The Infant Outcomes with Premature Rupture of Membranes after Seven Days of Age at dr. Zainoel Abidin General Hospital Banda Aceh, Indonesia

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ABSTRACT

Background: *Premature rupture of membranes (PROM) is the discharge of amniotic fluid before the signs of labor. PROM is still a serious problem in obstetrics because it has a negative impact on the infant's final outcome. Therefore, this study aims to identify the infant outcomes with premature rupture of membranes after seven days of age at Dr. Zainoel abidin general hospital Banda Aceh, Indonesia.*

Methods and Materials: *This study was an analytic observational study with a prospective cohort study design, using a sample size of 84 infants that met the inclusion criteria. This design was chosen because the researchers wanted to assess the outcomes of 7 days after birth due to PROM. The population in this study were all low birth weight infants who born due to PROM from January to September 2020 at Dr. Zainoel Abidin General Hospital Banda Aceh, Indonesia.*

Results: *The results showed that the infant outcomes after 7 days born due to PROM were not encouraging, with a p-value < 0.000. The lowest neonatal survival rate in the group weighing less than 1,000 grams was 0%. The 1,000 gram to 1,500 gram heavy group had a 55% survival rate and the 1,500 gram to 2,500 gram group had a 95% survival rate.*

Conclusion: *Based on the results of this study, premature rupture of membranes (PROM) increased infant mortality after 7 days of age at Dr. Zainoel Abidin General Hospital Banda Aceh, Indonesia.*

Keywords
PROM, Infant outcomes, Seven days of age, Indonesia.

Background
Premature rupture of membranes (PROM) is the discharge of amniotic fluid before the signs of labor. PROM is still a serious problem in obstetrics because it has a negative impact on the infant's outcome [1]. The membranes can tear before the gestational age of a woman at term, which is known as a preterm premature rupture of membranes (PPROM) [2]. The incidence of PROM is different for each country. According to the World Health Organization (WHO), the incidence of premature rupture

of membranes tends to increase in developing countries, with cases ranging from 5% to 10% of all deliveries. PROM occurs in about 3% of all pregnancies. The highest incidence occurred in term pregnancies, approximately 70% of cases of PROM occur in term pregnancies, but in referral centers, more than 50% of cases can occur in preterm pregnancies [3,4].

Methods and Materials
This research was conducted at Dr. Zainoel Abidin General Hospital Banda Aceh, Indonesia, as a regional general hospital and serves as a referral center for health services in the Aceh region. All samples that meet the inclusion criteria were taken from

January to September 2020. It was an analytic observational study with a prospective cohort study design, using a sample size of 84 that met the inclusion criteria. This design was chosen because the researchers wanted to identify the infant outcomes of 7 days after cesarean section due to PROM to survival rates.

The population in this study were all low-birth-weight infants who were delivered by cesarean section due to PROM. This research was conducted using non-probability sampling. This technique is often referred to as total sampling, which is a sampling technique by taking the entire population as a sample, so that the number of samples is the same as the population.

The source of the datas used were primary data obtained by direct examination, namely the weighing of newborns and interpretation using the Lubchenko curve. After the fetus reached 1 week of age, observations or interviews were carried out whether the infants with the inclusion criteria were still alive or dead. A total of 97 samples were obtained from January to September 2020, but only 84 samples that met the inclusion criteria, while 13 samples did not meet the inclusion criteria or entered the exclusion criteria, such as all infants with intrauterine growth restriction (IUGR), infants with congenital abnormalities, mothers with preeclampsia/eclampsia, hyperthyroidism, heart disease. Data processing using univariate and bivariate methods, using survival analysis. This survival analysis was aimed at estimating the probability of survival of a sample of 84 infants who met the inclusion criteria. The statistical method used to assess the probability of survival was the Kaplan Meier.

Results

This research was conducted at RSUDZA Banda Aceh from January to September 2020 with a total sample of 84 samples that met the inclusion and exclusion criteria. Based on this study, 57 samples (67.85%) were dominated by multiparous; the remaining 27 samples (32.15%) were primiparous. According to this study, the highest percentage of parity status was multigravida as much as 67.85%, while the lowest parity status was primigravida as much as 32.1%.

