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Original Research Article

Outcomes of pregnancy complicated by hypertension: A study of maternal and fetal health

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Abstract

Background: Untreated hypertension, especially preeclampsia, causes adverse maternal outcomes such as pulmonary edema, renal impairment, and posterior reversible encephalopathy syndrome, while uncontrolled gestational hypertension compromises fetal outcomes by increasing the odds of preterm delivery and low birth weight. Despite our enhanced healthcare infrastructure, HDP remains a significant contributor to maternal mortality in India and the rest of Southeast Asia.

Aims and Objective: Our study aims to compare pregnancy outcomes in women with chronic hypertension, gestational hypertension, and preeclampsia to identify risk profiles and inform targeted interventions for better maternal and neonatal health.

Methodology: This observational study was conducted from July to December 2024 at a tertiary care center in Chengalpattu, Tamil Nadu, where 1059 women were screened for hypertensive disorders, with 141 participants ultimately included. A comparative analysis of five hypertensive groups was conducted to evaluate maternal and fetal outcomes.

Results: The preeclampsia/eclampsia group showed higher rates of Caesarean deliveries (64.6%), HELLP syndrome (18.8%), acute renal failure (4.1%), pulmonary oedema (2.1%), and placental abruption (20.8%), all significant with $p < 0.01$. This group contributed to 62.5% of ICU admissions, with an average hospital stay of 9.30 days ($p < 0.01$). Neonatal outcomes were less favorable, showing a high incidence of preterm birth, low birth weight (2950.6 g, $p = 0.04$), and the lowest APGAR score at 1 minute (8.30, $p = 0.02$), with high NICU admission rates (29.2%).

Conclusion: This study outlines a clear risk continuum associated with hypertensive disorders in pregnancy. It shows that gestational hypertension and chronic hypertension carries a relatively low risk compared to preeclampsia and eclampsia, both of which significantly increase maternal and neonatal complications.

Keywords: Preeclampsia, Chronic hypertension, Maternal outcomes, Neonatal outcome, Gestational hypertension.

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1. Introduction

Hypertensive disorders of pregnancy (HDP) encompass conditions that arise during pregnancy, including chronic hypertension (before 20 weeks) and gestational hypertension (after 20 weeks).[1,2] Preeclampsia is characterized by gestational hypertension and systemic symptoms, often including proteinuria, while eclampsia is a severe progression involving seizures.[3] Chronic hypertension with superimposed preeclampsia occurs when new hypertensive symptoms arise in women with pre-existing hypertension. These disorders account for 5-14% of maternal deaths worldwide, particularly in low-income countries where rates can reach 16.7%.[4] In more developed nations, the eclampsia rate is only 0.2% with a 0.8% maternal mortality rate, whereas in less advantaged areas, eclampsia prevalence can rise to 8.1%, leading to a maternal mortality rate of 22%.[5] Hypertensive disorders in pregnancy (HDPs) affect 11% of pregnancies in India, making it one of the countries with the highest rates globally.[6] South Asians, who represent 25% of the world population,

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bear 60% of the global burden of heart disease.[7] Most maternal deaths from HDPs occur in low- and middle-income countries, particularly in South Asia and Sub-Saharan Africa, with many being preventable despite limited healthcare resources.[8] Additionally, 11.3% of non-pregnant Indian women aged 15 to 49 suffer from chronic hypertension.[6]

Untreated hypertension, especially preeclampsia, poses serious risks to maternal health, increasing the likelihood of acute conditions and cardiovascular events, with women facing an eightfold increase in risks for issues like thromboembolic events and strokes.[9] Uncontrolled gestational hypertension can lead to premature births and low birth weights due to inadequate blood flow to the uterus, exposing infants to long-term health challenges.[10] The causes of HDP are complex and include factors such as maternal age, obesity, and inadequate antenatal care.[9] Healthy nulliparous women generally have a low incidence of HDP, while those with a history face a significantly higher recurrence risk. Targeted management strategies are crucial for high-risk populations, as there is no definitive cure for HDP. Recent guidelines emphasize the importance of routine blood pressure measurements for early detection of these conditions associated with pregnancy-related morbidity.[11,12]

