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The Analysis of Screening for Preeclampsia with the Maternal and Child Health Book

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Abstract

Preeclampsia is a complication that occurs during pregnancy, childbirth, and the postpartum period, characterized by hypertension, edema, and proteinuria. The government is trying various programs to reduce the incidence of pre-eclampsia. In addition to pre-eclampsia screening instruments, the results of documentation data in the Maternal and Child Health Book have many opportunities for analysis, to be used as indicators for early detection of pre-eclampsia. This study aimed to analyze the use of the maternal and child health book for early detection of Pre-Eclampsia. The research design was a correlational analysis with a cross-sectional approach. The sample was some pregnant women in Trimester II and III with research criteria, aged 20-35 years, primigravida and multigravida, gestational age ≥16 weeks, a total of 45 people, with a Purposive sampling technique. The independent variables were MAP (Mean Arterial Pressure), ROT (Roll Over Test), and BMI (Body Mass Index). The dependent variable was the incidence of Preeclampsia in pregnancy. The data Analysis used the Chi-Square test. The results obtained the greater the MAP and ROT value the greater the risk of preeclampsia, and obesity has a two times greater risk of preeclampsia. Increased MAP, ROT, and BMI indicate changes in the vascular system, disrupting the balance between vasodilator and vasoconstrictor factors, which can cause increased vascular resistance. which is a characteristic of preeclampsia. ROT and MAP measurements need to be carried out in each trimester so that early management can be carried out if pre-eclampsia occurs.

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INTRODUCTION

Preeclampsia in the new definition is a group of complications that arise during pregnancy, childbirth and postpartum which are characterized by hypertension, edema and/or proteinuria. Currently, preeclampsia is the leading cause of maternal death, whether it occurs during pregnancy, childbirth or postpartum (Juwita., 2022). SKI 2023 data, the Maternal Mortality Rate in Indonesia in 2020, is 189 per 100,000 live births, the causes of maternal death include hypertension disorders as much as 33.07%. WHO data, the number of cases of preeclampsia in pregnancy in the world reached 12% in 2018. The number of cases of preeclampsia in the world is estimated to increase in 2025 with a total of 1.15 billion cases of preeclampsia or around 29% of the total population in the world. The health profile of East Java shows that the three highest causes of maternal death in 2023, preeclampsia is 31.15% (Karmilah & Mochartini, 2024).

Until now, the cause of preeclampsia is not known for certain, but scientists and experts agree that preeclampsia cases begin with blood flow disorders. Other factors that can increase the risk of preeclampsia are primigravida, a history of preeclampsia in previous pregnancies, malnutrition, multiple pregnancies, suffering from certain diseases such as hypertension, diabetes, kidney disorders, being pregnant for too long (more than 10 years), and obesity. The consequences that can occur in cases of preeclampsia are HELLP syndrome consisting of Hemolysis, Elevated liver Enzymes, Low Platelet count, eclampsia, cardiovascular disorders, lung, kidney and liver failure, coagulopathy, placental abruption and bleeding in the brain. The consequences that can occur in the fetus are Intra Uterine Growth Retardation (IUGR) and Intra Uterine Fetal Death (IUFD) (Agung Mulyaningsih, 2020). The impact of preeclampsia is very dangerous for pregnant women, so preeclampsia screening is needed to detect preeclampsia early so that appropriate treatment can be carried out so as not to cause many complications in pregnancy (Sulastri et al., 2023).

The main problem in pre-eclampsia patients is the delay in recognizing the incident. Many examinations and anamnesis are carried out during ANC, but often all of them are just routine data. One of the efforts for early detection of preeclampsia that has been running in primary health facilities is urine protein examination and preeclampsia screening sheets. Various data that have been stated in the maternal and child health book actually have many meanings that can be combined with urine examination results (Black & Morin, 2014). Researchers will analyze several data, such as BB, TB, TD to calculate BMI, MAP and ROT. In this study, researchers want to analyze data from the maternal and child health Book as a screening for preeclampsia events.

METHODS

The design of this study was correlation analytic with cross sectional approach. The population in this study was all pregnant women in Trimester II and III who were in Polindes Latulif. The sample in this study was some pregnant women in Trimester II and III who met the research criteria, namely reproductive age 20-35 years, primigravida and multigravida, gestational age ≥16 weeks, using the Purposive sampling technique. The independent variables were Mean Arterial Pressure (MAP) Examination, Roll Over Test (ROT) and Body Mass Index (BMI, urine protein examination, observation of pre-eclampsia screening sheet from maternal and child health book while the dependent variable was the incidence of Preeclampsia in pregnancy. The instruments used Checklist, maternal and child health Book, Tensimeter, Body Weight Scale, and urine protein examination tool. The statistical method for data analysis was Chi-Square test to see the relationship between two variables. This research has passed the ethics test with No. RK. 091/KEPK/STIK/XI/2024.

RESULT

The results showed that the characteristics of respondents were 64.58% aged 20-35 years, primipara 56.25%, and the last education was high school 64.58%, as shown in table 1 below.

