Urinary Protein Levels in Third-Trimester Pregnant Women: a Descriptive Study

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ABSTRACT

Background: In pregnancy, there are enormous changes in the body involving all organ systems to support and maintain fetal growth. Hypertension in pregnancy is a general term that includes preeclampsia. One of the symptoms found in the third trimester of pregnant women with preeclampsia is the presence of proteinuria. In the third trimester of pregnancy, urine protein screening is done to avoid maternal mortality or after delivery. This study aimed to identify the urinary protein levels in third-trimester pregnant women at Madapangga Community Health Center.

Methods: Descriptive cross-sectional research conducted at Madapangga Community Health Center, Bima, West Nusa Tenggara. The research subjects were all third-trimester pregnant women recruited from February to July 2023 with an accidental sampling method. Data were obtained from secondary sources such as; age, blood pressure, gestational status, and urine protein levels (+1, +2, +3) using urine dipstick examination.

Results: 21.80% of 119 pregnant women had positive urine protein, 26 pregnant women had positive urine protein, and 34.60% had hypertension. The majority of the respondents (80.80%) had +1 urine protein. The highest age range was 35-39 years old (53.80%) and most respondents were in their first and third pregnancy (34.60%).

Conclusion: Urine protein testing is a simple laboratory test that is easy to use and affordable. Checking as early as possible will avoid and reduce the mortality rate of pregnant women or after childbirth.

Keywords: Hypertension, Madapangga Community Health Center, Proteinuria, Preeclampsia.

INTRODUCTION

Pregnancy is a condition in which a woman has a conception that is implanted in the wall of her uterus or another location. At this time, there are enormous changes in the body involving all organ systems to support and maintain fetal growth (Pascual & Langaker, 2023). Pregnancy should be a hopeful and positive experience for every woman. Tragically, millions of people around the world do not have access to high-quality health services, and pregnancy is still a threatening experience for them. According to the data obtained from the United Nations, one woman dies every two minutes due to pregnancy or childbirth. This is a major setback in maternal health in many parts of the world (World Health Organization, 2023; Huda et al., 2012; Pringle et al., 2018).

Global data suggested that there will be an estimated 287,000 maternal deaths worldwide by 2020. In two of the eight UN regions, Europe and North America, and Latin America and the Caribbean, maternal mortality rates increased from 2016 to 2022, by 17% and 15% respectively (Abuya et al., 2015; Watertown, 2021). Most of these maternal deaths were caused by high blood pressure. (World Health Organization, 2023) In Indonesia, based on data...
from the Ministry of Health of the Republic of Indonesia in 2021, it was found that the second highest cause of maternal death was hypertension during pregnancy (Kemenkes RI, 2022). Hypertension in pregnant women is capable of causing death. Of 14,640 total maternal deaths, there were only 4,999 reported, meaning there are 9,641 not reported to the center. From this data, there were 2,868 maternal deaths in hospitals, 9,825 maternal deaths in community health centers, and 83,447 maternal deaths in villages and sub-districts (Istiqomah et al., 2023). Bima, West Nusa Tenggara, was the fourth highest district in 2022 for the number of maternal deaths with hypertension in pregnancy as one of the causes (Dinkes NTB, 2023).

Hypertension in pregnancy is a general term that includes gestational hypertension, preeclampsia, and eclampsia (Braunthal & Brateanu, 2019). One of the symptoms found in the third trimester of pregnant women with preeclampsia and eclampsia is the presence of protein in the urine (proteinuria). Therefore, in the third trimester, pregnant women are often examined for protein in the urine to be able to immediately identify whether the pregnant woman is experiencing preeclampsia or not, so that treatment can be carried out immediately and avoid death in pregnant women or after childbirth. One of the causes of death in pregnant women is preeclampsia/eclampsia. Preeclampsia is a widespread malfunction of the blood vessel endothelium, resulting in vasospasm (narrowing of the blood vessels). After 20 weeks of gestation, this can result in decreased organ perfusion and activation of the endothelium, which can lead to hypertension, edema, and proteinuria. Examination of urine protein is an important examination during pregnancy because it is one of the signs of preeclampsia. As gestational age increases, the pressure on the renal veins will increase. During pregnancy, renal blood flow and glomerular filtration rate increase compared with non-pregnant conditions (Istiqomah et al., 2023).

