

# Relationship Between Premature Rupture Of Membranes And The Incidence Of Asphyxia In Newborns At RSUD Dr. Soegiri Lamongan

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## Relationship Between Premature Rupture Of Membranes And The Incidence Of Asphyxia In Newborns At RSUD Dr. Soegiri Lamongan

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### ABSTRACT

Neonatal mortality rate is one indicator to assess health in the community. According to WHO, main causes of neonatal death include prematurity, neonatal asphyxia, and neonatal sepsis. The purpose of this study was to analyze the relationship between premature rupture of membranes and asphyxia in newborns at RSUD Dr. Soegiri Lamongan. This study used an analytical method with a cross sectional approach. The total sample was 240 newborns, consisting of babies with asphyxia and normal babies. Sampling with simple random sampling. Collecting data using a check list. Data taken from patient medical records (secondary data). Data analysis used the Chi Square test with a significance level of  $\alpha < 0.05$ . The results of the analysis with the Chi square test showed that the value of Asympt.Sig. (2-sided) on the Pearson Chi square test is 0.000 less than 0.05. So it can be concluded that there is a significant relationship between PROM/KPD and the incidence of neonatal asphyxia in the delivery room of dr. Soegiri Lamongan. Asphyxia neonatorum is a complication of newborns which one of the contributing factors is PROM. Therefore, emergency obstetric and newborn care efforts should be strengthened to prevent neonatal asphyxia. It is hoped that health workers in the delivery room will carry out careful monitoring of labor, and identify and take appropriate measures to help reduce the occurrence of neonatal asphyxia.

Keywords: Premature rupture of membranes; Asphyxia; Newborns

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## INTRODUCTION

Information on child mortality, which consists of neonatal mortality, infant mortality rate (IMR) and under-five mortality rate is an important indicator to assess the level of welfare including the health status of a country and the quality of life. Child mortality rates help identify vulnerable groups who are at higher risk of dying and become input strategies in efforts to reduce these risks, such as maternal health services and family planning programs that play a role in the survival of mothers and children. IMR is one of the indicators in the 2015-2018 Rencana Pembangunan Jangka Menengah Nasional (RPJMN) with a target of 24 per 1,000 live births<sup>1</sup>

The results of the Indonesian Demographic and Health Survey (IDHS) in 2017 showed that the Neonatal Mortality Rate was 15 per 1,000 live births and the Infant Mortality Rate (IMR) was 24 per 1,000 live births<sup>2</sup>. The condition of IMR and AKN obtained from routine reports is relatively small. However, if calculated, the absolute mortality rate is still high, namely as many as 4,059 babies die per year. In one day, it means as many as 11 (eleven) babies died. In 2017, the IMR for East Java Province was at 23.1 per 1,000 live births and this figure until 2017 was still above the national target<sup>3</sup>. Based on existing data, in 2016 the IMR in Lamongan District reached 90 babies, consisting of 44 boys and 46 girls. There are many factors that influence the IMR rate, but it is not easy to find the most dominant factor<sup>4</sup>

Based on data reported to the Directorate of Family Health in 2019, out of 29,322 under-five deaths, 69% (20,244 deaths) occurred during the neonatal period. Of all reported neonatal deaths, 80% (16,156 deaths) occurred in the first six days of life. In 2019, the most common causes of neonatal mortality were low birth weight (35.3%), asphyxia (27%), congenital abnormalities (21.4%), sepsis (12.5%), tetanus neonatorum (3.5%) and others (0.3%)<sup>5</sup>.

Asphyxia is a condition in which the baby does not breathe spontaneously and regularly after birth. The risk factors for neonatal asphyxia can be grouped into four, namely maternal factors, labor factors, infant factors and umbilical cord factors. Maternal factors are age, education, occupation, parity, antepartum bleeding, hypertension during pregnancy and anemia during pregnancy. Labor factors are type of delivery, birth attendant, place of delivery, prolonged labor, and premature rupture of membranes. Infant factors are premature, LBW and umbilical cord factors are umbilical cord twists, short umbilical cord and umbilical cord prolapse<sup>6</sup>.