Preeclampsia affects over 35% of pregnant women with gestational hypertension and 25% with chronic hypertension, contributing to 11% of maternal mortality.[13] During a typical pregnancy, the spiral arteries transform into large-capacity blood vessels. However, in preeclampsia, abnormal cytotrophoblastic invasion disrupts this remodeling, leading to increased blood pressure and irregular blood flow, which can cause placental and fetal hypoxia.[14] This process restricts blood flow to the fetus, prompting the release of vasoactive substances that raise maternal blood pressure and cause endothelial dysfunction, resulting in microthrombosis and organ impact similar to preeclampsia. Despite India's focus on improving healthcare and training professionals, hypertensive disorders of pregnancy (HDP) remain a significant issue, highlighting the need for more research on risk factors. The lack of studies on HDP predictors in India is concerning due to its role in maternal mortality in Southeast Asia. This study aims to evaluate maternal-neonatal outcomes related to chronic and gestational hypertension and preeclampsia, while exploring the influence of socio-demographic, obstetric, and medical histories on HDP development.

2. Methodology

The study was conducted over six months, from July 2024 to December 2024, at a private tertiary care center in Chengalpattu, Tamil Nadu, encompassing both outpatient and inpatients. As the aim was to analyze the outcomes across various hypertensive groups, there will be no control group. Instead, a comparative analysis was done among the five hypertensive groups to assess differences in maternal and fetal outcomes.

2.1. Selection criteria

The study involves women of reproductive age with hypertensive disorders of pregnancy, including both singleton and multiple pregnancies, and recruits at any gestational age. Excluded participants are those with pre-existing renal disease, chronic systemic illnesses, pre-gestational diabetes, incomplete medical records, or unwillingness to participate.

2.2. Ethical considerations

Before proceeding with our investigation, we got approval from the Institutional Ethics Committee (IEC), and all subjects provided written informed consent. The study followed the principles set in the Declaration of Helsinki for conducting research with human beings.

2.3. Sample size calculation

Based on the previously published local literature, the prevalence of HDP was 10.4%,[15] sample size formula for single proportion with absolute precision was employed to determine the study sample size. With a significance level set at 95%, and marginal error rate set at 5%, the determined sample size was 139. Nevertheless, we ended up recruiting 141 women with HDP, exceeding the actual requirement for this study by purposive sampling.

2.4. Data collection

Pregnant women presenting with hypertension-related symptoms in the outpatient department (OPD) or admitted to the hospital will be screened for eligibility using predefined criteria and a semi-structured screening tool. Informed consent will be obtained before data collection, and participants will be informed about the study's objectives, methodologies, potential risks, and confidentiality measures. After recruitment, we will document maternal demographic and clinical data, including age, body mass index (BMI), parity, gestational age at presentation, history of hypertension, comorbid conditions (e.g., anemia, gestational diabetes), and presenting symptoms such as headache, visual disturbances, swelling, proteinuria, and seizures. Hypertensive disorders will be categorized into five groups based on clinical diagnosis.

1. Chronic hypertension: Detected before 20 weeks of gestation, characterized by BP ≥ 140 mm Hg and/or DBP ≥ 90 mm Hg.
2. Gestational hypertension is referred as recently developed hypertension >20 weeks (SBP ≥ 140 mm Hg and/or DBP ≥ 90 mm Hg) without the systemic complications.
3. Preeclampsia is defined as hypertension (SBP ≥ 140 mm Hg and/or DBP ≥ 90 mm Hg) with proteinuria and/or systemic problems (e.g., thrombocytopenia, raised transaminase levels, renal failure, APE, or headache) after 20 weeks.

4. Eclampsia: Preeclampsia with new-onset seizures unrelated to other causes.
5. Chronic hypertension with superimposed preeclampsia: pre-existing hypertension along with target organ involvement.

Maternal outcomes such as mode of delivery (vaginal, assisted, cesarean) and maternal complications, including postpartum hemorrhage, placental abruption, HELLP syndrome, ICU admission, and maternal mortality were evaluated. Adverse fetal and neonatal outcomes assessed include fetal growth restriction, birth weight categories, preterm birth, fetal distress, NICU admission, low APGAR scores, stillbirth, and neonatal mortality. Treatments and interventions include antihypertensive medications, magnesium sulfate therapy, and corticosteroids for fetal lung maturity.

2.5. Data analysis

Data was analyzed using SPSS V20. Categorical variables (hypertensive subtypes, delivery procedures, newborn complications) were presented as percentages and frequencies. Continuous data (patient age, gestational period, and neonatal birth weight) were displayed as mean ± SD. ANOVA was used to compare continuous variables across groups.

