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MATERNAL AND FETAL OUTCOMES IN HYPERTENSIVE DISORDERS OF PREGNANCY: AN OBSERVATIONAL STUDY AT A TERTIARY CARE CENTRE

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Abstract:

Background: Hypertensive disorders of pregnancy (HDP) ranks among the foremost contributors to maternal and perinatal morbidity and mortality across the globe. These disorders encompass a continuum that ranges from gestational hypertension to more severe conditions such as preeclampsia, eclampsia, and HELLP syndrome. The early identification and judicious management of these conditions are paramount to enhancing outcomes, particularly in resource-limited settings. This study aimed to evaluate the maternal and fetal outcomes associated with hypertensive disorders of pregnancy within a tertiary care framework.

Methods: A prospective observational study was conducted at the Department of Obstetrics and Gynaecology, ESIC Medical College and Hospital, Joka, Kolkata, from November 2023 to November 2024. A total of 100 women diagnosed with HDP beyond 20 weeks of gestation were enrolled. Detailed clinical assessment, investigations, and follow-up evaluations were meticulously performed. Maternal outcomes such as mode of delivery and complications, and fetal outcomes including birth weight, gestational age, NICU admission, and perinatal mortality were recorded and analyzed.

Results: The incidence of HDP among all deliveries during the study period was 6%. Gestational hypertension was the most common subtype (78%), followed by preeclampsia (10%). Primigravida women constituted 68% of the cases. Caesarean section was performed in 84% of patients, while 30% had preterm deliveries. The most common maternal complication was postpartum eclampsia (12%), and the most frequent fetal outcomes included low birth weight (28%), intrauterine growth restriction (15%), NICU admission (16%), and neonatal death (2%). A statistically significant association was found between the type of HDP and adverse maternal and fetal outcomes.

Conclusion: HDP continues to present significant threats to maternal and neonatal health. Timely identification, appropriate antenatal care, and swift referral to specialized centers are paramount in mitigating complications. Strengthening perinatal care pathways and instituting standardized management protocols can profoundly enhance outcomes.

Keywords: Hypertensive disorders, Preeclampsia, Eclampsia, Maternal outcomes, Fetal outcomes, Gestational hypertension.

Introduction

Hypertensive disorders of pregnancy (HDP) are among the leading causes of maternal and perinatal morbidity and mortality worldwide, particularly in low- and middle-income countries. Globally, they complicate approximately 5–10% of pregnancies and significantly contribute to adverse outcomes such as preterm birth, low birth weight, placental abruption, and intrauterine growth restriction (IUGR) [1,2]. In India, the burden remains substantial, with HDP responsible for a considerable proportion of maternal deaths despite improvements in antenatal surveillance and institutional deliveries [3].

The spectrum of HDP includes chronic hypertension, gestational hypertension, pre-eclampsia, eclampsia, and chronic hypertension with superimposed pre-eclampsia. Among these, pre-eclampsia is particularly notorious due to its unpredictable course and potential for rapid progression to severe complications [4]. It is defined as new-onset hypertension after 20 weeks of gestation with proteinuria or signs of end-organ dysfunction in a previously normotensive woman [5]. Eclampsia, characterized by the occurrence of seizures in a preeclamptic patient, remains a major cause of maternal deaths in many resource-limited settings [6].

HELLP syndrome (Hemolysis, Elevated Liver enzymes, and Low Platelet count) is another serious manifestation of severe pre-eclampsia and is associated with increased maternal morbidity due to hepatic and hematologic complications [7]. The pathogenesis of HDP involves abnormal trophoblastic invasion, systemic endothelial dysfunction, oxidative stress, and an exaggerated maternal inflammatory response [8]. Several risk factors such as primigravida mother, advanced maternal age, obesity, pre-existing hypertension, and genetic predisposition have been implicated in the development of these disorders [9].

The management of HDP is challenging, requiring close monitoring, timely decision-making, and often early delivery helps to prevent worsening of maternal or fetal condition. Adverse maternal outcomes include abruptio placenta, pulmonary edema, renal failure, and postpartum hemorrhage, while fetal consequences range from growth restriction and preterm birth to stillbirth and neonatal death [10]. Therefore, regular evaluation of outcomes in hypertensive pregnancies is crucial for improving clinical care and guiding policy decisions, particularly in tertiary care settings where high-risk cases are referred and managed.

The present study was undertaken to assess maternal and fetal outcomes in women diagnosed with hypertensive disorders of pregnancy at a tertiary care centre in eastern India.

Material and Methods

This prospective observational study was conducted in the Department of Obstetrics and Gynaecology at ESIC Medical College and Hospital, Joka, Kolkata, a tertiary care teaching hospital, over a period of one year from November 2023 to November 2024.

