

Maternal and Perinatal Outcome in Severe Pre-eclampsia in a Tertiary Care Center

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Abstract

Background: Pre-eclampsia is the leading reason for referrals to a specialized healthcare facility, as it represents a significant contributor to maternal and perinatal morbidity and mortality.

Objective: The objective of this study is to examine the maternal and fetal outcomes associated with severe pre-eclampsia in a Tertiary Care Center.

Design: Prospective observational study.

Methodology: This prospective observational study took place at Dr. Prabhakar Kore Hospital and MRC, located in Belagavi and affiliated with KAHER's Jawaharlal Nehru Medical College, Belagavi. The study spanned from January 1, 2021, to December 31, 2021. Pregnant women diagnosed with severe Pre-eclampsia, which met the specified inclusion and exclusion criteria, and were admitted to the labor room at the tertiary care center, were enrolled in the study.

Results: Participants in the study ranged in age from 19 to 41 years, with a mean gestational age at diagnosis of 35.32 weeks \pm 3.7 weeks. Among the participants, 73.4% underwent lower segment cesarean section (LSCS), while 22.4% had vaginal deliveries, including 3 cases with

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instrumental delivery (ventouse). The study observed increased incidences of Hemolysis, Elevated Liver enzymes, and Low Platelet count (HELLP) syndrome (32.4%), placental abruption (30%), postpartum hemorrhage (22%), partial HELLP syndrome (16.2%), pulmonary edema (11%), eclampsia and disseminated intravascular coagulation (DIC) (8.1%). The incidence of prematurity was 55%, and intrauterine fetal demise (IUFD) occurred in 7% of the cases.

Conclusion: Maternal and perinatal problems are more common in eclampsia patients. Better prenatal care, early detection, and timely treatment of severe pre-eclampsia can lower the incidence of eclampsia.

Keywords: HELLP syndrome; Severe pre-eclampsia; Maternal and fetal outcomes.

INTRODUCTION

Pre-eclampsia is a pregnancy related condition characterized by high blood pressure and involvement of multiple organ systems. It significantly increases the chances of complications and death for both pregnant women and their unborn babies.

Hypertensive diseases are a significant factor leading to maternal and perinatal deaths and complications, affecting both developing and affluent countries. Pre-eclampsia, a multisystem condition, accounts for 3-8% of complicated pregnancies, with its prevalence being higher in poorer nations due to factors such as hypoproteinemia, malnutrition, and inadequate obstetric facilities. Approximately 10-15% of maternal deaths can be directly attributed to pre-eclampsia.¹ The incidence of pre-eclampsia in healthy nulliparas² and multiparas varies by ethnicity, ranging from 3% to 7% and 1% to 3%, respectively.³ Pre-eclampsia is a severe, hypertensive condition that occurs only during pregnancy. Reduces organ perfusion owing to vasospasm and activation of the coagulation cascade, impacting a number of systems.

The neurological system is commonly injured in these women, and it is a major source of sickness and mortality.⁴ The biggest risk to the foetus is reduced placental perfusion, which leads in decreased blood flow of oxygen and nutrients required for foetal growth and wellbeing. Due to a lack of amenities, the patient usually comes late in a rural setting.

A recent epidemiological study conducted by the World Health Organization (WHO) revealed that Pre-eclampsia is directly accountable for 70,000 maternal deaths annually on a global scale. Pre-eclampsia is a complex disorder that affects multiple organ systems. In India, it is estimated that 8-10% of all pregnancies are affected by Pre-eclampsia. Reports indicate that 5.4% of pregnant women specifically have Pre-eclampsia, and 7.8% of them experience hypertensive disorders during pregnancy. The prognosis is often quite excellent when moderate Pre-eclampsia arises after the 36th week of pregnancy, regardless of the patient's race or region. However, depending on the patient's physiological condition, the intensity of the clinical symptoms might vary greatly. When Pre-eclampsia develops before the 33rd week of pregnancy, or at any gestational age in women with pre-existing medical issues, the risk of poor consequences for both the mother and the baby increases

considerably.⁵

Hypertensive disorders of pregnancy (HDP) are prevalent in India, and there are various factors that increase their occurrence. The primary objectives of managing HDP are ensuring the healthy birth of the infant and restoring the mother's health. This involves obstetric management, appropriate monitoring of the fetus, controlling hypertension with anti hypertensive medications, administering anticonvulsant therapy, managing anesthesia during labor, and providing safe pain relief and anesthesia during delivery. Anti-hypertensive drugs and magnesium therapy are utilized to control hypertension and prevent seizures. Invasive monitoring of the patient's hemodynamics is necessary to avoid the serious complication of fluid overload and pulmonary edema. Anesthesia related challenges in HDP cases can be attributed to the systemic effects of the condition. A thorough pre-anesthetic assessment, optimizing physiological parameters, and expediting delivery are the main goals. The risks and benefits of different anesthesia techniques should be carefully considered, as there is currently no conclusive evidence favoring regional anesthesia or general anesthesia in HDP cases.¹

