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Original Research Article

Evaluation of Maternal and Perinatal Outcomes in Patients with Preeclampsia: A Retrospective Hospital-Based Study

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Abstract:

Background: Preeclampsia is a multisystem hypertensive disorder of pregnancy and remains a major cause of maternal and perinatal morbidity and mortality worldwide. It is associated with significant maternal complications, including eclampsia, HELLP syndrome, postpartum hemorrhage, and adverse neonatal outcomes such as preterm birth, low birth weight, and perinatal death. Early identification and time management are essential to improve pregnancy outcomes.

Aim: To evaluate the maternal and perinatal outcomes among patients diagnosed with preeclampsia at a tertiary care hospital.

Methodology: This retrospective hospital-based observational study was conducted in the Department of Obstetrics and Gynecology, Patna Medical College and Hospital, Patna, Bihar, India, over a period of one year. A total of 125 pregnant women diagnosed with preeclampsia and fulfilling the eligibility criteria were included. Data were retrieved from hospital records and analyzed for demographic characteristics, severity of preeclampsia, maternal complications, mode of delivery, and perinatal outcomes.

Results: Most patients were aged 26–30 years (42.4%), and 56.8% were primigravidae. Severe preeclampsia was observed in 65.6% of cases. Maternal complications included blood transfusion requirement (12.0%), eclampsia (9.6%), postpartum hemorrhage (8.0%), HELLP syndrome (6.4%), and placental abruption (5.6%). Preterm delivery occurred in 60.0% of pregnancies, while cesarean section was performed in 62.4% of cases. Low birth weight (<2.5 kg) was observed in 68.8% of neonates, 43.2% required NICU admission, and perinatal mortality was recorded in 12.0% of cases.

Conclusion: Preeclampsia is associated with substantial maternal and perinatal morbidity, particularly due to severe disease, preterm birth, and low birth weight. Strengthening antenatal surveillance, early diagnosis, and timely obstetric intervention can significantly improve maternal and neonatal outcomes.

Keywords: Preeclampsia, Maternal Outcomes, Perinatal Outcomes, Hypertensive Disorders of Pregnancy, Preterm Birth, Low Birth Weight, NICU Admission.

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Introduction

Preeclampsia is a major hypertensive disorder of pregnancy and is still one of the leading causes of maternal and perinatal morbidity and mortality worldwide. Hypertensive disorders of pregnancy are seen in around 10% of all pregnancies worldwide and are one of the major triads leading to adverse maternal outcomes and death along with haemorrhage and infection [1] .

The World Health Organization (WHO) reported that hypertensive disorders account for nearly 16% of maternal deaths in developed countries and remain a major public health problem in developed and developing countries. Hypertensive disorders of pregnancy are the third leading cause of maternal mortality in India, and they contribute significantly to maternal and neonatal health burden. Despite advances in obstetric care, the incidence of preeclampsia and its complications remain significant, especially in resource-limited settings, where delayed diagnosis and inadequate antenatal care continue to impact outcomes [2].

Preeclampsia is a multisystem disorder in which a previously normotensive pregnant woman develops hypertension and proteinuria after 20 weeks gestation. The diagnosis of preeclampsia is based on recommendations of the National High Blood Pressure Education Program (NHBPEP) and the American College of Obstetricians and Gynaecologists (ACOG) [3] . The disease is defined as BP ≥ 140/90 mmHg on two occasions at least four hours apart in a woman with proteinuria (≥300 mg in a 24-hour urine specimen). Severe preeclampsia is characterised by a blood pressure of ≥160/110 mmHg and severe proteinuria or end-organ dysfunction such as thrombocytopenia, impaired liver function, renal insufficiency, pulmonary oedema, or neurological symptoms (e.g., visual disturbances). Eclampsia is the most serious form of the disease and is characterized by generalised tonic-clonic seizures in a woman with pre-eclampsia [4].

The pathophysiology of preeclampsia is complex and is not completely understood. It is believed to be due to abnormal placentation in early pregnancy resulting in inadequate trophoblastic invasion of the maternal spiral arteries. This results in reduced uteroplacental perfusion, placental ischemia, oxidative stress and release of antiangiogenic and inflammatory factors into the maternal circulation. They are related to a generalized endothelial dysfunction, vasoconstriction and increased vascular permeability, all expressed in the clinical features of preeclampsia. The disease is multifactorial with genetic, immunological, environmental and vascular factors acting together to influence the development and progression of the disease [5].

