Jurnal Riset Kesehatan, 14 (1), 2025, 38 - 48

DOI: 10.31983/jrk.v14i1.12208

Jurnal Riset Kesehatan

http://ejournal.poltekkes-smg.ac.id/ojs/index.php/jrk

RISK FACTORS OF THE OCCURRENCE COMPLICATIONS OF SEVERE PRE-ECLAMPSIA AT PUBLIC HOSPITAL OF DATU SANGGUL IN 2022-2023

Risa Padila[a*] ; Rubiati Hipni[b] ; Yuniarti[c]; Fitria Jannatul Laili[d]

[a]Applied Bachelor of Midwifery Study Program ; Poltekkes Kemenkes Banjarmasin ; Mistar Cokro Kusumo Street Number 1A Banjarbaru, South Kalimantan ; Banjarmasin and 70714 ; Indonesia*

[b,c,d] Midwifery Departement ; Poltekkes Kemenkes Banjarmasin ; Mistar Cokro Kusumo Street Number 1A Banjarbaru, South Kalimantan ; Banjarmasin and 70714 ; Indonesia

Abstract

The maternal mortality rate in Tapin Regency was the highest in South Kalimantan Province in 2022 (MMR= 303/100,000 KH) and 2023 (MMR= 287/100,000 KH) dominated by preeclampsia as the highest cause. Datu Sanggul Hospital has the highest number of maternal deaths, 16 out of 20 maternal deaths in 2022-2023. The purpose of this study was to determine the relationship between risk factors that affect the occurrence of severe pre-eclampsia complications at the Public Hospital of Datu Sanggul in 2022-2023.. This study used an observational analytic method with a case-control design and simple random sampling technique. Samples in this study were 90 respondents, 45 with Severe Pre Eclampsia with complications and 45 without complications. The dependent variables were maternal age, parity, gestational age, multiple pregnancies, obesity, hypertension history, and diabetes mellitus history taken from secondary data. Statistical analysis used was chi-square and odds ratio. The results showed that there was a significant relation between hypertension history on the occurrence of Severe Pre Eclampsia complications (p-value 0.034) and a risk of 2.737 times to experience Severe Pre Eclampsia with complications. There is no significant relationship between maternal age (p-value 1,000), parity (p-value 0,395), gestational age (p-value 0,199), multiple pregnancies (p-value 0,361), obesity (p-value 1,000), diabetes mellitus history (p-value 0,352) on the occurrence of Severe Pre Eclampsia complications at Public Hospital of Datu Sanggul in 2022-2023. In conclusion, Hypertension history is a variable that has a significant relation to the occurrence of Severe Pre Eclampsia complications.

Keywords: *hypertension history; maternal age; parity; severe pre-eclampsia; complication(s)*

1. Introduction

Maternal mortality ratio rate (MMR) is a key indicator that can be used to assess the success of maternal health programs. MMR is the number of maternal deaths per 100.000 live births in a specific time period,that occur during pregnancy, childbirth, and postpartum that are attributable to maternal health programs but not for other reasons, such as accidents or external diseases. Based on Maternal Perinatal Death Notification data in South Kalimantan Province, Tapin district contributed the highest MMR in 2022, which was 303 per 100,000 live births. In 2023 Tapin district was able to reduce MMR to 287 per 100,000 live births, but this figure is still far from the target of the National Medium-Term Development Plan of

*) Corresponding Author (Risa Padila)
E-mail: risapadila@gmail.com

DOI: 10.31983/jrk.v14i1.12208

South Kalimantan Province in 2024, which is 183 per 100,000 live births. The largest place of death occurs in hospitals with the highest number of deaths occurring during the postpartum period. Public Hospital of Datu Sanggul, as the only government hospital in Tapin Regency, was the site of most maternal deaths, 6 out of 8 deaths. The causes of death were hypertension in pregnancy, childbirth and puerperium (50%, 3 out of 6 deaths), obstetric haemorrhage (16.7%, 1 out of 6 deaths), infection (16.7%, 1 out of 6 deaths), and childbirth complicated by an embolism(16%, 1 out of 6 deaths).

Preeclampsia is a pregnancy condition characterised by placental dysfunction and maternal response to systemic inflammation with endothelial activation and coagulation (POGI). Preeclampsia, on the other hand, is a common pregnancy condition that causes problems and complications of various organs, which can harm both mother and foetus. Ilham et al. (2019) in Wulandari, Ernawati and Nuswantoro (2021) stated that organ failure such as pulmonary edema, renal function failure, heart, DIC, HELLP syndrome, and coma caused by eclampsia are some of the most frequent complications of preeclampsia that cause maternal death with an incidence rate of around 11.9 per cent. According to Shamsi et al. (2013, in Syahadatina 2021; POGI, 2016), risk factors for preeclampsia include maternal age, height, body mass index, history of previous preeclamptic pregnancy, blood type, distance between pregnancies, multiparous pregnancy, sex of the unborn baby, and diseases: gestational diabetes or previous history of diabetes mellitus, chronic hypertension, and family history of preeclampsia, urinary tract infection, first partner or paternity, husband's age, stress factors, antiphospholipid syndrome.

