ARTÍCULO ORIGINAL

Gac Méd Caracas 2023;131(Supl 1):S52-S58
DOI: 10.47307/GMC.2023.131.s1.9

Factors influencing the incidence of premature rupture of membranes in Probolinggo District

Factores que influyen en la incidencia de ruptura prematura de membranas en el Distrito de Probolinggo

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SUMMARY

Introduction: *Premature rupture of membranes (PROM) is the rupture of the amniotic membranes before there are signs of labour.*
Objective: *This Study aims to analyze the factors that influence premature rupture of membranes.*
Methods: *This research is analytic research with a cross sectional design. The research was conducted in Probolinggo Regency. The population is all mothers giving birth in Probolinggo Regency in June - August 2021 as many as 90 people. The sampling technique uses total sampling. Sample: all mothers giving birth in Probolinggo Regency in June - August 2021 as many as 90 people. Bivariate data analysis with Chi-Square and multivariate logistic regression.*
Results: *Based on the results of bivariate analysis using Chi-Square, namely the variable abnormality of the location of the fetus with the result P value <α = 0.002 <0.05 there is a relationship between abnormalities of the location of the fetus and the incidence of PROM. The pre-eclampsia variable with a P value <α = 0.006 <0.05 has a relationship between pre-eclampsia and the incidence of PROM. The variable history of PROM with the results of P value <α = 0.007 <0.05 there is a relationship between PROM history and the incidence of PROM. The results of multivariate analysis using logistic regression showed that the dominant factor influencing the incidence of PROM was the variable abnormality of the position of the fetus with an OR of 7.999.*
Conclusion: *Health workers, especially midwives, continue to promote health about premature rupture of membranes so that the mortality rate for mothers and babies in Indonesia caused by infection due to PROM decreases.*

Keywords: *Amniotic fluid, PROM, abnormalities, pre-eclampsia, history.*

RESUMEN

Introducción: *La ruptura prematura de membranas (RPM) constituye la ruptura de las membranas*

DOI: https://doi.org/10.47307/GMC.2023.131.s1.9

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Recibido: 29 de enero 2023
Aceptado: 8 de febrero 2023

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amnióticas antes de que haya signos de trabajo de parto.
Objetivo: *Este estudio se propone el análisis de los factores que influencian la ruptura de las membranas.*
Métodos: *Esta investigación es una investigación analítica con diseño transversal. La investigación se llevó a cabo en Probolinggo Regency. La población son todas las madres que dan a luz en Probolinggo Regency en junio - agosto de 2021 hasta 90 personas. La técnica de muestreo utiliza el muestreo total. Muestra: Todas las madres que dieron a luz en Probolinggo Regency en junio - agosto de 2021 hasta 90 personas. Análisis de datos bivariado con Chi-cuadrado y regresión logística multivariante.*
Resultados: *Con base en los resultados del análisis bivariado usando Chi-cuadrado, es decir, la variable anormalidad de la ubicación del feto con el valor de resultado P <α = 0,002 <0,05 existe una relación entre las anomalías de la ubicación del feto y la incidencia de PROM. La variable preeclampsia con un valor de P <α = 0,006 <0,05 tiene una relación entre la preeclampsia y la incidencia de RPM. La variable historia de RPM con los resultados de P valor <α = 0,007 <0,05 existe una relación entre la historia de RPM y la incidencia de RPM. Los resultados del análisis multivariado mediante regresión logística mostraron que el factor dominante que influyó en la incidencia de RPM fue la variable anormalidad de la posición del feto con un OR de 7,999.*
Conclusión: *Los trabajadores de la salud, especialmente las parteras, continúan promoviendo la salud sobre la ruptura prematura de membranas para que la tasa de mortalidad de madres y bebés en Indonesia causada por la infección por RPM disminuya.*

Palabras clave: *Líquido amniótico, RPM, anomalías, preeclampsia, antecedentes.*

INTRODUCTION

Premature rupture of membranes (PROM) is the rupture of the amniotic membranes before there are signs of labor (1). Premature rupture of membranes is the rupture of the membranes before labor, that is, if the opening of the cervix in primiparas is less than 3 cm and in multiparas, it is less than 5 cm (2). Signs of labor include pain with his coming stronger, frequent, and regular; more mucus mixed with blood due to small tears in the cervix; sometimes the waters break on their own; on internal examination, the cervix is flat and there is an opening (3).