A number of maternal and pregnancy-related factors have been identified as risk factors for the development of pre-eclampsia. They include nulliparity, previous history of pre-eclampsia, maternal age above 40 years, multiple gestation, obesity, chronic hypertension, diabetes mellitus, renal disease, vascular disorders, smoking and some genetic predispositions. Early identification of those women at increased risk is important so that monitoring and intervention can be undertaken in a timely fashion. Although many biochemical, biophysical and imaging markers have been studied to predict preeclampsia, no single test has shown sufficient sensitivity, specificity and cost-effectiveness for use in routine clinical practice. Doppler velocimetry of the uterine artery in late first and second trimesters has shown some predictive value in identifying increased vascular resistance associated with abnormal placentation but its predictive accuracy remains limited [6].

Preeclampsia involves a wide range of maternal complications from mild hypertension to life-threatening conditions. Severe disease can result in eclampsia; HELLP syndrome (Haemolysis, Elevated Liver Enzymes and Low Platelet Count); disseminated intravascular coagulation (DIC); acute renal failure; pulmonary oedema; acute respiratory distress syndrome (ARDS); hepatic dysfunction; cerebrovascular accidents; retinal detachment; cortical blindness and maternal death. These complications add significantly to maternal morbidity and often require intensive medical management and early termination of pregnancy [7] .

The effect of pre-eclampsia on foetal and neonatal health is equally serious. Abnormal placental development leading to uteroplacental insufficiency results in reduced foetal oxygen and nutrient delivery and causes intrauterine growth restriction (IUGR), low birth weight, oligohydramnios, foetal distress, preterm birth and intrauterine foetal demise (IUFD). Moreover, infants born to women with preeclampsia are often admitted to neonatal intensive care units because of complications associated with prematurity, including respiratory distress syndrome, sepsis and feeding difficulties. Preeclampsia has been shown to significantly increase the risk of adverse perinatal outcomes and contributes substantially to neonatal morbidity and mortality [8] .

Many preventive and therapeutic strategies have been investigated including low-dose aspirin, calcium supplementation and antioxidant therapies, but none have eliminated the burden of pre-eclampsia. Therefore, improvement in maternal and neonatal outcome largely depends on early diagnosis, regular antenatal surveillance, timely referral and appropriate obstetric interventions. Therefore, understanding the clinical profile and outcome pattern of women with preeclampsia is essential to optimize management strategies and reduce complications related to the disease. Keeping in view the huge burden of preeclampsia and its impact on maternal and neonatal health, the present retrospective hospital-based study was conducted in the Department of Obstetrics and Gynecology, Patna Medical College and Hospital, Patna, Bihar, India.

The study was conducted to find out the maternal and perinatal outcome of preeclampsia and also to assess the spectrum of complications seen in these pregnancies. The findings of this study may help to understand the disease outcomes in a tertiary care setting and help in strengthening the strategies for prevention, early detection and management of preeclampsia.

Methodology

Study Design: The present study was a retrospective hospital-based observational study conducted to evaluate maternal and perinatal outcomes among patients diagnosed with preeclampsia. The study involved a review of hospital records of women admitted with preeclampsia and assessment of associated maternal and neonatal outcomes.

Study Area: The study was conducted in the Department of Obstetrics and Gynecology, Patna Med-

ical College and Hospital (PMCH), Patna, Bihar, India.

Study Duration: The study was conducted over a period of one year, from May 2025 to April 2026

Sample Size: A total of 125 pregnant women diagnosed with preeclampsia and fulfilling the eligibility criteria were included in the study.

Sample Population: The study population comprised pregnant women diagnosed with preeclampsia who attended the antenatal outpatient department (OPD), labor ward, emergency obstetric unit, or were admitted to the Department of Obstetrics and Gynecology, PMCH, during the study period. Both primi- and multigravida women were included irrespective of gestational age at diagnosis.

Data Collection: Data were collected retrospectively from the medical records of pregnant women diagnosed with preeclampsia and admitted to the Department of Obstetrics and Gynecology, Patna Medical College and Hospital, Patna, Bihar, during the study period. Information was retrieved from antenatal care (ANC) records, inpatient case sheets, labor room registers, operation theatre records, delivery registers, postnatal ward records, and neonatal intensive care unit (NICU) records. Relevant demographic, clinical, obstetric, and neonatal details were extracted using a structured data collection proforma. The variables collected included maternal age, parity, gestational age at diagnosis, blood pressure measurements, proteinuria status, severity of preeclampsia, maternal complications, mode of delivery, gestational age at delivery, birth weight, APGAR scores, NICU admission, and perinatal outcomes. To ensure confidentiality, all personal identifiers were removed and replaced with coded study numbers before data analysis.

