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Research Article

Analysis Of Determinant Factors For Preeclampsia Incidence In Pregnant Women Who Give Birth At Prima Medika General Hospital Denpasar, Bali For The Period Of January 2023 – August 2024

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Abstract

Background. Preeclampsia is one of the problems that are often encountered in pregnant women. Preeclampsia is a complication disorder that has an impact on the death of the mother and baby. The exact cause of preeclampsia is currently unknown. The purpose of this study is to analyze the determinants of preeclampsia incidence in pregnant women who give birth at Prima Medika Denpasar Hospital, Bali, for the period January 2023 – August 2024.

Method. The design of this research was a cross sectional. The number of samples was 248 pregnant women who give birth. The data collected from the medical records of Prima Medika General Hospital Denpasar. Data analysis uses Chi-Square analysis.

Result. The results showed that there was an influence of several variables with the incidence of preeclampsia, namely maternal age (p value = 0,026,OR: 9,24), maternal education (p value = < 0,0001,OR: 11,0), maternal occupation (p value = 0.006, OR: 2,44), maternal parity (p value = 0.005, OR:5,11), history of multiple pregnancies in mothers (p = 0,00019, OR: 35,25), history of hypertension in mothers (p value = < 0.0001, OR: 80,6) and history of diabetes mellitus in mothers (p value = 0.00003, OR: 43,25) while the variables gravida (p value = 0.237), and history of kidney disease (p value = 0.245) had no effect on the incidence of preeclampsia in pregnant women.

Conclusions. This study found that maternal age, parity, education, occupation, and certain medical histories significantly influence preeclampsia risk, highlighting the need for targeted interventions.

Key words: Preeclampsia, Determinant Factors, Pregnant Women

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Introductions

Pregnancy is a condition where a woman has a fetus developing in their body (generally known as the uterus). Pregnancy in humans lasts 40 weeks or 9 months, starting from the first day of the last menstruation until delivery (Fauziah et al., 2022). The pregnancy period is divided into 3 phases, namely the first trimester (0-3 months), second trimester (4-6 months), and third trimester (7-9 months) (Walyani, 2020). One of the complications of pregnancy that affects the health status of the mother, and the growth and development of the fetus is preeclampsia, where this event can be detected and treated appropriately during pregnancy, so that dangerous complications do not occur. According to WHO in 2016, the rate of preeclampsia in the world reached 0.51% - 38.4%. The incidence of preeclampsia in developed countries is 6 - 7% and eclampsia is 0.1 - 0.7%. The incidence of preeclampsia in Indonesia tends to be large, namely 3.48% (Kemenkes, 2017).

Preeclampsia has a bad effect on the mother and fetus. Preeclampsia can result in placental abruption, prematurity, and even complications in the fetus in the form of neonatal respiratory syndrome, cerebral palsy, enterocolitis, necrotizing retinopathy and perinatal death. Babies born to mothers with preeclampsia tend to have low APGAR scores, and a high risk of seizures. Preeclampsia also has a negative impact on the mother, such as organ dysfunction including destruction of the kidneys, liver, central nervous system, cardiomyopathy, pulmonary edema, stroke, respiratory distress syndrome, and death (Armaly et al., 2018). In the United States, of the \$2.18 billion total cost found to the health care system, \$1.03 billion was for maternal health care and \$1.15 billion for babies born to mothers with preeclampsia, and of this, about one-third of the total \$6.4 billion estimated short-term health care costs for pregnancies with preeclampsia (Stevens et al., 2017).

The exact cause of preeclampsia is still not known for certain. The risk factors that influence the incidence of preeclampsia include 2 categories, namely internal factors and external factors. Internal factors are divided into age, weight, pregnancy interval, education, occupation, number of children, history of hypertension, history of multiple pregnancies, history of diabetes mellitus and kidney disease. External factors include exposure to cigarette acid, history of antenatal care, and even the mother's nutritional intake.

Risk factors that influence the incidence of preeclampsia are age, occupation, and Ante Natal Care (ANC) visits. A study conducted by Putriana & Yenie (2019) states that factors related to preeclampsia include parity, age, history of hypertension, study, work, multiple pregnancies, and history of diabetes and kidney disease. Women who have high parity, namely up to three births, will stretch the uterus, which will result in excessive ischemia and preeclampsia can occur. Mothers who conceive at the age of <20 years and >35 years will be susceptible to preeclampsia. The higher the

individual's level of education, the easier it is to receive good information. Mothers who are pregnant and doing work are prone to preeclampsia because when mothers are pregnant and working, this has a greater stressor than pregnant women who do not work. Because when pregnant women who work, the stressor category tends to be greater than pregnant women who don't work. Multiple pregnancies influence the incidence of preeclampsia due to muscle tension in the uterus which results in uterine ischemia.

