

## Maternal Outcomes in Teenagers with Preeclampsia: A Comparative Analysis Study Introduction

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### Abstract

Adolescent pregnancy poses significant health challenges due to higher risks of complications, including preeclampsia, which contributes to increased maternal and neonatal morbidity rates. This study aims to compare pregnancy outcomes between adolescents and adults diagnosed with preeclampsia to identify specific risk factors and provide insights for improving healthcare practices. A cross-sectional study was conducted by analyzing medical records of singleton pregnancies complicated by preeclampsia at Muhammadiyah Palembang Hospital from 2019 to 2021. Data were analyzed using chi-square and Mann Whitney U tests with a significance threshold of  $p < 0.05$ . The results indicate that adolescents have significantly higher rates of placental abruption ( $p = 0.009$ ), oliguria ( $p = 0.006$ ), eclampsia ( $p < 0.001$ ), and ICU admissions ( $p < 0.001$ ) compared to adults. Furthermore, adolescents exhibited lower education levels ( $p < 0.001$ ), while no significant differences were observed in gestational age, delivery method, or preeclampsia onset. These findings underscore the heightened maternal risks associated with adolescent pregnancies complicated by preeclampsia, highlighting the importance of improved antenatal care and reproductive health education to mitigate adverse outcomes.

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**Keywords:** Preeclampsia, Teenagers.

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## INTRODUCTION

The time between the ages of 10 and 19 is known as adolescence (Maheshwari et al., 2022). The majority of pregnancies at this time are unplanned (Ganchimeg et al., 2014). Between 2015 and 2020, 15% of women under the age of 18 gave birth worldwide. Moreover, low- and middle-income nations accounted for almost 90% of these deliveries (Uzunov et al., 2022). According to estimates from the World Health Organization (WHO), 12 million of the 21 million teenagers between the ages of 15 and 19 who get pregnant each year give birth (Uzunov et al., 2022).

Due to physical immaturity, overlapping maternal growth, nutritional condition, socioeconomic issues, partner abuse, and emotional overload, adolescent pregnancy carries a greater hardship than adult pregnancy (Ganchimeg et al., 2014); (Uzunov et al., 2022); (Uzunov et al., 2022). Adolescents may be twice as likely to get preeclampsia (Salazar-Pousada et al., 2012); (Traisisilp et al., 2015). Preeclampsia and eclampsia in younger women raise the risk of complications for the mother (such as severe complications, morbidity, maternal near-miss cases, and cesarean deliveries) and the fetus

(such as preterm birth, intrauterine growth restriction [IUGR], low birth weight, and intensive care unit admissions) (Zárate et al., 2014); (Scholl et al., 1994). Ethnicity, family dynamics, sociodemographics, and the quality of prenatal treatment may all have an impact on these adverse results (Scholl et al., 1994); (Kawakita et al., 2016); (Cruz et al., 2011). In the past, we have documented that neonatal outcomes are poorer for younger pregnant teenagers than for older teens.

Compared to adult pregnancy, adolescent pregnancy has a greater risk of obstetrical and neonatal problems. Teenagers are therefore more susceptible to preeclampsia, early membrane rupture, anemia, STDs, and maternal mortality when it comes to obstetrical hazards (Harrison et al., 2018); (Rexhepi et al., 2019). Adolescent patients are more likely to have preterm deliveries, stillbirths, low birth weights, poorer Apgar scores, and congenital abnormalities in their babies (Ganchimeg et al., 2014); (Serunjogi et al., 2021).

Preeclampsia is a pregnancy-related progressive hypertension condition that can significantly affect several organs. Previously, it was defined as the presence of proteinuria, edema, and hypertension, defined as blood pressure  $\geq 140$  mmHg systolic and  $\geq 90$  mmHg diastolic, initially identified after 20 weeks of pregnancy (Macedo et al., 2020). Since the physiopathology of preeclampsia has improved over time, the diagnosis now include organ dysfunction in the kidney, liver, neurologic, hematological, or uteroplacental systems as well as hypertension (Tanner et al., 2022). A history of preeclampsia or related comorbidities, primiparity, and early or advanced pregnancy are risk factors for preeclampsia (Macedo et al., 2020).

Preeclampsia is more common in teens than in older patients, according to the majority of research that have examined the association between the adolescent population and the condition (Medhi et al., 2016). Prematurity, low birth weight, and fetal discomfort are among the negative consequences that this disease exposes babies to (Saadat et al., 2007).

Based on the above background, the aim of this study is to compare pregnancy outcomes in adolescents and adults with preeclampsia to identify specific risk factors and provide insights that can help improve healthcare practices. This study is expected to provide benefits in the form of recommendations to improve the quality of antenatal care and reproductive health education, especially for adolescents, to reduce the risk of maternal and neonatal complications caused by preeclampsia.

## **RESEARCH METHOD**

This cross-sectional study was conducted at Muhammadiyah Palembang Hospital from October 2022 to December 2022. The research was carried out by taking medical records from the hospital. The sample in this study was women giving birth with preeclampsia at the Muhammadiyah Palembang Hospital in the period January 2019 - December 2021. The study was approved by..