Inclusion Criteria

- Pregnant women diagnosed with preeclampsia according to the International Society for the Study of Hypertension in Pregnancy (ISSHP) criteria.
- Women with singleton pregnancies.
- Women admitted and managed at PMCH during the study period.
- Patients with complete antenatal, intrapartum, postpartum, and neonatal records available for review.

Exclusion Criteria

- Women with chronic hypertension diagnosed before pregnancy or before 20 weeks of gestation.
- Women with pre-existing diabetes mellitus or gestational diabetes mellitus.
- Women with chronic kidney disease or other pre-existing renal disorders.
- Women with autoimmune or connective tissue disorders.
- Women with pre-existing cardiovascular diseases.
- Multiple pregnancies (twins or higher-order gestations).
- Pregnancies are complicated by major fetal congenital anomalies.
- Patients with incomplete or missing medical records.

Procedure: Hospital records of all eligible patients diagnosed with preeclampsia during the study period were reviewed. Preeclampsia was diagnosed according to the International Society for the Study of Hypertension in Pregnancy (ISSHP) criteria as new-onset hypertension occurring after 20 weeks of gestation with proteinuria and/or evidence of maternal organ dysfunction. The severity of pre-eclampsia was assessed based on clinical findings and laboratory investigations documented in the medical records. Maternal outcomes evaluated included severe preeclampsia, eclampsia, HELLP syndrome, placental abruption, postpartum hemorrhage, disseminated intravascular coagulation, requirement for blood transfusion, intensive care unit admission, and maternal mortality. Perinatal outcomes assessed included gestational age at delivery, preterm birth, birth weight, low birth weight, APGAR scores, NICU admission, intrauterine fetal death, stillbirth, neonatal death, and overall perinatal mortality. All relevant information was systematically recorded and compiled for statistical analysis.

Statistical Analysis: The data collected were entered into Microsoft Excel and analyzed using the Statistical Package for Social Sciences (SPSS) version 26.0. Descriptive statistics were used to summarize the demographic, obstetric, maternal, and neonatal characteristics of the study population. Continuous variables were expressed as mean and standard deviation, whereas categorical variables were presented as frequencies and percentages. Associations between maternal characteristics, severity of preeclampsia, maternal complications, and perinatal outcomes were evaluated using the Chi-square test or Fisher's exact test, depending on the suitability of the data. Continuous variables were compared using the Independent Student's T-test. A p-value of less than 0.05 was considered statistically significant. The results were presented in the form of tables and percentages to facilitate interpretation of maternal and perinatal outcomes among women with preeclampsia".

Result

Table 1 presents the baseline demographic and obstetric characteristics of the study participants. There were approximately 125 women diagnosed with preeclampsia. Most of the women were in the age group of 26-30 years (42.4%) followed by women ≤25

years (33.6%) and above 30 years (24.0%). The percentage of primigravida women was slightly higher (56.8%) than multigravida women (43.2%) showing preeclampsia was more common in first pregnancies. In terms of gestational age at diagnosis, 60.8% of cases were diagnosed at or after 34 weeks of gestation, and 39.2% were diagnosed 34 weeks before. Severe preeclampsia occurred in 65.6% of patients and non-severe disease in 34.4%, showing that severe forms of preeclampsia were a substantial proportion of cases managed at this tertiary care center.

Table 1: Baseline Demographic and Obstetric Characteristics of Study Participants (N=125)

Characteristic	Category	Frequency (n)	Percentage (%)
Age (years)	≤25	42	33.6
	26-30	53	42.4
	>30	30	24
Gravidity	Primigravida	71	56.8
	Multigravida	54	43.2
Gestational Age at Diagnosis	<34 weeks	49	39.2
	≥34 weeks	76	60.8
Severity of Preeclampsia	Severe	82	65.6
	Non-Severe	43	34.4

Table 2 shows how maternal complications are distributed among preeclamptic women. Almost half of the study participants (45.6%) had no major maternal complication. The most common documented complications were postpartum haemorrhage (8.0%), eclampsia (9.6%), admission to intensive care unit (8.8%) and the need for blood transfusion (12.0%). In women, the incidence of HELLP syndrome and placental abruption was 6.4% and 5.6%, respectively, and the incidence of acute kidney injury was 3.2%. One patient (0.8%) experienced maternal mortality. These results suggest that preeclampsia is still associated with considerable maternal morbidity and may be complicated by serious events requiring advanced obstetric care and critical management.