The results of the research by Widiani, NN Ayuk, et al. (2016)<sup>7</sup> show that the risk factors that increase the incidence of neonatal asphyxia are umbilical cord twists, anemia during pregnancy, prolonged labor, low birth weight, maternal age <20 years and > 35 years, and hypertension during pregnancy. Meanwhile, the results of research conducted by Rahma, Andi Siti, et al. (2013)<sup>8</sup> showed that out of 104 cases of asphyxia, the risk factors were maternal age <20 years and > 35 years, gestational age <37 weeks and > 42 weeks, prolonged labor, childbirth. with action.

Apart from death, asphyxia neonatorum can also have various effects on babies. The results of several studies indicate that neonatal asphyxia is a risk factor for acute kidney failure<sup>9</sup>. Besides that, it can also cause hearing loss<sup>10</sup>.

Efforts made by the government to reduce the neonatal mortality rate are by holding training for Normal Childbirth Care (APN), holding resuscitation training programs and emergency neonatal training programs for midwives. In carrying out these efforts, human resources who have the ability to provide quality services are needed, namely by providing health education to the community, so that the knowledge possessed by the community is expected to influence people's behavior towards health<sup>9</sup>.

**METHOD**

<sup>1</sup> This study used a descriptive analytic study with a cross sectional approach. This study analyzed the relationship between premature rupture of membranes and the incidence of neonatal asphyxia in Dr. Soegiri Lamongan from June to December 2020. The number of samples in this study were 240 women who gave birth consisting of 120 mothers who gave birth with PROM and 120 mothers who gave birth normally who were taken by simple random sampling. The data collection technique was carried out using secondary data, namely by conducting a documentation study using official RSUD documents. Dr. Sorgiri Lamongan in the form of a respondent's medical record file. Variables observed or measured; premature rupture of membranes is maternity women who experience discharge (12-24 hours) at premature and term gestation; Asphyxia neonatorum is assessment of infants using APGAR scores that are seen in the birth register. Processing data using univariate analysis, bivariate analysis with Chi-Square test. Univariate analysis was carried out to see the data frequency distribution of each risk factor. Bivariate analysis was carried out to see the relationship between the two variables, namely PROM/KPD and asphyxia.

**RESULTS AND DISCUSSION**

**Univariate Analysis**

Table 1. Distribution of Maternal Age in Maternity Room RSUD Dr. Soegiri Lamongan in 2020

No	Age	n	%
1.	< 20 Years old	18	7,5
2.	20 – 35 Years old	186	77,5
3.	> 35 Years old	36	15
<b>Total</b>		240	100

From table 1. it can be seen that most of the age of the mother giving birth in the delivery room at RSUD Dr. Soegiri Lamongan (77.5%) were between 20 - 35 years old or of reproductive age. The age for optimal reproduction for a mother is between the ages of 20 and 35. Age is categorized into two, namely unhealthy reproductive age (<20 years and> 35 years) and healthy reproductive age (20 - 35

years). In the period of healthy reproduction, it is known that the safe age for pregnancy and childbirth is 20-30 years<sup>11</sup>.

The results of research conducted by Widiani, N.N., Ayuk, et al. (2016)<sup>7</sup> showed that the variables significantly related to neonatal asphyxia were maternal age with OR = 3.44 (95% CI: 1.76-6.72). Research conducted by Aslam HM, et al (2014)<sup>12</sup> also states that significant antepartum risk factors cause asphyxia, one of which is the mother's age between 20 - 35 years with an OR value of 0.30 95% CI 0.07-1.21. Different research results conducted by Muthmainah (2017)<sup>13</sup> explained that there was no relationship between maternal age and the incidence of neonatal asphyxia in term pregnancy at RSUD Ulin Banjarmasin.

Based on the results of this study that the age of the respondents is mostly between 20-35 years, this can explain that neonatal asphyxia can occur at high-risk and low-risk ages in pregnancy and childbirth. This is because there are many factors that cause neonatal asphyxia, either from the mother or the fetus itself.