Parity is the number of live babies a woman has ever given birth to. Parity is divided into 3, namely primipara, multipara, and grandemultipara. Parity is one of the most common causes of pregnant women experiencing preeclampsia. The younger a person's pregnancy or the more a person gives birth, the greater the chance that the pregnant woman will experience preeclampsia (Laura et al., 2021). High blood pressure experienced before pregnancy can cause problems/destruction of body organs. The pregnancy creates an increase in body weight which can then cause very bad problems, manifested by edema and proteinuria. Proteinuria can be caused by leakage in the kidneys due to excreting too much protein in the urine. This will interfere with pregnancy, where preeclampsia is vulnerable to organ system dysfunction (Andriani et al., 2022).

A previous history of chronic disease causes problems with the placental blood vessels before pregnancy, thereby causing the risk of preeclampsia when pregnant women have a history of chronic diseases such as diabetes mellitus and kidney disease. Based on a study by Nurhasanah (2017), it is proven that pregnant women with a previous history of chronic diseases such as diabetes and kidney disease, have a 2 times higher risk of developing preeclampsia than pregnant women without a history of chronic diseases.

The incidence of preeclampsia in Bali province in 2020 was 474 people (0.71) % (Dinas Kesehatan Provinsi, 2020). The incidence of preeclampsia at Sanglah General Hospital Denpasar in 2020 is still high, namely 20.23%. Based on the description of the background to the problem above, researchers are interested in conducting research on the determinant factors that influence the incidence of preeclampsia in pregnant women who give birth at Prima Medika General Hospital Denpasar for the period January 2023-August 2024.

Method

This type of research is research with a cross-sectional design, all pregnant women who gave birth in the delivery room, who experienced preeclampsia at Prima Medika General Hospital Denpasar in the months 1 January 2023 - 31 August 2024, namely with a sample of 248 respondents. The sampling technique in this research used total sampling. The data collection technique uses secondary data from medical records at Prima Medika General Hospital Denpasar, Bali. The

instrument in this research uses a questionnaire. The data analysis test used in this research is the chi-square statistical test.

Result

Based on Table 1, it can be seen that the majority of respondents were in the low-risk category (20-35 years), namely 156 respondents (62.91%), while respondents who were in the high risk category (< 20 and > 35 years) were 92 respondents (37.09%). Of the 248 respondents, the results showed that the majority of respondents were in the multigravida category, namely 156 respondents (62.91%), while 92 respondents with gravida in the primigravida category were 92 respondents (37.09%). Respondents with multiparity were 72 respondents (29.04%), while those with primipara and nullipara

were 65 (26.2%) and 111 respondents (44.76%). Regarding respondents' education, the majority of respondents had higher education, namely 166 respondents (66.94%), while those with low education were 82 respondents (33.06%). Most of the respondents worked, namely 143 respondents (57.67%), while those who did not work were 105 respondents (42.33%). Respondents with a history of hypertension were 95 respondents (38.3%), while respondents without a history of hypertension were 153 respondents (61.7%). The majority of respondents who did not have a history of multiple pregnancies were 127 respondents (51.21%) and had a history of multiple pregnancies as many as 121 respondents (48.79%).

Table 1. Frequency Distribution of Maternal Age, Gravida, Parity, Education, Occupation, History of Hypertension, Multiple Pregnancies, Diabetes Mellitus and History of Kidney Disease (N=248)

Variable	N	Percentage (%)
Maternal Age		
• High Risk (<20 & > 35 yo)	92	37,09
• Low Risk (20-35 yo)	156	62,91
Gravida Mother		
• Primigravida	92	37,09
• Multigravida	156	62,91
Parity		
• Nulipara	111	44,76
• Primipara	65	26,20
• Multipara	72	29,04
Education		
• Low Education	82	33,06
• Higher Education	166	66,94
Occupation		
• Not Working	105	42,33
• Working	143	57,67
History of Hypertension		
• With a history of hypertension	95	38,3
• Without a history of hypertension	153	61,7
History of Multiple Pregnancies		
• With a history of multiple pregnancies	121	48,79
• Without a history of multiple pregnancies	127	51,21
History of Diabetes Mellitus		
• With a history of diabetes mellitus	114	45,96
• Without a history of diabetes mellitus	134	54,04
History of Kidney Disease		
• With a history of kidney disease	3	1,21
• Without a history of kidney disease	245	98,79

Table 2. The Effect of Maternal Age, Gravida, Parity, Education, Occupation, History of Hypertension, Multiple Pregnancies, Diabetes Mellitus and History of Kidney Disease on Preeclampsia (N=248)

