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Original Article

Profile Of Pregnant Women With Hypertension: A Cross Sectional Study In Jambi City

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ABSTRACT

Background: Hypertension in pregnancy is one of the complications that cause maternal death in Indonesia. The incidence of hypertension during pregnancy is influenced by a variety of factors. This study aims to determine maternal characteristics with hypertension in pregnancy at the Raden Mattaher Jambi General Hospital.

Methods: This is a descriptive research using secondary data sources. This study population included all pregnant and delivering mothers who were diagnosed with hypertension in pregnancy between 2019 and 2022 with a total of 169 samples.

Results: The results of this study are the average age of mothers is not at risk (63.3%), housewives (83.4%), senior high school education status (58.6%), diagnosed with preeclampsia (71.6%), with severe preeclampsia category (93.4%), gestational age aterm (59.2%), multiparous (59.8%), grade 2 hypertension (68%), positive proteinuria status (63.9%), high ureum levels (60.9%), normal creatinine level (79.3%), decreased hemoglobin level (53.3%), normal platelet count (84%), leukocytosis (78.7%), normal erythrocyte level (61.5%), normal hematocrit value (53.8%), normal blood sugar level (86.4%), obesity class 1 (43.2%), no history of hypertension (59.2%), no history of preeclampsia (72.2%), regular antenatal visits (65.1%), and sectio cesarea method (88.2%).

Conclusion: Maternal characteristics were identified as age not at risk, housewife, senior high school education, diagnosed with preeclampsia, aterm, multiparous, grade 2 hypertension, positive proteinuria status, increased ureum level, normal creatinine level, decreased hemoglobin level, normal platelet count, leukocytosis, normal erythrocyte level, normal hematocrit value, normal blood sugar level**,** obesity type 1, no history of hypertension, no history of preeclampsia, history of regular antenatal visits, and sectio cesarea method.

INTRODUCTION

One of the indicators of sustainable development goals (SDGs) is a healthy and prosperous life that Indonesia must achieve by 2030. One of them is the reduction of maternal mortality rate (MMR). The maternal mortality rate (MMR) is defined as the number of maternal deaths caused or aggravated by pregnancy or pregnancy-related services during pregnancy, during labor or within 42 days after delivery per 100,000 live births. In 2021, according to the Indonesian Health Profile, there are several causes of maternal death in Indonesia and hypertension is the

most common cause of maternal and fetal death in developing countries with a total of 1,077 cases.[1,2]

The definition of maternal hypertension depends on the technique and conditions at the time of measurement, assessment of blood pressure changes in normal pregnancy, and appropriate criteria. Gestational hypertension is systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg, or both, in two measurements at intervals of at least 4 hours after 20 weeks' gestation, in women without history of hypertension. Preeclampsia is one of the complications of high blood pressure that is characterized by proteinuria or, in the absence of proteinuria, by one of several new onset symptoms: thrombocytopenia, impaired liver function, renal insufficiency, headache, and pulmonary edema that does not improve with medication. Eclampsia is a hypertensive pregnancy characterized by new-onset tonic-clonic, focal, or multifocal seizures without the presence of other aggravating factors including cerebral ischemia and infarction, drug usage, intracranial bleeding, or epilepsy.[3,4]

There are several risk factors that cause an increase in blood pressure in pregnant women, such as maternal age, residential area, primiparous, history of abortion, multiple pregnancy, marital status, history of antenatal care, history of hypertension, family history of hypertension, and diabetes mellitus. Hypertension in pregnancy can result in maternal morbidity, such as hemolysis, elevated liver enzyme level, low platelet count (HELLP) syndrome, temporary blindness, placental abruption, disseminated intravascular coagulation (DIC), pulmonary edema, acute respiratory distress syndrome (ARDS), intracranial hemorrhage, hypervolemia, and risk of recurrent preeclampsia.[5–10]

Between 2 and 8% of pregnancies worldwide have preeclampsia. In 2018, The Basic Health Research (RISKESDAS) reported, the proportion of pregnant women in Indonesia who experienced pregnancy complications was 28%, including 3.3% of pregnant women with hypertension complications. Meanwhile, in Jambi Province, the proportion of complications in pregnant women is 19.20%, including 2.24% of pregnant women with hypertension.[11,12].