Table 2: Maternal Complications among Patients with Preeclampsia (N=125)

Maternal Complication	Frequency (n)	Percentage (%)
Eclampsia	12	9.6
HELLP Syndrome	8	6.4
Placental Abruption	7	5.6
Postpartum Hemorrhage	10	8
Blood Transfusion Required	15	12
ICU Admission	11	8.8
Acute Kidney Injury	4	3.2
Maternal Death	1	0.8
No Complication	57	45.6

Table 3 shows the distribution of patients by gestational age at delivery. Among the 125 women in the study, 40.0% had a term (≥37-week) delivery and 60.0% had a preterm delivery. Preterm births were 37.6% late preterm (34-36 weeks) and 22.4% early preterm (<34 weeks). What the results show is that preeclampsia is highly linked to an increased rate of premature birth, as doctors often have to deliver babies early to avoid complications for the mother and foetus. The high rate of preterm deliveries in this study is a reflection of the significant impact of preeclampsia on pregnancy outcome and highlights the need for close antenatal surveillance and timely obstetric intervention.

Table 3: Gestational Age at Delivery among Study Participants (N=125)

Gestational Age at Delivery	Frequency (n)	Percentage (%)
<34 Weeks	28	22.4
34–36 Weeks	47	37.6
≥37 Weeks	50	40

Table 4 illustrates that 60.0% of the 125 pregnancies complicated by pre-eclampsia resulted in preterm delivery, while 40.0% survived to term gestation. The most common mode of delivery was caesarean section, accounting for 62.4% of cases. 68.8% of neonates were low birth weight (<2.5 kg), underscoring the detrimental effect of preeclampsia on foetal growth. Almost half of the newborns (43.2%) were admitted to NICU. Most of the neonates (83.2%) had a good APGAR score (≥7) at 5 minutes. Live birth

was achieved in 88.0% of pregnancies, intra-uterine foetal death, stillbirth and early neonatal death in 6.4%, 3.2% and 2.4% respectively. These results demonstrate the high maternal and perinatal burden associated with pre-eclampsia and underscore the importance of timely diagnosis and management.

Table 4: Delivery Characteristics and Perinatal Outcomes among Patients with Preeclampsia (N = 125)

Variable	Category	Frequency (n)	Percentage (%)
Gestational Age at Delivery	<34 Weeks	28	22.4
	34–36 Weeks	47	37.6
	≥37 Weeks	50	40
Mode of Delivery	Vaginal Delivery	47	37.6
	LSCS	78	62.4
Birth Weight (kg)	<1.5	19	15.2
	1.5–2.0	28	22.4
	2.0–2.5	39	31.2
	>2.5	39	31.2
NICU Admission	Yes	54	43.2
	No	71	56.8
APGAR Score at 5 Minutes	≥7	104	83.2
	<7	21	16.8
Perinatal Outcome	Live Birth	110	88
	Intrauterine Fetal Death (IUFD)	8	6.4
	Stillbirth	4	3.2
	Early Neonatal Death	3	2.4

Discussion

In the current retrospective hospital-based study, 125 preeclamptic women at Patna Medical College and Hospital in Patna had their maternal and perinatal outcomes assessed. Preeclampsia is still one of the leading causes of maternal and neonatal morbidity around the globe and continues to be a major challenge especially in developing countries. In the present study majority of the patients were in the age group of 26-30 years (42.4%) and primigravida women formed 56.8% of cases. Similar findings were reported by Saxena et al. (2010) who observed that the occurrence of preeclampsia was higher among primigravida women and younger age groups of mothers suggesting that the first pregnancy remains a significant risk factor for the development of the hypertensive disorders of pregnancy (Saxena et al., 2010). Similarly, in their study, Yadav et al. (2014) found that more than 50% of preeclamptic women were primigravidae which is comparable to our findings" [9].

In the current study, 65.6% of women had severe preeclampsia, indicating a substantial burden of severe disease. Onuh et al (2006) reported similar findings with about 61% of affected pregnancies developing severe preeclampsia. However, Harjai and Junnare (2026) reported a slightly higher prevalence of severe disease (77.3%) in a tertiary care setting, which could be attributed to variations in referral patterns and case selection. The high proportion of severe preeclampsia in tertiary care hospitals reflects the fact that complicated and high risk pregnancies are often referred to these institutions for specialised management [10] .

Maternal complications continue to be an important contributor to morbidity in women with pre-eclampsia . In the present study, blood transfusion was needed in 12.0% of patients, eclampsia in 9.6%, postpartum haemorrhage in 8.0%, HELLP syndrome in 6.4% and placental abruption in 5.6% of women. Maternal mortality was observed in one case (0.8%). Similar findings were also reported by Pillai (2017) with eclampsia in 10.9%, HELLP syndrome in 7.3% and placental abruption in 4.5% of women with severe preeclampsia. Likewise, Duley (2009) observed that preeclampsia continues to be a major cause of maternal morbidity from complications such as eclampsia, HELLP syndrome, renal dysfunction, and postpartum haemorrhage. The relatively low maternal mortality seen in our study can be attributed to timely referral, availability of intensive care facilities and improved obstetric management protocols at tertiary care centers [11] .