There were 67 patients (79.8%) with premature rupture of membranes whose pregnancies were premature, the remaining 17 patients (20,2%) with PROM have reached term pregnancy. 51 patients (60.8%) underwent cesarean section due to obstetric indications such as green amniotic fluid, fetal distress, history of previous cesarean section. For that condition, caesarean section was the best option.

A total of 33 patients (39.2%) successfully delivered vaginally, without having to perform a cesarean section, while 51 patients (60.8%) had to deliver by cesarean section. The characteristics of the research variables in this study were grouped based on the APGAR score and birth weight were listed in table 1.

Table 1: Characteristics of the research variables.

Characteristics	Total (N=84)	(%)
APGAR Score		
Severely depressed (0-3)	3	3,6
Moderate depressed (4-6)	13	15.4
Excellent condition (7-10)	68	81.0
Birth Weight (grams)		
Extremely low birth weight (<1,000)	4	4.8
Very low birth weight (1,000 – 1,500)	9	10.7
Low birth weight (1,500 – 2,500)	71	84.5

Table 1 showed that the highest APGAR scores were in excellent condition (7-10) with a percentage of 81%, while the lowest APGAR scores were in severely depressed (0-3) with a percentage of 3.6%. Meanwhile, for the characteristics of birth weight in this study, we found 84.5% with birth weight in the low birth weight group (LBW) or 1,500-2,500 grams and 4.8% with extremely low birth weight (ELBW) or below 1,000 grams, respectively. Most of low birth weight newborns were in the range 1,500-2,500 grams.

Based on the results of this study, we found that 68 infants survived after 7 days of birth. Meanwhile, 16 infants died after 7 days of birth.

Table 2 below showed the complete distribution between the variables of gestational age and birth weight.

Table 2: Distribution of Gestation Age Against Birth Weight.

Gestational Age	Birth Weight						Total	
	ELBW		VLBW		LBW			
	n	%	n	%	n	%	n	%
Preterm	4	4.8	5	6	58	69	67	79.8
Early Term	0	0	0	0	17	20.2	17	20.2
Total	4	4.8	5	6	75	89.2	84	100

The distribution of subjects based on the variable gestational age to birth weight were categorized as extremely low birth weight (ELBW) where the birth weight was less than 1,000 grams, the birth weight was very low (VLBW), namely average birth weight between 1,000 grams and 1,500 grams, and low birth weight (LBW), namely average birth weight between 1,500 grams and 2,500 grams.

The results showed that infants were born with a gestational age below 37 weeks or preterm with low birth weight (LBW) as much as 69%, with very low birth weight (VLBW) as much as 6%, with extremely low birth weight (ELBW) as much as 4.8%, respectively. The total sample who had low birth weight in the category of LBW with 89.2% followed by 6% VLBW, and 4.8% ELBW. In the early term sample, we found 17 samples (20.2%) had low birth weight (LBW).

In this study, observations were made on all samples (84 samples), it was found that 16 samples died under the age of 7 days (table 3).

Table 3: Characteristics of Study Variables who Died within the First 7 Days.

Characteristics	Total (N=16)	(%)
Gender		
Boys	7	43.8
Girls	9	56.2
Birth Weight (grams)		
ELBW (< 1,000)	4	25
VLBW (1,000 - < 1,500)	5	31.25
LBW (1,500 - < 2,500)	7	43.75

Table 3 showed that as many as 16 infants who died, it was found that the lowest birth weight was 530 grams. Based on the results of this research that has been done, the infants who died was dominated by baby girls as many as 56.2%, with the average body weight ranged from 1,500 grams to 2,500 grams.

Discussion
According to this research, as many as 84 samples were dominated by multiparous (57 samples). The highest percentage of parity status was multigravida with a rate of 67.9%, primigravida was 32.1%. Atiya and Sutjhata showed the risk of maternal parity on the fetal outcome with 365 samples, the results were 52.81% multigravida.

