International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2020): 7.803

Characteristics Profile of Pregnancy with Premature Rupture of Membranes in Sanglah General Hospital

I Gede Mahendra Adiguna Dira[1], Ketut Surya Negara[2]

[1]Resident of Obstetric and Gynecology Department, Faculty of Medicine Udayana University, Sanglah Hospital, Bali-Indonesia

[2]Obstetric and Gynecology Department, Faculty of Medicine Udayana University, Sanglah Hospital, Bali-Indonesia

Abstract: ***Premature rupture of membranes (PROM) is one of the most common pathological conditions found in pregnancy. PROM may cause various complications for both mother and baby. Previous studies found that PROM is a multifactorial disease. Thus, this study aims to identify the characteristics of subjects with PROM in Sanglah General Hospital. This observational retrospective descriptive study involved all pregnant women with PROM who labored at Sanglah General Hospital from 1 January 2018 until 31 December 2019. PROM is defined as the rupture of amniotic membranes without sign of labor within one hour after the rupture of amniotic membranes. The characteristics included in this study were age, parity, PROM duration, PROM risk factors, type of labor, the indication of cesarean section, neonatal birth weight, maternal and perinatal morbidities, and types of neonatal. There were 254 (15.02%) pregnant women with PROM. Most of the PROM cases found was term PROM (75.6%) and was primigravida woman (41.3%). The highest incidence of PROM was found in the 21-34 years age group (74.4%). The majority of PROM cases in this study had PROM duration <12 hours (94.9%), idiopathic (81.9%), vaginal delivery (51.6%), and no maternal morbidities (94.0%). Most neonates born to mothers with PROM in this study had no perinatal morbidities (94.0%) and had neonatal care in a regular ward (94.4%).***

Keywords: Characteristics, Premature rupture of membrane, Preterm PROM, Term PROM

1. Introduction

Premature rupture of membranes (PROM) is a common pathological condition found in pregnant women that may endanger the condition of both the mother and the fetus. PROM may cause infection in mother and fetus and neonatal respiratory problems, such as respiratory distress syndrome, and fetal lung hypoplasia. This will lead to increased maternal and perinatal morbidity and mortality. [1,2]

PROM can occur at term or preterm gestation. The rupture of the amniotic membranes before 37 weeks' gestation is referred to as preterm PROM. Meanwhile, the rupture of the amniotic membranes at 37 weeks of gestation or more is known as the term PROM.[1,2] The incidence of PROM worldwide varies between 5-10% and almost 80% occurs at a term of gestation.[1] The incidence of PROM in Indonesia ranges from 4.5-7.6%.[3]

The causes of PROM are multifactorial, but most PROM cases have no clear cause. Several known risk factors for preterm PROM are a history of PROM and preterm delivery, short cervical length, history of bleeding in the 2nd and 3rd trimester, uterine overdistention, copper and ascorbic acid deficiency, connective tissue disorders, low body mass index (BMI), low socioeconomic status, certain drug use, infection, smoking, amniocentesis, and previous sexual activity. Pathophysiologically, biochemical changes in the amniotic membrane was also a risk factor for PROM.[4]

PROM was associated with higher maternal and perinatal morbidity and mortality. Maternal complications in PROM include chorioamnionitis, placental abruption, cord compression, umbilical cord prolapse, and sepsis. Chorioamnionitis occurs in 9% of term PROM cases and mainly occurs in PROM duration more than 24 hours. In preterm pregnancy, chorioamnionitis can occur in 13-60% of cases of PROM.[5,6] Four causes of infant death associated with PROM are sepsis, asphyxia, respiratory distress syndrome, and pulmonary hyperplasia.[1,7,8] Due to high morbidities and mortalities associated with PROM, this study aims to identify the characteristics that may be associated with PROM.

2. Method

This observational retrospective descriptive study was conducted at Sanglah General Hospital Bali from 1 January 2018 until 31 December 2019. The inclusion criteria were a pregnant woman with PROM who labored at Sanglah General Hospital during the study period and had complete maternal and neonatal medical records. The exclusion criteria were patients not willing to participate in this study.

PROM is defined as the rupture of amniotic membranes without sign of labor within one hour after the rupture of amniotic membranes. The characteristics included in this study were age, parity, PROM duration, PROM risk factors, type of labor (i.e. vaginal delivery, assisted vaginal delivery, and cesarean section), the indication of cesarean section, neonatal birth weight, maternal and perinatal morbidities, and types of neonatal care (i.e. regular ward or neonatal intensive care unit [NICU]). These data were analyzed as descriptive data using the Statistical Package for the Social Sciences (SPSS) for windows version 20.0 software.

