The Correlation Between Incidences of Preterm Premature Rupture of Membrane with Leukocyturia and Bacteriuria at Wangaya General Hospital

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ABSTRACT

Prematurity or preterm birth can lead to perinatal and neonatal deaths. The leading cause of preterm labor is premature rupture of membranes. Infections are one of the leading causes of premature rupture of membranes, including urinary tract infections. This study aims to evaluate the correlation between bacteriuria and leukocyturia and the incidence of preterm premature rupture of membrane at Wangaya General Hospital Denpasar. This cross-sectional study used the target population of pregnant women undergoing treatment at Wangaya General Hospital. Sampling was carried out using the purposive sampling method. A total of 112 samples were enrolled in this study. Data was taken from the patient's medical record from January 1, 2023, to December 31, 2023 and then analyzed. Based on the results, the mean age is 27.43 ± 5.95 years. The bivariate analysis showed significant results with an OR of 2.485; CI 95% 1.120–5.510; p = 0.024 for bacteriuria and OR 4.697; CI 95% 1.903–11.595; p < 0.001 for leukocyturia. Furthermore, the multivariate analysis obtained significant results for the leukocyturia variable with an adjusted OR value of 4.697; CI 95% 1.903–11.595; p = 0.001. Therefore, it can be concluded that positive bacteriuria and leukocyturia increase the risk of pregnant patients experiencing preterm PROM.

Keywords: Bacteriuria, leukocyturia, prematurity, preterm premature rupture of membrane.

1. INTRODUCTION

Prematurity or premature birth is one of the leading causes of perinatal and neonatal deaths throughout the world. Preterm labor is defined as the onset of labor occurring 20 weeks before the 37th week of gestation [1]. According to WHO, every year, an estimated 13 million babies are born prematurly, and approximately 1 in 10 newborns experience premature birth WHO data shows that almost 1 million newborns die every year due to complications from premature birth [2]. Prematurity is still a significant problem in Indonesia, with the incidence of preterm or premature births reaching around 675,700 per year, and looking at the world ranking, Indonesia is ranked fifth as the country with the highest prematurity rate [3]. The incidence of premature births at Wangaya Regional Hospital is also still high, namely 112 premature births out of a total of 1016 births. Death in premature birth can be caused by neonatal sepsis and immaturity of organ systems, such as respiratory and digestive. The relatively expensive cost of treatment in the NICU (Neonatal Intensive Care Unit) must also be considered [2].

One of the leading causes of premature labor is premature rupture of membranes (PROM). Of the 223 cases of premature delivery at Sanglah General Hospital, the incidence of preterm birth caused by premature rupture of membranes reached third place at 52 cases [4]. Premature rupture of membranes (PROM) is the rupture of the amniotic membrane before labor occurs. Preterm premature rupture of membranes can occur at or after 37 weeks of gestation, which is called term PROM, and before 37 weeks of gestation or preterm PROM (PPROM) [5]. The problem of PROM requires special attention because of its significant prevalence and severe obstetric complications.
Preterm premature rupture of membranes (PROM) is also known to contribute to maternal deaths in Indonesia [4].

The incidence of PROM in the world ranges from 12.3% of the total delivery figure, most of which occurs in developing countries. In Indonesia, the incidence of PROM is still high, namely 4.5%–7.6% of all pregnancies. In term pregnancies, the incidence of PROM is 6%–19%, while in preterm pregnancies, it is 2%–5% [5]. The incidence of premature rupture of membranes (PPROM) at Sanglah Hospital, Denpasar, was 212 cases out of 1450 deliveries (14.62%). The incidence of birth with PROM at term gestational age (≥37 weeks) was 179 cases (84.43%), while at preterm, there were 33 cases (15.57%).

Preterm PROM is one of the leading causes of premature birth, with an incidence ranging from 30% to 40%. In PPROM, there is a risk to both the fetus and the mother. Maternal complications include intrauterine infection, retained placenta, and placental abruption. There have also been several cases of sepsis and maternal death reported. Neonatal complications include lung tissue hypoplasia, bronchopulmonary dysplasia, contractures, and high neonatal mortality ranging between 34%–82% [6].

Infection is the most common cause of premature labor and premature rupture of membranes, one of which is urinary tract infection (UTI). UTIs are associated with increased concentrations of the proinflammatory cytokines Interleukin-1 (IL-1), tumor necrotic factor, IL-6, IL-8, prostaglandins, and matrix metalloproteinase (MMP), which then stimulate uterine contractions, efface the cervix, and cause rupture of the membranes [6]. Pregnant women with UTI are known to have a 2.62 times higher risk of preterm PROM compared to those who do not experience UTI during pregnancy [7].