In cases of PROM, cesarean section is sometimes difficult to avoid to reduce infant morbidity and mortality [5]. Cesarean section was a separate choice where as many as 51 samples (60.8%) underwent the procedure. Most low birth weight newborns were in the range 1,500-2,500 grams. A total of 67 patients (79.8%) experienced premature rupture of membranes during preterm gestation. On the characteristics based on gestational age, the highest results were obtained, namely the Preterm group (<37 weeks) as many as 79.8%. This was consistent with the theory that premature rupture of membranes were leading cause of preterm birth in the United States, based on gestational age, babies born prematurely can be small or large during gestation but most cases of preterm or premature babies will be born with low birth weight. Many studies have been conducted regarding the association of prematurity with neonatal morbidity and mortality. Mosammat et al., Investigated 100 samples to assess maternal factors in preterm and low birth weight infants found a mean gestational age of 27 weeks [6]. Also, Tanushree et al., Jack found 213 samples with very-very low birth weight with a mean gestational age of 27 weeks and an average birth weight of 783 grams [7].

We found the highest APGAR scores were in excellent condition (7-10) with a percentage of 81%. However, these results were not in accordance with the research conducted by Bernard et al. with a sample of 1,237 newborns with very low birth weight who were found to have the highest APGAR scores, namely 0-3 or severely depressed. Samples with severely depressed APGAR scores who were unable to survive were 68.1% [8]. However, this is in line with this study where preterm birth was associated with low birth weight (LBW).

Based on body weight in the sample of this study, it was found that 84.5% with birth weight in the 1,500-2,500 gram group and 4.8% with birth weight below 1,000 grams. This was in line with the research conducted by Andhikary et al., where this study was a cross-sectional study of 50 pregnant women with gestational age more than 28 weeks who experienced PROM, where the results showed that perinatal mortality increased if PROM occurs when the fetus was not yet fit for extrauterine conditions. Also, this study observed that 45.8% of neonates weighed less than 2,500 grams, and 2.08% weighed under 1,500 grams [8]. In theory, neonates weighing less than 1,000 grams have a 95% risk of death and according to ACOG, the risk of death was increased in infants weighing less than 750 grams [9].

In this study, we found that 76.1% of babies with low birth weight were born with gestational age less than 37 weeks or prematurely, of which 4.7% of the sample were born with low birth weight. Meanwhile, the largest percentage was in the LBW category, namely 65.5%, followed by LBW 5.9%, and LBW 4.7%. This was in accordance with the theory, namely very low birth weight (LBW) where birth weight is less than 1,000 grams, very low birth weight (LBW), namely birth weight around 1,000 grams but below 1,500 grams, and low birth weight (LBW), namely birth weight above 1,500 grams to less than 2,500 grams.

We found 16 samples (infants) died under the age of 7 days. The total 16 samples who died, the lowest birth weight was 530 grams. From the results of the research that has been done, the sample who died was dominated by the female sex as much as 56.2%. There were no significant differences in mortality and morbidity between male and female newborns, even after considering other risk factors such as gestational age, birth weight, and delivery process using logistic and linear regression methods [10]. In addition, there was no relationship between sex and neonatal mortality in other research [11]. This result was similar to the study in China by Zhao D et al., there was no gender relationship with neonatal mortality [12]. Similar to the research conducted by D'Sa et al., gender was not a contributing factor to the incidence of neonatal death [13].

The probability of survival increased with higher birth weight. Alhassan et al. supported this in a retrospective study to assess risk factors and neonatal outcomes in NICU; the overall survival rate was 60.73%. The lowest survival rates were in the very low birth weight (14.3%) and very premature (20%). A significant relationship was observed between birth weight, gestational age, and survival [14].

Zhang et al., found that the increased in the survival rate of low birth weight neonates with or without major morbidity has increased. This point was associated with perinatal and neonatal care, which has changed in the last 2 decades. However, late-onset sepsis remains a major concern [12]. Also, in a longitudinal observational study involving 2,390 very preterm infants (gestational age <27 weeks) by Pappas et al., found that antenatal exposure to chorioamnionitis appears to increase the likelihood of cognitive and neurodevelopmental impairment [15].

Although mortality was greatly reduced with surfactant use, the proportion of infants who survived

With severe sequelae, such as chronic lung disease, cognitive delay, cerebral palsy, and neurosensory deficits, did not increase significantly. Although it had been reports the improvements of neurodevelopmental outcomes in several small studies, these improvements have not been seen on a global scale [16].

