

Prevalence and Factors Associated with Premature Rupture of Membranes in Denpasar Bali

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ABSTRACT

Premature rupture of membranes (PROM) is an obstetric problem which is one of the factors causing prematurity, infection, malpresentation, umbilical cord prolapse and perinatal mortality. This study aims to identify the relationship between sociodemographic and obstetric factors with the premature rupture of membranes in women giving birth. This cross-sectional study involved 274 people from 859 deliveries from January to December 2020, at a referral hospital in Denpasar, Bali. The sampling technique used is simple random sampling. The process of collecting data was taken from medical records and hospital registers. Data analysis using chi-square and logistic regression. Study found that the prevalence of PROM was 22.6%. The results of multivariate analysis found that age ($p=0.733$), occupation ($p=0.816$), gestational age ($p=0.055$), parity ($p=0.477$), and intra uterine pressure ($p=0.105$) were not associated with PROM. Educational factors ($p=0.021$), hemoglobin level ($p=0.000$), and history of PROM ($p=0.005$) were significantly related to the premature rupture of membranes. There is a relationship between education factors, hemoglobin levels and a history of PROM with premature rupture of membranes. This information is important for service providers to understand so that they can carry out early detection and treatment efforts to prevent PROM.

Keywords: premature rupture of membranes, maternity mother, hemoglobin, education

INTRODUCTION

Premature rupture of membranes (PROM) is a state of rupture of the membranes before

delivery and after an hour of waiting there are no signs of labor (1). PROM can occur in term or preterm pregnancy. If premature rupture of membranes occurs at a gestational age of less than 37 weeks, it is called preterm PROM (1).

The incidence of PROM in some countries varies. In America the incidence of PROM in 2020 is about 8% of pregnancies, and preterm PROM is 2% -3% of pregnancies (2) The incidence of PROM in several referral hospitals in Indonesia ranges from 14% - 18% of total deliveries in hospitals (5 -7). Factors related to the PROM from various studies are still varied. There is no definite causative factor, several studies have found primigravida more often than multigravida, candida and klebsiella infections more often than those who are not (1,2,6,7). Findings from several studies on factors associated with the incidence of PROM reported different results. Workineh et. al (2017) reported hypertension and smoking factors, Nakubulwa et. al (2015) reported bacterial infection factors and abnormal vaginal discharge, Samejima et. al (2021) reported factors of conization history, cervical length, and history of second trimester bleeding Byonanuwe et. al (2020) reported urinary tract infection factors, and history of abortion, Tiruye et. al (2021) reported urinary tract infection factors and utilization of antenatal care services, and Assefa et. al (2018) reported that a history of abortion, a history of Caesarea Section, and vaginal discharge were significantly associated with the incidence of PROM (8-13).

PROM is associated with maternal and fetal morbidity and mortality. The effects on the fetus include prematurity, infection, mal presentation, umbilical cord prolapse, neonatal asphyxia, perinatal morbidity and mortality. While the impact on the mother is prolonged labor, postpartum hemorrhage, uterine atony, puerperal infection. Other complications include; endometritis, retained placenta and bleeding requiring dilation and curettage, increased need for cesarean delivery, maternal sepsis, and maternal death. A study in Nigeria found the three main causes of neonatal death associated with PROM are sepsis, asphyxia, and pulmonary hypoplasia (14–19). Besides the impact on maternal and infant morbidity and mortality, another impact is economic losses due to drug costs, hospitalization, absenteeism at work and health personnel costs. There has not been found an effective way to prevent PROM and its impact is the inability to control its occurrence. Knowing the risk factors for PROM will increase the ability to predict the possibility of PROM so that it guides efforts to prevent complications. (18)