3. Results

Among a cohort of 1,059 women, the analysis found that the incidence of gestational hypertension was the most common, affecting 6.9% of participants (74 women), with a 95% confidence interval (CI) of 5.5 to 8.5. Pre-eclampsia was identified in 4.1% of the women (43 women), with a 95% CI ranging from 2.9 to 5.2. The incidence of eclampsia was relatively low, found in 0.5% of the women (5 women), with a 95% CI of 0.1 to 0.9. Chronic hypertension was noted in 0.7% of the cohort (7 women), corresponding to a 95% CI of 0.2 to 1.1. Additionally, superimposed pre-eclampsia was observed in 1.1% of the women (12 women), with a 95% CI of 0.5 to 1.7. In comparison, most pregnancies in the studied population were normotensive, accounting for 86.7% (918 women), with a 95% CI of 0.85 to 0.89. **(Table 1)**

The baseline characteristics of patients with pregnancy-induced hypertensive disorders (PIH) were assessed across three subgroups: gestational hypertension/chronic hypertension (n = 81), pre-eclampsia/eclampsia (n = 48), and superimposed pre-eclampsia (n = 12). The mean age difference was significant among the groups ($p < 0.01$). The gestational hypertension/chronic hypertension subgroup had an average of 30.21 ± 3.20 years, while the pre-eclampsia/eclampsia subgroup was younger, with a mean of 25.29 ± 4.47 years. The superimposed group also had a low mean age of 26.58 ± 1.73 years. The groups had a statistical difference ($p < 0.01$) in age distribution. The percentage of women <20 years of age was highest in the pre-eclampsia/eclampsia group (16.7%), while this age group constituted only 2.5% in the gestational hypertension/chronic hypertension subgroup and was absent in the superimposed group. The urban and rural residences do not vary significantly ($p = 0.210$) across the subgroups. The majority of patients resided in urban areas, with 69.1% in the gestational hypertension/chronic hypertension group and 56.2% in the pre-eclampsia/eclampsia group. Marital history does not show variation across the groups ($p = 0.465$). The level of education did not reveal significant differences among the groups ($p = 0.496$). The difference in gravidity between the groups was significant ($p < 0.01$). Primigravida was most common in the pre-eclampsia/eclampsia group (70.8%), followed by 33.3% in the superimposed group and 32.1% in the gestational/chronic hypertension group. The mean gestational age at admission significantly differed among the three groups ($p < 0.01$). The mean gestational age was higher in the gestation/chronic hypertension group (36.06 ± 2.78 weeks), the pre-eclampsia/eclampsia group (34.29 ± 3.59 weeks), and the superimposed group at 34.42 ± 3.87 weeks. A significant difference was observed in gestational age distribution ($p < 0.01$). The proportion of women admitted before 34 weeks was highest in the superimposed group (58.3%), followed by the pre-eclampsia group (52.1%) and 27.2% in the gestational/chronic hypertension group. **(Table 2)**

Most women in all groups attended antenatal care, with 98.8% in the gestational/chronic hypertension group. There was no variation in booking status among the groups ($p = 0.535$). However, there was a significant difference in the history of miscarriage among the groups ($p < 0.01$). The pre-eclampsia/eclampsia group had the highest rate of women with a history of miscarriage at 47.9%, compared to 18.5% in the gestational/chronic hypertension group and 41.7% in the superimposed group. The presence of a prior HDP was significantly correlated with the hypertensive disorder in the current pregnancy ($p = 0.05$). A history of PIH was more common in the pre-eclampsia/eclampsia group (35.4%) and superimposed group (33.3%), compared to 17.3% in the gestational/chronic hypertension group. No difference ($p = 0.308$) was observed with a family history of hypertension among the groups. Statistically significant variation in prepregnancy BMI was noted between the groups ($p = 0.03$). The mean BMI was highest in the superimposed group (32.30 ± 2.03 kg/m²), followed by 30.39 ± 3.39 kg/m² in the pre-eclampsia/eclampsia group, and 30.04 ± 2.42 kg/m² in the gestational/chronic hypertension group. A significant association ($p < 0.01$) was found between BMI and hypertensive disorder type. A higher proportion of women with a BMI >30 kg/m² or more was observed in the superimposed group (91.7%), followed by 62.3% in the pre-eclampsia/eclampsia group and 44.4% in the gestational/chronic hypertension group. **(Table 2)**

