

Correlation between the Duration of Premature Rupture of Membranes during the Labor and the Asphyxia of Newborn Babies at Aura Syifa Hospital Kediri Regency

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ABSTRACT

Premature Rupture of Membranes (PROM) is rupture of membranes more than one hour before onset of labor. One of the complications caused by PROM is asphyxia. The longer the rupture of the membranes the greater the risk of fetal distress. By the rupture of the membranes the amniotic fluid volume decreases and there is an emphasis on the umbilical cord so that there is less supply of oxygen and nutrients to the fetus which causes the newborn to have asphyxia. The purpose of this study was to determine the correlation between the length of premature rupture of membranes during labor with asphyxia of the new born infant in Aura Syifa Kediri Hospital. This study used an observational research design with a Cross Sectional approach. The population in the study was 89 mothers who were giving birth with the premature rupture of membranes and a sample of 49 respondents were taken with a simple random sampling technique. The results of the study at Aura Syifa Hospital showed that the majority of laboring with premature rupture of membranes had ruptured membranes > 12 hours (65.30%) and laboring with moderate asphyxia (59.18%). Aanalysis data is using the Kolmogorov-Smirnov test obtained p-value 0,000 <0,05. The conclusion of this study is the correlation between the duration of premature rupture of the membranes during the labor with asphyxia of newborn infant in Aura Syifa Kediri Hospital. Based on the results of the study, it is expected that premature rupture of membranes case can be anticipated as suggestions for future researchers to see the causal factors of premature rupture of membranes, one of which is parity.

Keywords: asphyxia, new born infant, premature rupture of membranes

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BACKGROUND

Premature rupture of membranes (PROM) is a rupture of the membranes more than one hour before the onset of signs of labor. The longer the time from the rupture of the membranes until the baby is born, the greater the possibility of increasing the incidence of maternal and infant morbidity and mortality (Manuaba, 2010). Complications that can be caused by PROM in the mother are infection, prolonged labor, postpartum hemorrhage, preterm labor, oligohydramnios, and death. While in infants, namely umbilical cord prolapses, birth trauma, premature, hypoxia, and asphyxia, even death (Fadlun, 2014).

Neonatal asphyxia is a condition in newborns who fail to breathe regularly and spontaneously immediately after birth, so that the baby cannot have oxygen and cannot remove carbon dioxide from his body (Dewi, 2013). The infant mortality rate (IMR) in East Java Province in 2015 was 24 per 1000 live births, while in 2016 it was 23.6 per 1000 live births, this is still above the national target (East Java Province Health Profile, 2016). Throughout 2014, the Neonatal Mortality Rate (NMR) in Kediri Regency was 188 cases out of 25,146 live births, while in 2015 there were 160 cases out of 24,740 live births. Asphyxia is at the top of the list, took over LBW which last year was at the top of the list of causes of neonatal death from 39% to 44% in 52 out of 252 cases. Then followed by LBW 26%, congenital defects 20%, infection 4%, and others 1% (Profile Kediri District Health Office, 2016).

The medical record data at Aura Syifa Hospital Kediri Regency in 2017 showed there were 722 cases (20%) of PROM out of a total of 3441 deliveries. Meanwhile, in 2018 there were 592 cases (20%) of PROM out of a total of 2946 deliveries. Asphyxia cases have increased in 2017 were 362 LBW cases with moderate asphyxia and severe asphyxia then in 2018 there were 385 LBW cases with moderate asphyxia and severe asphyxia.

Based on research by Surinati (2013) entitled "Premature Rupture of Membranes with Asphyxia Rate of Newborns" states that premature rupture of membranes is one of the factors causing neonatal asphyxia and infection. Hypoxia in the fetus that causes asphyxia neonatorum occurs due to problem in the supply of O₂ and in the transport of O₂ gas from the mother to the fetus so that there are problems in the supply of O₂ and in the removal of CO₂. The results of the analysis obtained a p-value of 0.002 ($p < \alpha = 0.05$), which means that there is a significant correlation between the duration of premature rupture of membranes and the case of asphyxia of newborns in the delivery room of Wangayah General Hospital in 2013.

The less amniotic fluid, the greater the risk of fetal distress. The normal volume of amniotic fluid during pregnancy is around 800-2000 cc. Rupturing of the amniotic membrane, the volume of amniotic fluid decreases to <500 cc, resulting in oligohydramnios which causes pressure on the umbilical cord and has an impact on fetal emergencies. Fetal emergencies can occur due to conditions that there is an imbalance in fetal oxygen and nutritional needs causes newborns to experience asphyxia (Prawirahardjo, 2014).