Prevention of urinary tract infections as a cause of PROM is necessary to reduce maternal and infant morbidity and mortality rates. One cost-effective method that can be used to screen for UTI is using a urine dipstick or urinalysis. This method can detect physical and chemical changes in urine caused by urinary tract infections, especially bacteriuria and leukocyturia. Therefore, this study aims to determine the correlation between bacteriuria and leukocyturia and the incidence of preterm premature rupture of membranes at Wangaya Denpasar Regional Hospital.

2. Materials and Methods

2.1. Study Design

This analytical observational study used a cross-sectional research design to analyze the correlation between bacteriuria and leukocyturia and the incidence of premature rupture of membranes. This study used secondary data from medical records from January 1, 2023, to December 31, 2023. The study was conducted at Wangaya Hospital, Denpasar, and started in March 2024.

2.2. Population and Sample

The population in this study were pregnant women undergoing treatment at Wangaya Hospital, Denpasar. Sample inclusion criteria include:

1. Complete registration on the Wangaya Regional Hospital registration list,
2. Agreement to participate in conducting research,
3. Pregnancy below 37 weeks of gestation who underwent urine examination at Wangaya Regional Hospital.

Sample exclusion criteria include:

1. Severe nutritional disorders,
2. Polyhydramnios,
3. Multiple pregnancies,
4. Birth canal trauma,
5. Bleeding in the mother (placental abruption, placenta previa),
6. Chronic disease in the mother (hypertension).

The sample size for this study was calculated based on the Lemeshow formula, where the number of samples required for this study was 112. The sample size was increased by 10% from the calculation results to obtain a total sample size of 123 samples to anticipate the risk of dropping out. Sampling was carried out by purposive sampling. Cases were captured through medical record data that met the inclusion and exclusion criteria after obtaining approval.

2.3. Data and Variables

Research variables included dependent variables, namely the incidence of Preterm PPROM; independent variables, namely bacteriuria and leukocyturia; and Controlled variables, namely age, parity, BMI, and occupation. Preterm premature rupture of membranes (PROM) is defined as rupture of the amniotic membranes before delivery at a gestational age of <37 weeks. Bacteriuria is defined as the presence of bacteria in the urine with a minimum number of 1 bacterium in one field of view as assessed by microscopic examination. Leukocyturia is defined as the presence of leukocytes in the urine with a minimum number of more than 10 leukocytes in one field of view as assessed by microscopic and dipstick examinations.

2.4. Data Analysis

Data in the form of patient identity and baseline characteristics were collected and extracted into a database using Microsoft Excel. The patient names were replaced with initials and medical record numbers and then stored in a file that could only be accessed by researchers and authorized parties. After the data was collected, data was processed using SPSS for Windows v25 software. The stages of data analysis in this research included univariate, bivariate, and multivariate analysis. Univariate analysis is data analysis for one variable without connecting it with other variables. The univariate analysis aims to describe the characteristics of the research subjects in tabular form. Data with a numerical scale was presented as mean ± standard deviation.

Data on a categorical scale was presented as a frequency distribution. The data distribution was analytically tested using the Shapiro-Wilk normality test with p < 0.05 considered normally distributed. When the data was not normally distributed, the numerical scale data was presented in the median, min-max form. Bivariate analysis was used to assess the correlation and magnitude
of the correlation between the independent variable and the dependent variable using the Chi-Square test or an alternative test in the form of Fisher’s Exact. Multivariate analysis uses binary logistic regression to see the correlation between independent and dependent variables. Previously, variables had to be assessed bivariate if \( p < 0.25 \), then they were entered into multivariate analysis. Next, an assessment of the main interaction between the main variable and each candidate variable was carried out, and the results can be seen from their significance using the adjusted odds ratio (aOR).

3. Results

3.1. Characteristics of Study Sample

This study was a cross-sectional design study involving 112 patients, with details of 39 patients diagnosed with preterm PROM and 73 non-preterm PROM patients. The samples used in the research were patients who came to the polyclinic and emergency department at Wangaya Regional Hospital. Research sampling was carried out using purposive sampling, where research samples were selected and collected according to inclusion and exclusion criteria until the minimum sample size was met. The data was collected by taking secondary data in the medical records room at Wangaya Regional Hospital from March to April 2024.