3. Result

There were 1690 labors in Sanglah General Hospital of which 254 patients (15.02%) were pregnant women with

PROM. Most of PROM cases were term PROM (192; 75.6%). In this study, it was found that the incidence of PROM most often found in the 21-34 years age group and was primigravida in both term and preterm pregnancies. The majority of PROM cases in this study had PROM duration <12 hours, no clear risk factor, and vaginal delivery. Most outcomes of PROM cases in this study had no maternal and perinatal morbidities. n this study, it was found that the majority of preterm babies had a neonatal birth weight of 2-2.5 kg, (31; 12.2%). Meanwhile, most term babies (165; 65%) had a neonatal birth weight of more than 2.5 kg. The detailed characteristics of subjects were described in Table 1.

Table 1: The Characteristics of Subject

Characteristics	Preterm PROM		Term PROM		Total	
	n	%	n	%	n	%
Age (years)						
≤ 20	6	2,4	18	7,1	24	9,4
21-34	47	18,5	142	55,9	189	74,4
≥35	9	3,5	32	12,6	41	16,1
Parity						
Primigravida	30	11,8	75	29,5	105	41,3
Gravida 2	22	8,7	50	19,7	72	28,3
Gravida 3	5	2.0	47	18,5	52	20,5
Gravida ≥4	5	2.0	20	7,9	25	9,9
PROM duration						
< 12 hours	58	22.8	183	72,0	241	94,9
≥ 12 hours	4	1.6	9	3,5	13	5,1
PROM risk factors						
Unknown	47	18,5	161	63,4	210	81,9
Longitudinal lie with breech presentation fetus	4	1,6	13	5,1	17	6,7
Multifetal pregnancies	6	2.4	4	1,6	10	4,0
Cephalopelvic disproportion	0	0	3	1,2	3	1,2
Transverse lie fetus	2	0.8	9	3,5	11	4,3
Macrosomia	0	0	1	0,4	1	0,4
Polyhydramnion	1	0.4	1	0,4	2	0,8
Urinary tract infections	2	0.8	0	0	2	0,8
Types of Labor						
Vaginal delivery	34	13.4	97	38.2	131	51.6
Assisted vaginal delivery	4	1.6	13	5.1	17	6.7
Cesarean section	24	9.4	82	32.3	106	41.7
Neonatal Birth Weight (gram)						
<1,500	5	2.0	0	0	5	2.0
1,500 – 2,000	20	7.9	1	0.4	21	8.3
2,000 – 2,500	31	12.2	26	10.2	57	22.4
> 2,500	6	2.4	165	65.0	171	67.3
Maternal Morbidities						
Chorioamnionitis	0	0	2	0.8	2	0.8
Umbilical cord prolapse	0	0	0	0	0	0
Urinary tract infection	2	0.8	0	0	2	0.8
No morbidities	60	23.6	190	74.8	250	98.4
Perinatal Morbidities						
Severe asphyxia	3	1.2	1	0.4	4	1.6
Moderate asphyxia	0	0	5	2.0	5	2.0
Multiple congenital anomalies	1	0.4	2	0.8	3	1.2
Neonatal ARDS	0	0	0	0	0	0
Sepsis	2	0.8	0	0	2	0.8
Neonatal jaundice	1	0.4	0	0	1	0.4
No morbidities	55	21.6	177	72.4	232	94.0
Types of Neonatal Care						
Regular ward	56	22.0	184	72.4	240	94.4
NICU	6	2.4	8	3.2	14	5.6
Total	**62**	**24.4**	**192**	**75.6**	**254**	**100**

Table 2: The Various Indication of Cesarean Section in PROM Cases

Indications	Preterm		Term		Total	
	N	%	N	%	N	%
Previous cesarean section	11	10,4	49	46,5	60	56,9

Transverse lie with breech presentation	1	0,9	9	8,5	10	9,4
Fetal distress	3	2,8	3	2,8	6	5,7
Multifetal pregnancy	2	1,9	3	2,8	5	4,7
Cephalopelvic disproportion	0	0	4	3,8	4	3,8
Preeclampsia with severe feature and impending eclampsia	7	6,6	3	2,8	10	9,4
HIV infection	0	0	1	0,9	1	0,9
Transverse lie	0	0	8	7,5	8	7,5
Failure of descent	0	0	0	0	0	0
Macrosomia	0	0	1	0,9	1	0,9
Hydrocephalus	0	0	0	0	0	0
Eclampsia	0	0	1	0,9	1	0,9
Umbilical cord prolapse	0	0	0	0	0	0
Total	**24**	**22.6**	**82**	**77.4**	**106**	**100**