This was the first research to discuss the description of urine protein levels in third-trimester pregnant women in Bima Regency, West Nusa Tenggara Province. Based on this background, this study aimed to identify the urinary protein levels in third-trimester pregnant women at Madapangga Community Health Center, Bima, West Nusa Tenggara.

**RESEARCH METHOD**

This research was a descriptive study with a cross-sectional approach, by collecting data at one time only (point time approach) to identify urinary protein levels in pregnant women according to age distribution and gestational status at Madapangga Community Health Center, Bima, West Nusa Tenggara. The research subjects were all patients of third-trimester pregnant women who visited Madapangga Community Health Center, Bima, West Nusa Tenggara from February 2023 to July 2023 using an accidental sampling method. Patients who did not have complete data and did not perform urinary protein examination were excluded from the study. Data obtained from secondary sources were age, gestational status, blood pressure, and urine protein levels (+1, +2, +3) using urine dipstick examination. Data were analyzed descriptively using SPSS version 23 and presented in the form of frequency and percentage.

**RESULTS**

A total of 119 pregnant women were included in this study. There were 26 (21.8%) pregnant women with positive urinary protein (Table 1).

<table>
<thead>
<tr>
<th>Urinary Protein</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>26</td>
<td>21.80</td>
</tr>
<tr>
<td>Negative</td>
<td>93</td>
<td>78.10</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Based on the results of the examination, 26 women had positive results for protein in their urine, 21 women had positive urinary protein (+), 3 women had positive urinary protein (++), and 2 women had positive urinary protein (+++) (Table 2).
Table 2. Urinary protein levels of 26 pregnant women with positive results

<table>
<thead>
<tr>
<th>Urinary Protein Levels</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive +</td>
<td>21</td>
<td>80.80</td>
</tr>
<tr>
<td>Positive ++</td>
<td>3</td>
<td>11.50</td>
</tr>
<tr>
<td>Positive +++</td>
<td>2</td>
<td>7.70</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Based on age, of the 26 subjects with positive urinary protein, 4 women in the age range of 20-24 years old had positive (+) urinary protein levels and none had positive (++) or positive (+++). Of 6 women in the age range of 25-29 years old, 5 had positive (+) urine protein levels, 1 had positive (++), and none had positive (+++). Two women in the age range of 30-34 years old had positive (+) urinary protein levels. Of 14 women in the age range of 35-39 years old, 10 had positive (+) urinary protein levels, 2 had positive (++) and 2 had positive (+++) (Table 3).

Table 3. Characteristics of pregnant women with positive urinary protein based on age

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
<th>Protein Urine Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>4</td>
<td>15.38</td>
<td>+ 4 ++ 0 +++ 0</td>
</tr>
<tr>
<td>25-29</td>
<td>6</td>
<td>23.08</td>
<td>+ 5 ++ 1 0</td>
</tr>
<tr>
<td>30-34</td>
<td>2</td>
<td>7.69</td>
<td>+ 2 ++ 0</td>
</tr>
<tr>
<td>35-39</td>
<td>14</td>
<td>53.85</td>
<td>+ 10 ++ 2 2</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100.00</td>
<td>21 3 2</td>
</tr>
</tbody>
</table>

The highest age range was 35-39 years old (53.8%) and they were mostly in the first and third pregnancy (34.6%) (Table 3).

Table 4. Gravida status of women with positive urinary protein

<table>
<thead>
<tr>
<th>Gravida Status</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
<th>Protein Urine Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>9</td>
<td>34.62</td>
<td>+ 9 ++ 0</td>
</tr>
<tr>
<td>G2</td>
<td>7</td>
<td>26.92</td>
<td>+ 6 ++ 1</td>
</tr>
<tr>
<td>G3</td>
<td>9</td>
<td>34.62</td>
<td>+ 5 ++ 1</td>
</tr>
<tr>
<td>G4</td>
<td>1</td>
<td>3.85</td>
<td>+ 1 ++ 0</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100.00</td>
<td>21 3 2</td>
</tr>
</tbody>
</table>

Based on the gravida status of the 26 subjects, 9 women were with gravida 1 (G1), of which 9 had positive (+) protein levels and none positive (++) or positive (+++). Of 7 women with gravida 2 (G2), 6 had positive (+) protein levels, none had positive (++) and 1 had positive (+++). Of 9 people with gravida 3 (G3), 5 had positive (+) protein levels, 3 had positive (++) and 1 had positive (+++). One woman with gravida 4 (G4) had positive (+) protein levels (Table 4).