Things can be done to maintain and improve the quality of (Mother and Child Health) MCH services through the implementation of clinical governance, develops skills training for health workers and update knowledge such as management of handling asphyxia. The routine Integrated ANC visits at least 4 times during pregnancy to detect danger signs of pregnancy and childbirth that may have by the mother so that it can be immediately handled and prevented to minimize maternal and infant mortality and morbidity. Furthermore, the limitation on the time for midwives to make immediate referrals in emergency cases that also threaten the life of both the mother and the baby (Kediri District Health Office Profile, 2016).

The purpose of this study was to determine the correlation between the duration of premature rupture of membranes (PROM) during labor and the case of newborn asphyxia at Aura Syifa Hospital, Kediri Regency. The specific objectives of the study were: 1) To identify the case of premature rupture of membranes during labor at Aura Syifa Hospital, Kediri

Regency. 2) To identify the case of asphyxia in newborns at Aura Syifa Hospital, Kediri Regency. 3) To analyze the correlation between the duration of premature rupture of membranes (PROM)during labor and the case of asphyxia in newborns at Aura Syifa Hospital, Kediri Regency.

METHODS

This research is an analytical observational study with a Cross Sectional design which was conducted on April 8-7 May 2019 at Aura Syifa Hospital, Kediri Regency. The population in this study were all mothers who gave birth vaginally with premature rupture of membranes (PROM) at Aura Syifa Hospital, Kediri Regency, with 89 respondents. The sample in this study was 49 respondents using simple random sampling technique.

The inclusion criteria in the study were: 1) Mothers who gave birth vaginally in the delivery room of Aura Syifa Hospital, Kediri Regency. 2) Maternal women who experience rupture of membranes 1 hour before a set of labor and are diagnosed with PROM. 3) Maternity mothers who are willing to be respondents. While the exclusion criteria are: 1) Mothers who give birth with PROM who are not willing to be respondents. 2) Maternity mothers who were referred during the study.

The instrument used in this study was an observational sheet to see the correlation between the duration of premature rupture membranes and the asphyxia level of newborns. Data analysis was carried out using Chi Square and Kolmogorov-Smirnov tests with p value <0.05. The Conclusion was H_0 was rejected if $p > 0.05$ and H_0 was accepted if $p < 0.05$. The ethics of data collection in this study included informed consent, anonymity, confidence and ethical clearance with register number 203 / KEPK-POLKESMA / 2019 on June 26, 2019.

RESULTS

The general data of this study include the characteristics of respondents based on age, parity, gestational age and occupation.

Table 1.1 Characteristics of Respondents based on age, parity, gestational age and occupation

Category	N	%
Age		
< 20 years old	2	4,08
20-35 years old	36	73,46
> 35 years old	11	22,44
Total	49	100
Parity		
Primipara	25	51,02
Multipara	24	48,97
Total	49	100
Gestational age		
Preterm	5	10,20
A term	44	89,79
Total	49	100
Occupation		
work	18	36,73
not working	31	63,26
Total	49	100

Based on table 1.1 in this study, most of the respondents were 20-35 years old with 36 respondents (73.46%), most of them were primiparas with 25 respondents (51.02%), almost all

of the respondents' gestational age was a term with 44 respondents (89.79 %), and most of the respondents did not work with 31 respondents (36.73 %). While the special data includes the following data:

Table 1.2 Frequency distribution of premature rupture of membranes during labor at Aura Syifa Hospital, Kediri Regency

Duration time	N	%
≤12 hours	17	34,69
>12 hours	32	65,30
Total	49	100

Based on table 1.2, it was found that most respondents with the total 32 respondents (65.30%) had ruptured membranes for > 12 hours before laboring.

Table 1.3 Distribution of the asphyxia frequency in the first minute of newborns at Aura Syifa Hospital, Kediri Regency

Asphyxia	N	%
Mild	17	34,69
Moderate	29	59,18
Severe	3	6,12
Jumlah	49	100

Based on table 1.3 it was found that the asphyxia frequency in the first minute of newborns with the total 29 babies (59,18 %).

Table 1.4 Distribution of the correlation between the duration of premature rupture of membranes (PROM) during laboring with asphyxia in newborns at Aura Syifa Hospital, Kediri Regency

Asphyxiain newborns	Duration of PROM				Total	%	P value
	≤ 12 hours	%	>12 hours	%			
Mild	15	30,6	2	4,1	17	34,7	0,000
Moderate	2	4,1	27	55,1	29	59,2	
Severe	0	0	3	6,1	3	6,1	
Total	17	34,7	32	65,3	49	100	

Based on table 1.4, it was found that from 49 respondents, 17 respondents experienced rupture of membranes 12 hours before laboring with mild asphyxia totaling 15 respondents (30.6%) and moderate asphyxia amounting to 2 respondents (4.1%). Meanwhile, 32 respondents experienced rupture of membranes > 12 hours before laboring with mild asphyxia totaling 2 respondents (4.1%), moderate asphyxia amounting to 27 respondents (55.1), and severe asphyxia totaling 3 respondents (6.1%).

