



(RESEARCH ARTICLE)



The effect of mother's age on premature rupture of membranes at Dewi Sartika General Hospital, Kendari City

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Abstract

Overview: This study aims to identify the influence of maternal age on the occurrence of preterm premature rupture of membranes (PPROM) at Dewi Sartika General Hospital in Kendari City. Utilizing a cross-sectional survey design, this research analyzes the relationship between maternal age and PPRM incidence at a single measurement point.

Body of Knowledge: Preterm premature rupture of membranes (PPROM) is a condition where the amniotic sac ruptures before the onset of labor signs. This poses risks of increased infection and other complications during pregnancy. Previous research indicates that both very young and older maternal age elevate the risk of PPRM, which can lead to premature delivery and fetal morbidity.

Methods: This study employed a cross-sectional survey design with a total sample of 91 pregnant women selected via total sampling technique. Data were collected through interviews and medical records, then analyzed using SPSS software. The primary variables analyzed included maternal age and PPRM incidence.

Results: The research findings reveal that 41 mothers (45.1%) fell into the high-risk age category for PPRM, while 50 mothers (54.9%) were in the low-risk category. A total of 60 respondents (65.9%) experienced PPRM. Statistical tests indicated a significance level (sig) of 0.003 (<0.05), indicating a significant impact of maternal age on PPRM incidence, with an odds ratio of 3.514. This suggests that pregnant women outside the ideal age range (20-35 years) are at 3.514 times higher risk of experiencing PPRM.

Recommendation: Healthcare providers, particularly midwives, are advised to enhance public awareness regarding pregnancy danger signs, including PPRM. The importance of early pregnancy check-ups should also be emphasized to detect pregnancy complications early and minimize risks. Intensive education on pregnancy care for women at high-risk ages is also crucial in reducing PPRM incidence and associated complications.

Keywords: Preterm premature rupture of membranes; Maternal age; High-risk pregnancy; Pregnancy risk; Maternal health

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1. Introduction

Premature rupture of membranes (PROM) is a serious issue in maternal and neonatal health worldwide, including in the ASEAN region and Indonesia. PROM occurs when the amniotic sac ruptures before the onset of labor, increasing the risk of infection and triggering preterm delivery. Such premature deliveries can lead to severe complications such as respiratory problems, neurological developmental disorders, and higher mortality rates compared to full-term births (1).

In ASEAN countries, including Indonesia, PROM is a major concern due to various challenges such as limited access to quality maternal health services in rural areas, low awareness of the importance of regular prenatal care, and socioeconomic factors affecting healthcare accessibility and quality (2). The high incidence of preterm births in Indonesia is largely attributed to PROM, which also imposes significant economic burdens on families and the healthcare system as a whole.

Addressing the issue of PROM requires a holistic approach, including raising public awareness about the risks associated with PROM, improving access to and quality of maternal and neonatal healthcare services, and implementing health policies that support well-integrated and coordinated care (3).

Maternal mortality is defined as the death of a woman during pregnancy, childbirth, or within 42 days after the termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes (4). According to the International Statistical Classification of Diseases and Related Health Problems (ICD), the maternal mortality ratio (MMR) is the number of maternal deaths per 100,000 live births (5).

According to estimates from the World Health Organization (WHO), approximately 500,000 women die each year due to complications during pregnancy and childbirth, with the majority of these deaths occurring in developing countries, accounting for about 99% of the total maternal deaths (6). Indonesia, despite achieving some Millennium Development Goals (MDGs) targets by 2015, still has a high maternal mortality ratio of 305 per 100,000 live births, far from the UN target of 102 per 100,000 live births (7).

Data from the Ministry of Health of the Republic of Indonesia indicate that the leading causes of maternal deaths are hemorrhage (30.3%), hypertension in pregnancy (27.1%), and infection (7.3%) (8). In Yogyakarta, for example, there has been fluctuation in maternal mortality rates from 46 cases in 2013 to 34 cases in 2017, with primary causes including heart disease, sepsis, hemorrhage, and blood poisoning (9).

One of the serious complications that can occur during pregnancy is premature rupture of membranes (PROM), defined as the rupture of the amniotic sac before the onset of labor. PROM can lead to intrauterine infection and preterm delivery, significantly increasing the risk of morbidity and mortality for both mother and baby (10). According to data from the Indonesia Demographic and Health Survey (IDHS), the incidence of PROM increased from 15% in 2012 to 20% in 2021 (11).