Variable	Preeclampsia				N	%	p-value	OR 95%	CI
	Yes		No						
	n	%	n	%					
Maternal Age									
• High Risk (<20>35yo)	84	67.75	8	35.49	92	100	0.026	9.24	
• Low Risk (20-35 yo)	40	32.25	116	64.51	156	100		(8.3-10.3)	
Total	124		124		248	100			
Gravida Mother									
• Primigravida	42	33.87	50	40.33	92	100	0.237		
• Multigravida	82	66.13	74	59.67	156	100			
Total	124		124		248	100			
Parity									

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• Nulipara	52	41.93	59	47.59	111	100	0.005	5.11
• Primipara	25	20.16	40	32.25	65	100		(2.7-9.7)
• Multipara	47	37.91	25	20.16	72	100		
Total	124		124		248	100		
Education								
• Low Education	71	57.26	11	8.87	82	100	<0.0001	11.0
• Higher Education	53	42.74	113	91.13	166	100		(5.4-23.8)
Total	124		124		248	100		
Occupation								
• Not Working	86	69.36	19	15.32	105	100	0.006	2.44
• Working	38	30.64	105	89.68	143	100		(1.3-4.5)
Total	124		124		248	100		
History of Hypertension								
• With history	90	76.61	5	0.00	95	100	< 0.0001	80.6
• Without history	34	23.39	119	100	153	100		(4.9-133.6)
Total	124		124		248	100		
History of Multiple Pregnancies								
• With history	115	92.75	6	4.83	121	100	0.00019	35.25
• Without history	9	7.25	118	95.17	127	100		(2.1-59.6)
Total	124		124		248	100		
History of Diabetes Mellitus								
• With history	110	88.71	4	3.22	114	100	0.00003	43.25
• Without history	14	11.29	120	96.78	134	100		(2.6-72.6)
Total	124		124		248	100		
History of Kidney Disease								
• With history	3	2.41	0	0.00	3	100	0.245	
• Without history	121	97.59	124	100	245	100		
Total	124		124		248	100		

Respondents with a history of diabetes mellitus were 114 respondents (45.96%) and those without a history of diabetes mellitus were 134 respondents (54.04%). Most of the respondents who had no history of kidney disease were 245 people (98.75%) and those who had a history of kidney disease were 3 people (1.21%).

The results of the analysis of the influence of age on the incidence of preeclampsia showed that 84 respondents (67.75%) were in the high-risk category of experiencing preeclampsia, while among mothers who were in the low-risk category there were 40 respondents (32.25%) who experienced preeclampsia. The results of the chi square statistical test obtained a p value = 0.026 < α = 0.05, meaning that there was an influence of age on preeclampsia in pregnant women who gave birth at Prima Medika General Hospital Denpasar, Bali for the period January 2023-July 2024. From the results of the analysis, an OR value = 9.2 was obtained, which means that respondents who were at high risk were 9.2 times more likely to experience preeclampsia than respondents who were at low risk (Table 2).

The results of the analysis of the influence of gravida on preeclampsia showed that 52 respondents (41.93%) who were included in the nulliparous category (never given birth) experienced preeclampsia, while among primiparous mothers there were 25 respondents (20.16%) who experienced preeclampsia, and 47 respondents (37.91%) who were included in the multiparous category experienced preeclampsia. The results of the chi square statistical test obtained a p value = 0.237 > α = 0.05, meaning there was no influence of

gravida on the incidence of preeclampsia in pregnant women who gave birth at Prima Medika General Hospital Denpasar Bali for the period January 2023-August 2024.

The results of the analysis of the effect of parity on preeclampsia showed that 82 respondents (66.13%) who were included in the multigravida category experienced preeclampsia, while among primigravida mothers there were 42 respondents (33.8%) who experienced preeclampsia. The results of the chi square statistical test obtained a p value = 0.005 < α = 0.05, meaning there was an influence of parity on the incidence of preeclampsia in pregnant women who gave birth at Prima Medika General Hospital Denpasar Bali for the period January 2023-August 2024.

The results of the analysis of the influence of maternal education on preeclampsia showed that 19 respondents (57.6%) who were in the high education category experienced preeclampsia, while among mothers with low education, 11 respondents (40.7%) experienced preeclampsia. The chi square statistical test results obtained p value = 0.299 > α = 0.05, meaning there is no influence of maternal education on the incidence of preeclampsia in pregnant women in the 1st trimester at Prima Medika General Hospital Denpasar Bali for the period January 2023-July 2024.