METHODS

The cross-sectional study was carried out at Surya Husadha Hospital, Denpasar Bali. Surya Husada Hospital is one of the public hospitals in Denpasar, Bali. Denpasar City is the capital city of Bali Province, Indonesia. The population in this study were all mothers who gave birth at Surya Husada Hospital from January to December 2020 totaling 859. This study involved 274 people from 859 mothers who gave birth at Surya Husadha Hospital, Denpasar Bali. The sampling technique used is simple random sampling. Guidelines for data collection were made by researchers referring to various literatures. Data were collected by a three-person research team. Data processing is carried out using a computerized system (statistical software). The analysis process consisted of bivariate and multivariate analytical descriptive analysis. Descriptive analysis to determine

the percentage of the prevalence of PROM and data on sociodemographic and obstetric characteristics of mothers in labor. Sociodemographic and obstetric data collected were; maternal age, parity, hemoglobin level at delivery, intrauterine pressure (multiple pregnancy / polyhydramnios), history of PROM in previous deliveries and history of smoking. To analyze the factors associated with PROM using bivariate and multivariate analysis. Bivariate analysis to get Crude OR value and multivariate analysis to get Adjusted OR value using binary logistic regression test backward stepwise method.

RESULTS

This study involved 274 people from 859 mothers who gave birth at Surya Husadha Hospital, Denpasar Bali. The sociodemographic and obstetric characteristics of the respondents are summarized in table 1

Table 1. Sociodemographic and obstetric characteristics of respondents (n = 274)

Variable Category	Frequency	Percentage (%)
Age		
No Risk (20-35 years old)	242	88,32
At risk (<20 years/ > 35 years)	32	11,68
Education		
Higher education	95	34,67
Primary and secondary level	179	65,32
Occupation		
Working	202	73,72
Not Working	72	26,28
Gestational Age		
Preterm	11	4,02
Term	263	95,98
Parity		
Primipara	100	36,50
Multipara	174	63,50
Hemoglobin Level		
Anemia (<11g/dl)	18	6,57
Not Anemia (≥ 11g/dl)	256	93,43
Intrauterine Pressure		
Existed	4	1,45
Not any	270	98,55
History of PROM		
Existed	6	2,19
Not any	268	97,81
Smoking History		
Existed	2	0,73
Not any	272	99,27

Bivariate Analysis of Factors Associated with PROM in table 2

Table 2. Bivariate analysis of factors associated with PROM (n = 274)

Variable	PROM		Crude OR	95%CI	P value
	No (%)	Yes (%)			
Age					
No Risk (20-35 years old)	188	54			
At risk (<20 years/ > 35 years)	24	8	1,160	0,493-2,370	0,733
Education					
Higher education	82	13			
Primary and secondary level education	130	49	2,378	1,215-4,651	0,010
Occupation					
Working	55	17			
Not Working	157	45	0,927	0,490-1,753	0,816
Gestational Age					
Preterm	6	5			
Term	206	57	0,332	0,098-1,128	0,650
Parity					
Primipara	75	25			
Multipara	137	37	0,810	0,454-1,448	0,477
Hemoglobin Level					
Anemia (<11g/dl)	7	11			
Not Anemia (≥ 11g/dl)	205	51	0,158	0,058-0,429	0,000
Intrauterine Pressure					
Existed	1	3			
Not any	211	59	0,093	0,010-0,913	0,037
History of PROM					
Existed	1	5			
Not any	211	57	0,054	0,006-0,472	0,000

COR: Crude Odds Ratio

The results of bivariate analysis showed that age, occupation, parity, and gestational age were not associated with PROM. Significant factors related to PROM are; maternal education (COR= 2,378; 95%CI : 1,215-4,651), hemoglobin level (COR= 0,158; 95%CI : 0,058-0,429), intrauterine pressure (COR= 0,093; 95%CI: 0,010-0,913), and history of PROM in previous deliveries (COR= 0.054; 95%CI: 0.006-0.472). All variables with p value < 0.25 were included in the multivariate logistic regression analysis.