All pregnant women admitted during this period who were diagnosed with hypertensive disorders of pregnancy (HDP) after 20 weeks of gestation and consented to participate in the study were included. The spectrum of HDP in this study included gestational hypertension, pre-eclampsia, eclampsia, chronic hypertension, and chronic hypertension with superimposed preeclampsia. Women with known chronic systemic illnesses unrelated to hypertension (such as diabetes mellitus, renal disease, or thyroid disorders), multiple pregnancies, or those who declined consent were excluded. A total of 100 women met the inclusion criteria and were enrolled, out of 1650 deliveries that occurred during the study period, giving an institutional incidence of 6% for HDP. Each patient underwent detailed history-taking, clinical examination, and necessary laboratory investigations. Hypertensive disorders were classified as per the American College of Obstetricians and Gynecologists (ACOG) guidelines. Maternal outcomes assessed included the mode of delivery, onset of labour, and complications such as eclampsia, HELLP syndrome, placental abruption, postpartum haemorrhage, and requirement for intensive care. Fetal outcomes evaluated were gestational age at delivery, birth weight, Apgar scores at 1 and 5 minutes, presence of intrauterine growth restriction (IUGR), NICU admission, and incidence of stillbirth or early neonatal death within seven days. All data were collected using a

predesigned case record form and subsequently entered into Microsoft Excel. Statistical analysis was performed using SPSS version 22.0. Descriptive statistics such as mean and percentage were used to summarize the data.

Results:

Out of 1650 pregnant women admitted during the study period, 100 patients were diagnosed with hypertensive disorders of pregnancy (HDP), yielding an incidence of 6%. The findings are presented in the following tables and figures.

Table 1 presents the distribution of patients according to maternal age and parity. In this study, the majority of women with hypertensive disorders of pregnancy were between 21 and 29 years of age, comprising 46% of the total study population. This was followed by 28% in the 30–34 years age group. A smaller proportion of patients fell into the extremes of reproductive age, with 14% aged below 20 years and 12% aged 35 years or older. With regard to parity, primigravida women represented a larger share of the study group, accounting for 68%, while multigravida women comprised the remaining 32%.

Table 1: Distribution According to Maternal Age and Parity

Category		**No. of Patients**
Age	<20 years	14
	21–29 years	46
	30–34 years	28
	≥35 years	12
Gravida	Primigravida	68
	Multigravida	32

Severity and the type of hypertensive disorder among study population is shown in Table 2. Among the 100 patients included in the study, the most common diagnosis was gestational hypertension, which was seen in 78% of cases. Pre-eclampsia accounted for 10% of the patients, representing the second most common category. Chronic hypertension, defined as pre-existing hypertension or that diagnosed before 20 weeks of gestation, was seen in 5% of cases. Chronic hypertension superimposed with pre-eclampsia was noted in 4% of the study population, indicating progression to a more severe condition in patients with pre-existing hypertension. Eclampsia, a severe form of pre-eclampsia characterized by the occurrence of seizures, was diagnosed in 3% of cases. A single patient (1%) manifested HELLP syndrome, a life-threatening complication characterized by hemolysis, elevated hepatic enzymes, and a diminished platelet count.

Table 2: Distribution of patients Based on Severity of HDP

Type of HDP	**No. of Patients**
Gestational Hypertension	78
Preeclampsia	10
Chronic Hypertension	5
Chronic HTN superimposed with Preeclampsia	4
Eclampsia	3
HELLP Syndrome	1

Figure 1 presents the mode of delivery among women diagnosed with hypertensive disorders of pregnancy. Out of the 100 patients included in the study, 84% underwent lower segment caesarean section (LSCS), while only 16% had a vaginal delivery.