In a preliminary study conducted by researchers at Public Hospital of Datu Sanggul, the number of cases of Severe Pre Eclampsia in 2022 was 95 cases: 71 cases of Severe Pre Eclampsia without complications (74.7%) and 24 cases of Severe Pre Eclampsia with complications (25.3%), with the number of death cases due to Severe Pre Eclampsia with complications as many as 3 cases out of 9 cases of maternal death. Whereas in 2023 there was an increase in the number of cases of Severe Pre Eclampsia by 118 people: 97 cases of Severe Pre Eclampsia without complications (78%) and 21 cases of Severe Pre Eclampsia with complications (17%), with the number of deaths due to Severe Pre Eclampsia as many as 3 cases out of 6 cases of maternal death. Based on the problems described above, the researcher is interested in knowing the Risk Factors for the Occurrence of Severe Pre Eclampsia Complications. This study aimed to determine the relationship between risk factors and the occurrence of complications in cases of severe pre-eclampsia at Datu Sanggul Regional Public Hospital during the period of 2022–2023.

2. Method

The type and design of this research is observational analytic method research with case control method, which is an epidemiological design that studies the relationship between exposure and disease by comparing case groups and control groups based on their exposure status, in the study the sample was 90 people with a division of 45 people in the case group of Severe Pre Eclampsia mothers accompanied by one of the complications (impending eclampsia, eclampsia, pulmonary edema, shock, HELLP syndrome and death), and 45 people in a control group of Severe Pre Eclampsia mothers without complications in the period January to December 2022-2023 contained in the Maternal Register in the Maternity Room and Postpartum Room of Public Hospital Datu Sanggul. Exclusion criteria for both groups were incomplete or missing medical records. Data were analyzed to determine the risk factors associated with complications in severe pre-eclampsia. The strength of association between exposure variables and outcomes was assessed using Odds Ratios (Ors), with statistical significance evaluated through the Chi-square test. Both bivariate analysis was employed to explore unadjusted associations, abd nultivariate logistic regression was performed to control for potential confounding variables and to identify the most dominant risk factors contributing to complications. This study obtained ethical clearence from the Health Researcch Ethics Committee of Poltekkes Kemenkes Banjarmasin, with approval number 456/KEPK-PKB/2024. All data were collected and analyzed in accordance with applicable ethical guidelines, and patient confidentiality was strictly maintained.

3. Result and Discussion

3.1. Result

DOI: 10.31983/jrk.v14i1.12208

This study was conducted at the Maternity Room of Datu Sanggul General Hospital on 1 April to 28 April 2024. Total population was 213 severe pre eclampsia, from the population of maternity respondents there were 45 severe pre eclampsia with complications in the case group of severe pre eclampsia without complications and 168 in the control group. In this study all 45 respondents with severe pre eclampsia with complications were categorised as a case group.

Table 1. Characteristics of Respondents Based on Severe Pre Eclampsia Cases at Datu Sanggul Hospital Year 2022-2023

	Characters	N	%
Severe Pre Eclampsia	With Complications	45	50
	Without Complications	45	50
	Total	90	100
Maternal Age (years)	<20 & >35	29	32,2
	20-35	61	67,8
	Total	90	100
Parity	Primiparity; Grandemultiparity	51	56,7
	Multiparity	39	43,3
	Total	90	100
Pregnancy Age	< 34 weeks	37	41,1
	≥ 35 weeks	53	58,9
	Total	90	100
Multiple Pregnancy	Gamelly, >1	5	5,6
	Single	85	94,4
	Total	90	100
BMI	> 27 kg/m2	39	43,3
	<27 kg/m2	51	56,7
	Total	90	100
Chronic Hypertension	Yes	41	45,6
	No	49	54,4
	Total	90	100
Diabetes Mellitus history	Yes	12	13,3
	No	78	86,7
	Total	90	100

Source: Secondary Data of Public Hospital Datu Sanggul, 2022-2023

Based on table 1 shows most of the severe pre eclampsia respondents was primiparity and grandemultiparity (56.7%). Almost half of the respondents at age <20 and >35 years old (32.2%), with early <34 weeks) as many as 37 people (41.1%), with obesity (BMI >27 kg/m2) as many as 39 people (43.3%), and had a chronic hypertension (45.6%). A small proportion of respondents with gamely (5.6%) and had a history of diabetes mellitus (13.3%)