Based on the results, the average age of the study sample was 27.43 ± 5.95 years. The characteristics of the study sample are presented in Table I. When viewed from the grouping of patients with preterm PROM and non-preterm PROM, it was found that the mean age difference was not significant between patients with preterm PROM (27.62 ± 5.88 years) compared with non-preterm PROM patients (27.33 ± 6, 03 years old). These findings were then further confirmed by categorizing patient age into ≥35 years and <35 years, where the number of preterm PROM patients with age ≥35 years was only 5 people (31.3%), compared with the number of patients Preterm non-PPROM with age ≥35 years was 11 people (68.8%). If viewed from parity, categorizing the number of parity ≥4 and <4, it was found that the number of preterm PROM and non-preterm PROM patients was balanced at 6 people. Based on the bivariate analysis results, no significant results were found between parity and the incidence of preterm PROM. Furthermore, looking at the BMI variable, it was found that most of the research samples had a normal BMI, and only a small portion of the sample in preterm PROM patients had an excessive BMI, namely 8 people (38.1%). If viewed from bivariate analysis, no significant results were found between BMI and the incidence of preterm PROM. Furthermore, if we look at work, only 3 people from the entire research sample were heavy workers, of which two were preterm PROM patients. If viewed from the bivariate analysis, it was found that there were no significant results between work and the incidence of preterm PROM.

3.2. The Correlation between Bacteriuria and the Incidence of Preterm PROM

The bacteriuria variable is categorized into positive and negative findings. Based on bivariate analysis, significant results were obtained with an OR value of 4.697; 95% CI 1.903–11.595; \( p = 0.001 \) (Table II). Based on this analysis’s results, patients with positive bacteriuria had a risk of experiencing PROM that was 4.697 times greater than patients with negative bacteriuria.

3.3. The Correlation Between Leukocyturia and Preterm PROM Events

The leukocyturia variable was categorized into positive and negative findings. Based on bivariate analysis, significant results were obtained with an OR value of 4.697; 95% CI 1.903–11.595; \( p = 0.001 \) (Table III). Based on the results of this analysis, it was found that patients with positive leukocyturia had a risk of experiencing preterm PROM that was 4.697 times greater than patients with negative leukocyturia.

3.4. Multivariate Analysis of the Correlation Between Bacteriuria and Leukocyturia and the Incidence of Preterm PROM

To determine the independent correlation between the independent and dependent variables without being influenced by confounding variables, a multivariate analysis was carried out using the Logistic Regression Test by controlling the variables age, parity, BMI, and occupation. Based on the results of multivariate analysis, significant results were obtained for the leukocyturia variable with an OR value of 4.697; 95% CI 1.903–11.595; \( p = 0.001 \) (Table IV). Based on the results of this analysis, it can be concluded that patients with positive leukocyturia are independently at risk of experiencing preterm PROM by 4.697 times greater than patients with negative leukocyturia.

4. Discussion

Based on the analysis results, if we look at the age variable, it was found that the mean age of the research sample with preterm PROM in this study was more significant than the mean age of preterm non-PROM patients. However, the difference found was very small and not statistically significant. These findings were then confirmed by bivariate analysis by dividing the age of the research sample into ≥35 years and <35 years, which also found insignificant results. This study’s results do not follow research conducted by Trihapsari et al. [10], who found significant results in age group differences with the incidence of premature rupture. The results of this research were also confirmed by research conducted by Rahman et al. [8], who found no significant difference in age. This difference in results was probably due to the disproportionate distribution of age groups with preterm and non-preterm PROM patients, so statistically significant results were not obtained.

The correlation between advanced age and preterm PROM during pregnancy is a hot topic in obstetrics and
The Correlation Between Incidences of Preterm Premature Rupture of Membrane with Leukocyturia and Bacteriuria  