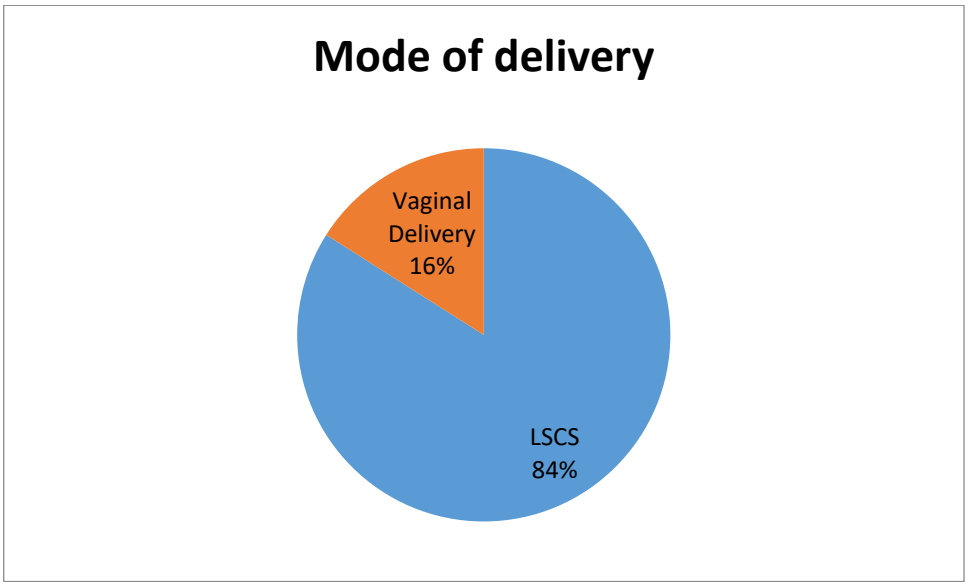

Figure 1: Mode of Delivery

Figure 2 illustrates the distribution of patients based on gestational age at the time of delivery. Out of 100 women with hypertensive disorders of pregnancy, 70% delivered at term (≥37 weeks of gestation), while the remaining 30% had preterm deliveries (<37 weeks).

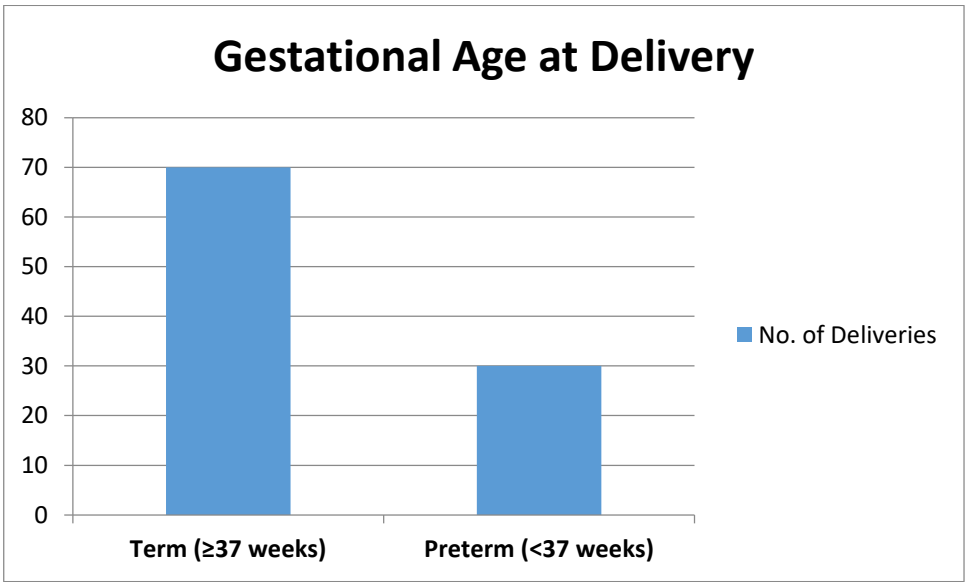

Figure 2: Gestational Age at Delivery

Table 3 outlines the maternal complications observed among the study population. The most frequently encountered complication was postpartum eclampsia, reported in 12 patients, accounting for the majority of serious maternal events. Antepartum eclampsia was seen in 2 cases, indicating seizure activity occurring before delivery.

HELLP syndrome, a severe and potentially life-threatening variant of pre-eclampsia characterized by hemolysis, elevated liver enzymes, and low platelet count, was diagnosed in 1 patient. Similarly, placental abruption, a condition involving premature separation of the placenta, was observed in 1 case.

These complications reflect the spectrum of severe maternal morbidity associated with hypertensive disorders of pregnancy. The predominance of postpartum eclampsia underscores the critical need for continued maternal monitoring even after delivery, as significant risks persist into the postpartum period.

Table 3: Maternal Complications

Complication	No. of Patients
Postpartum Eclampsia	12
Antepartum Eclampsia	2
HELLP Syndrome	1
Placental Abruption	1

Table 4 presents the distribution of fetal outcomes among neonates born to mothers with hypertensive disorders of pregnancy. The most frequently observed adverse outcome was low birth weight, reported in 28% of cases. This is consistent with the known association between maternal hypertension and compromised placental perfusion, which often results in restricted fetal growth.

Intrauterine growth restriction (IUGR) was seen in 15% of neonates, further supporting the impact of placental insufficiency on fetal development. Poor Apgar scores and birth asphyxia were each recorded in 12% of newborns, indicating a significant proportion of infants with immediate postnatal compromise. As a result, 16% of neonates required admission to the neonatal intensive care unit (NICU) for further management.

Severe perinatal outcomes were relatively rare but present, with 2 cases of neonatal death within 7 days and 1 stillbirth recorded during the study period.

These findings underscore the heightened risk of adverse perinatal outcomes in pregnancies complicated by hypertension. They also highlight the importance of timely obstetric intervention and neonatal support to improve survival and reduce morbidity in this high-risk group.