Preventing severe pre-eclampsia related deaths requires access to perinatal care, early detection of the disorder, vigilant monitoring, and appropriate management. In cases of severe pre-eclampsia, the primary treatment approach involves preventing potential maternal complications and delivering the patient. However, the decision to deliver is not always straight forward, considering the well being of the fetus. The rationale behind delaying delivery in such pregnancies is to reduce perinatal morbidity and mortality by allowing for a more mature fetus and, to some extent, achieving a favorable cervix.

Delivery of the patient remains the main treatment option, and the time interval from admission to delivery significantly impacts both maternal and fetal outcomes. Our healthcare facility, being a Tertiary Care Center, often receives complex emergency cases from peripheral maternity clinics and nursing homes. The present study aims to examine the maternal and perinatal outcomes in cases of severe pre-eclampsia.

MATERIALS AND METHODS

The study was conducted in "Dr. Prabhakar Kore Hospital and MRC", Belagavi attached to KAHER's Jawaharlal Nehru Medical College, Belagavi,

from 1st January 2021 to 31st December 2021, covering a period of 12 months. Prior approval from the Institutional Ethical Committee (IEC) was obtained. Waiver of permission was sought and received because all data was collected through the patient record prior to the start of the trial. Each participant was admitted to the study hospital as an inpatient or outpatient and underwent a medical history, physical examination, systemic exams, and pertinent investigations.

Inclusion Criteria:

In the labor room, pregnant women with singleton pregnancies, ranging from 20 to 42 weeks of gestation, are admitted. This includes both primigravida (first time pregnant) and multigravida (previously pregnant) individuals who have high blood pressure, specifically a systolic blood pressure of 160 mmHg or higher and/or a diastolic blood pressure of 110 mmHg or higher. These symptoms may occur with or without proteinuria (presence of protein in the urine) and can be accompanied by imminent signs such as headache, reduced urine output, visual disturbances, persistent epigastric pain (pain in the upper abdomen), abnormal liver function, and low platelet count (thrombocytopenia) below 100,000 per micro liter.

Exclusion Criteria:

The study excluded individuals confirmed case of essential Hypertension, case of Renal Disease, Gestational Hypertension, Diabetes Mellitus, and Cardiac Disease in pregnancy, Medical disorders like epilepsy, cardiac disease, thyroid disease etc.

Statistical Analysis:

For continuous quantitative variables, the mean and standard deviation will be calculated. When comparing data divided into two groups based on a certain qualitative characteristic, appropriate statistical tools such as Student’s unpaired t-test will be used to compare the continuous variables. In cases where pre and post-treatment measures are being compared, Student’s paired t-test will be employed. Discrete variables will be represented by the median. Categorical data will be presented in terms of rates, ratios, and percentages. The association between the outcome, clinical factors, and demographic characteristics will be assessed using tests like the Chi-square test, test of proportion, or Fisher’s exact test. Non-parametric tests will be used for discrete variables. Additionally, other suitable tools like ANOVA,

correlation, and regression analysis will be utilized as needed.

RESULTS

Table 1 illustrates that the majority of the study sample, specifically 45 participants, belonged to the age bracket of 20 to 25 years. The average age within this group was calculated to be 25.87 years, with a standard deviation of 4.8 years. These findings indicate that severe pre-eclampsia is more prevalent among younger individuals. The highest recorded age among the participants was 41 years, while the lowest was 19 years. Additionally, it was observed that 84% of the women included in the study resided in rural areas.

Table 1: Shows the age distribution of study participants in women.

Age	No (116)	Percentage (%)
18-20	13	11.2%
20-25	45	38.7%
26-30	43	37%
31-35	10	8.6%
>35	05	4.5%

According to the data presented in Table 2, our study reveals that among women diagnosed with severe pre-eclampsia, 51% were experiencing their first pregnancy (primigravida), while 57 patients had previously had multiple pregnancies (multigravida).

