

Preeclampsia screening study: Its relation to neonatal problems in Surabaya City Health Centers

Dewi Diah Zakia ¹, Widati Fatmaningrum ^{2,*} and Andriyanti ¹

¹ Department of Midwifery, Faculty of Medicine, Airlangga University, Surabaya, East Java, Indonesia.

² Department of Public Health Sciences, Faculty of Medicine, Airlangga University, Surabaya, East Java, Indonesia.

World Journal of Advanced Research and Reviews, 2025, 26(03), 2716-2720

Publication history: Received on 20 May 2025; revised on 25 June 2025; accepted on 28 June 2025

Article DOI: <https://doi.org/10.30574/wjarr.2025.26.3.2476>

Abstract

Most infant deaths occur in the neonatal period, with dominant causes such as low birth weight (LBW), prematurity, and congenital abnormalities. Preeclampsia in pregnant women is one of the main risk factors that can cause neonatal complications. One of the efforts to prevent preeclampsia is preeclampsia screening. The purpose of this study was to determine and analyze the relationship between preeclampsia screening results in pregnant women and the incidence of neonatal complications. This study is an observational analytical study with a case-control approach. There were 92 respondents divided into two groups, namely 46 case groups (neonatal with complications) and 46 control groups (neonatal without complications). The results showed no relationship between preeclampsia screening results and neonatal complications. The absence of a relationship was due to the possibility of the onset of preeclampsia, which may occur after the screening period. Pregnant women with screening results not at risk of preeclampsia are considered to have a pregnancy without risk so that they only receive standard antenatal care. Pregnant women who are considered at no risk are still at risk of late-onset preeclampsia. These findings suggest that Doppler ultrasound examination should be considered for all pregnant women, regardless of the initial screening results, given the potential for preeclampsia to occur in late pregnancy.

Keywords: Neonatal mortality; Early detection; Maternal health; Preeclampsia screening results; Neonatal complications

1. Introduction

Maternal Mortality Rate (MMR) and Infant Mortality Rate (IMR) are important benchmarks in assessing the health level of a country. Based on the definition from WHO, infant mortality refers to the number of babies who die before the age of one year per 1,000 live births in a one-year period. This indicator is often used as a parameter to describe the economic, social, and environmental conditions of a region (1). The decline in IMR clearly shows progress in preventing and eradicating various diseases that cause death. Therefore, IMR is a sensitive measure of the effectiveness of various interventions carried out by the government, especially in the health sector (2).

IMR data in 2023 showed that 80.4% occurred in the neonatal period (0-28 days). The causes include respiratory and cardiovascular problems (1%), low birth weight (LBW) (0.7%), congenital abnormalities (0.3%), infections (0.3%), neurological and central nervous system diseases (0.2%), and intrapartum complications (0.2%). 14.5% of deaths were of unknown cause, and other causes were 82.8% (3). Meanwhile, in the city of Surabaya, infant mortality was recorded at 4.00 deaths per 1,000 live births. The biggest causes are low birth weight (LBW) and prematurity (38.58%), asphyxia (15.75%), and the rest include congenital abnormalities, infections, neonatal tetanus, and several other conditions (2).

* Corresponding author: Dewi Diah Zakia

The neonatal mortality rate is still a serious concern. The main causes are LBW, infection, and congenital abnormalities. One of the main factors that triggers LBW is placental disorders due to hypertension in pregnant women, such as preeclampsia (4). Preeclampsia causes uteroplacental insufficiency, which inhibits the flow of nutrients and oxygen to the foetus so that the foetus cannot grow optimally and is born with low birth weight. This condition increases the risk of serious complications leading to death. Therefore, intensive efforts to maintain maternal health, including early detection and treatment of preeclampsia during pregnancy, are very important to reduce infant mortality and improve the welfare of newborns (5).