In term pregnancies or pregnancies of more than 37 weeks as many as 8 %-10 % of pregnant women will experience PROM, and in preterm pregnancies or pregnancies less than 37 weeks as many as 1 % of pregnant women will experience PROM (4). In Probolinggo District in 2019, the maternal mortality rate reached 92.9 per 100 000 live births, an increase compared to 2018 which was only 68.72/100 000 live births. Causes of maternal death include bleeding as much as 11.8 %, hypertension in pregnancy as much as 23.5 %, infection as much as 5.9 %, and other (comorbid diseases) as much as 58.8 %. One of the causes infections is premature rupture of membranes (5). Based on a preliminary study on 3 June 2021 in Probolinggo Regency, out of 10 mothers who gave birth at term, 75 % had premature rupture of membranes and 25 % did not experience premature rupture of membranes.

The causes of premature rupture of membranes are parity, diseases experienced by the mother during pregnancy, fetal position abnormalities, twin pregnancies, anemia, pre-eclampsia, history of bleeding, history of abortion, history of preterm labor, history of premature rupture of membranes, and smoking (6). The most common impact on PROM before 37 weeks of gestation is respiratory distress syndrome (RDS), which occurs in 10 %-40 % of newborns. The risk of infection will increase, as prematurity, asphyxia, hypoxia, prolapse, risk of disability, and fetal lung hypoplasia at term. Almost all PROM in preterm pregnancies will be born before term or delivery will occur within one week after the membranes rupture. Approximately 85 % of perinatal morbidity and mortality is caused by prematurity as a result of premature rupture of membranes (7).

Therefore, researchers are interested to assess the factors that influence the incidence of premature rupture of membranes. Health workers, especially midwives, continue to carry out health promotion regarding premature rupture of membranes in the hope that maternal and infant mortality rates in Indonesia in general and in particular Probolinggo Regency caused by infections due to premature rupture of membranes will decrease.

METHODS

This research is an analytical research that explains the relationship between variables by using a tool in the form of a questionnaire to measure each variable studied. The design of this research is cross sectional. The research variables are measured at one time so that a picture of the situation at that time is obtained. This research was conducted in Probolinggo Regency. The population were all mothers giving birth in Probolinggo Regency in June – August 2021, namely 90 people. The sampling technique used total sampling. Sample: all mothers giving birth in Probolinggo Regency in June – August 2021, namely 90 people. Data was collected using a questionnaire and the researcher made an agreement with the subject regarding the time and place to distribute the questionnaire. Data was analyzed using univariate and bivariate analysis with Chi-Squere test, and multivariate with logistic regression to determine the dominant factors that influence premature rupture of membranes with the help of SPSS. This research has gone through an ethical test with a Certificate number KEPK/201/STIKes-HPZH/I/2022. Before conducting the research, the respondents first signed informed consent as legality that they were willing to be respondents.

RESULTS

Univariate analysis

Premature rupture of membranes

Table 1

Distribution of premature rupture of membranes in Probolinggo district in June -August 2021

Variable	Frequency	Percentage %
Normal	34	38
Premature Rupture of Membranes	56	62
TOTAL	90	100

Table 2

Characteristics of Respondents Based on Parity, Diseases Experienced by the Mother During Pregnancy, Fetal Abnormalities, Multiple Pregnancies, Anemia, Pre Eclampsia, History of Bleeding, History of Abortion, History of Preterm Labor, History of Premature Rupture of the Membranes, and Smoking in Probolinggo District by Month June – August 2021

Variable	Frequency	Percentage %
Parity		
Primipara	42	47
Multipara	48	53
Diseases Experienced by Mothers During Pregnancy		
Have no disease	84	93
Have Illness	6	7
Fetal Abnormalities		
Normal	69	77
Abnormal	21	23
Number of Fetuses		
Twin	8	9
Single	82	91
Anemia		
Normal	72	80
Anemia	18	20
Pre-Eclampsia		
Normal	71	79
Pre-Eclampsia	19	21
Bleeding History		
No history	81	90
There is History	9	10
Abortion History		
Never Aborted	71	79
Had an abortion	19	21
History of Preterm Labor		
Never	85	94
Once	5	6
Premature Rupture of Membranes History		
Never KPD	68	76
KPD Ever	22	24
Smoke		
No	88	98
Yes	2	2
Total	90	100