The results of the analysis of the influence of work on preeclampsia showed that 19 respondents (59.4%) who worked experienced preeclampsia, while among mothers who did not work, 11 respondents (39.3%)

experienced preeclampsia. The results of the chi square statistical test obtained a p value = $0.195 > \alpha = 0.05$, meaning there was no influence of maternal employment on the incidence of preeclampsia in pregnant women in the 1st trimester at Prima Medika General Hospital Denpasar Bali for the period January 2023-July 2024.

The results of the analysis of the influence of a history of hypertension on the incidence of preeclampsia showed that 90 respondents (76.61%) who fell into the category of history of hypertension experienced preeclampsia, while among mothers who had no history of hypertension, 34 respondents (23.39%) experienced preeclampsia. The results of the chi square statistical test obtained a p value = $< 0.0001 < \alpha = 0.05$, meaning that there was an influence of a history of hypertension on preeclampsia in pregnant women who gave birth at Prima Medika Denpasar Bali General Hospital for the period January 2023-August 2024. From the results of the analysis, an OR value = 80.6 was obtained, which means that respondents with a history of hypertension were 80.6 times more likely to experience preeclampsia than respondents who did not have a history of hypertension (table 2).

The results of the analysis of the influence of a history of multiple pregnancies on the incidence of preeclampsia showed that 115 respondents (92.75%) were included in the category with a history of multiple pregnancies who experienced preeclampsia, while among mothers who were in the category with no history of multiple pregnancies, 9 respondents (7.25%) experienced preeclampsia. The results of the chi square statistical test obtained a p value = $0.00019 < \alpha = 0.05$, meaning that there was an influence of a history of multiple pregnancies on the incidence of preeclampsia in pregnant women who gave birth at Prima Medika Denpasar Bali General Hospital for the period January 2023-August 2024. From the results of the analysis, an OR value = 35.25 was obtained, which means that respondents with a history of hypertension were 35.25 times more likely to experience preeclampsia than respondents who did not have a history of multiple pregnancies (Table 2).

The results of the analysis of the influence of a history of diabetes mellitus on the incidence of preeclampsia showed that 110 respondents (88.71%) who fell into the category of history of diabetes mellitus experienced preeclampsia, while among mothers who did not have a history of diabetes mellitus, 14 respondents (11.29%) experienced preeclampsia. The results of the chi square statistical test obtained a p value = $< 0.00003 < \alpha = 0.05$, meaning that there was an influence of a history of diabetes mellitus on preeclampsia in pregnant women who gave birth at Prima Medika Denpasar Bali General Hospital for the period January 2023-August 2024. From the results of the analysis, it was also obtained that the OR value = 43.25, which means that respondents with a history of hypertension were 43.25 times more likely to experience preeclampsia than respondents without a history of diabetes mellitus (Table 2).

The results of the analysis of the influence of a history of kidney disease on the incidence of preeclampsia showed that 3 respondents (2.41%) who fell into the category of history of kidney disease experienced preeclampsia, while among mothers who did not have a history of kidney disease, 121 respondents (97.59%) experienced preeclampsia. The results of the chi square statistical test obtained a p value = $0.245 > \alpha = 0.05$, meaning there was no influence of a history of kidney disease on preeclampsia in pregnant women who gave birth at Prima Medika General Hospital Denpasar Bali for the period January 2023-August 2024.

Discussion

The Effect of Age on Preeclampsia

The results of the analysis of the influence of age on the incidence of preeclampsia showed that 84 respondents (67.75%) were in the high-risk category of experiencing preeclampsia, while among mothers who were in the low risk category there were 40 respondents (32.25%) who experienced preeclampsia.

The results of the chi square statistical test obtained a p value = $0.026 < \alpha = 0.05$, meaning that there was an influence of age on preeclampsia in pregnant women who gave birth at Prima Medika General Hospital Denpasar Bali for the period January 2023-August 2024. From the results of the analysis, an OR value = 9.24 was obtained, which means that respondents who were at high risk were 9.24 times more likely to experience preeclampsia than respondents who were at low risk.

Several studies show that the majority of mothers are mature (20-35 years). In line with WHO (2023), teenage pregnancies have a higher risk of experiencing pregnancy complications than adults and have a greater risk of pregnancy complications than mothers aged 20-35 years. Mothers aged in the range of 20-29 years are the small age in the distribution of maternal and infant deaths, while mothers who are still young and old have a high risk, pregnant women aged 16 years have an increased risk of preeclampsia, those aged > 35 years are at greater risk and > 40 years have a higher risk.