DOI: 10.31983/jrk.v14i1.12208

Table 2. Risk Factor Analysis Result on Ages, Gestational Ages, Parity, Multiple Pregnancy, Obesity, History of Hypertension, History of Diabetes Mellitus and the Incidence of Severe Pre Eclampsia with Complications in Public Hospital Of Datu Sanggul Year 2022-2023

Risk Factors		Severe Pre Eclampsia				OR 95% CI	*P value*
		with Complications		without Complications			
		N	%	N	%		
Ages (years)	<20 & >35	15	33,3	14	31,1	1,107 (0,457-2,681)	1,000
	20-35	30	66,7	31	68,9		
	Total	45	100	45	100		
Parity	Primiparity; Grandemultiparity	28	62,2	23	51,1	1,575 (0,680-3,648)	0,395
	Multiparity	17	37,8	22	48.9		
	Total	45	100	45	100		
Gestasional Ages	< 34 weeks	22	48,9	15	33,3	1,913 (0,816-4,484)	0,199
	≥ 35 weeks	23	51,1	30	66,7		
	Total	45	100	45	100		
Multiple Pregnancy	Gamelly,>1	1	2,2	4	8,9	0,233 (0,025-2,171)	0,357
	Single	44	97,8	41	91,1		
	Total	45	100	45	100		
Obesity (BMI)	> 27 kg/m2	20	44,4	19	42,2	1,095 (0,475-2,521)	1,000
	< 27 kg/m2	25	55,6	26	57,8		
	Total	45	100	45	100		
History of Hypertension	Yes	26	57,8	15	33,3	2,737 (1,162-6,447)	0,034
	No	19	42,2	30	66,7		
	Total	45	100	45	100		
Hystory of Diabetes Mellitus	Yes	4	8,9	8	17,8	0,451 (0,125-1,623)	0,352
	No	41	91,1	37	82,2		
	Total	45	100	45	100		

Source: Secondary Data of Public Hospital Datu Sanggul, 2022-2023

Ages

Based on the results of the study there was no significant relationship between the age of the mother at risk (<20 and >35 years) on the incidence of severe pre eclampsia with complications at Datu Sanggul Public Hospital in 2022-2023. Chi Square test results showed a p-value of 1.000 (α > 0.05; 95% CI 0.816-4.484).

Age is the period of life or the amount of time a person has passed, calculated from the date of birth (Ali in Sutiati Bardja, 2020). Prawirohardjo (2012) in the healthy reproductive period is known that the safe age for pregnancy and childbirth is 20-30 years. The results of this study are in line with research conducted by (Yeyeh et al., 2021). There is no relationship between age and the incidence of preeclampsia, where most respondents with preeclampsia are aged 20-35 years. Other studies conducted by Nabella (2021) and Harun et al., (2019) also said that there was no significant relationship between age and the incidence of preeclampsia and preeclamptic respondents were found to be mostly 20-35 years old.

In Skjaerven's study, it was said that even though the age of the pregnant woman was controlled, preeclampsia associated with an increase in the distance between pregnancies remained. So it can be concluded that pregnant women, both at risk and not at risk, should still undergo quality Antenatal Care, to reduce the risk of pregnancy complications (Bere et al., 2017 in Kristanti Rosa, Sari Yessy Nur Endah, 2023). Women of reproductive age are also considered to have preeclampsia due to social changes that cause changes in sexual behaviour (Annafi et al., 2022). First pregnancy by a new partner is considered a

DOI: 10.31983/jrk.v14i1.12208

risk factor, even if not nulliparous as the risk increases in women who have low exposure to sperm (POGI, 2016). The placenta is the main cause of preeclampsia and is a paternal genetic determinant; in fact, the existence of "paternal antigens" is being investigated. Changing partners with women without a history of preeclampsia increases the risk; high intervals between pregnancies, short sexual intercourse before pregnancy, and conception by intracytoplasmic sperm injection suggest limited exposure to so-called paternal antigens. Men born to mothers with preeclampsia also increase the risk to their partners (Galaviz-Hernandez et al., 2019).

Parity

Based on the results of the study, there was no significant relationship between parity at risk (primipara and grandemultipara, number of children 1 or ≥5) on the incidence of Severe Pre Eclampsia with complications. Chi Square test results showed a p-value of 0.395 (α> 0.05; 95% CI 0.680-3.648).