Table 3 Multivariate analysis of factors associated with PROM (n = 274)

Variable	A OR	95 % CI	P value
Education			
Primary and secondary level	2,362	1,137-4,905	0,021
Hemoglobin Level			
Anemia	0,153	0,055-0,423	0,000
History of PROM			
existed	0,039	0,004 -0,370	0,005
Intrauterine Pressure			
existed	0,136	0,012-1,513	0,105

AOR: Adjusted Odd Ratio

The results of the multivariate test found that the intrauterine pressure factor was not associated with PROM (AOR=0.136; 95%CI: 0.012-1.513). Factors related to the

PROM are education level (primary and secondary) (AOR=2,362; 95%CI :1,137 - 4.905), Hemoglobin level (AOR=0,153; 95%CI: 0,055-0,423), and PROM history (AOR= 0.039; 95%CI : 0.004 -0.370).

DISCUSSION

Based on the multivariate analysis in this study, it was found that there were three factors associated with PROM, namely education level (primary and secondary), hemoglobin levels, and history of PROM in previous pregnancies.

In this study, the level of education was associated with PROM (AOR=2,362; 95% CI :1,137 -4.905). Mothers who have a primary secondary education level have a risk of experiencing PROM 2.3 times more than those with higher education. Education can affect a person's behavior and lifestyle. The higher a person's education level, the easier it is to receive information (20). The information received can affect a person's knowledge and health behavior. This study is in line with research conducted by Pradana which found educational factors related to the incidence of PROM (21). This

is also in line with research conducted in Canada, which stated that low education was significantly associated with PROM (22). Education affects cognitive abilities and cognitive abilities lead to healthier behavior. The impact of cognitive abilities is not what one knows, but how one processes information. Most pregnant women know that maintaining hygiene and nutrition during pregnancy is important, but those who are better educated can understand it better (23). The level of education affects cognitive abilities and critical thinking on health problems experienced and also on health information received.

In this study, a history of PROM was associated with PROM (AOR=0.039; 95%CI: 0.004 -0.370). History of PROM in this study 0.039 times the risk compared to those without a history of PROM. Hackenhar (2014) found a history of PROM at 24 times the risk for experiencing PROM (23). This study is in line with that conducted by Assefa (2018) who found that the history of experiencing PROM in a previous pregnancy increased the risk of experiencing PROM by 7.6 times. This condition can occur as a result of untreated genitourinary infection or can also be caused by a short cervical length. In addition, there is a tendency for obstetric problems to recur naturally.(10) Genitourinary infections that are not treated properly and if a woman later becomes pregnant, will be a factor that increases the risk of PROM.

Anemia is one of the factors associated with an increased risk of PROM in this study (AOR=0.153; 95%CI: 0.055-0.423). The anemia data in this study were taken from the mother's medical record at the time of delivery. Examination of hemoglobin levels is one of the checks that must be carried out when pregnant women enter the labor process. Pregnant women are declared to have anemia if the hemoglobin level is less than 11g/dl. The most common cause of anemia is iron deficiency. Pregnancy with anemia is associated with increased

maternal and fetal morbidity and mortality. Anemia causes changes in the immune system, changes the proliferation of T and B cells, reduces the activity of killing phagocytes and neutrophils and decreases bactericidal and natural killers. Infection is one of the main pathological risk factors for preterm labor and PROM. The presence of bacteria or inflammatory cytokines in the amniotic fluid or chorioamnionitis membrane is strongly associated with preterm labor and premature rupture of membranes (25–27). Low hemoglobin levels also cause tissue and cell hypoxia. These events result in free radical cell injury and ultimately increase the risk of PROM (28,29). Mahjabeen in 2021 found that the risk of PROM is higher in pregnant women who are anemic (30).

CONCLUSION

There is a relationship between education factors, hemoglobin levels and a history of PROM with premature rupture of membranes

Ethical Aspect: This research has received a statement of ethical conduct from the Health Research Ethics Commission of the Denpasar Health Polytechnic with the number: LB.02.03/EA/KEPK/0350/2021

Conflict Of Interest: The author has no interests related to the material presented in this paper

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Author's contributions

All authors participated in the study. Dwi Lestari Puji Astuti collecting data and making article scripts, Ni Wayan Ariyani processing and analyzing data, making article scripts, Ni Made Dwi Mahayati, finishing articles, all authors have read and

approved the manuscript

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