Inclusion criteria for the study encompassed patients who delivered with a singleton pregnancy and were diagnosed with preeclampsia based on the criteria established by the American College of Obstetrics and Gynecology (ACOG). We verified that the gestational age was at least 20 weeks, with a systolic blood pressure of no less than 160 mmHg or a diastolic pressure of at least 110 mmHg, accompanied by severe features.

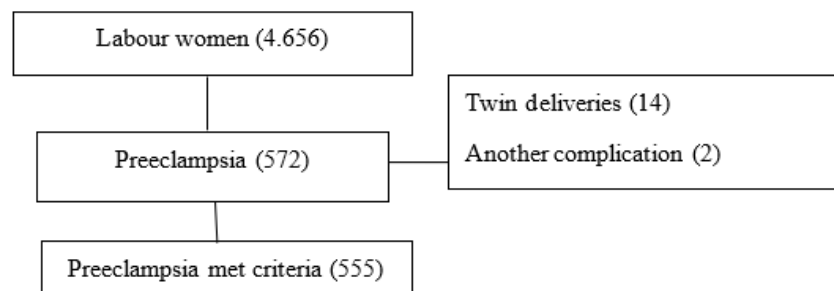
Exclusion criteria included multiple pregnancies, hypertension attributed to conditions other than preeclampsia (such as chronic hypertension, chronic kidney disease, lupus erythematosus, antiphospholipid syndrome, and diabetes mellitus), as well as incomplete medical records. The samples were categorized into early-onset preeclampsia (EO-PE) for those between 20 to 34 weeks and late-onset preeclampsia (LO-PE) for those

at 34 weeks gestation or later. Maternal outcomes assessed in this study included pulmonary edema, visual disturbances, placental abruption, oliguria, postpartum hemorrhage, ICU admission, mortality, eclampsia, and HELLP syndrome. Due to limitations in hospital laboratory services, HELLP syndrome was evaluated solely through platelet and liver enzyme tests, resulting in all patients being diagnosed with partial HELLP syndrome. Oliguria was defined as urine output of less than 15 mL/hour for six consecutive hours, with or without diuretic administration.

The characteristics of the subjects were analyzed using a descriptive univariate approach, presented in a frequency table. A subsequent comparison of characteristics between the two groups was performed, with categorical data analyzed using the chi-square test and numerical data assessed using the Mann Whitney U test, given the abnormal distribution of the numerical data. Maternal outcomes were analyzed in a cross-sectional bivariate manner using the chi-square test, with significance determined by a p-value of less than 0.05. Statistical analyses were performed using SPSS Statistics (version 25.0; IBM Corp., Armonk, NY, USA).

## RESULTS AND DISCUSSION

A total of 555 patients met the inclusion criteria. The analysis of maternal outcomes in preeclampsia cases revealed significant differences between teenage and adult mothers. Among the total sample, teenagers exhibited higher rates of certain complications.



**Figure 1. Flowchart of Patient Data Selection with Preeclampsia**

The age of the mothers ranged from 15 to 50 years, with both the median and mean age being 32 years. The earliest gestational age recorded was 21 weeks, associated with a stillbirth and a mother diagnosed with HELLP syndrome who required admission to the intensive care unit. Conversely, the latest gestational age noted was 42 weeks. The highest gravida status observed was 8. Detailed characteristics of the research subjects are presented in Table 1. We found no significant difference between teenagers and adult mothers in terms of the onset of pre-eclampsia ( $p=0,809$ )

**Table 1. Sample characteristics**

Characteristics	N (%)	Teenager (n=18)	Adults (n=537)	P-value
<b>Gestational age</b>				
20-36 weeks	106 (19,1%)	2	104	0,687
37-40 weeks	400 (72,1%)	15	385	
>40 weeks	49 (8,8%)	1	48	
<b>Education</b>				
Elementary	158 (28,5%)	9	149	<0,001
Junior high	127 (22,9%)	4	123	
Senior high	226 (40,7%)	5	221	
Bachelor	44 (7,9%)	0	44	
<b>Jobs</b>				
PNS	10 ( 1,8%)	0	10	0,191

Characteristics	N (%)	Teenager (n=18)	Adults (n=537)	P-value
Wiraswasta	47 (8,5%)	0	47	
IRT	498 (89,7%)	18	480	
<b>Delivery methods</b>				
Spontaneous labour	153 (27,6%)	5	148	0,996
C-section	402 (72,4%)	13	389	
<b>Onset pre-eclampsia</b>				
Early onset	40 (7,2%)	2	38	0,809
Late onset	515 (92,6%)	16	499	

We further analyze the difference in maternal outcomes as presented in table 2. A comparative revealed that age difference was significantly correlated with a higher rate of placental abruption, oligouria, eclampsia, and ICU admission. Teenagers with preeclampsia were significantly more likely to experience placental abruption, oliguria, eclampsia, and ICU admissions compared to adults. Despite these differences, most deliveries were at term and via cesarean section in both groups.