The most common indication for cesarean section in this study was previous cesarean section history (60; 56.9%), followed by longitudinal lie with breech presentation, and preeclampsia with severe feature and impending eclampsia. The indication of cesarean section found in this study was described in Table 2. Of the total vaginal deliveries, 123 out of 131 cases (93.9%), were spontaneous vaginal delivery (Table 3).

Table 3: The Types of Vaginal Delivery in PROM Cases

Vaginal Delivery	Preterm		Term		Total	
	N	%	N	%	N	%
Spontaneous	34	26	89	67.9	123	93.9
Induction	0	0	8	6.1	8	6.1
Total	34	26	97	74	131	100

4. Discussion

Rupture of the amniotic membrane will occur during normal labor due to increased intrauterine pressure due to repeated uterine contractions and distention. However, in PROM, the rupture of amniotic membranes was not followed by signs of labor. The causes of PROM are multifactorial and still controversial. [1,2,4,5]

The prevalence of PROM found in this study was 15.02% with most of them were term PROM. This was consistent with another study done by Maryuni and Kurniasih that found the prevalence of PROM in Indonesia was 10.7%.[9] Similarly, a study in Uganda found the prevalence of PROM was 13.8%.[10] Besides, the term PROM (gestational age >37 weeks) was the most frequent PROM found in other studies.[11,12] Theoretically, PROM is more common in term pregnancies due to the greater physiological uterine distention and biochemical and hormonal changes. Thus, the amniotic membrane becomes thinner and more fragile and become ruptures.[12]

In this study, PROM occurs most often in the 21-34 year age group. A retrospective study in Ethiopia also reports that the highest incidence of PROM cases was found in the reproductive age group (20-34 years) which was 58.3%.[11] Another study conducted by Workineh et al. study in 2017 has a similar result. They reported that the highest incidence of PROM cases was found in the 20-24 year age group (40.3%) and the 25-29 year age group (29.2%).[13] Maternal age during pregnancy may affect maternal and neonatal outcomes either directly or indirectly. As the maternal age increase, the risk of comorbidities, such as preeclampsia, diabetes mellitus, and heart failure, will also increase. Besides, the use of assisted reproductive technology in this age group is also influential. Further research is still to be done to determine the mechanisms or pathways involved either socially, biologically, or environmentally.[14]

The incidence of PROM in this study was found highest in the multigravida group. This is different from what was reported in several studies that PROM occurred mostly in primigravidas.[1,7,15] Pathophysiologically, in primigravida, the uterus cannot adapt to the pregnancy process, so that as the amniotic membrane becomes more distended, the greater the possibility of PROM. However, three previous studies were found that preterm PROM more commonly found in the multigravida group.[3,10,11] This is thought to be due to trauma in a previous pregnancy that causes cervical incompetence.[6]

In theory, the duration of rupture of membranes is one of the factors that influence both maternal and perinatal complications in PROM cases. In this study, most PROM duration was <12 hours. The same thing was also found in Endale's study where it was found that most cases of PROM cases (63.8%) occurred less than 12 hours.[1] Almost all PROM cases in this study that had a PROM duration less than 12 hours came from primary healthcare in Denpasar and surrounding areas. It can be concluded that our subjects had great awareness by immediately coming to the nearest health facility when they found abnormal vaginal discharge during their pregnancies.

The etiology of PROM itself is multifactorial and sometimes more than one cause is found. However, in this study, most of the subjects with PROM had no risk factors. Similarly, three previous studies also found no risk factors in most PROM cases.[7,16,17] According to the theory, abnormal presentation (eg, breech presentation, transverse lie), multifetal pregnancies, and polyhydramnios will increase the pressure on the amniotic cavity. When these increased pressure accompanied by defects in the amniotic cavity (i.e. decreased elasticity, decreased collagen levels), the increased pressure on this weak part of the amniotic membrane will cause PROM. These theories were consistent with the study done by Addisu et al. that found most PROM cases have a breech presentation or transverse lie.[11] Maryuni and Kurniasih also found a significant relationship between malposition and the incidence of PROM.[9] Besides, the socio-economic status as well as nutritional factors may affect immune system regulation and reduce antibacterial activity in amniotic fluid which leads to PROM. A prospective

observational study conducted in India found that PROM was found in 53% of patients with low socioeconomic status.[18] Infection also has long been thought to be one of the main causes of PROM. Group B Streptococcus (GBS) is the main pathogen where colonization has been found in many cases of PROM. The culture from amniotic fluid was found to be GBS positive in 1 in 3 cases of PROM.[19]