Table 1. Characteristics of respondents based on age, parity, education at Polindes Latulif

Respondent characteristics	f	%
Age		
<20 years	7	16.67
20-35 years	30	64.58
>35 years	8	18.75
Total	45	100
Parity		
Primipara	26	56.25
Multipara	14	31.25
Grandemulti	5	12.5
Total	45	100
Education		
Junior High School	7	16.67
Senior High School	30	64.58
High School	8	18.75
Total	45	100

Source: Primary Data

Table 2. Frequency distribution of respondents based on MAP, ROT, BMI examination in pregnant women at Polindes Latulip

Mean Arterial Pressure (MAP)	F	%
MAP positive	11	25
MAP negative	34	75
Total	45	100
Roll Over Test (ROT)		
ROT positive	6	14.6
ROT negative	39	85.4
Total	45	100
Body Mass Indeks (BMI)		
Thin	5	10.4
Normal	29	62.5
Overweight	6	14.6
Obesity	5	12.5
Total	45	100

Based on the table, it shows that most respondents, namely 34 people (75%) have negative Mean Arterial Pressure (MAP) examination results. Almost all respondents had negative Roll Over Test (ROT) results, namely 41 respondents (85.4%). Body Mass Index (BMI) examination showed that the majority of respondents had normal BMI results, namely 29 respondents (62.5%).

Tabel 3. Frequency distribution of respondents based on cases of preeclampsia in pregnant women in the second and third trimesters at Polindes Latulip

Pre-eclampsia	F	%
Pre-eclampsia	4	10.4
Not pre-eclampsia	41	89.6

Total	45	100

Based on the table above, most respondents did not experience preeclampsia, namely 41 respondents (89.6%).

Table 4 Cross-tabulation of the relationship between Mean Arterial Pressure (MAP) examination and preeclampsia at Polindes Latulip

Mean Arterial Pressure (MAP)	**Pre-eclampsia**				**Total**	
	PE		**Not PE**			
	f	**%**	**F**	**%**	**f**	**%**
MAP positive	2	18.3	9	81.9	11	100
MAP negative	2	2.9	32	97.1	34	100
Total	4	8.8	41	91.2	45	100
p-value *:* 0,002 r : 0,52						

Based on the table, it is found that there is a relationship between Mean Arterial Pressure (MAP) and preeclampsia in pregnancy, which can be interpreted that the greater the MAP value (positive), the greater the risk of preeclampsia, and vice versa, the smaller the MAP value (negative), the smaller the possibility of preeclampsia.

Table 5. Cross-tabulation of the relationship between Roll Over Test (ROT) examination and preeclampsia at Polindes Latulip

Roll Over Test (ROT)	**Pre-eclampsia**				**Total**	
	PE		**Not PE**			
	f	**%**	**f**	**%**	**f**	**%**
ROT positive	4	66.6	2	33.3	6	100
ROT negative	0	0	39	100	39	100
Total	4	8.8	41	91.2	45	100
p-value : 0,001 r : 0,452						

Based on the table, there is a relationship between Roll Over Test (ROT) and preeclampsia in pregnancy, which can be interpreted that the greater the ROT value (positive), the greater the risk of preeclampsia, and vice versa, the smaller the ROT value (negative), the smaller the possibility of preeclampsia.

Table 6. Cross-tabulation of the relationship between Body Mass Index (BMI) examination and preeclampsia at Polindes Latulip

Body Mass Indeks (BMI)	**Preeclampsia**				**Total**	
	PE		**Tidak PE**			
	f	**%**	**F**	**%**	**f**	**%**
Thin	0	0	5	100	5	100
Normal	0	0	29	100	29	100
Overweight	1	1.6	5	98.4	6	100
Obesity	3	60	2	40	5	100
Total	4	8.8	41	91.2	45	100
p-value : 0,002 r : 0,413						

Based on the table, it is found that there is a relationship between Body Mass Index (BMI) and preeclampsia in pregnancy, which can be interpreted that mothers who are overweight and obese have a risk twice as high of developing preeclampsia compared to pregnant women who are thin and normal weight.

DISCUSSION

Relationship of MAP to Preeclampsia

Preeclampsia usually occurs with systolic blood pressure ≥ 140 mmHg or diastolic ≥ 90 mmHg. High MAP can be an indicator of the risk of preeclampsia. Increased MAP is associated with vasoconstriction and endothelial dysfunction, which are characteristics of preeclampsia. This can cause impaired blood flow to vital organs, including the placenta. High MAP can increase the risk of complications such as stroke, heart attack, and organ failure. Monitoring MAP in pregnant women can help in early identification of preeclampsia and direct appropriate treatment (Dini Kurniawati et al., 2023); (Tampubolon et al., 2021).