Previous research indicates that maternal age is a significant risk factor in the occurrence of PROM. Mothers who are too young (<20 years) or too old (>35 years) have a higher risk of PROM, which can prolong the duration of labor and increase complications komplikasi (12). Data from the Health Office of Kendari City and several hospitals in Kendari show fluctuations in the prevalence of PROM, with a high number of cases reported in 2022 (13).

This study aims to analyze the influence of maternal age on the occurrence of premature rupture of membranes at Dewi Sartika General Hospital in Kendari City. Through this research, it is hoped that a significant relationship between maternal age and PROM can be identified, serving as the basis for recommendations to healthcare professionals in the prevention and management of PROM.

1.1. Statement of the Problem

The high rates of maternal and neonatal mortality are a serious health issue in Indonesia, especially in less developed regions. Maternal deaths are often caused by complications during pregnancy, childbirth, and the postpartum period, including premature rupture of membranes (PROM). PROM occurs when the amniotic sac ruptures before the onset of labor, leading to various serious complications such as infection, preterm birth, and increased risks of maternal and neonatal mortality.

According to data from the Health Office of Kendari City and several hospitals in Kendari, the prevalence of PROM fluctuates but remains at concerning levels. In 2022, there were 812 cases of PROM reported at the Health Office of Kendari City, 398 cases at Kendari Regional General Hospital, and 181 cases at Dewi Sartika General Hospital in Kendari. Furthermore, previous research has shown that maternal age is one of the key risk factors contributing to the occurrence of PROM. Mothers who are too young (<20 years) or too old (>35 years) have a higher risk of experiencing PROM, which can prolong labor and increase the risk of complications.

This study focuses on the influence of maternal age on the occurrence of PROM at Dewi Sartika General Hospital in Kendari City. Despite numerous studies identifying the relationship between maternal age and PROM, further research is needed to understand how this age factor impacts the occurrence of PROM in the local context. Therefore, this research aims to identify and analyze the influence of maternal age on the occurrence of PROM at Dewi Sartika General Hospital in Kendari City, as well as provide recommendations to help reduce the risk of PROM and improve maternal and neonatal health.

1.2. Purpose of the study

To Determine the Influence of Maternal Age on the Incidence of Premature Rupture of Membranes (PROM) at Dewi Sartika General Hospital in Kendari City.

1.3. Conceptual Framework

This study is modeled with a conceptual framework that illustrates the influence of maternal age on the incidence of premature rupture of membranes (PROM) at Dewi Sartika General Hospital in Kendari City. Maternal age is categorized into three groups: < 20 years (high risk), 20-35 years (not at risk), and > 35 years (high risk). PROM can lead to complications such as intrauterine infection and preterm birth. The data used includes the prevalence of PROM from the Kendari City Health Office, data from Dewi Sartika General Hospital, and statistical analysis results. The purpose of this research is to understand the relationship between maternal age and PROM and to provide a basis for effective health intervention and policy recommendations, as indicated by the arrows in Figure 1.