A theory suggests the incidence of preeclampsia in first pregnancy is related to the role of immunological factors. In the first pregnancy there is a formation of blocking antibodies against placental antigenic sites that may be disrupted, thus increasing the risk of preeclampsia. Whereas in grandemultiparous mothers, due to the large number of childbearing mothers, their reproductive system will weaken and lose flexibility. As a result, the blood, oxygen and nutrients delivered to the placenta will decrease, so the presence of toxic or sensitive substances may affect the endothelium. The process increases the chances of pregnant women who experience frequent childbirth to develop preeclampsia.

The results of this study are in line with research conducted by E. S. Wulandari et al., (2021) at Dr Sardjito Hospital Yogyakarta which shows that parity is not associated with the incidence of Severe Pre Eclampsia complications. In a study conducted by Yeyeh et al. (2021) at Purwakarta General Hospital also showed that parity was not associated with the incidence of Severe Pre Eclampsia complications. In another study, it was stated that there was a relationship between the parity factor and more severe cases of preeclampsia conducted by Latipah et al. (2023) and Hipni (2019).

The results of this study showed no significant relationship between parity (primipara and grandemultipara) and the incidence of Severe Pre Eclampsia with complications. Preeclampsia is a multifactorial disease that can be caused by many risk factors other than primigravida and grandemultipara. In addition, there is also a theory that says that the non-risk factors in this study, namely multiparity, also have a risk of preeclampsia, this is because the endometrial environment around the implantation site is less than perfect and not ready to accept the results of conception, so that the provision of nutrients and oxygenation to the results of conception is less than perfect and results in the growth of the results of conception will be disrupted. (N. Handayani & Febriana, 2022). According to this study, changing partners increases the likelihood of experiencing preeclampsia in subsequent pregnancies. The main mechanism may be immune incompatibility between mother and foetus. Newly married multigravida women should be considered as primigravida women (Tubbergen, 1999 in POGI, 2016).

Pregnancy Age

Based on the results of the study, there was no significant relationship between the age of pregnancy

DOI: 10.31983/jrk.v14i1.12208

at risk (< 34 weeks) on the incidence of severe pre eclampsia with complications. In the Chi Square test results obtained a p-value of 0.199 (α> 0.05; 95% CI 0.457-2.681).

Gestational age is a limitation for early-onset preeclampsia or late-onset preeclampsia. Early Onset Preeclampsia: Clinical symptoms of preeclampsia may appear before 34 weeks of gestation due to the strong pathogenesis of preeclampsia in the placenta. As a result, symptoms appear earlier and the outlook for the mother and foetus is worse. Whereas in Late Onset Preeclampsia: preeclampsia symptoms may appear after 34 weeks of gestation (Hidayati et al., 2018).

The results of the study are in line with research conducted by Yeyeh et al. (2021) at RSU A Purwakarta illustrating that there is a relationship between the incidence of preeclampsia in labouring mothers with Slow Type Preeclampsia. Andira & Sri Rahayu (2023) and Yeyeh et al. (2021) also said that preeclampsia is most common at 28-36 weeks of gestation. This is due to the fact that many pregnant women do not perform routine examinations in the early trimester of their pregnancy and only perform examinations in the final trimester.

In the results of this study the number of severe pre eclampsia mothers was mostly with Late Onset Preeclampsia, namely gestational age> 35 weeks (51.1%). These results are in line with Shrestha's research which found that the prevalence of late onset preeclampsia was more than early onset with a ratio of 1:2. Proteinuria is also more common in late onset preeclampsi (Shrestha et al., 2022). Late onset preeclampsia is a manifestation of a mismatch between the metabolic needs of the growing foetus towards aterm, the placenta having fewer lesions due to less maternal vascular perfusion, and umbilical artery/breast doppler velocimetry abnormalities. Those with late-onset preeclampsia have increased cardiac output and relatively unchanged total vascular resistance (Erez et al., 2017).

Multiple Pregnancy

Based on the results of the study, it was found that there was no significant relationship between risky pregnancies (gamelly, >1) of mothers on the incidence of severe pre eclampsia with complications. In the Chi Square test results obtained a p-value of 0.361 (α> 0.05; 95% CI 0.025-2.171).

In multiple pregnancies, the incidence of preeclampsia is higher than in singleton pregnancies by about two to three times. The pathogenesis of preeclampsia in multiple pregnancies is due to immunological response and larger placental mass (Chantanahom & Phupong, 2021). The greater weight of the placenta affects the increased need for blood supply leading to hypoperfusion and resulting oxidative stress (Kiondo et al., 2012 in Putri Arifin et al., 2024). Increased placental weight also causes hyperplacentosis, which is believed to increase the levels of antiangiogenic circulating in the maternal circulation, thus affecting the balance of antiangiogenic and angiogenic factors, which will eventually lead to preeclampsia (Pickerill et al., 2023).

