

**Original article:**

**Relationship Between Premature Rupture Of Membranes And Caesarean Section Delivery Analytical Observational Study at Sultan Agung Islamic Hospital Semarang**

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**Abstract**

**Background:** Premature rupture of membranes (PROM) is a rupture of the membranes before delivery which poses a serious threat in the form of an increased risk of cesarean delivery. The risk of greater morbidity and mortality needs to be considered in cesarean delivery compared to vaginal delivery. **Objective:** This study aims to determine the relationship between premature rupture of membranes and delivery by cesarean section at Sultan Agung Islamic Hospital, Semarang. **Methods:** This research is an analytic observational study with a cross sectional research design. The population of this study was pregnant women with inpatient deliveries at the Sultan Agung Islamic Hospital, Semarang in 2018-2020. The study sample size was 50 patients. The research instrument used medical records from the Obstetrics and Gynecology section at Sultan Agung Islamic Hospital, Semarang. The sampling technique of this study is a non-probability sampling technique with purposive sampling method and meets the inclusion and exclusion criteria. Data were analyzed by Chi Square Test (X<sup>2</sup>). **Results:** The results of the study from a total of 50 samples obtained were 19 patients (38%) with PROM, of which 10 were delivered by cesarean section (52.6%) and 9 patients had vaginal delivery (47.4%). Patients who did not experience PROM were 31 patients (62%) of which 26 were delivered by cesarean section (83.9%) and 5 patients delivered vaginally (16.1%). The results of the Chi Square test (X<sup>2</sup>) obtained a significance value or Asymptotic Significance (2-sided) of 0.039. **Conclusion:** The conclusion of this study is that there is a relationship between premature rupture of membranes and delivery by cesarean section.

**Keywords:** Premature rupture of membranes, Sectio-caesarea delivery

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**Introduction**

Premature rupture of membranes (PROM) is an obstetric problem due to rupture of the membranes that can occur before 37 weeks of gestation which is called preterm PROM. The membranes that rupture at or more than 37 weeks of gestation are called term PROM.<sup>10</sup> PROM is a condition that poses a serious threat in the form of an increased risk of cesarean delivery. Oligohydramnios and

fetal distress conditions to intrauterine infection in preterm and term PROM affect the well-being of the mother and fetus if not managed properly so it is necessary to terminate pregnancy, one of which is by caesarean section delivery.<sup>1</sup> Sectio-caesarea delivery needs attention because of the greater risk of postoperative morbidity and longer hospitalization recovery time than vaginal delivery.<sup>5</sup>

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The problem of premature rupture of membranes requires great attention because the incidence is quite high. According to in 2013 the incidence of PROM in the world was 50-60% while in Indonesia it was 35% of 17,665 births.<sup>15</sup> The incidence of PROM at term occurs around 6.46-15.6% of term pregnancies. The incidence of preterm PROM occurs in the range of 2-3% of all singleton pregnancies. These data show that the incidence of term PROM is higher than that of preterm PROM.<sup>10</sup> The incidence of PROM is associated with adverse maternal and perinatal outcomes. The immediate risks of PROM include

**Correspondence to:** umbilical cord prolapse, placental abruption, and cord compression. Further risks are in the form of neonatal and maternal infections and delivery by cesarean section.<sup>14</sup> The incidence of PROM without risk depends on the way of management and complications that occur. The greater the complications, the smaller the incidence of PROM without risk.<sup>8</sup> The incidence of potentially severe infections occurs in about 1/3 of pregnant women who experience preterm PROM.<sup>10</sup>

Increased cases of PROM can result in an increase in the number of caesarean sections.<sup>3</sup> From the background above, the author wants to examine the relationship between premature rupture of membranes and delivery by cesarean section so that maternal care with PROM can be managed properly and minimize sectioaesarea delivery.<sup>16</sup> The author wants to examine this with the consideration that there has been no similar research in Semarang, especially at the Sultan Agung Islamic Hospital, Semarang. The purpose of this study was to determine the relationship between PROM and sectioaesarea delivery. The benefits of this study are expected to increase knowledge about the relationship between PROM and sectioaesarea delivery and as an evaluation of delivery management and the basis for policy making in order to improve hospital services, especially at Sultan Agung Islamic Hospital, Semarang. The hypothesis of this study is that there is a relationship between PROM and delivery by cesarean section.