Table 1: Per-women incidence of hypertensive disorders of pregnancy

HDP	Incidence (per 1059 women)	95% CI for the incidence
Gestational hypertension	74 (6.9%)	5.5 – 8.5
Pre-eclampsia	43 (4.1%)	2.9 – 5.2
Eclampsia	5 (0.5%)	0.1 – 0.9
Chronic hypertension	7 (0.7%)	0.2 – 0.11
Chronic hypertension with superimposed pre-eclampsia	12 (1.1%)	0.5 – 1.7
Normotensive pregnancies	918 (86.7%)	0.85 – 0.89

Table 2: Baseline socio-demographic and obstetric characteristics of patients with PIH

Baseline maternal characteristics	Gestational hypertension/ chronic hypertension (n = 81)	Pre-eclampsia/eclampsia (n = 48)	Chronic hypertension with superimposed preeclampsia (n = 12)	p value
Age (mean ± SD)	30.21 ± 3.20	25.29 ± 4.47	26.58 ± 1.73	**<0.01***
Age in groups (years)				
<20 years	2 (2.5%)	8 (16.7%)	0 (0)	**<0.01***
21 to 30 years	38 (46.9%)	33 (68.8%)	12 (100%)	
>30 years	41 (50.6%)	7 (14.6%)	0 (0)	
Place of residence				
Urban	56 (69.1%)	27 (56.2%)	6 (50%)	0.210
Rural	25 (30.9%)	21 (43.8%)	6 (50%)	
Marital status				
Married	80 (98.8%)	46 (95.8%)	12 (100%)	0.465
Unmarried	1 (1.2%)	2 (4.2%)	0 (0)	
Educational status				
Primary	11 (13.6%)	5(10.4%)	1 (8.3%)	0.496
Middle	4 (4.9%)	7 (14.6%)	2 (16.7%)	
High	38 (46.9%)	18 (37.5%)	6 (50%)	
Degree	28 (34.6%)	18 (37.5%)	3 (25%)	
Gravida				
Primi	26 (32.1%)	34 (70.8%)	4 (33.3%)	**<0.01***
Multi	55 (67.9%)	14 (29.2%)	8(66.7%)	
Gestational age in weeks at admission (mean ± SD)	36.06 ± 2.78	34.29 ± 3.59	34.42 ± 3.87	**<0.01***
Gestational age in groups				
≤34 weeks	22 (27.2%)	25 (52.1%)	7 (58.3%)	**<0.01***
34 – 37 weeks	32 (39.5%)	11 (22.9%)	0 (0)	
>37 weeks	27 (33.3%)	12 (25.0%)	5 (41.7%)	
Booking status				
Booked	80 (98.8%)	45 (93.8%)	12 (100%)	0.535
Unbooked	1 (1.2%)	3 (6.2%)	0 (0)	
Previous history of miscarriage				
Yes	15 (18.5%)	23 (47.9%)	5 (41.7%)	<0.01*
No	66 (81.5%)	25 (52.1%)	7 (58.3%)	
Previous history of PIH				
Yes	14 (17.3%)	17 (35.4%)	4 (33.3%)	**0.05***
No	67 (82.7%)	31 (64.6%)	8 (66.7%)	
Family history of hypertension				
Yes	32 (39.5%)	14 (29.2%)	6 (50%)	0.308
No	49 (60.5%)	34 (70.8%)	6 (50%)	
Prepregnancy BMI Kg/m^2 (mean ± SD)	30.04 ± 2.42	30.39 ± 3.39	32.30 ± 2.03	**0.03***
Prepregnancy BMI in groups				
<30 Kg/m^2	45 (55.6%)	18 (37.5%)	1 (8.3%)	**<0.01***
>30 Kg/m^2	36(44.4%)	30 (62.5%)	11 (91.7%)	