If the birth mother is over 35 years old, it can cause problems, especially hypertension which can lead to preeclampsia. When the mother is 20 years old, she often experiences growth in the form of a uterus that is not yet at pregnancy standards. This can result in very high rates of preeclampsia. Apart from that, at this young age, mothers are generally not physically or mentally capable (Andriani et al., 2022). This research is supported by Rukiah et al. (2021) on 130 pregnant women respondents. The results of the analysis show that there is no relationship between age and the incidence of preeclampsia. In this research, it was found that maternal deaths occurred due to excessive blood loss, and this occurred in the maternal age range of 20-35 years, which is the appropriate age for giving birth. This is because the age of 20-35 years is the era of managing pregnancy and the mature age for pregnancy

and childbirth. This is in line with the Palupi & Indawati (2014) study conducted on 373 respondents. In this research, it was found that several respondents aged 20-35 years were in line with this research, so it can be assumed that mothers aged around 20-35 years were the lowest age in terms of maternal and infant mortality rates, while very young and even old mothers had higher problems.

According to research by Winasih (2021), the majority of mothers who gave birth with preeclampsia were 67.94% aged 20-35 years. This is not in accordance with various literature which states that maternal age < 20 years and > 35 years is a risk factor for preeclampsia. The large number of preeclampsia that occurs in the 20–35 year age range is because pregnancy and childbirth most often occur during reproductive age (fertile age). Age alone may not have much influence on the incidence of preeclampsia, but if there are other accompanying risk factors such as comorbidities, nullipara or multiple pregnancies it will increase the risk of preeclampsia. According to research conducted at Sanglah General Hospital Denpasar, factors associated with preeclampsia are age < 20 and > 35 years (Sumampouw et al., 2019). According to the theory of healthy reproductive age, that is 20 to 35 years, where the uterus and other parts of the body are completely ready to accept pregnancy but remain alert to preeclampsia because the cause is not yet known.

The Effect of Gravida on Preeclampsia

The results of the analysis of the influence of gravida on preeclampsia showed that 82 respondents (66.13%) who were included in the multigravida category experienced preeclampsia, while among primigravida mothers there were 42 respondents (33.87%) who experienced preeclampsia. The results of the chi square statistical test obtained a p value = 0.237 > α = 0.05, meaning there was no influence of gravida on the incidence of preeclampsia in pregnant women who gave birth at Prima Medika General Hospital Denpasar Bali for the period January 2023-August 2024.

Gravida is a term used in midwifery which means a woman who is pregnant. Primigravida is a woman who is pregnant for the first time, while multigravida is a woman who is pregnant for the second time or more (Prawirohardjo, 2018). Research by Laila (2019), showed that the majority of mothers gave birth with preeclampsia in multigravida, 35 people (81%). Another study by Marniati et al. (2016) showed that gravida status was related to the incidence of preeclampsia, who stated that multigravidas are at risk of experiencing preeclampsia 5.5 times greater than primigravida. In contrast to Dielsa & Ulya (2020) who found that primigravida women (87 patients, 50.3%) compared to multigravida women (59 patients, 48.8%) statistically there was no relationship between gravida status and preeclampsia.

The Effect of Parity on Preeclampsia

Parity is related to the incidence of preeclampsia due to giving birth to ≤ 3 children, which has a high risk for pregnant women. This condition can cause the reproductive organs, especially the uterine muscles, to experience weakness, which can make the delivery process difficult and has a higher risk of preeclampsia.

The results of the analysis of the effect of parity on preeclampsia showed that 52 respondents (41.93%) were included in the nullipara category (never given birth), 25 respondents (20.16%) were included in the primipara category, and 47 respondents (37.91%) were included in the multipara category who experienced preeclampsia. The results of the chi square statistical test obtained a p value = 0.005 < α = 0.05, meaning that there was an influence of parity on the incidence of preeclampsia in pregnant women who gave birth at Prima Medika General Hospital Denpasar Bali for the period January 2023-August 2024.

Parity is the number of live babies a woman has ever given birth to. Parity is divided into 3, namely nullipara, primipara and multipara. Parity is one of the most common causes of pregnant women experiencing preeclampsia. The younger a person's pregnancy or the more a person gives birth, the greater the chance of the pregnant woman experiencing preeclampsia. This is because women who become pregnant early and when they are pregnant, even at a young age, are more likely to be susceptible to the onset of preeclampsia, which is caused by the reproductive organs not being ready to conceive, while women who have experienced childbirth repeatedly are more likely to have a declining physical condition and health which then makes them more likely to suffer from preeclampsia (Rohmah, 2019). This research is in line with Laila (2019), which was conducted on 45 respondents. Based on this research, there is a relationship between parity and the incidence of preeclampsia.

