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The Relationship Between Maternal Age and Medical History with the Incidence of Preeclampsia at Prima Medika General Hospital Denpasar

I Made Mahadinata Putra MN[1*], I Gede Eka Handrean[1], Kadek Satya Manggala[2]

[1]Lecturer Medical Education Study Program, Medical Faculty, Universitas Mahasaraswati Denpasar, Indonesia (80113)

[2]Student in Medical Education Study Program, Medical Faculty, Universitas Mahasaraswati Denpasar, Indonesia (80113)

E-mail: mahadinata@unmas.ac.id; handrean@unmas.ac.id; stmanggala@gmail.com

*Corresponding author details: I Made Mahadinata Putra MN; mahadinata@unmas.ac.id

ABSTRACT

Background: Pregnancy, lasting about 40 weeks, is a critical period divided into three trimesters. Among potential complications, preeclampsia is particularly concerning due to its significant impact on maternal and fetal health. Early detection and management are crucial to prevent severe outcomes. Despite its elusive etiology, risk factors include maternal age, medical history, and lifestyle factors. The study investigates the relationship between maternal age, medical history, and the incidence of preeclampsia, a serious pregnancy complication, at Prima Medika General Hospital in Denpasar, Indonesia. ***Methods:*** A cross-sectional study design was used, analyzing 248 medical records of pregnant women diagnosed with preeclampsia from January 2023 to August 2024. The chi-square statistical test assessed the relationships between maternal age, history of chronic diseases, and preeclampsia incidence. ***Results:*** The study found significant influences on preeclampsia incidence from age, with 67.75% of high-risk (< 20 and > 35 years) respondents experiencing the condition, compared to 32.25% in the low-risk (20-35 years) group ($p = 0.026$, OR = 9.2). A history of hypertension significantly increased preeclampsia risk ($p < 0.0001$, OR = 80.6), as did multiple pregnancies ($p = 0.00019$, OR = 35.25) and diabetes mellitus ($p < 0.00003$, OR = 43.25). Kidney disease history showed no significant impact ($p = 0.245$). ***Conclusions:*** Maternal age, hypertension, and diabetes mellitus significantly increase preeclampsia risk at Prima Medika General Hospital Denpasar. Tailored antenatal care is essential for women with these risk factors. Although kidney disease showed no significant link, personalized healthcare remains crucial.

Keywords: preeclampsia; maternal age; medical history.

INTRODUCTION

Pregnancy is a physiological condition where a woman carries a developing fetal in her uterus. It typically lasts about 40 weeks or nine months, beginning from the first day of the last menstrual period until delivery [1]. This period is divided into three phases: the first trimester (0-3 months), the second trimester (4-6 months), and the third trimester (7-9 months) [2]. Among the complications that can arise during pregnancy, preeclampsia is particularly concerning due to its significant impact on both maternal health and fetal development. Early detection and appropriate management of preeclampsia are crucial to prevent severe complications.

According to the World Health Organization (WHO) in 2016, the global incidence of preeclampsia ranged from 0.51% to 38.4%. In developed countries, the incidence is approximately 6-7%, with eclampsia occurring in 0.1-0.7% of pregnancies. In Indonesia, the prevalence of preeclampsia is notably high at 3.48% [3]. Specifically, in Bali province, the incidence of preeclampsia in 2020 was reported to be 474 cases or 0.71%. At Sanglah General Hospital Denpasar, the incidence remains high at 20.23% in the same year [4].

Preeclampsia poses serious risks to both the maternal and fetal. It can lead to placental abruption, prematurity, and neonatal complications such as respiratory distress syndrome, cerebral palsy, enterocolitis, necrotizing retinopathy, and perinatal death. Infants born to maternals with preeclampsia often have low APGAR scores and a heightened risk of seizures.

Maternal complications include organ dysfunction, such as renal and hepatic impairment, central nervous system damage, cardiomyopathy, pulmonary edema, stroke, respiratory distress syndrome, and even death [5]. In the United States, the economic burden of preeclampsia is substantial, with healthcare costs amounting to $2.18 billion, including $1.03 billion for maternal care and $1.15 billion for neonatal care [6].