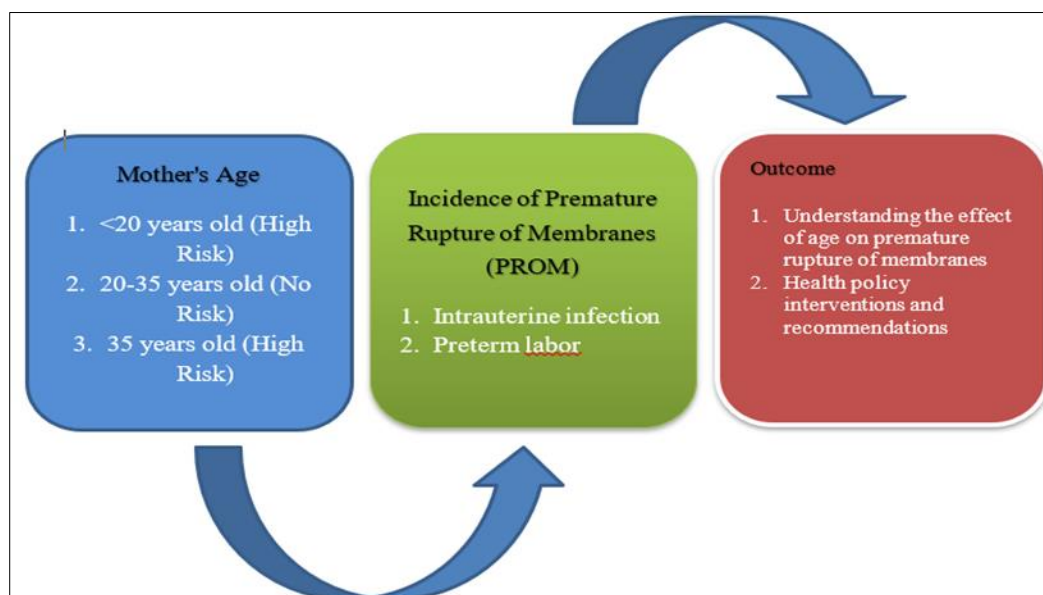


Figure 1 Conceptual Framework of the Study

1.4. Significance of the study

This study enriches the scientific literature by providing empirical evidence on the influence of maternal age on the incidence of premature rupture of membranes (PROM) at Dewi Sartika General Hospital in Kendari City, serving as an important reference for future research. The results of this study can be used as a basis for developing more effective health policies, especially for high-risk maternal age groups. Additionally, this research provides insights for medical professionals to conduct early detection and appropriate interventions, as well as to enhance education and awareness among the community regarding the risks of PROM. The findings also provide a foundation for further research into

more comprehensive prevention strategies, contributing to the improvement of maternal and infant health through effective interventions and education.

2. Material and method

2.1. Study Design

This study employs a cross-sectional survey design within an analytical survey framework to determine how and why health phenomena, particularly the incidence of premature rupture of membranes (PROM), occur. The impact of the variable, namely maternal age, on the research object is measured or collected only once at a single point in time. This design allows researchers to obtain a clear picture and analysis of the relationship between maternal age and the incidence of PROM at the time the study is conducted (14)

2.2. Research site

This study is conducted at Dewi Sartika General Hospital in Kendari City, selected for its relevant and representative data on the incidence of PROM, which allows for a comprehensive and measurable assessment of the influence of maternal age on PROM.

2.3. Population, sample and sampling procedure

The study population includes all 1,022 mothers who gave birth normally at Dewi Sartika General Hospital in Kendari City in 2022. Using the Slovin formula with a 10% margin of error, a sample size of 91 participants was obtained. The calculation is performed using the formula $n = N / (1 + N\alpha^2)$, where N is the population size and α is the margin of error. Based on this calculation, the total research sample is 91 mothers, selected using a total sampling technique to ensure accurate representation of the population.

2.4. Data Analysis

The data in this study were analyzed using two main methods. First, univariate analysis was employed to interpret the frequency distribution of the two main variables, namely maternal age and the incidence of premature rupture of membranes (PROM), using the percentage formula $P = FN \times 100\%$. Second, logistic regression analysis was used to determine the effect of maternal age on the incidence of PROM, utilizing SPSS to evaluate the significance and strength of the relationship between the independent and dependent variables. The results of this analysis are presented in the form of frequency distribution tables and detailed explanations.

2.5. Ethical Considerations

This study adhered to ethical considerations by obtaining permission from the leadership and the research site before conducting interviews and administering questionnaires to respondents. Informed consent was obtained from respondents before data collection, ensuring the confidentiality of the information provided and explaining the purpose of the data collection. The study avoided pressuring respondents to participate and respected individual privacy in accordance with ethical guidelines.

3. Results

The following findings and discussion were presented according to set research objectives:

3.1. Gambaran Karakteristik Responden

Table 1 Distribution of Educational Characteristics of Mothers Giving Birth at Dewi Sartika General Hospital, Kendari City in 2022

Education Level	Number (n)	Percentage (%)
Low Education: Elementary and Junior High School	13	14.3
High Education: Senior High School and Higher Education	78	85.7
Total	91	100

The above findings and discussion are presented according to the set research objectives:

Based on Table 1, respondents with low education (Elementary and Junior High School) accounted for 13 individuals with a percentage of 14.3%, while respondents with high education (Senior High School and Higher Education) accounted for 78 individuals with a percentage of 85.7% in 2022 at Dewi Sartika General Hospital, Kendari City.