METHOD

This study, which applies a retrospective cross-sectional methodology and descriptive analysis, uses secondary data from the Raden Mattaher Hospital's medical records department for the years 2019–2022. The sample in this study is the whole population that fulfilled the inclusion criteria. Total sampling is the method used in this research, and a minimum sample size of 96 is required. The inclusion criteria in this study were pregnant and post-partum women who were diagnosed with hypertension in pregnancy at Raden Mattaher Hospital Jambi Province in 2019-2022. The data analysis used was univariate analysis which aims to describe the characteristics of pregnant women who experience hypertension in pregnancy whose results are presented in the form of frequency distribution tables and percentages of each variable.

RESULT AND DISCUSSION

In this study, we obtained 169 samples of pregnant women with hypertension in pregnancy range from 2019 - 2022. **Table 1** shows the characteristics of these patients**.**

In this study, non-risk age experienced more hypertension in pregnancy, as many as 107 samples (63.3%) of 169 samples taken. This is in line with studies that Sutiati Bardja performed at Arjawinangun Hospital in 2020, where the majority of samples of pregnant women in the study were mothers at a non-risk age who experienced severe preeclampsia / eclampsia.[13] Research conducted by Flora Naibaho in 2018 at East Nusa Tenggara, also showed that the majority of increased blood pressure occurred in pregnant women with normal age categories (30-35 years).[14]

Table 1. Characteristics of Pregnant Women with Hypertension at Raden Mattaher Hospital 2019 - 2022

Stage I UTB Value	Frequency (n)	Percentage (%)
Age		
At Risk	62	36,7
Not At Risk	107	63,3
Job		
Work	28	16,6
Housewife	141	83,4
Education		
Not in School	1	0,6
Elementary School	19	11,2
Junior High School	17	10,1
Senior High School	99	58,6
University	33	19,5
Diagnosis Of Hypertension In Pregnancy		
Chronic Hypertension	1	0,6
Gestasional Hypertension	11	6,5
Preclampsia	121	71,6
Eclampsia	36	21,3
Diagnosis Of Preeclampsia		
Mild Preeclampsia	6	5
Severe Preeclampsia	113	93,4
Superimposed Preeclampsia	2	1,7
Gestational Age		
Preterm	62	36,7
Aterm	100	59,2
Postterm	7	4,1
Parity		
Primiparous	65	38,5
Multiparous	101	59,8
Grandemultiparous	3	1,8
Classification Of Maternal Blood Pressure		
Normal	1	0,6
Pre- Hypertension	6	3,6
Grade 1 Hypertension	47	27,8
Grade 2 Hypertension	115	68
Proteinuria		
Positive	108	63,9
Negative	61	36,1
Renal Function		
Ureum		
Low	0	0
Normal	66	39,1
High	103	60,9
Kreatinin		
Low	7	4,1
Normal	134	79,3
High	28	16,6
Blood profile		
Hemoglobin		
Low	90	53,3
Normal	77	45,6
High	2	1,2
Thrombocyte		
Thrombocytopenia	20	11,8
Normal	142	84
Thrombocytosis	7	4,1

Leukocyte		
Leukocytopenia	0	0
Normal	36	21,3
Leukocytosis	133	78,7
Eryhtrocyte		
Low	3	1,8
Normal	104	61,5
High	62	36,7
Hematocrite		
Low	72	42,6
Normal	91	53,8
High	6	3,6
Random blood glucose		
Normal	146	86,4
Hypoglicemic	19	11,2
Hyperglicemic	4	2,4
Maternal body mass index		
Underweight *(<18,5* Kg/M^2*)*	0	0
Normal (18,5-22,9 Kg/M^2)	10	6,5
Overweigh (23-24,9 Kg/M^2)	19	12,3
Obesity 1 (25-29,9 Kg/M^2)	67	43,2
Obesity 2 (≥30 Kg/M^2)	59	38,1
History of hypertension		
Yes	69	40,8
No	100	59,2
History of preeclampsia		
Yes	47	27,8
No	122	72,2
History of antenatal care		
Never	0	0
Irregular	59	34,9
Regular	110	65,1
Delivery method		
Vaginal Delivery	15	8,9
Sectio Cesarea	149	88,2
Induced Labor	5	3,0
Total	169	100

The age category at risk is not the only factor affecting the incidence of hypertension in pregnancy. Primigravida, other medical conditions, unhealthy lifestyles (irregular diet and lack of physical activity), and environmental factors such as stress can also cause women at risk to develop hypertension in pregnancy.