Bivariate Analysis

Table 3

Relationship Between Independent Variables and Premature Rupture of Membranes in Probolinggo Regency in June – August 2021

Variable	PROM Incident				Total		P value
	Normal		PROM				
	n	%	n	%	n	%	
Parity							0.172
Primipara	19	45	23	55	42	47	
Multipara	15	31	33	69	48	53	
Diseases Experienced by Mothers							
During Pregnancy							0.816
Have no disease	32	38	52	62	84	93	
Have Illness	2	33	4	67	6	7	
Fetal Abnormalities							0.002
Normal	32	46	37	54	69	77	
Abnormal	2	9	19	91	21	23	
Number of Fetuses							0.435
Twin	2	25	6	75	8	9	
Single	32	39	50	61	82	91	
Anemia							0.664
Normal	28	39	44	61	72	80	
Anemia	6	33	12	67	18	20	
Pre-Eclampsia							0.006
Normal	32	45	39	55	71	79	
Pre-Eclampsia	2	11	17	89	19	21	
Bleeding History							0.310
No history	32	40	49	60	81	90	
There is History	2	22	7	78	9	10	
Abortion History							0.661
Never Aborted	26	36	45	64	71	79	
Had an abortion	8	42	11	58	19	21	
History of Preterm Labor							0.916
Never	32	38	53	62	85	94	
Once	2	40	3	60	5	6	
Premature rupture of membrane History							0.007
Never PROM	31	46	37	54	68	76	
PROM Ever	3	14	19	86	22	24	
Smoke							0.718
No	33	38	55	62	88	98	
Yes	1	50	1	50	2	2	
Total	34	38	56	62	90	100	

Multivariate Analysis

Table 4

Multivariate Analysis of Factors Influencing the Incidence of Premature Rupture of Membranes in Probolinggo Regency in June – August 2021

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B) Lower	Upper
Step 1[a]	Number of Fetuses	2.079	0.804	6.696	1	0.010	7.999	1.656	38.635
	Pre-Eclampsia	1.371	0.852	2.588	1	0.108	3.938	0.741	20.911
	History KPD	1.216	0.733	2.755	1	0.097	3.374	0.803	14.185
	Constant	-0.277	0.283	0.955	1	0.328	0.758		

DISCUSSION

The results showed that most of the deliveries in Probolinggo District were with premature rupture of membranes (62 %). The incidence of premature rupture of membranes (PROM) ranges from 5 %-10 % of all births. Preterm PROM occurs in 1 % of all pregnancies and 70 % of PROM cases occur in term pregnancies. PROM is the cause of premature birth in 30 % (8). Premature rupture of membranes in Probolinggo Regency mostly occurs in term labor as much as 100 %. This is because physiologically the membranes rupture when there are signs of labor towards complete dilation. But due to another reason, the waters rupture before complete opening which can occur due to labor factors that are not progressing.

It was found that the majority of parity mothers were multiparas as much as 53 %. Most mothers do not have any disease during pregnancy as much as 93 %. Most of the fetal position is normal as much as 77 %. Most of the number of fetuses is single as much as 91 %. Most mothers do not experience anemia as much as 80 %. Most of the mothers did not experience pre-eclampsia as much as 79 %. Most mothers do not have a history of bleeding as much as 90 %. Most mothers have never had an abortion as much as 79 %. Most mothers have never experienced preterm labor as much as 94 %. Most mothers have never experienced a history of premature rupture of membranes as much as 76 %. Most mothers do not smoke as much as 98 %.

Women who have given birth several times will have a higher risk of experiencing PROM in their next pregnancy (9). PROM often occurs in multipara parity. This is supported by the research results of Tunut and Sudarto (10) indicated that the factors that influence the incidence of PROM are multipara parity of pregnancies which are too frequent because they can affect embryogenesis, the amniotic membranes are thinner, so they break easily prematurely, and the more parities the easier it is for amnion infection to occur because damage to the cervical structures in previous deliveries.

Women with second and third parity in reproductive age usually have relatively safer conditions to get pregnant and give birth. The uterine wall at that age is still stronger because it hasn't undergone much change, and the cervix has not experienced an opening that can properly support the amniotic membranes. While women who have given birth several times have a higher risk of experiencing PROM because the connective tissue of the amniotic membranes is easily fragile because the vascularization of the uterus experiences several disorders which eventually result in the membranes spontaneously breaking.