The results of the study are in line with research by S. Handayani et al., (2023) which showed no significant relationship between multiple pregnancies and the incidence of preeclampsia at Muhamadiyah Hospital Palembang due to the small number of twin pregnancy respondents who experienced

DOI: 10.31983/jrk.v14i1.12208

preeclampsia in the study conducted.

Results of this study there was no significant relationship between multiple pregnancies and the incidence of severe pre eclampsia complications. The exact incidence of preeclampsia complications in multiple pregnancies is difficult to know because multiple pregnancies more often give birth at a gestational age of less than a few months before preeclampsia can occur and because women pregnant with twins are usually older and have many children. (Putri Arifin et al., 2024). In addition, the incidence of multiple pregnancies is quite small, which only occurs in 2-4% of the total number of births (Santana et al., 2018). In this study, the incidence of multiple pregnancies was only 1:17 of the total respondents, namely in 5 pregnancies out of 90 respondents of severe pre eclampsia pregnant women, the number of samples that are less well distributed will certainly affect the results of computer statistical tests.

Obesity

Based on the results of the study, there was no significant relationship between maternal obesity (BMI > 27 kg/m2) and the incidence of severe pre eclampsia with complications. In the Chi Square test results obtained a p-value of 1.000 (α> 0.05; 95% CI 0.475-2.521).

Obesity is the excessive accumulation of fat in the body. Those with excessive BMI or obesity have chronic inflammation in their bodies, leading to an increase in C-reactive protein and cytokines in their plasma. This increases the inflammatory response that releases ROS and myeloperoxidase, which damage vascular endothelial cells and cause symptoms of preeclampsia.

In obese people the heart pumps more forcefully or increases due to the smaller diameter of the blood vessels, which results in a person having increased blood pressure. Obesity, or distorted body proportions, is the cause of smaller blood vessels, as the body of an obese person has a lot of fat deposited, which can compress blood vessels and make them narrower. In addition, these things happen in pregnant women, which can lead to endothelial malfunction due to the release of toxic substances and ischaemia, which is caused by low perfusion of blood flow, leading to a lack of blood being delivered to the placenta, and hypoxia, which is caused by a lack of oxygen being delivered to the placenta. (Rakhmawati & Wulandari, 2021).

The results of this study are in line with research conducted by Kristanti Rosa, Sari Yessy Nur Endah (2023) that there is no correlation between the Body Mass Index (BMI) factor and the incidence of preeclampsia in the Sumber Wringin Health Centre working area.

In this study there was no significant association between obesity and the incidence of severe pre eclampsia complications. Women who gain weight during pregnancy are also more likely to experience this condition, this is also influenced by unhealthy diet and lack of physical activity. Early identification of risk factors for preeclampsia, such as obesity, allows the implementation of prevention and reduces the risk of complications for preeclamptic mothers and foetuses. Thus, proper diet and physical activity play an important role in the prevention of severe pre eclampsia complications. A theory says antioxidants help prevent preeclampsia. The concentration of antioxidants in the blood of obese women is higher because pregnancy weight is related to the risk of preeclampsia (Lopez, 2018 in Sudarman et al., 2021). Limiting

DOI: 10.31983/jrk.v14i1.12208

excess weight gain during pregnancy and modifying metabolic risk factors with regular physical exercise creates favourable metabolic conditions for pregnancy progression and benefits elements of the pathogenetic continuum for the development of preeclampsia. (Poniedziałek-Czajkowska et al., 2023).

History of Hypertension

Based on the results of the study, it was found that there was a significant relationship between the history of hypertension and the incidence of severe pre eclampsia with complications. The Chi Square test results showed a p-value of 0.034 (α < 0.05; 95% CI 1.162-6.447). The results of the Odss Ratio calculation showed that respondents with a history of hypertension had a 2.737 times risk of experiencing severe pre eclampsia with complications compared to respondents without a history of hypertension.

Chronic hypertension is an important risk factor for preeclampsia, 25% of 92 pregnancies with chronic hypertension will progress to superimposed preeclampsia (Simanjuntak, 2021). Mothers with a history of hypertension are at greater risk of developing preeclampsia, this is because hypertension is a disease that causes significant pain in the cardiovascular system and heart (Putriningtyas & Wiranto, 2021). A history of hypertension is associated with increased levels of Soluble Fms-Like Tyrosine Kinase 1 (SFIT-1), a cause of angiogenic imbalance in pregnant women who experience preeclampsia.

The results of this study are in line with research conducted by Handayani and Arnani that there is a significant relationship between the history of hypertension and the incidence of preeclampsia (Arnani et al., 2022; N. Handayani & Febriana, 2022). From research conducted by Sudarman et al. (2021) there are six literatures that obtained a p value <0.05, which means that there is an association between chronic hypertension and the incidence of preeclampsia.