In this study, the results showed that preeclampsia tended to be more common in pregnant women with no risk (low) parity than in pregnant women who were at risk (high). In line with this research, the majority of preeclampsia incidents were found in respondents with low parity (≤ 3). Parity is an influential predisposing factor for preeclampsia. Based on the theory expressed that parity is one of the predisposing factors for preeclampsia (Laura et al., 2021).

The study by Winasih (2021) found that the majority of mothers giving birth with preeclampsia were parity 1-4 as much as 57.42%, while with parity 0 there were 87 people (41.63%). This shows that there is not too much difference between nullipara and multipara. The results of this study are supported by Budi & Hariyasa (2017), the majority of preeclampsia in pregnant women were nulliparous, 53 people (49.07%).

The Effect of Maternal Education on Preeclampsia

The results of the analysis of the influence of maternal education on preeclampsia showed that 71 respondents (57.26%) who were in the low education category experienced preeclampsia, while among mothers with higher education, 53 respondents (42.74%) experienced preeclampsia. The chi square statistical test results obtained $p \text{ value} = < 0.0001 < \alpha = 0.05$, meaning that there is an influence of maternal education on the incidence of preeclampsia in pregnant women who give birth at Prima Medika General Hospital Denpasar Bali for the period January 2023-August 2024.

Maternity mothers who have minimal education are associated with the incidence of preeclampsia, because mothers have minimal insight, because they gain insight from training carried out by health workers which is usually carried out routinely every few months. Then he better understood healthy patterns by carrying out complex antenatal checks and then there was no correlation with level of education in preeclampsia. Education is an activity and effort to add characteristics, then the transformation of actions to maturity and even individual perfection takes place. The results of this study were obtained if mothers who had higher education and those who had no education had a similar chance of contracting preeclampsia.

Women with a high level of study have skills in obtaining, organizing and studying information related to healthy patterns. You can discuss and ask health workers and even make choices. However, the education that an individual has cannot ensure that the individual suffers and is not disturbed by a specific disorder (Hutabarat et al., 2016). In line with research by Nursal et al. (2017) which was conducted on pregnant women with 34 case samples and 34 control samples. This study shows that there is no significant correlation with the level of education and the occurrence of preeclampsia. The results of this study were that mothers who had higher education and mothers who did not, of course, had a similar chance of contracting preeclampsia. This is also in line with the study by Saraswati & Mardiana (2016), which was conducted on 145 respondents in each problem and control category. In this study, it was found that there was no correlation with the level of education in the occurrence of preeclampsia in pregnant women.

The Effect of Maternal Occupation on Preeclampsia

The results of the analysis of the influence of work on preeclampsia showed that 38 respondents (30.64%) who worked experienced preeclampsia, while among mothers who did not work, 86 respondents (69.36%) experienced preeclampsia. The chi square statistical test results obtained $p \text{ value} = 0.006 < \alpha = 0.05$, meaning that there is an influence of maternal employment on the incidence of preeclampsia in pregnant women who give birth at Prima Medika General Hospital Denpasar Bali for the period January 2023-August 2024.

Work is thought to be related to physical activity. Housewives who do various physical activities such as cleaning the house, helping children with school, preparing food, and other monotonous activities every day can increase stress. Stress can stimulate the release of the endothelium against blood flow and blood vessels which can result in vasoconstriction which causes an increase in blood pressure and then causes preeclampsia. Individual work activities can affect muscle performance and blood flow in pregnant women, where blood flow undergoes transformation along with increasing gestational age, and there is a boost due to enlargement of the size of the uterus. The increasing gestational age has an impact on the risk of increased heart performance to meet the mother's needs during pregnancy. Pregnant women who work are very susceptible to preeclampsia because pregnant women who work have greater stress than pregnant women who don't work. Based on Karrar et al. (2025), the heavy work experienced by pregnant women is an explanation for the occurrence of preeclampsia in mothers during pregnancy. Therefore, the work carried out by pregnant women has complications and contributes to the occurrence of preeclampsia.

This study is supported by Agustina et al. (2022) which was conducted on 93 pregnant women respondents. In this study, it was found that there was a correlation between work and preeclampsia. This research shows that working respondents have a 3.6 times higher chance of developing preeclampsia than respondents who do not work. This research found that mothers who have heavy jobs are associated with high levels of preeclampsia, because working mothers have greater levels of stress than mothers who do not work, which affects muscle performance and blood flow which can result in increased blood pressure, which triggers preeclampsia. This research is in line with research by Yani et al. (2023), which was conducted on 60 pregnant women respondents. This research shows that there is a correlation between maternal employment and the condition of preeclampsia in pregnant women. These results are in line with the assumption that employment has an influence on individual bodily activities that cause preeclampsia. The mental impact will then drain the kidney glands (adrenals) which produce the hormone adrenaline. The adrenaline hormone will then work and increase the heart rate significantly, which will increase blood pressure, thereby causing the risk of preeclampsia.