The exact etiology of preeclampsia remains elusive, but risk factors are categorized into internal and external factors. Internal factors include maternal age, body weight, pregnancy interval, education, occupation, parity, history of hypertension, multiple gestations, diabetes mellitus, and renal disease. External factors encompass exposure to tobacco smoke, antenatal care history, and maternal nutritional intake. A previous history of chronic diseases, such as diabetes mellitus and kidney disease, can cause issues with placental blood vessels even before pregnancy, thereby increasing the risk of preeclampsia. Previous studies demonstrated that pregnant women with such a history have a twofold increased risk of developing preeclampsia compared to those without a chronic disease history [7].

This study aims to investigate the relationship between maternal age and medical history with the incidence of preeclampsia at Prima Medika General Hospital Denpasar. By employing a retrospective analysis of medical records, this research seeks to elucidate the determinants of preeclampsia and inform strategies for prevention and management. Identifying high-risk groups may guide targeted interventions and improve antenatal care practices, ultimately enhancing maternal and fetal outcomes.

METHOD

This study employed a cross-sectional design conducted at Prima Medika General Hospital Denpasar, Bali, Indonesia. The research focused on pregnant women who gave birth in the delivery room and experienced preeclampsia between January 1, 2023, and August 31, 2024. The study included a total sample of 248 respondents. This sample represents all eligible pregnant women who met the inclusion criteria during the specified period. The sampling technique used was total sampling, which ensured comprehensive coverage of the target population. Data were collected using secondary data from medical records at Prima Medika General Hospital Denpasar. To supplement this data, a structured questionnaire was employed as an instrument to extract relevant information from the medical records. Key variables included maternal age, history of chronic diseases (such as hypertension, diabetes mellitus, and kidney disease), and the diagnosis of preeclampsia. The data analysis was conducted using the chi-square statistical test to examine the association between maternal age, medical history, and the incidence of preeclampsia. The results were considered statistically significant with a p-value of less than 0.05. Data analysis was performed using SPSS version 26.0 (IBM Corp, Armonk, NY, USA). Ethical approval for the study was obtained from the Institutional Review Board of Prima Medika General Hospital Denpasar, and patient confidentiality was maintained throughout the research process.

RESULTS

Based on Table 1, the majority of respondents were in the low-risk age category (20-35 years), comprising 156 individuals (62.91%). In contrast, 92 respondents (37.09%) fell into the high-risk category (< 20 and > 35 years). Among the 248 respondents, most were multigravida, with 156 individuals (62.91%), while 92 respondents (37.09%) were primigravida. Respondents with multiparity numbered 72 (29.04%), whereas those classified as primipara and nullipara were 65 (26.2%) and 111 (44.76%), respectively. Regarding educational background, the majority had higher education, accounting for 166 respondents (66.94%), while 82 respondents (33.06%) had lower education levels. Most respondents were employed, with 143 individuals (57.67%), compared to 105 respondents (42.33%) who were unemployed. A history of hypertension was reported by 95 respondents (38.3%), while 153 respondents (61.7%) had no such history. The majority, 127 respondents (51.21%), did not have a history of multiple pregnancies, whereas 121 respondents (48.79%) did. Regarding diabetes mellitus, 114 respondents (45.96%) had a history, while 134 respondents (54.04%) did not. Most respondents, 245 (98.75%), had no history of kidney disease, with only 3 respondents (1.21%) reporting such a history.

TABLE 1: 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 year old)	92	37,09
Low Risk (20-35 year old)	156	62,91
Gravida maternal		
Primigravida	92	37,09
Multigravida	156	62,91

Variable	N	Percentage (%)
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 CI 95%
	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 Maternal								
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								
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		

Variable	Preeclampsia				N	%	*p-value*	OR CI 95%
	Yes		No					
	n	%	n	%				
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		

The analysis of age influence on preeclampsia incidence revealed that 84 respondents (67.75%) in the high-risk category experienced preeclampsia, compared to 40 respondents (32.25%) in the low-risk category. The chi-square test yielded a p-value of 0.026, which is less than $\alpha = 0.05$, indicating a significant influence of age on preeclampsia incidence in pregnant women at Prima Medika General Hospital, Denpasar, Bali, from January 2023 to July 2024. The odds ratio (OR) was 9.2, suggesting that high-risk respondents were 9.2 times more likely to experience preeclampsia than low-risk respondents (Table 2).