Preeclampsia is the most common complication of pregnancy in women who have chronic hypertension. A study of 763 women with chronic hypertension found that 25% of them had superimposed preeclampsia; this was higher for women with hypertension for more than 4 years. The results of this study are in accordance with Saifuddin's theory that a woman's health status before and during pregnancy is an important component that influences the onset and development of complications. One of the factors associated with preeclampsia is a history of hypertension. Therefore, the author concludes that pregnant women with a history of hypertension often experience Severe Pre Eclampsia. This is due to the possibility of an unhealthy diet, which involves the consumption of foods that are high in salt which can lead to hypertension.

History of Diabetes Mellitus

Based on the results of the study, there was no significant relationship between diabetes mellitus and the incidence of severe pre eclampsia with complications. The Chi Square test results showed a p-value of 0.352 (α> 0.05; 95% CI 0.125-1.623).

Mothers who experience insulin resistance before pregnancy may experience vascular damage mechanisms characterised by chronic levels of inflammation, which impact on vascularisation and normal placentation (Valdés, 2014 in W. Wulandari & Pangesti, 2022). Excess glucose during pregnancy inhibits cyto-trophoblast (CTB) cell function by inducing stress pathway signalling (P38 MAPK and PPARγ)

DOI: 10.31983/jrk.v14i1.12208

followed by MMP-9 inhibition leading to CTB migration and invasion complications, oxidative stress leading to placental hypoxia, and increased IL6 leading to angiogenic imbalance. All these changes lead to an abnormal placenta, resulting in the development of preeclampsia.(Uddin MN et all, 2013 in Sudarman et al., 2021).

The results of the study are in line with research R. dan F. A. F. Wulandari (2012) in Public Hospital OF Dr Moewardi Surakarta showed that there was no relationship between a history of diabetes mellitus and cases of Severe Pre Eclampsia (p = 1,000). Based on research by Hosler et al (2011) in Saraswati & Mardiana (2016) stated that pregnant women aged ≥35 years are at risk 4.05 times to suffer from diabetes mellitus in their pregnancy compared to the age of pregnant women <35 years. While in this study respondents with healthy reproductive age were greater, namely 61 people (67.8%) compared to respondents with risky ages, namely 29 people (32.2%), almost all respondents in this study, both those who experienced severe pre eclampsia with complications and severe pre eclampsia without complications, did not have a previous history of diabetes mellitus, namely 78 (86.7%).

There are other factors that influence the incidence of preeclampsia in pregnant women with diabetes mellitus. A good diet during pregnancy, such as consuming foods that are high in antioxidants, contributes to the prevention of preeclampsia. This is because oxidative stress is associated with preeclampsia and antioxidant vitamins C and E reduce the incidence of preeclampsia by 60% among high-risk women. Oxidative stress and angiogenic imbalance are important pathophysiological processes in preeclampsia. Hp phenotype affects the response to antioxidant vitamins in individuals with diabetes. Daily vitamin E supplementation eliminates the increased risk of cardiovascular disease seen in Hp 2-2 individuals with type 2 diabetes (Weissgerber & Mudd, 2015).

4. Conclusion and Suggestion

Based on the results of research and discussion of risk factors for Severe Pre Eclampsia complications at Datu Sanggul Hospital, it is concluded that there is a relationship between a history of hypertension and the occurrence of Severe Pre Eclampsia complications at Datu Sanggul Hospital in 2022-2023.

5. Acknowledgments

Thanks to the Poltekkes Kemenkes Banjarmasin for facilitating the implementation of this research. To the Head of Datu Sanggul Hospital who has given permission to conduct this research. To the participants who have been willing to become respondents in this study.

6. References

Andira, & Sri Rahayu. (2023). Faktor – Faktor Yang Berhubungan Dengan Preeklampsia Pada Ibu Hamil Trimester III Di Ruang Dahlia PUBLIC HOSPITAL OF. *Jurnal Sains Dan Kesehatan*, *2*(1), 1–8. https://doi.org/10.57151/ jurnalsainsdankesehatan.v2i1.63

Annafi, M. I., Jumsa, M. R., & Budyono, C. (2022). Gambaran Preeklampsia Berat dengan Komplikasi di Rumah Sakit Umum Daerah Provinsi Nusa Tenggara Barat Periode Januari 2018 sampai Desember

2019. *Lombok Medical Journal*, *1*(1), 17–22. https://doi.org/10.29303/lmj.v1i1.534