### Material and Methods

This type of research is an observational analytic study with a cross sectional research design. The statistical test used is the Chi square test (X<sup>2</sup>). This research was conducted at the Islamic Hospital Sultan Agung Semarang from June to July 2021. The population in this study were pregnant women with inpatient deliveries at the Islamic Hospital Sultan Agung Semarang in 2018-2020. The population was determined by non-probability

sampling with purposive sampling method and met the inclusion and exclusion criteria and then included in the research sample until the number was met. The number of samples taken was 50 patients. The research instrument was the medical record of the Obstetrics and Gynecology section at the Sultan Agung Islamic Hospital, Semarang. The inclusion criteria for this study were mothers who gave birth by sectioaesarea because the primary diagnosis of premature rupture of membranes at term was with the head position and mothers who gave birth through vaginal delivery due to the primary diagnosis of premature rupture of membranes at term with the head position. Exclusion criteria for this study included pregnant women with a primary diagnosis of malpresentation, pregnant women with multiple or multiple pregnancies, and incomplete medical record data. The sample data was processed using the Statistical Package for the Social Sciences (SPSS) application. Data analysis used univariate analysis and bivariate analysis.

### Result

#### 1. Univariate Analysis

Univariate analysis is a description of the research sample that presents the frequency distribution of the number of cases of PROM and cesarean delivery. The distribution of the frequency of PROM events at Sultan Agung Islamic Hospital Semarang can be seen in Table 1. Based on the results of the study on the frequency distribution of PROM, 50 samples were obtained with the number of cases of PROM 19 patients and 31 patients without PROM. The results of this study indicate that the incidence of PROM is 38% of the total research sample. This figure is much larger than the figure estimated which is around 6.46-15.6%.<sup>10</sup> The incidence of PROM at 38% is also higher than the incidence of PROM in Indonesia which is 35% of 17,665 births. The difference in the proportion of the incidence of PROM can be caused by differences in the number of patients experiencing PROM and differences in the number of populations studied.

**Table 1. Distribution of the frequency of premature rupture of membranes at Sultan Agung Hospital Semarang in 2018-2020**

Incident premature rupture of membrane	Amount	Percentage
Premature rupture of membrane	19	38%
No premature rupture of membrane	31	62%
Total	50	100%

The characteristics of the sample in this study were seen from the age of pregnant women and gravida status. The distribution of the frequency of PROM events based on gravida status at Sultan Agung Islamic Hospital Semarang can be seen in Table 2.

**Table 2. Frequency Distribution of Premature Rupture of Membranes Based on Gravida Status at Sultan Agung Hospital Semarang in 2018-2020**

Incident premature rupture of membrane	Gravida Status				Total	%
	Primi gravida	%	Multi gravida	%		
Premature rupture of membrane	11	22	8	16	19	38
No Premature rupture of membrane	11	22	20	40	31	62
Total	22	44	28	56	50	100

Table 2 shows that mothers who experience PROM are more common in primigravida mothers. This study is in line with previous research that primigravida mothers have a 5.4 times risk of experiencing PROM compared to multigravida mothers.<sup>13</sup> However, this study is different from other theories that the cause of PROM is multiparous because the cervical opening process is faster than primiparas so that infection is easy to occur. The results that are not in line with this theory can be caused by various factors, including regular antenatal care, a healthy lifestyle, how to clean the genitals properly (from front to back), and immediately see a doctor if there are things that are not normal in the pubic area.<sup>7</sup>

The distribution of the frequency of PROM events based on maternal age at Sultan Agung Islamic Hospital Semarang can be seen in Table 3.

Based on table 3, mothers who experience PROM often occur in mothers of age who are not at risk (20-35 years). This study is in line with other studies that mothers giving birth with PROM are more than 20-35 years old. This is because the age of 20-35 years is a productive age for pregnancy.<sup>11</sup> However, this is not in line with the theory which states that age < 20 years or > 35 years is at risk of PROM.<sup>9</sup> These different results can be caused by good antenatal care management.

The distribution of the frequency of delivery types at the Sultan Agung Islamic Hospital in Semarang is shown in Table 4.

**Table 3. Distribution of the frequency of premature rupture of membranes based on maternal age at Sultan Agung Hospital Semarang in 2018-2020**

Incident premature rupture of membrane	Mother's age				Total	%
	At risk (<20 or >35 Years)	%	No Risk (20-35 Years Old)	%		
Premature rupture of membrane	2	4	17	34	19	38
No Premature rupture of membrane	6	12	25	50	31	62
Total	8	16	42	84	50	100

**Table 4. Frequency Distribution of Types of Delivery at RSI Sultan Agung Semarang in 2018-2020**

Type of delivery	Amount	Percentage
Sectio caesarea	36	72%
No caesarean section (vaginal)	14	28%
Total	50	100%

Based on table 4, it shows that from a total sample of 50 patients, 36 were delivered by cesarean section and 14 were delivered vaginally. These data indicate that the total incidence of cesarean section deliveries is 72%, which exceeds the national incidence of cesarean section deliveries. According to the Ministry of Health of the Republic of Indonesia in 2018, the incidence of sectio caesarea in Indonesia is 17.6% of the total number of deliveries.<sup>6</sup> The high rate of cesarean section deliveries at the Sultan Agung Hospital, Semarang as a Type B Hospital is due to being an obstetrical referral from various health facilities such as clinics and health centers in the local area as well as referrals from district hospitals. Efforts to minimize sectio caesarea can be done by providing education to pregnant women for routine antenatal care as an early detection of risk factors for sectio caesarea.