Table 2: Classification of the study participants based on their gravida status

Category	Sub Category	N=116	% Age
Gravida Status	Primigravida	59	51
	G2	30	26
	G3	21	18
	More than Gravida ⁴	06	5

The information presented in Table-3 indicates that out of the 116 cases examined, 37 women experienced complications. It was observed that among these cases, HELLP syndrome was present in 32.4% of patients, placental abruption in 30%, postpartum hemorrhage (PPH) in 22%, partial HELLP syndrome in 16.2%, pulmonary edema in 11%, and eclampsia with disseminated intravascular coagulation (DIC) in 8.1%. Additionally, 3% of patients required admission to the maternal intensive care unit (ICU). Notably, no maternal deaths were reported as a result of severe pre-eclampsia.

Table 3: Categorization of the study sample based on the occurrence of maternal complications

Complication	Number	%
HELLP	12	32.4
Abruption	11	30
PPH	08	22
Partial HELLP	06	16.2
AKI	04	11
Pulmonary Edema	04	11
Eclampsia	03	8.1
DIC	03	8.1
ICU Admission	01	3
Cerebral Edema	01	3

According to the data provided in Table 3, the study shows that 66% of the new borns were male. In terms of birth weight, 22.4% of the babies fell within the range of 1.1 to 1.5 kg, while 26.7% had a weight ranging from 2.1 to 2.5 kg. Additionally, 14% of the babies had a birth weight exceeding 3 kg. In the current study, out of a total of 116 infants, 105 were born alive. Among these live births, approximately 95 babies experienced perinatal complications. The most common neonatal outcome associated with severe pre-eclampsia was prematurity, observed in 55% of the babies. Additionally, there were 11 cases of intrauterine fetal demise (IUD), including 5 cases of fetal stillbirth (FSB) and 6 cases of neonatal mortality shortly after birth (MSB). Within the neonatal period, 5 babies passed away. Among them, 3 infants died on the fifth day of life due to extremely low birth weight, 1 infant died on the eighth day of life due to an inborn error of metabolism, and 1 infant died on the fifteenth day of life as a result of sepsis.

Table 4: Categorization of the study sample based on the occurrence of perinatal complications

Category	Sub Category	N=116	% age
Sex	Male	76	66
	Female	40	34
Birth weight	<1.0 Kg	08	6.8
	1.1-1.5 Kg	26	22.4
	1.6-2.0 Kg	18	15.5
	2.1-2.5 Kg	31	26.7
	2.6-3.0 Kg	19	16.3
	>3.0 Kg	14	12.3
Complications	Type	Number (n=95)	%
	Prematurity	50	53
	FGR	15	15.7
	IUD	11	12

Low apgar	14	14.3
Perinatal death	05	5

As depicted in Table 5, the present study involved the transfer of 52 infants to the Neonatal Intensive Care Unit (NICU) for various reasons. The majority of these babies were monitored for a duration of 48-72 hours and received antibiotics and intravenous fluids. The most frequent indications for NICU admission were low birth weight, birth asphyxia, and preterm birth. Additionally, two babies were transferred to the NICU due to specific conditions: one with congenital diaphragmatic hernia and another with hyperbilirubinemia.

Table 5: Distribution according on the criteria for NICU admission.

Indications	N=52	%
LBW	16	30.7
Birth Asphyxia	09	17.3
Prematurity	15	29
FGR	06	11.5
MAS	04	8
Others	02	3.5

DISCUSSION

Pre-eclampsia, a type of hypertensive disorder during pregnancy, is a significant global health concern. It affects 5-10% of pregnancies and is a leading cause of maternal and neonatal morbidity and mortality. Severe pre-eclampsia occurs in approximately 25% of cases. This study, conducted at KAHER's Dr. Prabhakar Kore Hospital affiliated with JNMC, aims to investigate the impact of severe pre-eclampsia on women and its outcomes for both mothers and newborns during the study period from January 2021 to December 2021.

Age is a crucial factor in our study as it correlates with higher risks for both mothers and newborns. Our findings reveal that the average age of the women included in the study was 25.87 years, with a standard deviation of 4.8 years. This suggests that severe pre-eclampsia is more prevalent among younger individuals. Specifically, 38.7% of the women belonged to the age group of 20-25 years, while 8.6% fell within the age range of 31-35 years. Patnaik *et al.*, 2019⁶ have reported similar findings, indicating that 70% of women in their study fell within the age range of 20-30 years, while only 10% were over 30 years old. Similarly, Saxena *et al.*, 2016⁷ conducted a study where approximately 71%

of the participants were in the age group of 20-30 years. However, in contrast to our results, Sahu *et al.*, 2009⁸ found that maternal age was significantly higher in cases of pregnancy-induced hypertension.