The results of Sari's research (6) showed that mothers with preeclampsia had a 1.85 times greater chance of giving birth to an LBW baby compared to mothers who did not experience preeclampsia. Another study conducted by Umi (7) stated that there was a relationship between preeclampsia and premature birth. Another study also stated that babies born to mothers with preeclampsia had a risk of death 8.156 times higher compared to babies born to mothers without preeclampsia (8).

2. Material and methods

This study used a quantitative method with an observational analytical design and a case-control approach. The purpose of this study was to study the relationship between preeclampsia screening results and neonatal complications by comparing the case group and the control group, where neonatal complications were studied first, then the preeclampsia screening results were studied with a retrospective approach. This study was conducted at one of the Health Centers in Surabaya City from January to March 2025.

This study consists of 2 variables, namely independent variables (preeclampsia screening results) and dependent variables (neonatal complications). From 838 neonates during the period 2023-2024 were selected based on group categories. The case group is neonatal data with neonatal complications, and the control group is neonatal data without neonatal complications. The case group was found to be 46 respondents who were then studied (total sampling) with the inclusion criteria of data on infants with neonatal complications and the infant's mother had been screened for preeclampsia at a gestational age of <20 weeks. The control group was selected by simple random sampling with the inclusion criteria of data on infants with no neonatal complications and the infant's mother had been screened for preeclampsia at a gestational age of <20 weeks. The comparison of the case group and the control group is 1:1.

Data were collected, processed, and then analysed by testing the relationship between variables using the chi-square test. This study has been declared ethically feasible by the Health Research Ethics Committee of the Faculty of Medicine, Airlangga University, with number 72/EC/KEPK/FKUA/2025.

3. Results and discussion

3.1. Preeclampsia Screening Results and Neonatal Complications

Table 1 above in the majority of respondents' case groups shows that the preeclampsia screening results are not at risk of preeclampsia by 58.7%. Table 1 shows that of the various types of neonatal complications recorded, the most frequently found are low birth weight babies (LBW), with a proportion of 30.4%.

In this study, the incidence of infants with neonatal complications included foetal growth retardation, foetal distress, asphyxia, IUFD, neonatal death, prematurity, and LBW. The incidence of infants with the most neonatal complications found was Low Birth Weight (LBW), with a proportion of 30.4%. The large number of LBW cases was due to the fact that neonates in the case group were dominated by the characteristics of mothers with anaemia, at risk of KEK, and thin mothers (underweight). These conditions cause a decrease in the blood's ability to transport oxygen and reduce the supply of nutrients to the foetus (4)

Pregnant women are susceptible to anaemia due to the increase in blood volume during pregnancy for the formation of the placenta, foetus and iron reserves in breast milk. Haemoglobin levels in pregnant women decrease in the first trimester and are lowest in the second trimester, then increase again in the third trimester. Anaemia in pregnant women can increase the risk of premature birth, maternal and child mortality, and infectious diseases. Iron deficiency anaemia in mothers can affect the growth and development of the foetus or baby during pregnancy and after (3). A review of the article conducted by Farhan (9) concluded that anaemia suffered by pregnant women has an effect on the birth weight of babies who tend to be LBW. In line with Farhan (9), research conducted by Lusi (10) showed that pregnant women who experience anaemia with Hb levels <11 g/dL have a 5.464 times risk of giving birth to LBW.

Pregnant women who experience nutritional problems can have an impact on the health and safety of the mother and baby as well as the quality of the baby born. Chronic Energy Deficiency (CED) can occur due to long-term nutritional imbalance (energy and protein). Pregnant women with CED are at risk of reducing muscle strength that helps the labour process, which can result in prolonged labour, postpartum haemorrhage, and even maternal death. Disorders due to pregnant women with CED can also occur in the baby being carried, such as foetal death (miscarriage), premature birth, birth defects, Low Birth Weight (LBW) and even infant death (3). Riska (11) in her research stated that mothers with CED have a significant relationship with the incidence of LBW.