Table 2 Distribution of Occupational Characteristics of Mothers Giving Birth at Dewi Sartika General Hospital, Kendari City in 2022

Occupation	Number (n)	Percentage (%)
Housewife	50	54.9
Civil Servant	14	15.4
Private Sector	27	29.7
Total	91	100

Based on Table 2, in 2022 at Dewi Sartika General Hospital, Kendari City, the characteristics of respondents based on the mother's occupation showed that there were 50 housewives (54.9%), 14 civil servants (15.4%), and 27 private sector employees (29.7%).

3.2. Univariate Analysis

This study, conducted on 91 mothers giving birth at Dewi Sartika General Hospital, Kendari City in 2022, involved a descriptive or univariate analysis of the following respondent characteristics. Data were summarized in a secondary data recap table, followed by the distribution of categorical results in table form, and then explained in a brief narrative. This study relates to the variable of maternal age in cases of premature rupture of membranes (PROM).

Table 3 Distribution of Maternal Age Characteristics at Dewi Sartika General Hospital, Kendari City in 2022

Maternal Age	Number(n)	Percentage(%)
At risk if < 20 years and > 35 years	41	45.1
Not at risk if 20-35 years	50	54.9
Total	91	100

From Table 3, it is known that the distribution of maternal age at risk is 41, with a percentage of 45.1%, while the non-risk age group is 50, with a percentage of 54.9% in 2022 at Dewi Sartika General Hospital, Kendari City.

Table 4 Distribution of Premature Rupture of Membranes Characteristics at Dewi Sartika General Hospital, Kendari City in 2022

KPD	Jumlah(n)	Persentase(%)
KPD	60	65.9
Tidak KPD	31	34.1
Total	91	100

Based on Table 4.4, the characteristics of respondents based on premature rupture of membranes (PROM) are as follows: In 2022 at Dewi Sartika General Hospital, Kendari City, 60 respondents experienced PROM (65.9%), while 31 respondents did not experience PROM (34.1%).

3.3. Logistic Regression Analysis

Table 5 Model Fit Test Table

Hosmer and Lemeshow Test			
Step	Chi-square	Df	Sig.
1	0.637	1	0.101

A sig value of 0.101 > 0.05 indicates that the test model is sufficiently appropriate to explain the data regarding the influence of maternal age on the rate of PROM.

Table 6 Effect of Maternal Age on Premature Rupture of Membranes

Variables in the Equation							
		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 1 ^a	Umur	1.257	0.486	6.697	1	0.010	3.514
	Constant	-2.674	0.838	10.188	1	0.001	0.069

Table 4.6 shows a sig value of 0.003 < 0.05, indicating that there is indeed an influence of maternal age on the rapid rupture of the membranes, suggesting that H_a is accepted and H_0 is rejected. This means that maternal age impacts the frequency of PROM. The Exp(B) value for maternal age is 3.514, indicating that respondents are 3.514 times more likely to experience PROM.

Tabel 7 Besar Pengaruh Umur Ibu Terhadap Ketuban Pecah Dini

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	109.467 ^a	0.077	0.106
Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.			

The Nagelkerke R square value indicates a coefficient of determination of 0.106, showing that maternal age affects 10.6% of the likelihood of PROM.

4. Discussion

Based on the data from Table 3, the distribution of maternal age shows that 41 respondents fall into the at-risk age category, with a percentage of 45.1%, while 50 respondents fall into the non-risk age category, with a percentage of 54.9%. From Table 4, it is noted that 60 respondents experienced premature rupture of membranes (PROM), representing 65.9%, while 31 respondents did not experience PROM, representing 34.1%.

Premature rupture of membranes (PROM) is a serious condition in pregnancy that can have negative impacts on both maternal and fetal health (15). This study aims to explore the relationship between maternal age and the incidence of PROM at Dewi Sartika General Hospital, Kendari City. From the data analysis involving 91 respondents, it was found that the majority of cases (65.9%) experienced PROM, indicating that this condition is relatively common among the hospital's maternal population.

Logistic regression analysis showed a significant influence between maternal age and the risk of PROM. The Exp(B) value of 3.514 indicates that each additional year of maternal age increases the risk of PROM by approximately 3.5 times. This finding is consistent with the literature highlighting higher pregnancy complication risks in younger or older mothers. Very young or older maternal age can affect the physical and biological readiness of the body to undergo pregnancy and childbirth, potentially increasing the risk of PROM.