The statistical test using the Chi Square test, a p-value of 0.000 was obtained, but because it did not meet the requirements, it was continued with the Kolmogorov-Smirnov test which obtained a p-value of 0.000 which means <0.05. It was concluded that there was a correlation between the duration of premature rupture of membranes during the labor with the case of newborn asphyxia at Aura Syifa Hospital, Kediri Regency.

DISCUSSION

Duration of Premature rupture of membranes during labor

The results of the study on April 08 – May 7, 2019 in the delivery room of Aura Syifa Hospital, Kediri Regency, from 49 respondents, most of them were 32 respondents (65.30%) experienced rupture of membranes for >12 hours before laboring. Meanwhile, 17 respondents (34.69%) experienced rupture of membranes for 12 hours before laboring.

Premature rupture of membranes is a rupture of the membranes for more than 1 hour

without any signs of labor. PROM is stated to be prolonged if it occurs more than 12 hours before laboring (Rukiyah, 2010). In this study, 32 respondents experienced rupture of membranes for >12 hours before laboring. Prolonged labor can occur in cases of premature rupture of membranes either due to maternal, fetal, or birth canal factors so that rupture of membranes lasts > 12 hours. Based on the results of the study on the case of premature rupture of membranes > 12 hours, there were 6 respondents with high-risk age, 13 respondents were multigravida, 3 respondents with preterm pregnancy, and 17 respondents are workers.

The age during pregnancy is one of the most essential factors on the pregnancy process, fetal health, and the labor process. A high-risk age of the mother is <20 years old or >35 years old. The ideal age for pregnancy is 20-35 years old because complications in pregnancy can be avoided. The fertility peak, 95% for getting pregnant at the age of 20 to 29 years old. After at the age of 30 years old, the chance of getting pregnant decreases to 90% (Kumalasari, 2012). However, in this study, most of the respondents aged 20-35 years old were 73.46%. So, the results are different from the theory that says the age of 20-35 years old can avoid of getting complications.

Parity is the number of live births that a woman has. In the results of the study with 51.02% of respondents were primiparous. Primipara is a woman who has given birth to a live baby for the first time. In primiparas, the cause of the high case of premature rupture of membranes is the first pregnancy is the hardest experiment on the mother's reproductive ability (Nugroho, 2012).

A gestational age is the period from conception to birth, calculated from the first day of the last menstrual period. The results showed that 89.79% of respondents had term pregnancy. In normal circumstances 8-10% of pregnant women at term will experience premature rupture of membranes. Towards term gestation, there can be focal weakness of the amniotic membranes which triggers the tearing of the amniotic membranes before the signs of labor (Prawirohardjo, 2010).

In this study, 63.26% of respondents did not work. Work describes the mother's activities that affect energy needs. Physical work during pregnancy that is too hard and with a length of working is more than three hours per day can cause fatigue. Fatigue at work makes the chorion and amnion to weaken, resulting in premature rupture of the membranes. However, it is possible for pregnant women who do not work to be exhausted due to doing domestic work that is too heavy for more than three hours per day than those who work.

The results of this study are supported by the results of Legawati's research (2018), entitled "Determinants of the Occurrence of Premature Rupture of Membranes in the Cempaka Room of RSUD Dr. Doris Sylvanus Palangkaraya" stated that the factors influence PROM are maternal age, parity, gestational age, baby birth weight, gemelli/twins, abnormal location and delivery method.

From the results of this study, it was found that 32 respondents (65.30%) experienced rupture of membranes for >12 hours before laboring. Because of the rupture of the membranes, it is possible for a prolonged parturition to happen which is caused by many factors such as: the mother, fetus, or birth canal so that the rupture of the membranes can take place > 12 hours before delivery. For this reason, midwives need to pay attention on handling cases of premature rupture of membranes for both referral midwives and midwives who carry out independent practice in order to overcome any complications that will arise due to premature rupture of membranes.

Newborn Asphyxia

The results of the study on April 08 – May 07, 2019 in the delivery room of Aura Syifa Hospital, Kediri Regency, from 49 respondents who experienced premature rupture of membranes > 12 hours total 32 respondents, most of the babies had moderate asphyxia with 27 babies (55.1 %), while the remaining 2 babies (4.1%) had mild asphyxia and 3 babies (6.1%)

had severe asphyxia. While those who had premature rupture of membranes \leq 12 hours were 17 respondents, most of the babies had mild asphyxia with 15 babies (30.6%) and the remaining 2 babies (4.1%) had moderate asphyxia.

Asphyxia is an emergency condition of a baby who cannot breathe spontaneously and regularly immediately after birth, so that it can reduce oxygen and increase carbon dioxide which causes bad consequences in the future life (Manuaba, 2010).

