maternal Risk Factors Associated With Low Birth Weight In Wardha, India. *J Epidemiol Community Health* 2011;65:A344
- [5] Wandera et al. Determinants of periodontal health in pregnant women and association with infants' anthropometric status: a prospective cohort study from Eastern Uganda. *BMC Pregnancy and Childbirth* 2012;12:90
- [6] Mulyawan. Low birth weight description, characteristics, maternal characteristics, child characteristics, and infant characteristics from vegetarian mother in 17 cities in Indonesia. <http://lontar.ui.ac.id/opac/ui/>. Accessed on 11 Februari 2013
- [7] Nkonki et al. Explaining household socio-economic related child health inequalities using multiple methods in three diverse settings in South Africa. *International Journal for Equity in Health* 2013; 10: 13.
- [8] Lawn. Neonatal Survival 1: 4 million neonatal deaths (When? Where? Why?). www.thelancet.com. Accessed on 9 Maret 2013
- [9] Nobile et al. Influence of maternal and social factors as predictors of low birth weight in Italy. *BMC Public Health* 2007; 7:192.
- [10] Capra et al. The origins of health and disease: the influence of maternal diseases and lifestyle during gestation. *Italian Journal of Pediatrics* 2013; 39:7
- [11] Yakoob et al. Reducing stillbirths: behavioural and nutritional interventions before and during pregnancy. *BMC Pregnancy and Childbirth* 2009; 9
- [12] Trihardiani. Risk Factors of Low Birth Weight in Puskesmas West Singkawang and Northern Singkawang. *Nutrition Science Study of Medical Faculty Diponegoro University in Semarang*. 2011.
- [13] Profil Kesehatan Kabupaten Banggai Tahun 2010.
- [14] Proverawati et al. *Nutrisi Janin dan Ibu Hamil*. Yogyakarta: Nuha Medika. 2010.
- [15] Qader. Influence of antenatal care on birth weight: a cross sectional study in Baghdad City, Iraq. *BMC Public Health* 2012, 12
- [16] Cruz. Risk Factors For Low Birth Weight In The Municipalities Of Juazeiro And Petrolina (Brazil): A Case-Control Study. *Journal Epidemiology Community Health*. 2011; 65: A443
- [17] Wahjoeningsih. Association of Maternal Hypotency with APGAR Score of New Born Babies with Sectio Caesaria Emergently by Subarakhnoid Blocking in IRD RSUD Soetomo Surabaya. *Anesthesiology Department dan Medical Emergency Reanimation of Medical Faculty of Airlangga University*. Surabaya. 2011.
- [18] Qiu et al. Maternal Characteristics In Relation To Low Birth Weight Infants In A Japanese Cohort Study. *Journal Epidemiology Community Health*. 2011; 65:A149
- [19] Murphy et al. Behavioural change in relation to alcohol exposure in early pregnancy and impact on perinatal outcomes - a prospective cohort study. *BMC Pregnancy and Childbirth* 2013; 13:8
- [20] Smeeton et al. 2004. Assessing the determinants of stillbirths and early neonatal deaths using routinely collected data in an inner city area. *BMC Medicine* 2004; 2: 27