The Effect of A History of Hypertension on Preeclampsia

The results of the analysis of the influence of a history of hypertension on the incidence of preeclampsia showed that 90 respondents (76.61%) with a history of hypertension experienced preeclampsia, while among mothers who did not have a history of hypertension, 34 respondents (23.39%) experienced preeclampsia. The results of the chi square statistical test obtained a $p \text{ value} = < 0.0001 < \alpha = 0.05$, meaning that there was an influence of a history of hypertension on preeclampsia

in pregnant women who gave birth at Prima Medika Denpasar Bali General Hospital for the period January 2023-August 2024. From the analysis results also obtained an OR value = 80.6, which means that respondents who were anemic were 80.6 times more likely to experience preeclampsia than respondents who did not have a history of hypertension.

High blood pressure experienced before pregnancy can cause problems/destruction of body organs. The pregnancy creates an increase in body weight which can then cause very bad problems, manifested by edema and proteinuria. Proteinuria can be caused by leakage in the kidneys due to excreting too much protein in the urine. This will interfere with pregnancy, where preeclampsia is prone to organ system dysfunction. A history of hypertension is a risk factor that greatly influences the occurrence of preeclampsia. High blood pressure, which has been experienced before pregnancy, can cause organ problems in the body and is exacerbated by pregnancy which aggravates organ problems that have occurred previously.

The rate of preeclampsia increases as mothers suffer from chronic high blood pressure, because there is a problem with placental blood flow. One of the predisposing aspects of preeclampsia is the presence of blood pressure, previous vascular hypertension disorders, even essential hypertension. This is in accordance with a study from Andriani et al. (2022) which was conducted on 34 pregnant women respondents. Based on this research, it was found that there was a relationship between a history of hypertension and the occurrence of preeclampsia in pregnant women. This research found that mothers who had a history of high blood pressure during previous pregnancies, resulted in hypertension in subsequent pregnancies. In line with this research, it was found that 26 respondents had a history of hypertension, which contributed to complications in subsequent pregnancies.

In a study by ZA et al. (2019) which was carried out on 20 respondents in the control category and 20 respondents in the case group, it was assumed that the risk factors for preeclampsia were a history of chronic hypertension before pregnancy, a history of previous preeclampsia, a history of preeclampsia in the mother and female relatives, obesity, and even being pregnant several times. In line with this research, a correlation was found between a history of hypertension and preeclampsia.

The Effect of A History of Multiple Pregnancies on Preeclampsia

The results of the analysis of the influence of a history of multiple pregnancies on the incidence of preeclampsia showed that 115 respondents (92.75%) who had a history of multiple pregnancies experienced preeclampsia, while among mothers who did not have a history of multiple pregnancies, 9 respondents (7.25%) experienced preeclampsia. The results of the chi square statistical test obtained a p value = 0.00019 < α = 0.05,

meaning that there was an influence of a history of multiple pregnancies on preeclampsia in pregnant women who gave birth at Prima Medika Denpasar Bali General Hospital for the period January 2023-August 2024. From the results of the analysis, an OR value = 35.25 was obtained, which means that respondents who had a history of multiple pregnancies were at 35.25 times greater risk of experiencing preeclampsia than respondents who had no history of twin pregnancy.

Multiple pregnancies are pregnancies with two or more fetuses. Multiple pregnancies cause greater risks to both the fetus and mother. The development of twin fetuses tends to play a role in the occurrence of preeclampsia. This is due to the increased burden on blood flow to the fetus. The study according to Sutrimah et al. (2015) found that there was no significant correlation between multiple pregnancies and the risk of preeclampsia. The results of this study were explained by the fact that the proportion of total respondents with single pregnancies was very large compared to mothers with multiple pregnancies, so there was no correlation with preeclampsia. The occurrence of preeclampsia in twin pregnancies can be caused by excessive stretching of the uterus (overdistention), which results in decreased blood flow to the uterus which can trigger preeclampsia in pregnant women. However, in this study there was no relationship between risk factors for multiple pregnancies and the incidence of preeclampsia because this was due to the low number of mothers with multiple pregnancies.

This research is supported by Tonasih & Kumalasary (2020) which was conducted on 1271 mother respondents. This research shows that multiple pregnancies have no correlation with the occurrence of preeclampsia. In this study, it was found that there was no correlation between multiple pregnancies and preeclampsia because the majority of respondents in the case category did not have a history of multiple pregnancies. In line with this research, it was found that most respondents in the case category did not have multiple pregnancies.