Based on the results of bivariate analysis using *Chi Square*, namely the variable abnormality of the location of the fetus with the result P value $<\alpha = 0.002 < 0.05$, it means there is a relationship

between abnormalities in the location of the fetus and the incidence of premature rupture of membranes. Pre-eclampsia variable with P value $<\alpha = 0.006 < 0.05$, The indicated there is a relationship between pre-eclampsia and premature rupture of membranes. The variable history of premature rupture of membranes with a P value $<\alpha = 0.007 < 0.05$, which demonstrated that there is a relationship between premature rupture of membranes history and the incidence of premature rupture of membranes.

Abnormal fetal position is one of the predisposing factors for premature rupture of membranes because, in the breech position, there is no lowest part that covers the pelvic inlet (PAP) which can block pressure on the lower membranes. A breech position can allow uterine tension to increase, thus causing the amniotic membranes to rupture prematurely (11). Abnormalities of location such as a breech position or a transverse position can make the lowest part directly receive intrauterine pressure, namely the buttocks. Because the location of the fetus is not normal that is breech and latitude, it often results in the umbilical cord protruding after the rupture of the membranes, this can worsen the condition of the mother and fetus.

Pre-eclampsia is a disease characterized by hypertension, edema, and proteinuria arising from pregnancy. The disease occurs at gestational age above 20 weeks, most seen at 37 weeks gestation, but can also occur at any time in mid-pregnancy. Preeclampsia can develop from mild pre-eclampsia to severe pre-eclampsia. In pre-eclampsia, blood vessel spasm occurs which results in vasoconstriction resulting in slow blood flow and local and surrounding tissue hypoxia. Arterial vasospasm also causes an increase in capillary permeability resulting in edema and stunted fetal growth and can cause premature rupture of membranes (12).

In preeclampsia, blood vessel spasm occurs which results in vasoconstriction resulting in slow blood flow and local and surrounding tissue hypoxia. So if all the atria in the body experience spasm, then the blood pressure will naturally rise, overcome the increased peripheral pressure so that oxygenation can be fulfilled. Arterial vasospasm also causes an increase in capillary permeability resulting in edema and stunted fetal growth.

Women who had PROM in a previous pregnancy are more at risk of experiencing it again between 3-4 times in their next pregnancy than women who did not experience PROM before, because the membrane composition becomes fragile and the collagen content decreases in subsequent pregnancies (13).

History of PROM in birth mothers who have experienced PROM before tends to experience it again. This is because mothers with a history of PROM will affect the composition of the membranes in the uterus so that they become brittle which results in premature rupture of membranes, so mothers with a history of PROM are likely to experience premature rupture of membranes in their next pregnancy.

Multivariate analysis using logistic regression found the dominant one factor influencing the incidence of premature rupture of membranes was the variable abnormality of fetal position with OR 7,999. In a fetus with an abnormal location, namely the location of the breech and latitude, there is a risk of causing premature rupture of membranes because in a pregnancy with an abnormal location of the fetus, the lowest part of the fetus cannot cover the pelvic inlet (PAP) which can block pressure on the lower membranes. A breech position can allow uterine tension to increase, thus causing the amniotic membranes to rupture prematurely (14).

Breech deliveries pose a serious problem because infant mortality in breech deliveries is 4 times greater than in normal deliveries. In the transverse position, when labor begins, the fetal shoulders can descend below the pelvic cavity in the front, PROM and umbilical cord development can occur. If the birth is left unaided, the shoulders will enter the pelvis so that the pelvic cavity is completely filled with the shoulders and other body parts. The fetus cannot descend any further and is trapped in the pelvic cavity. The Latitude position can be attempted to become a longitudinal position with a head presentation by the doctor. However, returning to a longitudinal position is difficult and often doctors do not recommend an external cephalic version before planned birth or delivery arrives. The internal cephalic version has risks, namely premature rupture of membranes, inflated umbilical cord, and preterm labor.

CONCLUSION

Factors that influence the occurrence of premature rupture of membranes in Probolinggo Regency are abnormalities in fetal position, pre-eclampsia, and history of premature rupture of membranes. The dominant factor that influences the occurrence of premature rupture of membranes in Probolinggo Regency is fetal abnormalities.

Acknowledgments

We are thankful to Puslapdik (Pusat Layanan Pembiayaan Pendidikan) and LPDP (Lembaga Pengelola Dana Pendidikan) for financial support.

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