Arnani, A., Yunola, S., & Anggraini, H. (2022). Hubungan Riwayat Hipertensi, Obesitas, dan Frekuensi Antenatal Care Dengan Kejadian Preeklampsia. *Jurnal 'Aisyiyah Medika*, *7*(2), 237–245. https://doi.org/10.36729/jam.v7i2.871

Arwan, B., & Sriyanti, R. (2020). Relationship between Gravida Status, Age, BMI (Body Mass Index) and Preeclampsia. *Andalas Obstetrics and Gynecology Journal*, *4*(1, Jan-Jun 2020), 25127. http://jurnalobgin.fk.unand.ac.id/index.php/JOE

Chantanahom, N., & Phupong, V. (2021). Clinical Risk Factors for Preeclampsia in Twin Pregnancies. *Plos One*, *April*, 1–8. https://doi.org/10.1371/journal.pone.0249555

Erez, O., Romero, R., Maymon, E., Chaemsaithong, P., Done, B., Panaitescu, B., Chaiworapongsa, T., Hassan, S. S., & Tarca, A. L. (2017). The Prediction of Late-oneset Preeclampsia: Results from a longitudinal proteomics study. *PLoS ONE*, *12*(7).

Galaviz-Hernandez, C., Sosa-Macias, M., Teran, E., Garcia-Ortiz, J. E., & Lazalde-Ramos, B. P. (2019). Paternal determinants in preeclampsia. *Frontiers in Physiology*, *10*(JAN), 1–7. https://doi.org/10.3389/fphys.2018.01870

Handayani, N., & Febriana, D. A. (2022). Faktor-Faktor Yang Berhubungan dengan Kejadian Preeklamsia Pada Ibu Hamil Trimester III di Rumah Sakit Umum Daerah Kota Depok. *Indonesian Journal of Midwifery Scientific*, *1*(1), 40–47.

Handayani, S., Solama, W., & Hipson, M. (2023). Faktor-Faktor yang Berhubungan dengan Kejadian Preeklampsia pada Ibu Hamil. *Junal 'Aisyiyah Palembang*, *8*(Nomor 1), 43–57.

Harun, A., Anita, A., & Putri, N. B. (2019). Faktor yang Berhubungan Terhadap Kejadian Preeklampsia di Public Hospital Of Syekh Yusuf Gowa Tahun 2019. *Jurnal Kesehatan Delima Pelamonia*, *3*(1), 35–41. https://doi.org/10.37337/jkdp.v3i1.131

Hidayati, A. N., Akbar, M. I. A., & Rosyid, A. N. (2018). Penatalaksanaan Kegawatdaruratan Hipertensi dalam Kehamilan. In *Gawat Darurat Medis dan Bedah*. Rumah Sakit Universitas Airlangga.

Hipni, R. (2019). Hubungan Paritas Dan Pendidikan Ibu Terhadap Kejadian Preeklampsia Di Public Hospital of Idaman Banjarbaru. *Embrio*, *11*(1), 23–29. https://doi.org/10.36456/embrio.vol11.no1.a1846

Kristanti Rosa, Sari Yessy Nur Endah, S. (2023). Faktor-Faktor Yang Mempengaruhi Kejadian Pra Eklampsia. *Jurnal Penelitian Perawat Profesional*, *5*(3), 1271–1278.

Latipah, S., Afrilia, E. M., & An-nisa, C. (2023). Faktor Usia, Paritas dan IMT Ibu Hamil Berhubungan dengan Kejadian Preeklampsia di Tangerang. *Jurnal Ilmiah Keperawatan Indonesia (JIKI)*, *6*(2), 166. https://doi.org/10.31000/jiki.v6i2.7635

Nabella, R. V. (2021). Faktor yang Berhubungan dengan Kejadian Pre Eklampsia Berat (Severe Pre Eclampsia) di Rumah Sakit. *Jurnal Ilmu Kesehatan Karya Bunda Husada*, *7*(1), 19–26.

Pickerill, K., Ard, Q., Larter, A., Reyes, S., Viray, C., Witmer, C., Mateljan, V., Nelson, K., Rogers, C., Kinshella, M., Craik, R., Elawad, T., Mistry, H., Volvert, M., von Dadelszen, P., Magee, L., Vidler, M., & Tsigas, E. (2023). SC4_4. Pathways to pre-eclampsia: learning from lived experience about the risk factors for pre-eclampsia. *Pregnancy Hypertension*, *33*, e79. https://doi.org/10.1016/j.preghy.

2023.07.156

POGI. (2016). *PNPK Diagnosis dan Tatalaksana Pre-Eklampsia*. Perkumpulan Obstetri dan Ginekologi Indonesia Himpunan Kedokteran Feto Maternal.