The analysis of gravida's influence on preeclampsia showed that 52 respondents (41.93%) in the nulliparous category experienced preeclampsia, as did 25 respondents (20.16%) in the primiparous category, and 47 respondents (37.91%) in the multiparous category. The chi-square test yielded a p-value of 0.237, greater than $\alpha = 0.05$, indicating no significant influence of gravida on preeclampsia incidence during the same period.

The analysis of parity's influence on preeclampsia revealed that 82 respondents (66.13%) in the multigravida category experienced preeclampsia, compared to 42 respondents (33.8%) in the primigravida category. The chi-square test yielded a p-value of 0.005, less than $\alpha = 0.05$, indicating a significant influence of parity on preeclampsia incidence.

The analysis of maternal education influence showed that 19 respondents (57.6%) with higher education experienced preeclampsia, compared to 11 respondents (40.7%) with lower education. The chi-square test yielded a p-value of 0.299, indicating no significant influence of education on preeclampsia incidence.

The analysis of employment influence on preeclampsia revealed that 19 respondents (59.4%) who were employed experienced preeclampsia, compared to 11 respondents (39.3%) who were not employed. The chi-square test yielded a p-value of 0.195, indicating no significant influence of employment on preeclampsia incidence.

The analysis of hypertension history influence showed that 90 respondents (76.61%) with a history of hypertension experienced preeclampsia, compared to 34 respondents (23.39%) without such a history. The chi-square test yielded a p-value of < 0.0001, indicating a significant influence. The OR was 80.6, suggesting that respondents with a history of hypertension were 80.6 times more likely to experience preeclampsia (Table 2).

The analysis of multiple pregnancy history influence revealed that 115 respondents (92.75%) with such a history experienced preeclampsia, compared to 9 respondents (7.25%) without it. The chi-square test yielded a p-value of 0.00019, indicating a significant influence. The OR was 35.25, suggesting that respondents with a history of multiple pregnancies were 35.25 times more likely to experience preeclampsia (Table 2).

The analysis of diabetes mellitus history influence showed that 110 respondents (88.71%) with a history experienced preeclampsia, compared to 14 respondents (11.29%) without it. The chi-square test yielded a p-value of < 0.00003, indicating a significant influence. The OR was 43.25, suggesting that respondents with a history of diabetes mellitus were 43.25 times more likely to experience preeclampsia (Table 2).

The analysis of kidney disease history influence showed that 3 respondents (2.41%) with such a

history experienced preeclampsia, compared to 121 respondents (97.59%) without it. The chi-square test yielded a p-value of 0.245, indicating no significant influence on preeclampsia incidence.

DISCUSSION

The analysis of the influence of age on the incidence of preeclampsia revealed that 84 respondents (67.75%) in the high-risk category experienced preeclampsia, while 40 respondents (32.25%) in the low-risk category did so. Several studies indicate that most maternals are of mature age (20-35 years). According to WHO, teenage pregnancies have a higher risk of complications compared to adults, and maternals younger than 20 or older than 35 years face greater risks of pregnancy complications. Women aged 20-29 years are at the lowest risk for maternal and infant mortality, whereas younger and older maternals face higher risks. Pregnant women aged 16 years have an increased risk of preeclampsia, and those over 35, particularly those over 40, face even higher risks [8]. Maternals over 35 may encounter issues such as hypertension, leading to preeclampsia. At 20 years, maternals might not yet have a fully developed uterus suitable for pregnancy, resulting in high rates of preeclampsia. Additionally, younger maternals may not be physically or mentally prepared [9].