**Table 2. Correlation between maternal age and maternal outcomes**

Maternal outcome	Total (n,%)	Teenager	Adults	P-value
Edema	1 (0,2%)	0	1	0,727
Death	0 (0%)	0	0	1,00
Vision	15 (2,7%)	2	13	0,084
Placental abruption	3 (0,5%)	1	2	0,009
Oligouria	52 (9,4%)	5	47	0,006
Postpartum hemorrhage	7 (1,3%)	1	6	0,249
Eclampsia	17 (3,1%)	5	12	<0,001
HELLP	10 (1,8%)	1	9	0,467
ICU	17 (3,1%)	4	13	<0,001

## Discussion

Typically, adolescent pregnancies are linked to delayed initiation of prenatal care and suboptimal health management, particularly among those with pre-existing health conditions, which increases the likelihood of adverse maternal and neonatal outcomes. This situation may account for the insufficient prenatal care that could make them more susceptible to preeclampsia (PE). A correlation between PE and factors such as obesity, lack of prenatal care, and pre-existing cardiac or renal conditions has been noted.

Preeclampsia and hypertensive disorders represent significant contributors to maternal mortality. When considering the age of the mother, particularly in adolescents, the situation becomes even more dire. Previous reports indicate that a notable proportion of women experiencing severe preeclampsia deliver close to term, a situation largely attributed to insufficient prenatal care (Chedraui et al., 2009). The primary goal of adequate prenatal care is to detect cases of preeclampsia early, facilitating timely labor induction to improve maternal and fetal outcomes, especially for those with mild preeclampsia nearing term. The induction of labor in cases of severe preeclampsia necessitates a carefully planned approach to ensure favorable outcomes for both mother and child. Research has shown that over half of young women diagnosed with preeclampsia undergo cesarean delivery (Kawakita et al., 2016). The rate of cesarean sections is notably high at our facility, particularly among adolescents and those with preeclampsia. This

trend was similarly observed in the current cohort of adolescents with severe preeclampsia, reflecting patterns seen in both groups studied. We acknowledge this as a concern, attributing it in part to the overcrowding in the delivery ward. Nonetheless, it is crucial to emphasize that our institution is committed to safeguarding the lives of both mothers and their infants. Our study location frequently receives referrals of women facing severe obstetric and maternal complications, including cases of severe preeclampsia characterized by an unripe cervix, uncontrolled hypertension, and neurological symptoms, which are the primary reasons for cesarean deliveries in this analysis. In such scenarios, prompt delivery via cesarean section is essential. Despite the severity of preeclampsia and associated organ dysfunction, there were no maternal fatalities reported, contrasting with findings from other similar studies (Koum et al., 2004). To effectively reduce cesarean section rates in severe preeclampsia cases, a comprehensive and individualized approach focused on quality care is necessary.

Adverse neonatal outcomes have been documented among adolescent mothers. However, to our knowledge, this study may be the first to identify similar adverse neonatal outcomes in adolescent mothers experiencing severe preeclampsia, where maternal age appeared to have no significant impact on the results.

Regarding the limitations of this research, it is important to note its retrospective design, which restricts the breadth of information gathered. Consequently, our findings may not be fully applicable to the broader Indonesian population. Additionally, the absence of comparative study groups, such as those without preeclampsia, represents another significant limitation. Nevertheless, the study possesses notable strengths: a) the data were collected from a specific low-income demographic primarily from rural and marginalized regions of the Indonesia, and b) our findings contribute to the limited literature available on outcomes in adolescents with severe preeclampsia in relation to their age.

Adolescents represent a vulnerable demographic and pose a significant public health challenge. In our context, there is an urgent need for enhancement and reform in antenatal and intrapartum care. The findings from this research can serve as a framework for advancing maternal healthcare in our nation and other developing countries with comparable circumstances. We recommend: a) improving the quality of prenatal care; b) increasing reproductive health education for both male and female adolescents; and c) advocating for the protection of girls' rights while addressing intimate partner violence and the prevention of unintended pregnancies. Promoting awareness of women's rights and their societal roles should be prioritized globally, on par with those of men.

## CONCLUSION

The results of this study demonstrate that adolescent pregnancies complicated by severe preeclampsia are associated with significantly higher maternal risks, such as placental abruption, oliguria, eclampsia, and ICU admissions, compared to adult pregnancies. These findings highlight the critical need for targeted interventions, including enhanced antenatal care and tailored reproductive health education for adolescents, to mitigate these risks.

Future research should focus on longitudinal studies to explore the long-term maternal and neonatal outcomes associated with preeclampsia in adolescents. Additionally, efforts to address socio-economic and educational disparities, as well as the provision of accessible healthcare services, could significantly contribute to improving maternal and neonatal health outcomes in this vulnerable population. The insights from

this study can serve as a foundation for policy recommendations aimed at reducing the burden of preeclampsia and its associated complications among adolescent mothers.

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