PROM increases the risk of infection for both the mother and the fetus (16). Intact membranes serve as a barrier against bacterial infections (17). When the membranes rupture prematurely, the risk of intrauterine infection rises significantly. Such infections can lead to serious conditions like chorioamnionitis in the mother and sepsis in the baby. These infections can be life-threatening if not promptly managed. PROM often results in preterm labor. When membranes rupture prematurely, especially at an early gestational age, the labor process may start earlier than expected. Preterm labor can cause various complications for the baby, including respiratory issues, neurological development disorders, and other long-term health problems. Babies born prematurely also have a higher risk of mortality compared to full-term infants (18).

Babies born due to PROM are at risk of developmental disorders. Preterm labor can lead to delays in physical and cognitive development. Premature infants often require intensive care in the neonatal intensive care unit (NICU) and may face long-term developmental challenges. PROM can cause significant stress and anxiety for the mother. Uncertainty about the baby's health, the risk of preterm labor, and potential health complications can be major sources of stress. This stress can also impact the mother's mental and physical health during and after pregnancy (19).

The health complications resulting from PROM can affect the quality of life for both the mother and baby. The mother may experience long-term health issues due to infections or other complications related to PROM. Babies born prematurely may also face developmental challenges that affect their quality of life throughout childhood and even adulthood. Maternal age plays a crucial role in the incidence of PROM. Studies show that very young or very old maternal age can increase the risk of PROM. Research by (20). found that mothers who become pregnant at a young age (below 20 years) have a higher risk of experiencing PROM because their bodies are not yet physically mature to handle the pregnancy process. Conversely, (12) indicated that mothers who become pregnant at an older age (above 35 years) also have an increased risk due to decreased tissue elasticity.

Biologically, less elastic membranes in mothers of extreme ages (very young or very old) are more susceptible to pregnancy pressure, potentially leading to premature rupture of membranes. PROM occurs when the membranes rupture before signs of labor appear, increasing the risk of infection for both the fetus and the mother, and potentially leading to preterm labor. This can have serious implications for the unborn baby's health, including risks of respiratory and developmental complications.

Management of PROM depends on the gestational age at the time of rupture. In early pregnancy, care focuses on delaying labor and reducing the risk of infection through antibiotics and close monitoring. At later stages, management focuses on managing preterm labor to maximize the unborn baby's health.

The primary goal in managing PROM is to reduce the risk of complications for both the mother and baby and to prolong pregnancy as much as possible to increase fetal readiness. Solutions to reduce the incidence of PROM include more proactive preventive approaches, such as intensive reproductive health education about the importance of regular and quality prenatal care. Implementing strict prenatal care protocols and regular check-ups for mothers of extreme ages can help identify potential complications early and direct appropriate interventions.

These findings have significant implications for clinical practice and health policy formulation. Physicians and medical staff need to consider maternal age as a significant risk factor in pregnancy risk assessment. More intensive prenatal monitoring, careful birth planning, and focused reproductive health education can help reduce the incidence of PROM and improve overall maternal healthcare.

5. Conclusion

Based on the analysis and statistical tests using SPSS, this study shows a significant influence between maternal age and the incidence of PROM at Dewi Sartika General Hospital, Kendari City, with a P-value of 0.010 (< 0.05). Mothers outside the ideal age range (20-35 years) have a higher risk of experiencing PROM, which can lead to serious complications such as intrauterine infections and preterm labor. These results support the importance of more focused health interventions for high-risk age groups to reduce the incidence of PROM and improve maternal and infant well-being.

Recommendations

Based on the results of this study, the following steps are recommended to reduce the incidence of PROM and improve maternal and infant well-being:

- Intensive Education, Enhance education programs for pregnant mothers, especially those in high-risk age groups (<20 years and >35 years), about the risks of PROM and preventive measures. Information on the importance of nutrition, physical, and mental health during pregnancy should be comprehensively conveyed.
- Regular Prenatal Check-ups, Expand and intensify more detailed regular prenatal check-up programs, particularly for high-risk age groups. This will help in early detection of issues and allow for prompt and appropriate interventions.
- Healthcare Worker Training, Provide further training to healthcare workers at Dewi Sartika General Hospital and other health facilities on handling PROM and related complications. Focus on improving diagnostic skills and risk management for PROM.
- Awareness Campaigns, Launch public awareness campaigns about the ideal age for pregnancy, risks of PROM, and the importance of regular maternal health check-ups. These campaigns can be conducted through social media, seminars, and local communities.
- Further Research, Support and conduct further research to understand other factors influencing PROM, so that prevention and management strategies can be continuously developed and improved based on the latest scientific evidence.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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