Our study also compared adverse maternal outcomes across different subtypes of pregnancy-induced hypertensive disorders (PIH). The rate of Caesarean delivery was significantly high among patients with pre-eclampsia/eclampsia (64.6%) compared to gestational/chronic hypertension (28.4%) and superimposed group (50%) (p<0.01). HELLP syndrome was significantly more common in the pre-eclampsia/eclampsia group (18.8%) compared to 2.5% in the gestational/chronic hypertension group and 8.3% in the superimposed group (p < 0.01). Acute renal failure was observed only in the pre-eclampsia/eclampsia group (4.1%), while no cases were reported in the other two groups (p = 0.41). Pulmonary edema occurred in 1 (2.1%) case in the pre-eclampsia/eclampsia group, whereas no cases were reported in the other two groups (p = 0.74). Placental abruption was significantly more common in the pre-eclampsia/eclampsia group (20.8%), compared to 3.7% in the gestational/chronic hypertension group and 16.7% in the superimposed group (p < 0.01). DIC was observed in 6.3% of patients in the pre-eclampsia/eclampsia group and 8.3% in the superimposed group, but no cases were found in the gestational/chronic hypertension group (p = 0.22). The study also observed that the incidence of atonic PPH was significantly higher among the pre-eclampsia/eclampsia group (13%) than the other two subtypes (p-value = 0.03). A significant difference in ICU admission rates was found among the groups (p < 0.01). The pre-eclampsia/eclampsia group had the highest ICU admission rate (62.5%), followed by 41.7% in the superimposed group and 32.1% in the gestational/chronic hypertension group. The pre-eclampsia/eclampsia group had the longest hospital stay (9.30 ± 0.90 days), followed by 8.00 ± 1.15 days in the superimposed group and 7.25 ± 1.30 days in the gestational/chronic hypertension group (p < 0.01). Maternal mortality was 2.1% in the pre-eclampsia/eclampsia group, while no deaths were recorded in the other two groups (p = 0.74, not statistically significant. **(Table 3)**

Preterm birth was significantly more prevalent in the pre-eclampsia/eclampsia group, affecting 75% of cases. This was followed by 55.5% in the gestational/chronic hypertension group and 41.6% in the superimposed group (p = 0.03). A significant association was found between low birth weight and the type of hypertensive disorder (p = 0.03). The highest incidence of low birth weight occurred in the pre-eclampsia/eclampsia group at 66.7%, compared to 53.1% in the gestational/chronic hypertension group and 33.3% in the superimposed group. Mean birth weight was lowest in the pre-eclampsia/eclampsia group (2950.6 ± 345.6g), compared to the gestational/chronic hypertension group (3145.3 ± 454.3g) and the superimposed group (3030.7 ± 402.3g) and the difference was statistically significant (p = 0.04). The mean APGAR score at 1 minute was lowest in the pre-eclampsia/eclampsia group (8.30 ± 0.75), compared to 8.65 ± 0.60 in the gestational/chronic hypertension group and 8.45 ± 0.65 in the superimposed group (p = 0.02). The APGAR score at 5 minutes followed a similar pattern, with the lowest score in the pre-eclampsia/eclampsia group, and the difference was statistically significant (p = 0.01). NICU admission rates significantly differed among the groups (p = 0.02). The highest rate was seen in the pre-eclampsia/eclampsia group (29.2%), followed by 16.7% in the superimposed group and 9.9% in the gestational/chronic hypertension group.FGR (18.8%) and Birth asphyxia (13%) were most common in the pre-eclampsia/eclampsia group compared to the gestational/chronic hypertension group and the superimposed group (p < 0.01). Stillbirth occurred in 2 (4.1%) cases in the pre-eclampsia/eclampsia group, while no stillbirths were recorded in the other two groups (p = 0.41). **(Table 4)**

Table 3: Comparison of adverse maternal outcomes between various subtypes of PIH

Maternal outcomes	Gestational hypertension/ chronic hypertension (n =81)	Pre-eclampsia/eclampsia (n = 48)	Chronic hypertension with superimposed preeclampsia (n = 12)	p value
Caesarean delivery	23 (28.4%)	31(64.6%)	6 (50%)	**<0.01***
HELLP syndrome	2 (2.5%)	9 (18.8%)	1 (8.3%)	**<0.01***
Acute renal failure	0 (0)	2 (4.1%)	0 (0)	0.41
Pulmonary edema	0 (0)	1 (2.1%)	0 (0)	0.74
Placental abruption	3 (3.7%)	10 (20.8%)	2 (16.7%)	**<0.01***
Disseminated intravascular coagulation (DIC)	0 (0)	3 (6.3%)	1 (8.3%)	0.22
Atonic PPH	1 (1.2%)	6 (13%)	1 (8.3%)	**0.03***
Maternal ICU admission	26 (32.1%)	30 (62.5%)	5 (41.7%)	**<0.01***
Length of hospital stay	7.25 ± 1.30	9.30 ± 0.90	8.00 ± 1.15	**<0.01***
Maternal mortality	0 (0)	1 (2.1%)	0 (0)	0.74