Wibawa and Mahardika

<table>
<thead>
<tr>
<th>Variable</th>
<th>Preterm PROM (n = 39)</th>
<th>Preterm non-PROM (n = 73)</th>
<th>OR</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean ± SB</td>
<td>27.62 ± 5.88</td>
<td>27.33 ± 6.03</td>
<td>–</td>
<td>–</td>
<td>0.637</td>
</tr>
<tr>
<td>35 years or above</td>
<td>5 (31.3%)</td>
<td>11 (68.8%)</td>
<td>0.829</td>
<td>0.266–2.584</td>
<td>0.746</td>
</tr>
<tr>
<td>Below 35 years</td>
<td>34 (35.4%)</td>
<td>62 (64.6%)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 4</td>
<td>6 (50.0%)</td>
<td>6 (50.0%)</td>
<td>2.030</td>
<td>0.608–6.781</td>
<td>0.336</td>
</tr>
<tr>
<td>Below 4</td>
<td>33 (33.0%)</td>
<td>67 (67.0%)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Body mass index (BMI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excess (25.0–26.9 kg/m²)</td>
<td>8 (38.1%)</td>
<td>13 (61.9%)</td>
<td>–</td>
<td>–</td>
<td>0.635</td>
</tr>
<tr>
<td>Normal (18.5–24.9 kg/m²)</td>
<td>23 (37.1%)</td>
<td>39 (62.9%)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Thin (&lt;18.5 kg/m²)</td>
<td>8 (27.6%)</td>
<td>21 (72.4%)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy worker</td>
<td>2 (66.7%)</td>
<td>1 (33.3%)</td>
<td>3.892</td>
<td>0.342–44.339</td>
<td>0.277</td>
</tr>
<tr>
<td>Not a heavy worker</td>
<td>37 (33.3%)</td>
<td>72 (66.1%)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Note. Analysis was carried out via a Mann-Whitney U, b Chi-Square, and c Fischer’s Exact Test. Results were considered significant if p < 0.05.

TABLE II: CORRELATION BETWEEN BACTERIURIA AND PRETERM PROM

<table>
<thead>
<tr>
<th>Variable</th>
<th>Preterm PROM (N = 39)</th>
<th>Preterm non-PPROM (N = 73)</th>
<th>OR</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteriuria positive</td>
<td>22 (46.8%)</td>
<td>25 (53.2%)</td>
<td>2.485</td>
<td>1.120–5.510</td>
<td>0.024</td>
</tr>
<tr>
<td>Bacteriuria negative</td>
<td>17 (26.2%)</td>
<td>48 (73.8%)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Note. Analysis was carried out using the Chi-Square Test. Results are considered significant if p < 0.05.

TABLE III: CORRELATION BETWEEN LEUKOCYTURIA AND PRETERM PROM

<table>
<thead>
<tr>
<th>Variable</th>
<th>Preterm PROM (N = 39)</th>
<th>Preterm non-PPROM (N = 73)</th>
<th>OR</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leukocyturia positive</td>
<td>31 (48.4%)</td>
<td>33 (51.6%)</td>
<td>4.697</td>
<td>1.903–11.595</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Leukocyturia negative</td>
<td>8 (16.7%)</td>
<td>40 (83.3%)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Note. Analysis was carried out using the Chi-Square Test. Results are considered significant if p < 0.05.

TABLE IV: MULTIVARIATE ANALYSIS OF THE INCIDENCE OF PRETERM PROM

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted OR</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteriuria (positive/negative)</td>
<td>0.743</td>
<td>0.225–2.452</td>
<td>0.625</td>
</tr>
<tr>
<td>Leukocyturia (positive/negative)</td>
<td>4.697</td>
<td>1.903–11.595</td>
<td>0.001</td>
</tr>
<tr>
<td>Age (≥35/&lt;35)</td>
<td>5.167</td>
<td>0.494–54.022</td>
<td>0.170</td>
</tr>
<tr>
<td>Parity (≥4/&lt;4)</td>
<td>0.533</td>
<td>0.148–1.920</td>
<td>0.336</td>
</tr>
<tr>
<td>BMI (obese/excessive/normal/thin)</td>
<td>0.454</td>
<td>0.160–1.287</td>
<td>0.138</td>
</tr>
<tr>
<td>Work (heavy/light)</td>
<td>0.323</td>
<td>0.025–4.204</td>
<td>0.388</td>
</tr>
</tbody>
</table>

Note. Analysis was carried out using the Binary Logistic Regression Test. Results are considered significant if p < 0.05.

gynecology research. Preterm premature rupture of membranes occurs when the amniotic membrane breaks before labor begins and occurs after 37 weeks of gestation. Older maternal age, usually defined as 35 years or older at delivery, is associated with various pregnancy complications, including preterm PROM. Epidemiological studies show a positive association between advanced maternal age and the risk of preterm PROM. These studies show that the incidence of preterm PROM increases gradually with increasing maternal age. As the mother ages, physiological changes occur in the amniotic membranes, causing premature rupture. This may be caused by changes in collagen metabolism, weakening of the fetal membranes, and decreased elasticity. In addition, increasing maternal age increases oxidative stress in various tissues, including the fetal membranes. Oxidative stress can cause cell damage, disrupt the integrity of the amnion, and cause premature rupture of membranes [9].