Our current study reveals an association between pre-eclampsia and primigravida (first-time pregnancy). We observed that pre-eclampsia occurred more frequently among primigravida women, accounting for 51% of the cases, compared to 49% among multigravida (women with multiple pregnancies). Out of the total 116 women included in the study, 59 were primigravida, while 57 were multiparous (had previous pregnancies). In a study conducted by Katz *et al.*, 2012⁹ similar to our study, it was reported that 70% of women in the study population were primigravida. Similarly, Swamy *et al.*, 2012¹⁰ and Pillai *et al.*, 2017¹¹ conducted studies where 50% and 61% of the study populations were primigravida, respectively. Sibai *et al.*, 2005¹² and Cunningham *et al.*, 2010¹³ conducted a review of multiple studies worldwide and found that the incidence of pre-eclampsia was higher in nulliparous (having no previous pregnancies) populations compared to multiparous populations.

Out of the total 116 cases examined in our study, 37 patients (32%) experienced maternal complications. The most prevalent complication was HELLP syndrome, observed in 12 cases, followed by placental abruption in 9 cases, postpartum hemorrhage (PPH) in 8 cases, and partial HELLP syndrome in 6 patients. Regarding intensive care unit (ICU) admission, our study found that 0.3% of cases required ICU care. In contrast, Patnaik *et al.*, 2019⁶ reported an ICU admission rate of 4.16% among cases with severe pre-eclampsia, highlighting the adequate care provided to the cases in our study. Murphys *et al.*, 2000¹⁴ conducted a study where 9 cases of placental abruption were reported. However, in a study by Singhal *et al.*, 2009¹⁵ only one case of abruption was documented. George *et al.*, 2017¹⁶ reported a high maternal mortality rate of 61.66%. On the other hand, Ngwenya *et al.*, 2019¹⁷ reported lower maternal mortality rates of 1.5%, 1.7%, and 1.3% in their respective settings.

In our study, the overall rate of fetal growth restriction (FGR) was found to be 15.7%. Out of the total 105 babies born alive (87%), 14 infants (13.5%) had an Apgar score less than 7 at 5 minutes. Specifically, about 7.6% of the babies had an Apgar score between 0 and 5, while 6% had a score between 5 and 7 at 5 minutes after birth. Among the 105 live-born infants, a total of 52 babies required admission to the Neonatal Intensive Care

Unit (NICU). The median duration of stay in the NICU for these infants was 12 days. There was no significant difference observed in the rate of FGR, NICU admission, or NICU stay among different gestational age groups. The study reported a neonatal mortality rate of 5%. Turgut *et al.*, 2008¹⁸ conducted a study where they found that the mean Apgar score at one minute was 6.39, and at five minutes, it was approximately 7.39. Prematurity is frequently observed in cases of severe pre-eclampsia, and in our study, the majority of cases (66%) involved preterm deliveries. Similar results were reported by Tuffnell *et al.*, 2005¹⁹ where 65.3% of infants were born prematurely.

In our current study, the primary reason for admission to the Neonatal Intensive Care Unit (NICU) was low birth weight, accounting for 53% of cases, followed by fetal distress at 15.7%. In contrast, a study by Turgut *et al.*, 2008¹⁸ reported a higher NICU admission rate of 69.5%, with hyperbilirubinemia being the most common cause for admission.

CONCLUSION

The objective of this study was to investigate the consequences for both the mother and fetus when faced with severe pre-eclampsia. The aim was to hinder the disease's natural advancement by implementing preventive measures at secondary and tertiary levels. Detecting and preventing the condition early on are vital in mitigating its severity and related complications. Proficient management of severe pre-eclampsia substantially diminishes the rates of illness and death for both the mother and newborn. The study emphasizes the significance of adequate antenatal care and management in tertiary healthcare facilities to effectively decrease risks to both the mother and baby.

LIMITATIONS

There are several limitations to consider when assessing maternal and perinatal outcomes in severe pre-eclampsia. Firstly, the study may have a small sample size, which can limit the generalizability of the findings to a larger population. Additionally, there may be selection bias present if certain high-risk cases were excluded from the study. Moreover, confounding factors such as the presence of other comorbidities or the use of different treatment approaches can influence the outcomes and make it difficult to isolate the effects of severe pre-

eclampsia alone. Furthermore, the study may not have accounted for all potential confounders, such as socio-economic status, which can impact maternal and perinatal outcomes. Lastly, the follow-up duration of the study might be limited, which may not capture long-term outcomes and potential complications that can arise later in pregnancy or postpartum. Considering these limitations is crucial when interpreting the results and applying them to clinical practice.

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