Table 1 Characteristics of Preeclampsia and Neonatal Complications Screening Result Data

No	Characteristics	Neonatal Complications				Total	
		Case		Control			
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
1	Preeclampsia Screening Results						
	At risk of preeclampsia	19	41.3	14	30.4	33	35.9
	No risk of preeclampsia	27	58.7	32	69.6	59	64.1
2.	Neonatal complications						
	Fetal Growth Restriction	11	23.9	0	0	11	12.0
	<i>Fetal Distress</i>	2	4.3	0	0	2	2.2
	Asphyxia	4	8.7	0	0	4	4.3
	IUFD	3	6.5	0	0	3	3.3
	Neonatal Death	1	2.2	0	0	1	1.1
	Premature	11	23.9	0	0	11	12.0
	LBW	14	30.4	0	0	14	15.2
	No Complications	0	0	46	100	46	50

In this study, the results of preeclampsia screening showed that most pregnant women in the case group were not at risk of preeclampsia, amounting to 58.7%. Pregnant women who were not at risk of preeclampsia continued to have antenatal visits at the Health Centre at least 6 times. As many as 41.3% of pregnant women were at risk of preeclampsia. By conducting screening, most women who are potentially experiencing preeclampsia can be identified (12). For mothers who are at risk of preeclampsia, the mother will be referred to a hospital equipped with uterine artery Doppler examination facilities (13). Pregnant women will also be given daily aspirin and calcium supplements. If it is not proven that the mother has preeclampsia, the mother will be referred back to the Health Centre to continue monitoring the pregnancy at the Health Centre according to schedule (14). Preventive therapy is continued until the gestational age of 36 weeks (15). Monitoring pregnant women through preeclampsia screening is very important to ensure the safety of the mother and baby by providing fast and appropriate treatment.

3.2. Relationship between Preeclampsia Screening Results and Neonatal Complications

Based on Table 2, it is known that in the case group, pregnant women at risk of preeclampsia were 41.3%, while those who were not at risk of preeclampsia were 58.7%. In the control group, pregnant women at risk of preeclampsia were 30.4%, while those who were not at risk of preeclampsia were 69.6%. The results of the study showed that pregnant women at risk of preeclampsia gave birth to more babies with neonatal complications, and pregnant women who were not at risk of preeclampsia gave birth to more babies without neonatal complications. There is no relationship between preeclampsia screening results and neonatal complications. This is based on the results of the analysis with the chi-square test, which obtained a p-value of 1.181, where the p-value > 0.05, which means there is no relationship between preeclampsia screening results and neonatal complications.

This study showed no relationship between preeclampsia screening results and neonatal complications. Preeclampsia screening results that are at risk or not have the same potential to experience neonatal complications. Factors that

influence the occurrence of preeclampsia are the time of occurrence of preeclampsia. The time of occurrence of preeclampsia is divided into 2, early onset (<34 weeks) and late onset (≥ 34 weeks). Early-onset preeclampsia may be detected during screening, while late-onset preeclampsia is more difficult to detect because clinical symptoms may not have appeared when the preeclampsia screening examination is performed (12).

Table 2 Results of preeclampsia screening with neonatal complications

Characteristics	Neonatal Complications				p value	OR (95% CI)
	There are neonatal complications (cases)		No neonatal complications (control)			
	Frequency	Percentage (%)	Frequency	Percentage (%)		
At risk of preeclampsia	19	41.3	14	30.4	1.181 (>0.05)	1.608 (0.6 - 3.8)
No risk of preeclampsia	27	58.7	32	69.6		
Total	46	100	46	100		

This study found that neonatal complications occurred more frequently in mothers with screening results that were not at risk for preeclampsia. Screening results that were at risk for preeclampsia would potentially become preeclampsia and contribute to neonatal complications. Pregnant women at risk for preeclampsia received post-screening management, including referral to the hospital, aspirin, calcium supplementation, and uteroplacental artery Doppler ultrasound to prevent complications. So that the incidence of complications was found to be lower (15). Meanwhile, pregnant women with screening results that were not at risk for preeclampsia were considered to have a pregnancy without risk so that pregnant women only received standard antenatal care. Pregnant women who were considered at no risk were still at risk for late-onset preeclampsia. These findings indicate that uteroplacental artery Doppler ultrasound examination should be considered for all pregnant women, regardless of the initial screening results, considering the potential for preeclampsia to occur in late pregnancy. However, its implementation is still constrained by procedural limitations and a referral system that is limited by the applicable health service protocol.