This study had no significant correlation between parity and the incidence of preterm PROM. These findings do not follow research conducted by Trihapsari et al. [10], who found a significant correlation between parity and the incidence of preterm PROM. Similar results were also found in the research of Lestari and Musa [11], who found a significant correlation between parity and the incidence of preterm PROM. This difference in results is likely due to the disproportionate distribution of parity groups with preterm PROM and non-preterm PROM patients, so statistically significant results were not obtained.

The correlation between parity (how often a woman gives birth) during pregnancy and preterm PROM is an essential issue in research. A history of parity influences the risk of preterm PROM in subsequent pregnancies. Women who have experienced preterm PROM in a previous pregnancy have a higher risk of experiencing preterm PROM again in a subsequent pregnancy. First-time women may experience structural and functional
changes to the cervix, making them more likely to experience premature dilation and rupture of the membranes [12]. During the first trimester, the muscles and supporting tissues may become increasingly stretched, weakening the integrity of the amniotic sac and increasing the risk of preterm PROM. During pregnancy, the uterus enlarges to accommodate the growth of the fetus. Multiparous women who have been pregnant previously may experience more significant uterine distension due to previous uterine distension. This increased extensibility can reduce the risk of PROM by evenly distributing the force of uterine contractions and reducing pressure on the fetal membranes. In addition, childbirth can affect the structural integrity of the fetal membranes. The amniotic sac may be stronger in multiparous women because it stretches and changes shape during childbirth, making it less likely to rupture. On the other hand, primigravidas may have fetal membranes that are less strong, so they are more susceptible to PPROM [13].

If we look at the correlation between BMI and the incidence of preterm PROM, there was no significant correlation in this study. The results of this research are in line with the research conducted by Salam [14], who found no significant correlation between BMI and PPROM. Obesity is a considerable risk factor for various pregnancy complications, including preterm PROM. The pathomechanism underlying the correlation between obesity and preterm PROM involves complex interactions between physiological, hormonal, and inflammatory processes. Based on literature sources, obesity is associated with low-grade chronic inflammation that occurs continuously so that it can affect the surrounding tissue. Adipose tissue releases proinflammatory cytokines such as tumor necrosis factor-alpha (TNF-α) and interleukin 6 (IL-6), which can cause inflammation throughout the body, including the reproductive tract [15]. Increased levels of inflammatory mediators can weaken the fetal membranes and increase the risk of preterm PROM. Obesity is also associated with changes in hormone levels, including adipokines (hormones secreted by adipose tissue) and sex hormones such as estrogen and progesterone. Dysregulation of these hormones can disrupt the balance needed to maintain the integrity of the amniotic membranes, thereby causing premature rupture of the membranes. In addition, obesity is a significant risk factor for gestational diabetes mellitus and insulin resistance. Gestational diabetes mellitus and insulin resistance are associated with increased oxidative stress and inflammation, which can further exacerbate the risk of preterm PROM by increasing tissue damage and weakening the fetal membranes. When viewed from the mechanical load, obesity places mechanical pressure on the reproductive organs, including the uterus and cervix. Increased intra-abdominal pressure and mechanical stretching of the uterine and cervical tissue in obese women can lead to premature weakening and rupture of the amniotic membranes [16].

In this study, no significant results were obtained. Not many studies have been conducted to analyze the influence of workload during pregnancy on the incidence of preterm PROM. The correlation between workload and preterm PROM during pregnancy is essential in occupational medicine research. Although limited research has focused on this correlation, some studies have examined the broader association between work-related factors and adverse pregnancy outcomes. Physically demanding work, such as lifting heavy objects, standing for long periods, or performing repetitive movements, can increase the risk of preterm PROM. Strain and physical activity can cause uterine contractions and mechanical stress on the amniotic membranes, increasing the chance of rupture. High levels of psychosocial stress in the workplace: workload, long hours, and inadequate social support are associated with adverse pregnancy outcomes such as preterm birth and low birth weight. Although there is little direct evidence linking psychosocial stress and PROM, chronic stress can cause hormonal dysregulation and inflammation, which may indirectly increase the risk of PROM [17].