Most of the PROM cases in this study underwent spontaneous vaginal delivery. This is because most of the PROM cases in our study had a duration of <12 hours whereas in our center labor induction was only performed when the PROM duration was longer than 12 hours. This was consistent with previous studies that found most PROM cases had a vaginal delivery.[15,20] The most common indication for cesarean section in our study was the previous history of cesarean section. On the other hand, the indications of cesarean section in the other studies are very different, i.e. malpresentation, failure of descent, and fetal distress.[1,15] The indication for cesarean section varies widely in each study because it is greatly influenced by many factors, such as demographic and clinical characteristics of the patient.

In terms of neonatal outcome, most of the subjects with preterm PROM had a neonatal birth weight of 2-2.5 kg. Meanwhile, most term PROM had a neonatal birth weight of more than 2.5 kg. Similar to these results, Endale et al. also reported that most of the subjects with term PROM in their study had neonatal birth weight ≥2,5 kg.[1] A prospective study conducted in India also found that 50.48% of PROM cases had a neonatal birth weight of 2100 grams to 3000 grams followed by 30.09% who weighed less than 1500 grams.[21]

Almost all PROM cases in this study, both term and preterm, had no maternal and perinatal morbidities. In a study conducted by Lovereen, puerperal infection as the most maternal morbidity (11.8%), followed by wound infection (4.5%), and chorioamnionitis (3.6%).[16] Also, Abrar et al. found that there were 2.6% of infants with moderate asphyxia with PROM duration <6 hours and 5.3% of infants with moderate asphyxia with PROM duration >6 hours.[3] Another study found that most infants born from mothers with PROM had sepsis.[15] Morbidity and mortality of infants are influenced by many factors. Therefore, PROM is not a sole risk factor that determines the morbidity that occurs in infants.

Types of neonatal care were much affected by perinatal morbidities. In this study, 14 cases (5.6%) required neonatal care in NICU, which was consist of 2.4% preterm PROM and 3.2% cases term PROM. The indications for NICU care in these eight infants were in addition to very low infant weight in premature infants and the occurrence of perinatal complications such as severe asphyxia, acute respiratory distress syndrome (ARDS), jaundice, sepsis, and multiple congenital anomalies. Similarly, Endale et al. also found that 25.4% of babies born to mothers with term PROM require neonatal care in NICU.[1] Meanwhile, a previous study found that almost all babies born and mothers with preterm PROM require treatment at the NICU.[22] The decisions of infant care in the NICU are also heavily influenced by the number of NICU availability and the quality of health services.

5. Conclusion

There were 254 labors with PROM during 2018-2019 at Sanglah General Hospital Bali. Most PROM cases found was term PROM and was primigravida woman. The highest incidence of PROM was found in the 21-34 years age group. The majority of PROM cases in this study had PROM duration <12 hours, idiopathic, vaginal delivery, and no maternal morbidities. Most neonates born to mothers with PROM in this study had no perinatal morbidities and did not require neonatal care at NICU.