Table 2. Maternal Parity Distribution in Maternity Room RSUD Dr. Soegiri Lamongan in 2020

No	Parity	n	%
1.	Primipara	79	33
2.	Multipara	143	59,5
3.	Grandemultipara	18	7,5
<b>Total</b>		240	100

From table 2 it can be seen that most of the parity of mothers giving birth in the delivery room at RSUD Dr. Soegiri Lamongan (59.5%) are multiparous parity. Pregnancy and childbirth that are considered safe are parity 2 and 3. Pregnancy and childbirth at risk are the first child and the delivery of the fourth or more child, because in the first child the stiffness of the muscles or tears provides much greater resistance and can prolong labor. Whereas in the fourth child or more, there is a repeated decline in the elasticity of the tissue so that it can prolong the labor process<sup>14</sup>.

Table 3 Distribution of Maternal Age at Maternity Hospital Dr. Soegiri Lamongan in 2020

No	Gestational Age	n	%
1.	< 37 weeks	46	19,2
2.	37 – 40 weeks	163	67,9
3.	> 40 weeks	31	12,9
<b>Total</b>		240	100

From table 3 it can be seen that most of the gestational age of the mother giving birth in the delivery room at RSUD Dr. Soegiri Lamongan (67.9%) are aged 37-40 weeks, which is the age at term. Babies born at less than 37 weeks of gestation often experience asphyxia because the organs are not functioning properly, one of which is the lack of surfactant in the lungs of premature babies, which can cause respiratory distress syndrome. Meanwhile, in infants with serotonic pregnancy, asphyxia often occurs due to reduced blood flow to the fetus due to the reduced function of the placenta. Due to lack of oxygen during the intrauterine period, the fetus is hypoxic and ultimately fetal distress occurs and is born with an asphyxic condition.

Tabel 4. Distribution of Baby Weight in Maternity Room Dr. Soegiri Lamongan in 2020

No	Baby Weight	n	%
1.	≤ 2500 gram	52	21,7
2.	2600 – 4000 gram	175	72,9
3.	> 4000 gram	13	5,4
<b>Total</b>		240	100

From table 4. it can be seen that most of the baby's weight for the mother giving birth in the delivery room at RSUD Dr. Soegiri Lamongan (72.9%) were babies with normal weight between 2600-4000 grams. A baby's birth weight is influenced by several factors, both from the mother and from the baby itself. The quality of the baby is very dependent on the nutritional intake of pregnant women. Adequate nutrition will ensure a healthy baby with sufficient weight.

The results of research conducted by Sumy, Dwi Sumy, Dwi Antono (2018)<sup>15</sup> obtained Fisher Exact test results with p value (0.007) > α value (0.05) which can be concluded that there is a significant relationship between Low Birth Weight (LBW) with asphyxia in newborns at Aura Syifa Hospital, Kediri Regency. In contrast to the results of research conducted by Utami, Rahayu Budi (2015)<sup>16</sup> which showed that there was no significant relationship between birth weight and the incidence of neonatal asphyxia with the result that p = 0.600 was greater than 0.05.

Based on the results of this study, most of the birth weight babies were between 2600 grams-4000 grams or normal body weight, this could explain that neonatal asphyxia can occur both in babies with normal birth weight and abnormal birth weight. This is because there are many factors that cause neonatal asphyxia, either from the mother or the fetus itself.

Tabel 5. Distribution of PROM/KPD Incidents in Maternity Room Dr. Soegiri Lamongan in 2020

No	PROM/KPD	n	%
1.	Yes	120	50
2.	No	120	50
<b>Total</b>		240	100

From table 5 it can be seen that some (50%) mothers who gave birth experienced PROM and some (50%) mothers who gave birth did not experience PROM. This is because the researchers took the same number of respondents, both mothers who gave birth with PROM and without PROM as the control group.

Premature rupture of membranes is defined as the rupture of the membranes before delivery. The incidence of premature rupture of membranes in term pregnancy is higher than in preterm pregnancy. Complications that arise due to premature rupture of membranes depend on gestational age<sup>11</sup>.

Sumy's research results, Dwi Antono (2018)<sup>15</sup> states that the results of the Fisher Exact test obtained p value (0.207) > α value (0.05) which means that there is no significant relationship between premature rupture of membranes and asphyxia in newborns at Aura Hospital, Syifa Kabupaten Kediri. While the results of research by Rahmah, W, et al (2020)<sup>17</sup> state that the results of the Chi Square



statistical test show a p value of 0.000 ( $p < 0.05$ ), so it can be interpreted that there is a relationship between premature rupture of membranes and neonatal asphyxia at RSKIA PKU Muhammadiyah Kotagede Yogyakarta.