According to Winasih (2021), the majority of fetuses in women giving birth with preeclampsia were one fetus, 204 (97.61%), while the number of fetuses > 1 was 5 (2.39%). This is because the majority of samples are mothers giving birth with one fetus. The number of Gemelli mothers giving birth in 2020 was 36 people and 5 people experienced preeclampsia, which is 13.89%. There were 997 mothers who gave birth with a single fetus and 204 people experienced preeclampsia or 20.46%.

In line with research by ZA et al. (2019) which was carried out on 20 respondents in the control category and 20 respondents in the case group. From this research, the conclusion was drawn that there was no correlation between risk factors for multiple pregnancies in the occurrence of preeclampsia in mothers giving birth. Mothers carrying twin fetuses had a six times lower chance of developing preeclampsia than mothers who

were not pregnant with twins. The results of research Dwi & Wahyuningsih (2016), showed that 43 people (91%) of respondents who did not have multiple pregnancies had preeclampsia.

The Effect of A History of Diabetes Mellitus and Kidney Disease on Preeclampsia

The results of the analysis of the influence of a history of diabetes mellitus on the incidence of preeclampsia showed that 110 respondents (88.71%) who had a history of diabetes mellitus, experienced preeclampsia, while among mothers who did not have a history of diabetes mellitus, 14 respondents (11.29%) experienced preeclampsia. The results of the chi square statistical test obtained a p value = $0.00003 < \alpha = 0.05$, meaning that there was an influence of a history of diabetes mellitus on preeclampsia in pregnant women who gave birth at Prima Medika General Hospital Denpasar Bali for the period January 2023-August 2024. From the results of the analysis, it was also obtained that the OR value = 43.25, which means that respondents who had a history of multiple pregnancies were 43.25 times more likely to experience preeclampsia than respondents. who do not have a history of diabetes mellitus.

The results of the analysis of the influence of a history of kidney disease on the incidence of preeclampsia showed that 121 respondents (97.59%) who had no history of kidney disease experienced preeclampsia, while among mothers who had a history of kidney disease, 3 respondents (2.41%) experienced preeclampsia. The results of the chi square statistical test obtained a p value = $0.245 > \alpha = 0.05$, meaning there was no influence of a history of kidney disease on preeclampsia in pregnant women who gave birth at Prima Medika General Hospital Denpasar Bali for the period January 2023-August 2024.

A previous history of chronic disease causes problems with the placental blood vessels before pregnancy, thereby causing the risk of preeclampsia when pregnant women have a history of chronic diseases such as diabetes mellitus and kidney disease. Based on a study by Nurhasanah (2017), it is proven that pregnant women with a previous history of chronic diseases such as diabetes and kidney disease, have a 2 times higher risk of developing preeclampsia than pregnant women without a history of chronic diseases.

Women with a history of previous chronic diseases have a higher tendency to experience preeclampsia. Pre-existing kidney problems increase the risk of adverse pregnancy outcomes, especially with the risk of preeclampsia. In line with the study by Tangren et al. (2018), a correlation between history of kidney disease and the incidence of preeclampsia was found. According to this research, pregnant women with a previous history of kidney disease have a 2.9 times higher risk of developing preeclampsia than pregnant women who do not have this history. Pregnancy is associated with a high transformation in renal plasma flow which results in an increase in the Glomerulus Filtration Rate (GFR) by 50% during mid-gestation. Low hyperfiltration in pregnancy has been described as

an aspect of the risk of preeclampsia, prematurity, and even low birth weight.

According to Sarli (2016), who conducted research on 13 respondents, it showed that there was no correlation between diabetes mellitus and the occurrence of preeclampsia. In this study, preeclampsia often occurs in pregnancies that experience transformations in endocrine and carbohydrate metabolism which results in diabetes mellitus during pregnancy. Likewise, from research by Winasih (2021), the majority of pregnant women without a history of preeclampsia and diabetes mellitus were 104 people (96.3%), only 12.44% of mothers had comorbidities such as chronic hypertension, diabetes mellitus (1.91%), and kidney disease (0.96%).

Conclusions

In conclusion, this study highlights several key factors influencing the incidence of preeclampsia among pregnant women at Prima Medika General Hospital Denpasar between January 2023 and August 2024. Maternal age, parity, education, and employment status were all found to significantly impact preeclampsia risk. Additionally, a history of hypertension, multiple pregnancies, and diabetes mellitus were strongly associated with higher preeclampsia rates. Conversely, no significant association was found between preeclampsia and factors such as gravida or a history of kidney disease. These findings underscore the importance of targeted interventions and monitoring for high-risk groups to manage and reduce the incidence of preeclampsia effectively.

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Conflict of interest

The authors declare that there is no conflict of interest.

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