References

[1] Endale T., Fentahun N., Gemada D., Hussen M.A. 2016. Maternal and fetal outcomes in term premature rupture of membrane. *World J Emerg Med*, 7(2): 147-152.
[2] Dayal, Hong PL. Premature Rupture of Membranes. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 [cited 2020 Oct 5].
[3] Abrar NM, Handono B, Rukmana GIT. 2017. Karakteristik Luaran Kehamilan dengan Ketuban Pecah Dini di RSUP Dr. Hasan Sadikin Periode Tahun 2013-2015. *J Sist Kesehat*; 2(4).
[4] Menon R, Richardson LS. 2017. Preterm Prelabor Rupture of the Membranes: A Disease of the Fetal Membranes. *Semin Perinatol*. 41(7):409–19.
[5] Mercer B.M. 2014. Premature Rupture of Membranes. In: Creasy R.K., Resnik R., *dkk*., editors. *Maternal-Fetal Medicines Principles & Practices*. *7th ed*. Philadelphia: Elsevier,P 663-672.
[6] Emechebe C.I., Njoku C.O., Anachuna K., Udofia U. 2015. Determinants and Complications of Pre-Labour Rupture of Membranes (PROM) At the University of Calabar Teaching Hospital (UCTH), Calabar, Nigeria. *Scholars Journal of Applied Medical Sciences*, 3(5B): 1912-1917.
[7] Gahwagi M.M., Busarira M., Atia M. 2015. Premature Rupture of Membranes Characterictics, Determinants, and Outcomes of in Benghazi, Libya. *Open Journal of Obstetrics and Gynecology*, 5: 494-504.
[8] Linehan L.A., Walsh J., Morris A., Kenny L., O'Donoghue K., Dempsey E., Russell N. 2016. Neonatal and Maternal outcomes following midtrimester preterm premature rupture of the membranes: a retrospective cohort study. *BMC Pregnancy and Childbirth*, 16:25.
[9] Maryuni M, Kurniasih D. 2017. Risk Factors of Premature Rupture of Membrane. Kesmas: National Public Health Journal. 11 (3): 133-137.
[10] Byonanuwe, S., Nzabandora, E., Nyongozi, B., Pius, T., Ayebare, D. S., Atuheire, C., Mugizi, W., Nduwimana, M., Okello, M., Fajardo, Y., & Ssebuufu, R. 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*.

[11] Addisu D, Melkie A, Biru S. 2020. Prevalence of Preterm Premature Rupture of Membrane and Its Associated Factors among Pregnant Women Admitted in Debre Tabor General Hospital, North West Ethiopia: Institutional-Based Cross-Sectional Study. Vol. 2020, *Obstetrics and Gynecology International. Hindawi*: p. e4034680.

[12] Assefa NE, Berhe H, Girma F, Berhe K, Berhe YZ, Gebrehet G, Werid WM, Berhe A, Rufae HB, Welu G. Risk factors of premature rupture of membranes in public hospitals at Mekele city, Tigray, a case control study. BMC Pregnancy Childbirth [Internet]. 2018 [cited 2020 Oct 5];18.

[13] Workineh, Y., Birhanu, S., Kerie, S. et al. 2018. Determinants of premature rupture of membrane in Southern Ethiopia, 2017: case control study design. BMC Res Notes 11, 927.

[14] Newburn-Cook, C. V., & Onyskiw, J. E. (2005). Is Older Maternal Age a Risk Factor for Preterm Birth and Fetal Growth Restriction? A SystematicReview. Health care for women international, 26(9), 852-875.

[15] Vishwakarma K., Patel S.K., Yadav K., Pandey A. 2015. Impact of premature rupture of membranes on maternal & neonatal health in Central India. *Journal of evidence based medicine and healthcare*, 2(49):8505-8508.

[16] Lovereen S, Khanum MA, Nargis N, Begum S, Afroze R. 2018. Maternal and Neonatal outcome in premature rupture of membranes. *Bangladesh J Med Sci Dhaka*. 17(3):479–83.

[17] Revathi V., Sowjanya R., Lavanya S. 2015. Maternal and Perinatal Outcome in Premature Rupture of Membranes at Term. *IOSR Journal of Dental and Medical Sciences*, 14(4): 12-15.

[18] Sajitha, A. K., Geetha, K. C., & Mumtaz, P. 2020. The maternal and perinatal outcome in preterm premature rupture of membrane (pPROM): A prospective observational study. *International Journal of Clinical Obstetrics and Gynaecology;* 4(6): 208-212.

[19] Saghafi, N., Pourali, L., Ghazvini, K., Maleki, A., Ghavidel, M., & Babaki, M. K. 2018. Cervical bacterial colonization in women with preterm premature rupture of membrane and pregnancy outcomes: A cohort study. International Journal of Reproductive BioMedicine, 16(5), 341.

[20] Patill S., Patil V. 2014. Maternal and foetal outcome in premature rupture of membranes. *IOSR Journal of Dental and Medical Sciences*, 13(1 2):56-83.

[21] Singh, J., Kanti, V., & Verma, V. 2019. Study of fetomaternal outcome in cases of premature rupture of membrane at tertiary care rural institute of Western Uttar Pradesh. *Int J Reprod Contraception, Obstet Gynecol*, 9(1), 77.

[22] Yu H., Wang X., Gao H., You Y., Xing A. 2015, Perinatal outcomes of pregnancies complicated by preterm premature rupture of the membranes before 34 weeks of gestation in tertiary center in China: A retrospective review. *BioScience Trends*, 9(1):3 5-41.