Based on the results of this study, it can be explained that neonatal asphyxia can occur both in mothers who experience premature rupture of membranes and who do not experience premature rupture of membranes. This is because there are many factors that cause neonatal asphyxia, either from the mother or the fetus itself.

Tabel 6. Distribution of Asphyxia Neonatorum Incidence in Maternity Room Dr. Soegiri Lamongan in 2020

No	Asphyxia Neonatorum	n	%
1.	Yes	146	60,8
2.	No	94	39,2
<b>Total</b>		240	100

From Table 6 it can be seen that the majority (60.8%) of infants have neonatal asphyxia. Asphyxia occurs due to disruption of gas exchange and  $O^2$  transport from mother to fetus so that there is a disruption in  $O^2$  supply and in eliminating  $CO^2$ . The result can cause respiratory acidosis or mixed with metabolic acidosis due to anaerobic metabolism and hypoglycemia can occur.

The results of research conducted by Aisyiah et al. (2016)<sup>18</sup> state that there is a significant relationship between parity, anemia, and premature rupture of membranes with the incidence of neonatal asphyxia in newborns at Cilegon Regional Hospital, Banten Province. Research conducted by Rahmawati, et al. (2016)<sup>19</sup> also stated that there was a significant relationship between poor obstetric history, PROM, and infant weight with the incidence of asphyxia at Pariaman Regional Hospital.

**Bivariate Analysis**

Table 7 Cross Table of Relationship between PROM/KPD and Asphyxia in the Maternity Room of Dr. Soegiri Lamongan

		Asphyxia		Total
		No	Yes	
PROM/KPD	No	65 (54,2%)	55 (45,8%)	120 (100%)
	Yes	29 (24,2%)	91 (75,8%)	120 (100%)
<b>Total</b>		94	146	240

From table 7 above, it can be seen that most of the mothers with PROM, their babies were born with neonatal asphyxia, namely as many as 91 babies (75.8%). And a small proportion (24.2%) of mothers with PROM, their babies did not experience neonatal asphyxia.

**Results of Chi Square Test Analysis**

Table 8. Results of Chi Square Test Analysis of the Relationship between PROM/KPD and Asphyxia in the Joint Room at dr. Soegiri Lamongan in 2020

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2- sided)	Exact Sig. (1-sided)
Pearson Chi-Square	22,664 <sup>a</sup>	1	,000		
Continuity Correction <sup>b</sup>	21,422	1	,000		
Likelihood Ratio	23,115	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	22,570	1	,000		
N of Valid Cases	240				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 47,00.

b. Computed only for a 2x2 table

From the results of the analysis test with the chi square, it is obtained that the Asymp.Sig. (2-sided) on the Pearson Chi-Square test is 0.000 less than 0.05. So based on this decision, it can be concluded that there is a relationship between the incidence of premature rupture of membranes in labor mothers with neonatal asphyxia in newborns in the delivery room of Dr. Soegiri Lamongan.

The results of this study are in line with the research conducted by Ninik, A (2013)<sup>20</sup> which states that the X<sup>2</sup> count (29.96) is greater than the X<sup>2</sup> table (3,841) which means there is a relationship between premature rupture of membranes and the incidence of asphyxia in newborns in BAPELKES RSUD Jombang. The results of Andini's research, Kartika Sari, et al. (2018)<sup>21</sup> also stated that based on the results of the Spearman's Rho correlation test, a significance value was obtained and also the coefficient value of the coefficient. The significance value of this study is p = 0.029 which is smaller than 0.05, which indicates that there is a significant relationship between the duration of premature rupture of membranes and the level of neonatal asphyxia.