DISCUSSION

Pregnancy is the physiological process of fetal development in the body of a mother (Bernstein & VanBuren, 2013). Women undergo their pregnancy starting from the beginning of conception and ending until the beginning of labor approximately 280 days (40 weeks), not exceeding 300 days (43 weeks) (Rahayu & Yulviana, 2022). In pregnancy, physiological changes that occur in pregnancy aim to support fetal development and prepare for birth. Some changes that occur can affect normal values and some resemble symptoms of a disease. Therefore, it is important to know whether pregnant women experience normal changes as a result of pregnancy or a pathological condition (Soma-Pillay et al., 2016). In early pregnancy, there is a vasodilating effect of prostaglandin, and...
progesterone which causes peripheral vasodilation. Cardiac output is the product of heart rate and shock volume. An increase in cardiac output is mainly due to an increase in the volume of the chambers and an increase in heart rate. This increase in cardiac output is partly due to increased blood flow to the uterus, placenta kidneys, skin, and extremities. Increased cardiac output is required in late pregnancy as uterine blood flow. This increases 10-fold and renal blood flow increases by 50%. Increased renal blood flow leads to a 50% increase in glomerular filtration rate, and an 80% increase in renal plasma flow (RPF) (Kepley & Bates, 2023) As a result of the increase in glomerular filtration rate, there is an increase in the excretion of protein and albumin through the urine (Vinturache & Khalil, 2021; Ghamrawi et al., 2019).

Proteinuria is a term used to describe protein present in the urine in the form of albumin, globulin, and other mucoproteins. Proteinuria is one of the signs of kidney damage. Almost half of the protein lost comes from the distal tubule (Tamm-Horsfall glycoprotein). During normal pregnancy, protein excretion is increased compared to non-pregnancy, and in healthy women can excrete 200 to 260 mg of protein per day in the third trimester, but the mechanism is still unknown (Bartal et al., 2022). Despite the increase during pregnancy, it will rarely be detected by regular screening examinations. Urinary protein secretion is considered abnormal in pregnant women when it exceeds 300 mg/24 hours during pregnancy, usually correlated with +1 on the urine dip test (Airoldi et al., 2007).

Hypertension during pregnancy is based on standardized measurements of blood pressure. Preeclampsia is gestational hypertension with significant proteinuria (>300mg/24 hours). The cause of this disorder remains unclear, but many theories suggest that in pregnancy endothelial dysfunction, vasoconstriction, and microthrombosis lead to placental vascular insufficiency. When stressed, syncytiotrophoblast (the epithelial layer of placental villi in contact with maternal blood) releases many factors such as pro-inflammatory cytokines, cell-free fetal DNA, exosomes, and anti-angiogenic agents into the maternal circulation. This disrupts maternal endothelial function resulting in a systemic inflammatory response and hypertension (Ghada, 2019).

CONCLUSION

Urinary protein testing is a simple laboratory test that is easy to use and affordable. Checking as early as possible will avoid and reduce the mortality rate of pregnant women or after childbirth. Limitation of this study can be examine in future study, such as: 1) conduct research on the effect of education for TM III pregnant women on proteinuria (+) and hypertension; 2) conduct more in-depth research on the causal factors of urinary protein (+) on hypertension in TM III pregnant women; 3) carry out a thorough health check for pregnant women to find out whether there are any congenital diseases or comorbidities before conducting research to increase the validation of research data; and 4) higher sample size should be achieved to obtain higher data validation on factors related to the occurrence of proteinuria and hypertension in pregnant women.

ACKNOWLEDGMENTS

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of this study.

REFERENCES