According to this study, pregnant women who were housewives or did not work had a higher incidence of hypertension during pregnancy, namely there were 141 samples (83.4%) of the total sample of 169 samples. Research conducted by Opitasari, et al. (2014) on pregnant women diagnosed with preeclampsia also stated that the majority of these mothers were mothers with a non-working / housewife employment status.[15] Ernawan, et al. in 2021 in Semarang Regency is also in line with this study, namely majority of samples are maternal with preeclampsia who didn't work/housewives.[16] The high incidence of hypertension in pregnancy in housewives can be caused by several factors, such as lack of physical activity because the routine of housewives is much different from working mothers, and stress factors due to family and financial problems can also be a trigger for hypertension in pregnancy.

This study found that senior high school (SMA) education is the most common educational background for pregnant women with hypertension, with a total of 99 samples (58.6%). Ernawan, et al. (2021) is in line with this study, namely the majority of pregnant women who experience hypertension in

pregnancy are mothers with senior high school (SMA) education level.[16] Hasnah et al.'s 2019 study on the correlation between preeclampsia incidence and socioeconomic status also revealed that preeclampsia was identified in the majority of samples with the highest degree of education, senior high school (SMA).[17] This is due to the low level of maternal knowledge and information obtained regarding complications that occur during pregnancy, especially hypertension.

Based on this study, pregnant women with hypertension in pregnancy were mostly diagnosed with preeclampsia with a total of 121 samples (71.6%) and 113 samples (93.4%) of them were diagnosed with severe preeclampsia. At an Ethiopian referral hospital, Hinkosa et al. performed another study that claims most of pregnant women with hypertension are diagnosed with preeclampsia/ eclampsia, followed by gestational hypertension, then superimposed preeclampsia in the third position, and chronic hypertension is the least diagnosis in mothers with increased blood pressure.[5] The high number of severe preeclampsia cases at Raden Mattaher Hospital Jambi is inseparable from the status of the hospital as a referral center in Jambi Province, so that cases that tend to be severe and require comprehensive action will be handled more.

In this study, the gestational age of maternal samples with hypertension in pregnancy showed the majority of pregnant women who performed labor at term gestation, namely 37 - 40 weeks, as many as 100 samples (59.2%). The majority of pregnant women with hypertension in pregnancy give birth at term, according to Gudeta et al.'s findings.[18] Pregnant women with hypertension in pregnancy usually didn't immediately terminate pregnancy because they consider the condition of the fetus, waiting for better fetal development and weight that is more in line with labor to avoid other complications. Therefore, most pregnant women with hypertension complications come to the hospital at term to deliver.

Based on this study, most mothers who experience hypertension in pregnancy are mothers who have given birth 2 or more times (multipara) as many as 101 samples (59.8%). According to Tyas et al., pregnant women who develop hypertension in pregnancy are mostly multiparous, followed by primiparous women.[19] In maternal body, especially the circulatory system, undergoes a physiological adaptation to pregnancy to adapt to the needs of the fetus. This occurs frequently in multiparous women, increasing the probability of hypertension during pregnancy.

In this study, the majority of samples were had grade 2 hypertension (68%). According to Amalia et al., most pregnant women with preeclampsia had grade 2 hypertension, which is supported by the findings of this study.[20] The large number of mothers with grade 2 hypertension is due to the majority of samples being mothers diagnosed with severe preeclampsia. Severe preeclamptic mothers have a diastolic blood pressure of at least 110 mmHg and/or a systolic blood pressure of at least 160 mmHg.[3,21]

In this study, the number of mothers with proteinuria (measurement results ≥ +2) was 108 samples (63.9%). This is in line with Ernawan, et al., more than half of the total research sample were mothers with positive urine protein status.[16] The large number of mothers with proteinuria is due to the majority of samples being mothers diagnosed with preeclampsia. Mothers with preeclampsia have a urine protein dipstick reading of 2+ [3,21]