Sectio caesarea delivery is carried out based on certain indications. Indications for cesarean section delivery in 36 patients with cesarean section are shown in Table 5.

**Table 5. Indications for Sectio Caesarea Delivery at Sultan Agung Hospital Semarang in 2018-2020**

Indication	Amount	Percentage
Premature rupture of membranes	10	27,77%
Former SC	8	22,22%
Severe preeclampsia	6	16,66%
CPD	5	13,88%
Labor does not progress	5	13,88%
Plasenta previa	2	5,55%
Total	36	100%

2. Bivariate Analysis

Bivariate analysis to determine the relationship between the independent variable and the dependent variable with the Chi square test (X<sup>2</sup>). PR (Prevalence Ratio) with the Risk Estimate statistical test to determine the risk.

than 18 hours can increase the risk of infection in the fetus. Previous research showed that prolonged PROM (more than 18 hours) had 10 times the risk of neonatal infection.<sup>1</sup> Infection in the fetus causes fetal distress until it progresses to asphyxia due to insufficient oxygen and nutrients for the fetus. Another condition for choosing cesarean delivery in PROM patients is when oligohydramnios or induction failure is found.<sup>2</sup>PROM causes oligohydramnios which can trigger compression of the umbilical cord to occur fetal hypoxia. The presence of oligohydramnios should be suspected of fetal distress. The more amniotic fluid that comes out will result in a smaller amount and if there are no signs of labor, the risk of fetal distress is even greater.<sup>12</sup>This study is in line with previous research that the majority of PROM patients who experienced asphyxia and were not asphyxia gave

birth by sectio caesarea.<sup>4</sup>

The results of the Continuity Correction test obtained a P value of 0.039 (<0.05), which means that there is a significant (mean) relationship between the PROM variable and caesarean section delivery. The results of the Risk Estimate statistical test obtained a PR value of 0.628 indicating that PROM is a risk factor (PR>1) for sectio caesarea which has a 0.628 greater risk for the occurrence of cesarean delivery.

**Discussion**

Premature rupture of membranes (PROM) is the rupture of the membranes before the start of labor. The condition of oligohydramnios or fetal distress to intrauterine infection in term or preterm PROM requires termination. Termination can be done through induction of labor with bishop score evaluation before induction. If the induction of labor is successful, a vaginal delivery can be performed, but if the induction of labor fails or if there are obstetric abnormalities, a caesarean section is required.<sup>1,3</sup>

This study shows that there are 10 patients with PROM who experienced cesarean section delivery (52.6%). The PROM cases taken in this data are PROM without other delivery complications and then a cesarean section is delivered. PROM without complications of cesarean section delivery can be related to the duration of PROM. The duration of PROM more

The study showed that 9 people with PROM experienced vaginal delivery (47.4%). Vaginal delivery is performed in PROM patients due to success in labor induction. Induction of labor is done in an effort to stimulate the onset of his. PROM patients who had vaginal delivery were also caused by the absence of other complications, so there was no indication for sectio caesarea.<sup>12</sup>This study showed that there were 26 patients without

**Table 6. Chi Square Test(X<sup>2</sup>)**

Premature rupture of membrane	Labor				Total	P Value	PR
	Sectio caesarea		No sectio caesarea(vaginal)				
	F	%	F	%			
Premature rupture of membrane	10	52.6	9	47.4	19	100	
No Premature rupture of membrane	26	83.9	5	16.1	31	100	0.039 0.628
Total	36	72	14	28	50	100	

PROM who underwent cesarean section delivery (83.9%). This shows that sectio caesarea is not only performed in PROM conditions. Delivery by cesarean section is carried out on maternal and fetal indications. There were 5 patients without PROM who experienced vaginal delivery (16.1%). This shows that the patient is a spontaneous parturition without other complications so that there is no indication for caesarean section. Sectio caesarea delivery is performed when the mother or fetus is at high risk and vaginal delivery is not possible.<sup>3</sup>

### Conclusion

The results showed that there was a relationship between PROM and delivery by cesarean section ( $p = 0.039$ ).