Table 4: Fetal Outcomes

Fetal Outcome	No. of Cases
IUGR	15
Low Birth Weight	28
Poor Apgar	12
Birth Asphyxia	12
NICU Admission	16
Neonatal Death (<7 days)	2
Stillbirth	1

Discussion:

Hypertensive disorders of pregnancy (HDP) pose significant risks to both maternal and fetal health and remain a leading cause of morbidity and mortality, particularly in developing countries. The findings from our study reflect the continued burden of these disorders in a tertiary care setting, where high-risk pregnancies are often referred for advanced management.

In this study, gestational hypertension accounted for the majority of cases (78%), followed by preeclampsia (10%) and other severe forms such as eclampsia and HELLP syndrome. A similar pattern was observed by Prakash et al., who reported that gestational hypertension was the most frequently diagnosed form of HDP in their cross-sectional analysis [11]. The predominance of gestational hypertension may suggest increasing awareness and early detection, although progression to more severe forms remains a concern.

Postpartum eclampsia emerged as the most common maternal complication in our cohort. This underscores the need for continued vigilance during the postpartum period. According to a prospective study by Sultana et al., a significant proportion of eclamptic seizures occurred after delivery, often within the first 48 hours [12]. Such outcomes highlight the importance of blood pressure monitoring even after childbirth, especially in patients with unresolved hypertension or proteinuria.

The high caesarean section rate (84%) in our study reflects clinical decisions made to optimize maternal and fetal outcomes in the context of HDP. Gupta et al. similarly observed a higher prevalence

of operative delivery among women with hypertensive complications, citing indications such as fetal distress, failed induction, and poor cervical response [13].

Preterm birth occurred in 30% of our patients, consistent with earlier studies showing that HDP frequently necessitates early delivery to prevent worsening maternal or fetal conditions. A study conducted by Kumari et al. reported a comparable preterm delivery rate of 28%, often due to severe preeclampsia or growth restriction [14].

Among fetal outcomes, low birth weight (28%) and IUGR (15%) were prominent, confirming the impact of placental insufficiency associated with maternal hypertension. Singh et al. found that nearly 1 in 4 neonates born to hypertensive mothers had low birth weight and demonstrated signs of intrauterine growth restriction [15].

NICU admissions were required in 16% of cases, reflecting both prematurity and birth asphyxia. In a multicentre study by Begum et al., it was noted that NICU admission was significantly higher among neonates born to mothers with HDP, particularly when delivery occurred before 37 weeks or in the presence of fetal distress [16].

Severe maternal complications such as HELLP syndrome and placental abruption, although rare in our study, were associated with considerable morbidity. Jain et al. reported that such complications, though infrequent, often led to ICU admissions and were linked to prolonged hospital stay and increased maternal intervention [17].

Stillbirth and early neonatal death occurred in 3% of cases. While this rate is relatively low compared to regional averages, it still highlights the fatal potential of unmanaged HDP. Dutta et al. emphasized that even with institutional delivery, fetal demise can occur due to delayed referral or late-onset complications [18].

Our analysis also revealed a significant correlation between the type of HDP and the occurrence of maternal and fetal complications, suggesting that more severe forms such as preeclampsia and eclampsia are associated with a higher risk profile. This is consistent with findings by Naik et al., who showed that complication rates escalated with disease severity [19].

Primigravida was a notable risk factor in our population, accounting for 68% of HDP cases. This trend has been confirmed in several studies, including one by Rani et al., which found primigravida mothers to be disproportionately affected due to immunological and vascular maladaptation to pregnancy [20].

From a public health perspective, it is essential to strengthen antenatal screening and community-level awareness, particularly for high-risk groups. Patel et al. emphasized that early detection through routine blood pressure and urine checks can significantly reduce adverse outcomes [21].

Lastly, the study underlines the need for standardized management protocols and availability of emergency obstetric services in peripheral centers to prevent delay in referral. A recent review by Bhosale et al. concluded that outcomes in HDP improve substantially with timely diagnosis and a multidisciplinary approach to care [22].

Conclusion:

Hypertensive disorders of pregnancy remain a significant contributor to adverse maternal and fetal outcomes, even in tertiary care settings. This study demonstrated that gestational hypertension was the most common form of HDP, with primigravida women being disproportionately affected. A substantial proportion of patients required operative delivery, and maternal complications such as postpartum eclampsia and fetal outcomes like low birth weight, IUGR, and NICU admissions were commonly observed. The findings underscore the importance of early identification, regular antenatal monitoring, and timely intervention to mitigate complications. Strengthening peripheral healthcare systems, improving referral mechanisms, and adhering to standardized management protocols are essential to improve maternal and perinatal outcomes in pregnancies complicated by hypertension.

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