Significant results were obtained from the research between the findings of bacteriuria and the incidence of preterm PROM. Although the results in the multivariate analysis were insignificant, the bivariate analysis showed that positive findings for bacteriuria had a 2.485 times greater risk of experiencing preterm PROM. Findings with inverse results were obtained in research conducted by Tanshen et al. [18], who found significant results between bacteriuria and the incidence of preterm PROM. The correlation between bacteriuria (the presence of bacteria in the urine) and preterm PROM during pregnancy relies on complex molecular mechanisms that contribute to inflammation, tissue damage, and weakening of the fetal membranes. Although studies examining the molecular pathways linking bacteriuria and preterm PROM are still limited, several hypotheses can be formulated based on the known pathophysiology of urinary tract infections (UTI) and preterm PROM [19]. Bacterial colonization of the urinary tract triggers an immune response by releasing inflammatory mediators such as cytokines, chemokines, and prostaglandins. These inflammatory molecules can attack surrounding tissue, including the fetal membranes, causing inflammation and tissue damage. Chronic inflammation weakens the structural integrity of the amniotic membrane, making it more susceptible to premature rupture of membranes [20].

Matrix-metalloproteinase (MMP) is an enzyme involved in the degradation of extracellular matrix components, including collagen, the main structural protein of fetal tissue. Bacterial infection and inflammation can upregulate MMP expression and activity, thereby causing damage to collagen fibers and weakening fetal membranes. Various studies have shown that increased MMP levels are associated with preterm PROM and may be involved in membrane rupture [20]. Bacterial infections can cause oxidative stress in the urinary tract and surrounding tissues. Reactive oxygen species (ROS) produced during oxidative stress can cause cell damage and lipid peroxidation, contributing to tissue damage and weakening. Oxidative stress markers have been detected in the amniotic fluid of women with PROM, implicating oxidative damage in the pathogenesis of membrane rupture. Bacterial products such as lipopolysaccharide (LPS) and peptidoglycan can activate toll-like receptors (TLR) on immune cells...
and uterine tissue, triggering inflammatory signaling pathways. Activation of TLR-mediated signaling pathways, such as nuclear factor kappa beta (NF-κB) and mitogen-activated protein kinase (MAPK), induces the production of proinflammatory cytokines and prostaglandins, thereby triggering uterine contractions [21].

Significant results were obtained from the research between leukocytosis findings and the incidence of preterm PROM. These findings were also confirmed independently through multivariate analysis, which found that patients with positive leukocyturia had a risk of experiencing preterm PROM that was 4.697 times greater than patients with negative leukocyturia results. The results of this study do not follow research by Karo et al. [10], who found insignificant results between positive leukocyturia findings and the incidence of PPROM.

Leukocyturia, which is characterized by the presence of white blood cells in the urine and preterm premature rupture of membranes, rupture of the membranes before labor begins, is clinically associated with urinary tract infections and obstetric complications. Studies report that the prevalence of leukocyturia varies depending on the population studied and the diagnostic criteria used. Leukocyturia indicates the presence of white blood cells in the urine, which means an immune response to bacteria in the urine. Inflammation caused by microbial infections is often associated with pregnancy birth and preterm PROM. Changes in the structure and integrity of the extracellular matrix are influenced by endogenous host responses, including proinflammatory cytokines such as TNF-α and interleukin-1β (IL-1β), which induce the production of MMPs that degrade the extracellular matrix. In addition, invading microorganisms can produce enzymes that can damage their enzymes, such as collagenase, which acts on extracellular matrix proteins. Enzymes that damage the endogenous matrix or originate from microorganisms can expose or release the matrix, promoting the inflammatory process [21].

5. Conclusion

Based on the research results, it can be concluded that positive bacteriuria and leukocyturia increase the risk of prematurity in pregnant women experiencing preterm PROM. A study with a case-control design is needed to obtain a proportional proportion of cases consisting of preterm PROM patients and non-preterm PROM patients to minimize the risk of bias due to a disproportionate sample size. In addition, further research is needed to evaluate other factors that may play a role in the incidence of preterm PROM.

Acknowledgment

The authors thank all the Clinical Microbiology Laboratory technicians of Prof. Dr. IGNG Ngoerah General Hospital, Denpasar, Bali, Indonesia, for their technical assistance.

AUTHOR CONTRIBUTIONS

All authors actively contributed to writing this case report.

ETHICAL ELIGIBILITY

This case report has obtained approval from the patient regarding the publication of patient data following ICJME regulations.

CONFLICT OF INTEREST

The author declares no conflict of interest in writing or publishing this case report.

REFERENCES