It is called to be moderate asphyxia based on the APGAR score of 4-6. The average APGAR score for newborns with moderate asphyxia in the first minute is 6. Signs and symptoms that appear such as heart beat rate 60-80x/minute, slow breathing effort, muscle tone is usually in good condition, can still react when given stimulation, and looks cyanosis ((Dewi, 2013).

From the results of this study, it was found that 29 infants (59.18%) who were born with premature rupture of membranes had moderate asphyxia. Moderate asphyxia occurred in the respondent's baby with rupture of membranes $>$ 12 hours before laboring. Researchers found that the longer the rupture of the membranes, the higher the level of asphyxia in the baby. This is caused by a lack of oxygen supply to the fetus for a long time. For this reason, resuscitation tools are needed that are ready to be used if at any time asphyxia occurs so that treatment is not too late. There is a need to increase skills in every midwife in handling neonatal emergencies in order to know the cases that allow the occurrence of asphyxia in newborns.

The correlation between the duration of premature rupture of membranes during labor and the case of newborn asphyxia

Based on table 4.7, it was found that from 49 respondents, 17 respondents experienced rupture of membranes \leq 12 hours before laboring with mild asphyxia total 15 respondents (30.6%) and moderate asphyxia 2 respondents (4.1%). Meanwhile, 32 respondents who had rupture of membranes $>$ 12 hours before laboring with mild asphyxia total 2 respondents (4.1%), moderate asphyxia total 27 respondents (55.1), and severe asphyxia total 3 respondents (6.1%). From the Kolmogorov-Smirnov test, a p-value of 0.000 is obtained which is smaller than 0.05, meaning that there is a correlation between the duration of premature rupture of membranes during labor and the case of newborn asphyxia at Aura Syifa Hospital, Kediri Regency.

Premature rupture of membranes is a state of rupture of the membranes before laboring. The rupture of the membranes can cause pressure on the umbilical cord so cause an emergency fetus. The less amniotic fluid, the more serious the condition of the fetus. Fetal emergencies can occur due to an imbalance in the need for oxygen and fetal nutrients, causing newborns to have asphyxia (Prawirohardjo, 2014).

In this study, most of the respondents had rupture of membranes $>$ 12 hours before laboring, which was 65.30%. According to Manuaba (2010), it is stated that the PROM is prolonged if the PROM occurs more than 12 hours before laboring. One of the functions, the amniotic membrane is to protect or become a barrier to the fetus from outside of uterus, so less risky to get infections. The longer the time span from the rupture of the membranes in labor until the baby is born, the greater risk to have maternal and infant morbidity and mortality.

This is in line with the research conducted by Wiradharma (2013) entitled "Risks of Asphyxia in Premature Rupture of Membranes at Sanglah Hospital" found that mothers gave birth with PROM $>$ 12 hours whose children had asphyxia 44.7% while mothers gave birth with PROM $<$ 12 hours whose infants had asphyxia 5.3% with an RO (Odds Ratio) 9.7 and a p-value of 0.004 so that there was a significant difference between PROM duration $>$ 12 or $<$ 12 hours towards asphyxia.

It is also supported by the study from Surinati (2013) at Wangayah Hospital in 2013 entitled "Premature Rupture of Membranes with Asphyxia Rate of Newborns" stated that premature rupture of membranes was one of the factors causing neonatal asphyxia and

infection. Hypoxia in the fetus that causes asphyxia neonatorum occurs due to problems in the supply of O₂ and in the transport of O₂ gas from the mother to the fetus so that there are problems in the supply of O₂ and in the removal of CO₂. The results of the analysis obtained a p-value of 0.002 ($p < \alpha = 0.05$), which means that there is a significant correlation between the duration of premature rupture of membranes and the case of asphyxia newborns in the delivery room of Wangayah General Hospital in 2013.

The results of this study, it was found that 32 respondents with rupture of membranes > 12 hours gave birth with moderate asphyxia 27 babies (55.1 %), while 17 respondents with ruptured membranes 12 hours gave birth with mild asphyxia 15 babies (30.6 %). The results show that the length of time the membranes rupture until laboring affects the case of asphyxia in newborns. For this reason, it is necessary to update the anamnesis, method or treatment in cases of premature rupture of membranes so that it can prevent or minimize the asphyxia.

CONCLUSION

Based on the results of the study that were adjusted to the research objectives, it was concluded, as follows:

- a. The total of 65.30% of mothers giving birth with premature rupture of membranes had rupture of membranes for > 12 hours.
- b. The total of 59.18% of the case in moderate asphyxia occurred to infant born with premature rupture of membranes.
- c. There is a correlation between the duration of premature rupture of membranes during the labor with the case of newborn asphyxia at Aura Syifa Hospital, Kediri Regency.

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