MAP reflects the average blood pressure experienced by vital organs. Increased MAP indicates changes in the vascular system, which often occurs in preeclampsia. Preeclampsia is characterized by hypertension. High MAP (≥ 105 mmHg) is often an early sign of abnormal blood pressure, helping in early detection of this condition. Increased MAP can be associated with organ damage, which is one of the diagnostic criteria for preeclampsia. Measuring MAP helps assess the risk of further damage. MAP can help assess other risk factors that contribute to preeclampsia, such as obesity or a history of hypertension, providing a more comprehensive picture of the mother's health (COC, 2017); (Park et al., 2015).

Mean Arterial Pressure (MAP) is an important metric in assessing cardiovascular health, especially during pregnancy. Preeclampsia is a serious complication that can occur, and monitoring MAP can help in the early detection and management of this condition. MAP reflects the average blood pressure required to ensure blood flow to vital organs, making it a good indicator of tissue perfusion status. An elevated MAP is directly related to hypertension and can be an early indicator of this problem, with MAP values greater than 105 mmHg often indicating the risk of preeclampsia. In preeclampsia, endothelial dysfunction occurs, leading to vasoconstriction and increased vascular resistance. This contributes to an elevated MAP. An elevated MAP can indicate inadequate blood flow to the placenta, leading to serious complications for the fetus (Chaemsaithong et al., 2022); (Zhu et al., 2021).

MAP is a useful tool in preeclampsia screening, as it can provide important information about the mother's cardiovascular health. With its ability to show changes related to hypertension and vascular dysfunction, MAP is an important indicator in the early detection, monitoring, and management of preeclampsia, which in turn can improve health outcomes for both mother and fetus (Serra et al., 2020); (Paauw et al., 2016).

Relationship of Roll Over Test (ROT) with Preeclampsia in Pregnancy

Roll Over Test (ROT) is a procedure used to assess the blood pressure response in pregnant women when they move from the supine to the lateral position. This test has important relevance in the context of preeclampsia, a condition characterized by hypertension and organ damage during pregnancy. In healthy pregnant women, lateral recumbency usually lowers blood pressure. However, in women with preeclampsia, blood pressure may remain elevated or even increase when changing positions (Mosimann et al., 2020) ; (Husaidah et al., 2020).

In healthy pregnant women, lateral recumbency can increase blood flow to the placenta and reduce pressure on the inferior vena cava, contributing to a decrease in blood pressure. In contrast, in women with preeclampsia, this response may be impaired, indicating vascular dysfunction (Ranti, 2022); (Serra et al., 2020).

A ROT result showing an increase in blood pressure when moving to the lateral position may be an indicator of vascular dysfunction, which is

characteristic of preeclampsia. Studies have shown that women with positive ROT results are at higher risk of developing preeclampsia (Costa et al., 2011); (Sulistiawati et al., 2024).

Several studies have shown that ROT can help detect preeclampsia better than just relying on simple blood pressure measurements. Studies have shown that women with preeclampsia tend to show significant increases in blood pressure when changing positions. ROT can be used as an additional screening tool to detect preeclampsia earlier, allowing for faster intervention and better management (Karmilah & Mochartini, 2024); (Panaitescu et al., 2018).

Relationship between BMI and preeclampsia

Body Mass Index (BMI) is an important indicator in assessing a person's nutritional status and health, especially in pregnant women. Obesity, characterized by high BMI, is often accompanied by systemic inflammatory conditions. Adipose tissue (fat) functions as an endocrine organ that produces pro-inflammatory cytokines. Increased levels of these cytokines can cause endothelial dysfunction, which contributes to increased blood pressure and the risk of preeclampsia. High BMI can cause changes in vascular function. Obesity disrupts the balance between vasodilator and vasoconstrictor factors, which can lead to increased vascular resistance. This leads to hypertension, which is one of the main features of preeclampsia. Women with high BMI often experience insulin resistance, which can affect metabolism and increase the risk of hypertension. Insulin resistance can lead to increased glucose levels (Esyuananik et al., 2020); (Gallo et al., 2014).

CONCLUSION SUGGESTION

This study shows the effectiveness of maternal and child health book in its use for early detection of preeclampsia through ROT and MAP measurements. The results obtained the greater the MAP and ROT value the greater the risk of preeclampsia, and obesity has a two times greater risk of preeclampsia. Increased MAP, ROT, and BMI indicate changes in the vascular system, disrupting the balance between vasodilator and vasoconstrictor factors, which can cause increased vascular resistance. which is a characteristic of preeclampsia.

SUGGESTION

ROT and MAP measurements need to be carried out in each trimester, especially the third trimester, so that earlier management measures can be taken if preeclampsia occurs. Integrated antenatal care examination is an activity that greatly supports the use of maternal and child health book, because in conducting antenatal care examinations, everything is documented in maternal and child health book. The results of the study expect that all health services that provide pregnancy examinations must utilize maternal and child health book, so that the health of the mother and fetus can be monitored continuously.

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CONFLICTS OF INTEREST

The author declares that there are no conflicts of interest with the topic or any associated objects upon the publication of this study.

AUTHOR CONTRIBUTION

The author contributed in the whole process of the research such as, the development of ideas, developers of research methods, data collection, data analysis, preparation of manuscripts, and publications.

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