4. Conclusion

Based on the research that has been done, it can be concluded that the results of preeclampsia screening have no relationship with neonatal complications. Policymakers should consider including uteroplacental artery Doppler ultrasound examination in pregnancy examination protocols, even though the results of preeclampsia screening show no risk of preeclampsia.

Compliance with ethical standards

Disclosure of conflict of interest

Authors have no conflict of interest Statement of ethical approval (optional) (WJS-I-sub heading no numbering).

References

- [1] Ministry of Health. Performance Report of the Ministry of Health of the Republic of Indonesia. Jakarta; 2024 Feb.
- [2] Surabaya City Health Service. Surabaya City Health Profile 2023 (1). 2024;
- [3] Ministry of Health of the Republic of Indonesia. Indonesian Health Profile 2023. 2024;
- [4] Suryani E. Low Birth Weight Babies and Their Management. Blitar: Strada Press; 2020.
- [5] Jung E, Romero R, Yeo L, Gomez-Lopez N, Chaemsathong P, Jaovisidha A, et al. The etiology of preeclampsia. Vol. 226, American Journal of Obstetrics and Gynecology. Elsevier Inc.; 2022. p. S844–66.
- [6] Sari AI. The Relationship between Preeclampsia Mothers and the Incident of LBW at RSD Balung, Jember Regency. Ovary Midwifery Journal. 2021 Feb;2:77–80.

- [7] Umi O, Khoiriyah H, Aini I, Purwanti T. The Relationship between Preeclampsia and the Incidence of Preterm Labor. Vol. 11, Journal of Midwifery. Jombang; 2021 Mar.
- [8] Rukmono P, Anggunan A, Octarianingsih F, Sari SR. The Relationship Between Mothers Giving Birth Who Experience Preeclampsia and Neonatal Death at Dr. H. Abdoel Moeloek Regional Hospital. MAHESA: Malahayati Health Student Journal. 2022 Feb 26;2(1):65-73.
- [9] Farhan K, Dhanny DR. Anemia in Pregnant Women and Its Effects on the Baby. Muhammadiyah Journal of Midwifery. 2021 Sep 18;2(1):27.
- [10] Lusi A, Artawan IM, Padmosiwi WI. RELATIONSHIP BETWEEN PREGNANT WOMEN'S HEMOGLOBIN LEVELS AND THE INCIDENCE OF LOW BIRTH WEIGHT BABIES AT THE PROF. DR. W. Z, JOHANNES KUPANG REGIONAL HOSPITAL. NURSING RESEARCH JOURNAL. 2023;9:44-148.
- [11] Riska MAH, Hanifa F, Ola SE. The Relationship between Young Primigravida, Chronic Energy Deficiency (CED) and Socioeconomic with the Incidence of Low Birth Weight (LBW) at Tenjo Health Center in 2022. SIMFISIS Indonesian Midwifery Journal. 2022 Nov 17;2(2):297-302.
- [12] Lee NMW, Chaensaithong P, Poon LC. Prediction of preeclampsia in asymptomatic women. Vol. 92, Best Practice and Research: Clinical Obstetrics and Gynaecology. Bailliere Tindall Ltd; 2024.
- [13] Ministry of the Republic of Indonesia. Kia Book Kia Book Maternal and Child Health Maternal and Child Health. 2023.
- [14] BPJS Health. Referral Program. Jakarta; 2014.
- [15] Obstetrics P, Indonesia G, Medicine H, Maternal F. National Guidelines for Medical Services for Diagnosis and Management of Pre-Eclampsia. Indonesian Obstetrics and Gynecology Association Feto Maternal Medicine Association 2016; 2016.