Research conducted by Abay Woday, et al (2019)<sup>22</sup> found that the prevalence of birth asphyxia was found to be 22.6% in the first minute after birth. Independent predictors of birth asphyxia were primiparous (AOR = 3.77: 95% CI 1.87, 7.65), difficult labor (AOR = 3.45: 95% CI 1.58, 7.49), premature rupture of membranes (AOR = 5.02: 95% CI 1.69, 14.87), and had blood-stained amniotic fluid at birth (AOR = 5.02: 95% CI 1.69, 14.87). The results of research conducted by Webet, Alebachew Bayih, et al (2020)<sup>23</sup> also stated that the prevalence of birth asphyxia remains an important public health problem. The prevalence of birth asphyxia was 28.35% with several risk factors, namely mal presentation of the fetus (AOR = 3.32: 95% CI 1.13, 9.78), premature rupture of membranes (AOR = 6.30: 95% CI 2.45, 16.22), meconium stained amniotic fluid (AOR = 7.15: 95% CI 3.07, 16.66), vacuum



delivery (AOR = 6.21: 95% CI 2.62, 14.73), night labor (AOR = 6.01: 95% CI 2.83, 12.79) and delivery by interns only (AOR = 3.32: 95% CI 1.13, 9.78).

This is not in accordance with the results of research conducted by Safa'ah (2015) in Aisyiah et al. (2016)<sup>18</sup>, about the relationship between premature rupture of membranes and the incidence of neonatal asphyxia in newborns at dr. R. Koesma Tuban using Fisher's exact test obtained  $p = 0.064$  where  $p > 0.05$ , so  $H_0$  is accepted, meaning that there is no significant relationship between premature rupture of membranes and the incidence of asphyxia in newborns. Sumy's research, Dwi Antono (2018)<sup>15</sup> also concluded that there was no significant relationship between PROM/KPD and neonatal asphyxia at Aura Syifa Hospital, Kediri Regency.

Premature rupture of membranes (PROM) is the rupture of the amniotic fluid before delivery or before delivery, at an opening less than 4 cm in the latent phase<sup>14</sup>. This can occur late in pregnancy or long before delivery. Prolonged PROM is a PROM that occurs more than 12 hours before delivery. Premature rupture of membranes causes a direct connection between the outside world and the inner space of the uterus, making it easier for ascending infections. The longer the latent period, the greater the chance of infection in the uterus, prematurity of labor and further increase the incidence of health and death and the baby or fetus in the womb<sup>24</sup>. PROM can cause hypoxia and asphyxia due to oligohydramnios. Complications that can occur in fetuses with premature rupture of membranes include prematurity, infection, malpresentation, prolapse of funikuli, and perinatal mortality.

Asphyxia neonatorum is a condition in which the baby cannot breathe spontaneously and regularly after birth. This is caused by fetal hypoxia in the uterus. Hypoxia is associated with factors that arise in pregnancy, childbirth, or immediately after the baby is born<sup>11</sup>. Some of the causes of asphyxia are maternal factors, fetal factors, and umbilical cord factors. Fetal factors are premature, difficult labor, congenital abnormalities, and meconium mixed amniotic fluid. Maternal factors include preeclampsia, eclampsia, antepartum hemorrhage, prolonged labor, fever during labor, severe infections, post-term pregnancy, impaired exchange of nutrients or oxygen, and his disorders. While the umbilical cord factors include umbilical cord twists, short umbilical cord, umbilical cord knot, umbilical cord prolapse, pressure on the umbilical cord and premature rupture of membranes<sup>6</sup>.

According to the assumptions of the researchers, there was a relationship between PROM and the incidence of asphyxia because PROM was one of the factors causing neonatal asphyxia and infection. Rupture of the amniotic membrane that causes the lungs to constrict, opening of intra-uterine connection with vasoconstriction, thus microresistent to expansion so that organisms easily enter and complicate resuscitation which can cause asphyxia. Although these two factors are closely related, KPD does not always cause asphyxia, as well as asphyxia is not always due to PROM because there are other factors that can cause asphyxia.

## CONCLUSION AND SUGGESTION

8 Based on the research conducted, it can be concluded that there is a significant relationship between premature rupture of membranes (PROM) and the incidence of neonatal asphyxia in the delivery room of the RSUD. Dr. Soegiri Lamongan in 2020.

First advice for pregnant women. It is expected for pregnant women to carry out pregnancy checks regularly, so that it can be detected early if there are risk factors and management can be carried out immediately. Second advice for Hospitals/Health Workers. This research is expected to provide input for hospitals or health workers to improve the quality of services and increase knowledge and skills in helping babies with emergency situations, especially in the management of neonatal asphyxia. Third advice for Educational Institutions. This research is expected to be a material for consideration or input for conducting research related to PROM and asphyxia neonatorum.

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