DOI: 10.31983/jrk.v14i1.12208

Poniedziałek-Czajkowska, E., Mierzyński, R., & Leszczyńska-Gorzelak, B. (2023). Preeclampsia and Obesity—The Preventive Role of Exercise. *International Journal of Environmental Research and Public Health*, *20*(2). https://doi.org/10.3390/ijerph 20021267

Pratiwi, D. (2020). Faktor Maternal Yang Mempengaruhi Kejadian Preeklampsia Pada Kehamilan. *Jurnal Medika Hutama*, *02*(01), 1–5. http://jurnalmedika hutama.com/index.php/JMH

Putri Arifin, R. F., Rustiani, V., & Firmansyah, W. (2024). Preeclampsia in Multiples: A Comparative Case Study on Dichorionic-Diamniotic Twin Pregnancy. *Jurnal Indonesia Sosial Teknologi*, *5*(5), 2229–2234. https://doi.org/10.59141/jist.v5i5. 1096

Putriningtyas, N. D., & Wiranto. (2021). Faktor Risiko Kejadian Hipertensi pada Ibu Hamil. *Indonesian Journal of Public Health and Nutrition*, *1*(3), 759–767.

Rakhmawati, N., & Wulandari, Y. (2021). Faktor-Faktor yang Mempengaruhi Pre Eklamsia pada Ibu Hamil di Puskesmas Banyuanyar Surakarta. *Jurnal Kesehatan Madani Medika*, *12*(01), 59–67.

Santana, D. S., Surita, F. G., & Cecatti, J. G. (2018). Multiple pregnancy: Epidemiology and association with maternal and perinatal morbidity. *Revista Brasileira de Ginecologia e Obstetricia*, *40*(9), 554–562. https://doi.org/ 10.1055/s-0038-1668117

Saraswati, N., & Mardiana. (2016). Faktor Risiko Yang Berhubungan Dengan Kejadian Preeklampsia Pada Ibu Hamil (Studi Kasus Di Public Hospital of Kabupaten Brebes Tahun 2014). *Unnes Journal of Public Health*, *5*(2), 90–99.

Setyawati, N. F., Yuliawuri, H., Pristina, S. R. N., & Kaisar, M. M. M. (2023). *Metodologi Riset Kesehatan* (Vol. 01).

Shrestha, J., Subedi, A., Gauchan, E., Shrestha, A., & Pandey, C. (2022). Pregnancy Outcome in Early versus Late Onset Preeclampsia. *Nepal Journal of Obstetrics and Gynaecology*, *16*(2), 53–59. https://doi.org/10.3126/njog.v16i2. 42101

Simanjuntak, L. (2021). *Obstetrik Emergensi*. 90–108.

Sudarman, Tendean, H. M. M., & Wagey, F. W. (2021). Faktor-Faktor yang Berhubungan dengan Terjadinya Preeklampsia. *E-CliniC*, *9*(1), 68–80. https://doi.org/10.35790/ ecl.v9i1.31960

Sutiati Bardja. (2020). Faktor Risiko Kejadian Preeklampsia Berat/Eklampsia pada Ibu Hamil. *Embrio*, *12*(1), 18–30. https:// doi.org/10.36456/embrio.v12i1.2351

Weissgerber, T. L., & Mudd, L. M. (2015). Preeclampsia and Diabetes. *National Institutes of Health*, *15*(3), 1–16. https://doi.org/10.1007/s11892-015-0579-4

Wulandari, E. S., Ernawati, E., & Nuswantoro, D. (2021). Risk Factors of Preeclampsia With Severe Features and Its Complications. *Indonesian Midwifery and Health Sciences Journal*, *5*(1), 29–37. https://doi.org/10. 20473/imhsj.v5i1.2021.29-37

Wulandari, R. dan F. A. F. (2012). Faktor Risiko Kejadian Preeklampsia Berat Pada Ibu Hamil di PUBLIC HOSPITAL OF Dr Moewardi Surakarta. *Jurnal Kesehatan*, *5*(1), 29–35.

Wulandari, W., & Pangesti, W. D. (2022). Prevalensi Preeklamsi dengan Komplikasi di Rumah Sakit Rujukan Kabupaten Banyumas Tahun 2017-2020. *Jurnal Kebidanan Harapan Ibu Pekalongan*, *9*(1), 1–15. https://doi.org/10.37402/jurbidhip.vol9.iss1.168

Yeyeh, A., Sari, D. Y., & Humaeroh, D. (2021). Hubungan Karakteristik Ibu Bersalin Dengan Preeklampsia Berat Di RSU Purwakarta Tahun 2020. *Jurnal Ilmiah Kesehatan 2021*, 16–26.