In this study, the majority of samples had high ureum levels (>13 mg/dl), as many as 103 samples (60.9%). This is in line with Amyranti, et al. which 308 samples out of a total of 330 samples were mothers with preeclampsia who had increased ureum levels.[22] Serum creatinine, urea, and uric acid levels drop as a result of an increase in glomerular filtration rate (GFR) during a typical pregnancy. However, in preeclampsia, hypoperfusion is the cause of the decreased GFR, which is then compounded by renal

tubular dysfunction. This leads to increased blood ureum levels. Elevated blood urea levels also contribute to micro-angiopathy stemming from hemolysis, as a result of maternal endothelial dysfunction, and lead to increased urea synthesis in the body. In the placenta of mothers with preeclampsia there are decreased levels of monoamine oxidase (MAO) and increased levels of serotonine. This plays a role in reducing renal perfusion.[23,24]

In this study, there were 7 samples with low creatinine levels (4.1%). This study contradicts the assumption that an increase in creatinine levels in women with preeclampsia suggests that renal function has been compromised.[25,26]

In this study, most of the samples had decreased hemoglobin levels (<12 g/dl), as many as 90 samples (53.3%). This is in line with Siregar S, et al. in 2021 at Raden Mattaher Jambi Hospital, namely the majority of samples in this study were mothers with preeclampsia who had decreased hemoglobin level.[10] Hypertensive causes hemolytic anemia as a result of erythrocyte cell hemolysis that occurs when passing through blood vessels that have endothelial and fibrin damage. There is an imbalanced rise in plasma volume, erythrocyte volume, and hemoglobin mass during pregnancy, with plasma volume growing greater than usual, causing hemodilution. This situation increases the need for iron. Iron deficiency anemia can increase serum norepinephrine concentrations, triggering corticotropine releasing hormone (CRH) synthesis by the placenta, which increases CRH stimulation and stimulates an increase in inflammatory cytokines, glucocorticoids and oxidative stress. Increased oxidative stress stimulates angiotensin 1-autoantibody receptor (AT1-AA), which leads to the formation of sFlt-1 and sEng. Their interaction with vascular endothelial growth factor (VEGF) and placental growth factor (PlGF) results in systemic vascular dysfunction. This is characterized by increased blood pressure, decreased Nitric Oxide (NO), and increased endothelin, resulting in preeclampsia.[27,28]

In this study, the majority of samples were diagnosed with leukocytosis (>10x10^9 /L), as many as 133 samples (78.7%). This is in line with Canzoneri B, et al. which states that mothers with mild preeclampsia will has increased leukocytes and the leukocytes will further increase in mothers with severe preeclampsia.[29] Increased leukocyte levels indicate an inflammatory response for the release of trophoblast remnants into the maternal blood circulation. The immune system is affected by the physiology of pregnancy, which is characterized by leukocyte activation. The worsening manifestation of this is preeclampsia due to lack of control pathways, including membrane glutathione activity. The inflammatory characteristics of preeclampsia involve an irregular distribution of T lymphocyte clusters and an increased Th1-type immune response. Furthermore, placental hypoxia caused by failure of spiral artery remodeling induces the release of inflammatory stimuli, such as lipid peroxidation, leukocyte activation, and increased production of proinflammatory cytokines, into the circulation.[30]

In this study, the majority of samples had normal platelet counts (150 - 400 x 109 /L), as many as 142 samples (84%). This is in line with Maryono, et al. which results in the form of the majority of samples were pregnant women with severe preeclampsia who have normal platelet counts.[31] The large number of samples with normal platelet counts indicates that the samples of mothers diagnosed with preeclampsia have not experienced further complications in the form of HELLP syndrome, one of the parameters of which is a decrease in platelet count (thrombocytopenia).