The previous studies, which studied 130 pregnant women found no relationship between age and preeclampsia incidence. Maternal deaths in this study were primarily due to excessive blood loss in the 20-35 age range, considered optimal for childbirth [10]. This aligns with the findings [11], who observed that respondents aged 20-35 had the lowest maternal and infant mortality rates, while very young and older maternals faced higher risks. Previous research found that 67.94% of maternals with preeclampsia were aged 20-35, which contrasts with literature suggesting that age < 20 and > 35 is a risk factor [12]. The prevalence of preeclampsia in this age range could be attributed to the fact that most pregnancies occur during reproductive age. Age alone may not significantly impact preeclampsia incidence, but other risk factors such as comorbidities, nulliparity, or multiple pregnancies can increase the risk. According to research at Sanglah General Hospital Denpasar, factors associated with preeclampsia include age < 20 and > 35 years [13]. The theory of healthy reproductive age, defined as 20 to 35 years, suggests that the uterus and body are well-prepared for pregnancy, though vigilance for preeclampsia remains crucial due to its unknown causes.

The analysis showed that 90 respondents (76.61%) with a history of hypertension experienced preeclampsia, compared to 34 respondents (23.39%) without such a history. High blood pressure before pregnancy can damage organs, and pregnancy weight gain can worsen this, leading to edema and proteinuria, which disrupt pregnancy and increase the risk of preeclampsia. A history of hypertension is a key risk factor for preeclampsia, as it can exacerbate organ issues during pregnancy. Previous studies found a link between hypertension history and preeclampsia, with women experiencing hypertension in successive pregnancies [9]. Similarly [14], identified risk factors including chronic hypertension, previous preeclampsia, and familial predisposition, confirming a correlation between hypertension history and preeclampsia.

The analysis revealed that 110 respondents (88.71%) with a history of diabetes mellitus experienced preeclampsia, while only 14 respondents (11.29%) without such a history did. In contrast, the analysis regarding kidney disease history showed no significant influence on preeclampsia, with a p-value of 0.245. A history of chronic diseases like diabetes mellitus and kidney disease can affect placental blood vessels, increasing the risk of preeclampsia, who found that women with such histories have a twofold higher risk [7].

Women with chronic disease histories, particularly kidney issues, have a higher tendency to experience preeclampsia due to pre-existing organ problems. Previous studies found that a history of kidney disease increases the risk of preeclampsia by 2.9 times. Pregnancy significantly alters renal plasma flow, increasing the glomerular filtration rate or GFR by 50% during mid-gestation. Low hyperfiltration during pregnancy is linked to risks of preeclampsia, prematurity, and low birth weight [15]. However [16], found no correlation between diabetes mellitus and preeclampsia in a study of 13 respondents, suggesting that preeclampsia often occurs in pregnancies with endocrine and carbohydrate metabolism changes. Similarly [12], reported that most pregnant women at Sanglah General Hospital without a history of preeclampsia and diabetes mellitus were 104 (96.3%), with only 1.91% having diabetes mellitus and 0.96% having kidney disease. This indicates that while diabetes mellitus and kidney disease are significant risk factors, other factors may also play a role in the development of preeclampsia.

These findings have important implications for clinical practice. Healthcare providers should prioritise monitoring and interventions for women with a history of hypertension, diabetes mellitus, and other risk factors. Tailored antenatal care programmes can help reduce these risks and improve pregnancy outcomes. This study has several limitations, including its cross-sectional design, which limits the ability to draw causal conclusions. Additionally, reliance on medical record data may introduce data inaccuracies. Future research should consider longitudinal designs and larger sample sizes to validate and expand these findings.

CONCLUSIONS

This study shows that maternal age and medical history, especially hypertension and diabetes mellitus, significantly affect the risk of preeclampsia at Prima Medika General Hospital Denpasar. Women with these risk factors require careful monitoring and tailored antenatal care to reduce the likelihood of preeclampsia.

Although no significant link was found with kidney disease in this population, the study highlights the need for personalised healthcare approaches.