### Conflict of interest

The authors state no conflict of interest.

### Ethical clearance

Ethical clearance has been approved by the research ethics commission of the Faculty of Medicine, Sultan Agung Islamic University Semarang with the number 158/EC/KEPK/2021.

### Authors' contribution

Study design: all authors.

Data gathering: Mutiara Delia Subiyanto

Writing and submitting manuscript: Yulice Soraya Nur Intan

Editing and approval of final draft: all authors.

### References

1. Boskabadi, H. & Zakerihamidi, M. (2018) 'Evaluation of Maternal Risk Factors, Delivery, and Neonatal Outcomes of Premature Rupture of Membrane: A Systematic Review Study', *Journal of Pediatrics Review*, 7(2), pp. 77–88. doi: 10.32598/jpr.7.2.77.
2. Byonanuwe, S. et al. (2020) 'Predictors of Premature Rupture of Membranes among Pregnant Women in Rural Uganda: A Cross-Sectional Study at a Tertiary Teaching Hospital', *International Journal of Reproductive Medicine*, 2020, pp. 1–6. doi: 10.1155/2020/1862786.
3. Cunningham, Leveno, Bloom, Hauth, Rouse, S. (2014) *Obstetri Williams*. 24th edn. New York: McGraw-Hill Education.
4. Febriani, S. R., Garna, H., & Mansyur, F. A. F. (2017) 'Perbandingan Asfiksia Neonatorum pada Kejadian Ketuban Pecah Dini dan Tidak Ketuban Pecah Dini Serta Hasil Luanan Bayi di RSUD Al – Ihsan Periode Januari 2016–31 Mei 2017', *Prosiding Pendidikan Dokter*, (3(2)), pp. 550–560.
5. Ibishi, V. A., & Isjanovska, R. D. (2015) 'Prelabour Rupture of Membranes: Mode of Delivery and Outcome', *Open access Macedonian journal of medical sciences*, 3(2), pp. 237–240. doi: <https://doi.org/10.3889/oamjms.2015.037>.
6. Kementerian Kesehatan Republik Indonesia (2018) *Laporan Nasional Riskesdas*. Jakarta: Badan Penelitian dan Pengembangan Kesehatan.
7. Manuaba (2012) *Ilmu Kebidanan, Penyakit Kandungan, dan KB*. Jakarta: EGC.
8. Mochtar, R. (2012) *Sinopsis Obstetri*. 3rd edn. Jakarta: EGC.
9. Nugroho, T. (2012) *Obsgyn Obstetri dan Ginekologi : untuk kebidanan dan keperawatan*. Yogyakarta: Nuha Medika.
10. POGI (Perkumpulan Obstetri dan Ginekologi Indonesia Himpunan Kedokteran Feto Maternal) (2016) 'Pedoman Nasional Pelayanan Kedokteran Ketuban Pecah Dini', in.
11. Pradana, T. A. & Surya, I. G. N. H. W. (2020) 'Karakteristik Ibu Bersalin dengan Ketuban Pecah Dini (Aterm & Preterm) di Rumah Sakit Umum Pusat Sanglah Denpasar Periode Juli 2015–Juni 2016', *Jurnal Medika Udayana*, 9(1), pp. 92–97.
12. Prawirohardjo, S. (2016) *Ilmu Kebidanan*. 4th edn. Jakarta: PT. Bina Pustaka Sarwono Prawirohardjo.
13. Rifiana, A. & Hasanah (2018) 'Faktor-Faktor Yang Berhubungan Dengan Ketuban Pecah Dini Pada Ibu Bersalin di Puskesmas Tanggeung Ciannjur', *Ilmu dan Budaya*, 41(60), pp. 7001–7018. Available at: <http://journal.unas.ac.id/ilmu-budaya/article/view/461>.
14. Weekes, C. R. & Mahomed, K. (2017) 'Term Prelabour Rupture of Membranes ( Term PROM )', *The Royal Australian and New Zealand College of Obstetrics and Gynecologists*, (July 2010), pp. 8–11.
15. WHO (2014) *Levels and Trend Maternal Mortality*. Geneva: WHO Press.
16. Yoan Putri Praditia Susanto (2019) 'Faktor-Faktor Yang Berhubungan Dengan Penatalaksanaan Persalinan Sectio Caesarea di RS TK. II Pelamonia Makassar', *Jurnal Kesehatan Delima Pelamonia*, 3(1), p. ISSN : 2597-7989. doi: <https://doi.org/10.37337/jkdp.v3i1.119>.