In this study, most samples had normal erythrocyte levels (2.71-4.55 x10 /mm63), as many as 104 samples (61.5%). This is not in line with research that explains the relationship between decreased erythrocyte levels and the incidence of preeclampsia. Inflammatory condition in preeclampsia causes placental hypoxia

resulting in increased erythropoiesis. As a result, immature erythrocytes enter the circulation and can be destroyed easily by minor events because they have poor repair mechanisms. In addition, preeclampsia also increases the inflammatory process that causes erythrocyte destruction through reactions with oxygen radicals and proteolytic enzymes.[32]

In this study, the majority of samples had normal hematocrit values, as many as 91 samples (53.8%). This is in line with Siregar, et al. in 2021 at Raden Mattaher Jambi Hospital, namely the majority of samples were mothers with preeclampsia who had normal hematocrit values.[10] This is in contrast to the hematocrit value observed in the majority of preeclamptic mothers, which increased due to hemoconcentration induced by a decrease in plasma volume produced by vasospasm. As stated by Wibowo, there is a relationship between hematocrit and the severity of preeclampsia.[33]

In this study, the majority of samples had normal blood sugar levels (<200 mg/dl), as many as 146 samples (86.4%). According to Anonim T. et al.'s research, most samples of pregnant women with preeclampsia had an average blood sugar of 116.75 mg/dl. This is consistent with their findings.[34] Most of the samples in this study had normal blood sugar levels because the majority of the samples were not mothers with diabetes mellitus or gestational diabetes, so the blood sugar levels in the samples had normal levels.

According to this study, the majority of mother had obesity 1 in third trimester, namely 67 samples (43.2%). According to Diana, et al., most preeclampsia patients are obese mothers, which is in line with this.[35] Mothers with obese can increase the risk of hypertension in pregnancy since obese mothers have high LDL and triglyceride levels, and low HDL levels. This causes a lack of extravillous cytotrophoblast migration, increased trophoblast apoptosis, and increased free fatty acid levels so that the risk of preeclampsia increases.[36] In obesity there is increased synthesis of leptin. This triggers activation of NADPH oxidase, a process that impairs vasodilation in the endothelium by increasing NO degradation. This mechanism results in a NO deficiency that impairs endothelial function and contributes to the spiral artery remodeling process, which is the pathophysiology of preeclampsia-eclampsia.[37]

Based on this study, most pregnant women didn't have history of hypertension before pregnancy, as many as 100 samples (59.2%). According to Hinkosa et al., most of samples are from mothers who had no history of hypertension before their pregnancy.[5] This study is not in accordance with Tendean H, et al. which in the study stated that a history of hypertension before pregnancy can cause disruption of vital organs such as the lungs, heart, and blood vessels, thus increasing the risk of preeclampsia.[36]

Based on this study, 122 pregnant women (72.2%) who didn't have a history of preeclampsia experienced hypertension in pregnancy. This is in line with Bharti, et al. namely the majority of samples are mothers who have increased blood pressure without a history of preeclampsia in previous pregnancies.[38] This study contradicts Tendean H's theory, which states that mothers with a history of preeclampsia are at risk of recurrent preeclampsia due to poor cardiovascular profile due to thickening of the carotid intima media and decreased cardiac output. [36]

The results of this study showed that 110 pregnant women (65.1%) with hypertension in pregnancy made regular antenatal visits (≥4 times). This is in line with Amalia, et al., where most of the samples were pregnant women with hypertension and had a history of complete antenatal visits (antenatal visits according to trimester) compared to respondents whose antenatal visits were incomplete.[39] The high number of samples who experienced hypertension in pregnancy and made regular antenatal visits indicates that complications in pregnancy can be detected faster so that they can be referred

more quickly to advanced referral health facilities.

In this study, the majority of samples performed labor by sectio cesarea method, as many as 149 samples (88.2%). This is in line with Corrigan, et al., where 3,531 pregnant women who experienced hypertension in pregnancy mostly delivered by cesarean section.[40] In this study, it was found that the majority of samples were mothers with severe preeclampsia who had entered aterm gestation so that the appropriate management was pregnancy termination. A suitable pregnancy termination method for at-risk patients such as preeclampsia and eclampsia patients is the sectio cesarean method which aims to reduce the risk of serious complications during labor.

CONCLUSION

In this study, maternal characteristics were obtained in the form of age not at risk, housewife, senior high school education, diagnosed with preeclampsia, at term, multiparous, grade 2 hypertension, proteinuria, increased ureum levels, normal creatinine levels, decreased hemoglobin levels, normal platelet counts, leukocytosis, normal erythrocyte levels, normal hematocrit values, normal blood sugar levels, obese 1, no history of hypertension, no history of preeclampsia, history of regular antenatal visits, and sectio cesarea method.

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