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REFERENCES

[1] Fauziah NA, Komalasari, Sari DN. Faktor-faktor yang Mempengaruhi Emesis Gravidarum pada Ibu Hamil Trimester. Majalah Kesehatan Indonesia 2022;3:13–8.

[2] Walyani. Kehamilan Dan Menyusui Anak Pertama. 1st ed. Yogyakarta: Pustaka Baru Press; 2020.

[3] Kemenkes. Profil Kesehatan Indonesia 2016. Jakarta: Kementerian Kesehatan Republik Indonesia; 2017.

[4] Dinas Kesehatan Provinsi. Profil Kesehatan Provinsi Bali 2019. Denpasar: 2020.

[5] Armaly Z, Jadaon JE, Jabbour A, Abassi ZA. Preeclampsia: Novel Mechanisms and Potential Therapeutic Approaches. Front Physiol 2018;9. https://doi.org/10.3389/fphys.2018.00973.

[6] Stevens W, Shih T, Incerti D, Ton TGN, Lee HC, Peneva D, et al. Short-term costs of preeclampsia to the United States health care system. Am J Obstet Gynecol 2017;217:237-248.e16. https://doi.org/10.1016/j.ajog.2017.04.032.

[7] Nurhasanah DN. Faktor-Faktor yang Berhubungan dengan Kejadian Preeklamsia pada Ibu Hamil di RSUD Panembahan Senopati Bantul Tahun 2016 . Universitas 'Aisyiyah Yogyakarta 2017.

[8] WHO. Adolescent Pregnancy. United State: 2023.

[9] Andriani R, Murdiningsih M, Rahmadhani SP. Hubungan Karakteristik Ibu Dengan Kejadian Preeklampsia Pada Ibu Hamil. Jurnal 'Aisyiyah Medika 2022;7. https://doi.org/10.36729/jam.v7i2.861.

[10] Rukiah AY, Sari DY, Humaeroh D. Hubungan Karakteristik Ibu Bersalin Dengan Preeklampsia Berat Di Rsu a Purwakarta Tahun 2020. Jurnal Ilmiah Kesehatan 2021;11:16–26.

[11] Palupi DD, Indawati R. Faktor Risiko Kematian Ibu dengan Preeklampsia/Eklampsia dan Perdarahan di Provinsi Jawa Timur. Jurnal Biometrika Dan Kependudukan 2014;3:107–13.

[12] Winasih NLS. Gambaran Ibu Bersalin Dengan preeklampsia Di Rumah Sakit Umum Pusat Sanglah Denpasar Tahun 2020. Jurnal Ilmiah Kebidanan (The Journal of Midwifery) 2021;9:177–82. https://doi.org/10.33992/jik.v9i2.1443.

[13] Sumampouw CM, Tendean HM, Wagey FW. Gambaran preeklampsia berat dan eklampsia ditinjau dari faktor risiko di RSUP Prof.Dr.R.D.Kandou Manado. Jurnal Medik Dan Rehabilitasi 2019;1.

[14] ZA RN, Renjani RS, Astuti R. Pengaruh Umur, Kehamilan Ganda dan Gravida pada Kejadian Preeklampsia di Rumah Sakit Umum Meuraxa Banda Aceh Tahun 2015. JOURNAL OF HEALTHCARE TECHNOLOGY AND MEDICINE 2019;2:115. https://doi.org/10.33143/jhtm.v2i2.244.

[15] Tangren JS, Wan Md Adnan WAH, Powe CE, Ecker J, Bramham K, Hladunewich MA, et al. Risk of Preeclampsia and Pregnancy Complications in Women with a History of Acute Kidney Injury. Hypertension 2018;72:451–9. https://doi.org/10.1161/HYPERTENSIONAHA.118.11161.

[16] Sarli D. Faktor-Faktor Yang Berhubungan Dengan Kejadian Pre-Eklampsia Pada Ibu Bersalin Di Rsup Dr.M.Djamil Padang. The Shine Cahaya Dunia Kebidanan 2016;1:1–23.