Preterm delivery is a common complication of preeclampsia as it requires early termination of pregnancy to prevent maternal and foetal complications. In this study, 60.0% women delivered preterm including 22.4% before 34 weeks and 37.6% between 34 and 36 weeks of gestation. These findings are similar to those reported by Sibai (2003) who reported a preterm delivery rate of 50% to 70% in women with severe preeclampsia. Similarly, Ananth et al. (2013) found rates of medically indicated preterm birth to be significantly higher among women with hypertensive disorders than women with normotensive pregnancies. Our study's high preterm birth rate demonstrates how pre-eclampsia affects the ability to continue pregnancy and foetal maturity [12].

The severity of disease and foetal status often decide the mode of delivery in preeclamptic pregnancies. In the present study, 62.4 % women had lower segment caesarean section (LSCS) and 37.6 % women delivered vaginally. Singh et al. (2016) reported similar results where approximately 60% of women with preeclampsia underwent caesarean delivery. Similar findings were also reported by Neelima (2018) who found caesarean section rate >58% in preeclampsia. The increased caesarean rate is likely related to foetal distress, failed induction, uncontrolled hypertension and urgent delivery for prevention of adverse outcome [13].

Adverse neonatal outcomes were common in our study. 68.8% of neonates had low birth weight (<2.5kg) and 15.2% extremely low birth weight (<1.5kg). These findings are in agreement with Xiong et al. (2002) who showed a strong association between preeclampsia and foetal growth restriction causing low-birth-weight infants. Similarly, Sibai (2003) reported high rates of intrauterine growth restriction in pregnancies complicated with severe preeclampsia. Preeclampsia is characterised by placental insufficiency and impaired uteroplacental blood flow, which are both major contributors to poor foetal growth and reduced birth weight [14] .

The neonatal morbidity was also reflected by the high NICU admission rate of 43.2% observed in our study. This is comparable to the 39-45% NICU admission rates reported by Pillai (2017) and Singh et al. (2016). Neonatal compromise at birth was significant with 16.8 % of neonates having low APGAR scores at five minutes. Backes et al. (2011) reported similar results, finding that neonates born to mothers with severe preeclampsia had increased neonatal depression and respiratory complications. Prematurity, low birth weight and foetal distress are the main reasons for the increased need for NICU care in these neonates [15].

Perinatal mortality remains an important problem in pregnancies complicated by preeclampsia. In the present study intrauterine foetal death was 6.4%, stillbirth was 3.2% and early neonatal death was 2.4% resulting in significant perinatal loss. Onuh et al. (2006) also reported similar findings where they found perinatal mortality rates of about 10-15% in women with severe preeclampsia. The adverse perinatal outcomes seen in our study are most likely related to prematurity, placental insufficiency, fetal growth restriction and intrauterine hypoxia [16] .

The retrospective design and single-center setting of this study might limit the generalisability of the findings. Moreover, there may be an information bias for reliance on medical record data because of incomplete documentation. But the study is of great importance as it gives an insight into maternal and perinatal outcome of pre-eclampsia in a tertiary care hospital and stresses the need for early diagnosis, close antenatal surveillance, and timely intervention for betterment of maternal and neonatal outcome.

Conclusion

The present retrospective hospital-based study emphasizes on the significant effects of preeclampsia on maternal and perinatal health outcomes. Severe pre-eclampsia was common and was associated with significant maternal complications including eclampsia, postpartum haemorrhage, HELLP syndrome, placental abruption, and need for blood transfusion and intensive care support. The disorder was also associated with poor perinatal outcomes, including increased rates of preterm delivery, low birth weight, NICU admission, low APGAR scores, intrauterine foetal demise, stillbirth, and neonatal mortality. The high rate of caesarean deliveries further reflects the obstetrical challenges in the management of preeclamptic pregnancies. These findings highlight the continuing significance of preeclampsia as a leading cause of maternal and neonatal morbidity in tertiary care facilities. Early detection of high risk pregnancies, regular antenatal surveillance, timely referral and timely obstetric intervention are important to reduce complications and improve pregnancy outcome. Strengthening antenatal care services and ensuring access to comprehensive maternal and neonatal health care could be an important strategy in reducing the burden of preeclampsia and improving maternal and perinatal survival.

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