Conclusions

Based on the results of this study, the survival rate for low-birth-weight infants with premature rupture of membranes after 7 days of age had a survival rate of 81%. The premature rupture of membranes (PROM) increased infant mortality after 7 days of age at Dr. Zainoel Abidin General Hospital Banda Aceh, Indonesia.

Suggestions

This research needs further research by adding variable characteristics, namely the cause of death of the infant and the care of neonates with low birth weight at the Dr. Zainoel Abidin Regional General Hospital, Banda Aceh.

References

1. Habte A, Dessu S. Lukas K. Determinants of Premature Rupture of Membranes Among Pregnant Women Admitted to Public Hospitals in Southern Ethiopia, 2020: A Hospital-Based Case-Control Study. 2021; 13: 613-636.

2. Dayal S, Hong O. Premature Rupture Of Membranes - StatPearls - NCBI Bookshelf. StatPearls Publishing 2020.

3. Boskabadi H, Zakerihamidi M. Evaluation of Maternal Risk Factors, Delivery, and Neonatal Outcomes of Premature Rupture of Membrane: A Systematic Review Study. J. Pediatr. Rev. 2018; 7: 77-88

4. Yeasmin MS, M Jalal Uddin, Rajat Sanker Roy Biswas, et al. Risk Factors of Premature Rupture of Membrane in A Tertiary Care Hospital, Bangladesh. Chattagram Maa-O-Shishu Hosp. Med. Coll. J. 2020; 19: 5-8.

5. Nuzul R, Widari H, Suanda J. Analysis of factors related to the choice of cesarean section delivery at RSUD dr. zainoel abidin Banda Aceh. in AIP Conference Proceedings 2020; 2291.

6. Jinnat MA, Ahmed S, Monira S, et al. Maternal Risk Factors, Clinical Profile and Short-Term Outcome of Pre-Term Low Birth Weight Babies. KYAMC Journal. 2020; 11: 77-82.

7. Sahoo T, Anand P, Verma A, et al. Outcome of extremely low birth weight (ELBW) infants from a birth cohort (2013–2018) in a tertiary care unit in North India. Journal of Perinatology [Internet]. 2020; 40: 743-749.

8. Adhikary S, Tanira S, Sultana A, et al. Fetal Outcome in Premature Rupture of Membrane - A Study conducted in a tertiary level hospital in Bangladesh. Mediscope. 2020; 7: 108-112.

9. Kliegman R, Lye P, Bordini B, et al. Nelson Pediatric Symptom-Based Diagnosis. 1st ed. Elsevier Inc; 2017; 944-1126.

10. Barzilay B, Shirman N, Bibi H, et al. Newborn gender as a predictor of neonatal outcome in mixed-gender twins born with very low birth weight. BMC Pediatrics. 2019; 19: 1-7.

11. Stuti G, Mehrotra G, Mulye S, et al. Effect of gender and gestational age on short term morbidities and mortality in extremely low birth neonates. International Journal of Contemporary Pediatrics. 2017; 4: 993.

12. Zhao D, Zou L, Lei X, et al. Gender Differences in Infant Mortality and Neonatal Morbidity in Mixed-Gender Twins. Scientific Reports [Internet]. 2017; 7: 3-8.

13. D'Sa S, Pinto D, Anousha A, et al. Effect of low birth weight on neonatal mortality in preterm and small for gestational age babies in a tertiary neonatal intensive care unit in India. International Journal of Contemporary Pediatrics. 2016; 3: 735-738.

14. Hartiningrum I, Fitriyah N. Bayi Berat Lahir Rendah (BBLR) di Provinsi Jawa Timur Tahun 2012-2016. Jurnal Biometrika dan Kependudukan. 2018; 7.

15. Liu P-C, Hung Y-L, Shen C-M, et al. Histological chorioamnionitis and its impact on respiratory outcome in very-low-birth-weight preterm infants. Pediatrics & Neonatology [Internet]. 2021; 62: 258-264.

16. Zhang G, Feenstra B, Bacelis J, et al. Genetic Associations with Gestational Duration and Spontaneous Preterm Birth. New England Journal of Medicine. 2017; 377: 1156-1167.