Table 4: Comparison of adverse neonatal outcomes between various subtypes of PIH

Neonatal outcomes	Gestational hypertension/ chronic hypertension (n =81)	Pre-eclampsia/eclampsia (n = 48)	Chronic hypertension with superimposed preeclampsia (n = 12)	p value
Preterm (<37 weeks)	45 (55.5%)	36 (75%)	5 (41.6%)	**0.03***
Low birth weight (<2.5kg)	43 (53.1%)	32 (66.7%)	4 (33.3%)	**0.03***
Birth weight in grams	3145.3 ± 454.3	2950.6 ± 345.6	3030.7 ± 402.3	**0.04***
APGAR at 1 minute	8.65 ± 0.60	8.30 ± 0.75	8.45 ± 0.65	**0.02***
APGAR at 5 minute	9.30 ± 0.55	9.00 ± 0.50	9.10 ± 0.40	**0.01***
NICU admission	8 (9.9%)	14 (29.2%)	2 (16.7%)	**0.02***
FGR	2 (2.5%)	9 (18.8%)	1 (8.3%)	**<0.01***
Birth asphyxia	6 (7.4%)	15 (31.3%)	2 (16.7%)	**<0.01***
Still birth	0 (0)	2 (4.1%)	0 (0)	0.41

4. Discussion

HDP pose significant risks, leading to maternal and newborn morbidity and mortality. This study aimed to identify risk factors for HDP and assess maternal and neonatal outcomes across subtypes, including gestational hypertension, pre-eclampsia/eclampsia, and chronic hypertension with superimposed pre-eclampsia. In our screening of 1,059 women, 6.9% experienced gestational hypertension, 4.1% had pre-eclampsia, 0.5% developed eclampsia, and 0.7% had chronic hypertension. Chronic hypertension with superimposed pre-eclampsia occurred in 1.1%. The majority of pregnancies, 86.7%, were normotensive. Our findings highlight the elevated risk of negative outcomes, especially in cases of pre-eclampsia/eclampsia, underscoring the need for early detection and care.

Our study found that gestational hypertension and preeclampsia are more prevalent among the PHID subtypes, similar to research by Mathew et al. and Pradhan et al.[4,16] This can be attributed to regular antenatal monitoring. Age differences were significant ($p < 0.01$), with the gestational hypertension group averaging 30.21 years, preeclampsia at 25.29 years, and chronic hypertension with preeclampsia at 26.58 years. The preeclampsia group had 16.7% of participants under 20 years old and 70.8% classified as primigravida ($p < 0.01$). Additionally, significant differences in mean gestational age at admission were noted between the PIHD subtypes. Anh et al. reported 42.4% of women with pregnancy-related hypertensive disorders as primigravida, while Garovic et al. found a 7.3% incidence rate of HDP per pregnancy.[17,18] Notably, preeclampsia was more common in women under 20 than in the 20 to 34 age group, highlighting the need for focused clinical risk assessments for younger, primigravida women.

The higher Caesarean delivery rate in preeclampsia/eclampsia (64.6%) compared to gestational/chronic hypertension (28.4%) and chronic hypertension with superimposed preeclampsia (50%) highlights urgent delivery needs due to maternal and fetal concerns. HELLP syndrome was more prevalent in the preeclampsia/eclampsia group (18.8%), indicating severe disease complications. Acute renal failure (4.1%) and pulmonary edema (2.1%) were also noted, suggesting significant multi-organ involvement. Additionally, placental abruption was more common in the preeclampsia/eclampsia group (20.8%), reflecting uteroplacental insufficiency. Previous studies in Vietnam and India noted similar complications associated with severe preeclampsia, including HELLP syndrome and abruption.[17-20] Findings from Seyom et al. also indicated that HELLP syndrome (12.4%) and acute renal failure (7%) primarily affected preeclampsia patients.[21]

The study indicated a high ICU admission rate of 62.5% for patients with pre-eclampsia/eclampsia, highlighting the severity of the condition and the need for intensive care. These patients had longer hospital stays (9.30 ± 0.90 days), suggesting greater maternal morbidity. Maternal mortality occurred only in severe cases, underlining the importance of prompt management. A meta-analysis by Bucher et al. showed ICU admission rates for pregnancy-induced hypertensive disorders ranged from 0.6% to 28.4%.[22] Xavier et al. noted longer hospitalizations in women with preeclampsia/eclampsia, while Tran et al. found that 19.5% required ICU transfer.[11,23] ICU admissions were particularly common in cases of HELLP syndrome and severe PPH, leading to higher C-section rates. Notably, no maternal deaths were reported in their study, though fetal outcomes worsened with maternal ICU admissions.

This study highlights the severe impact of hypertensive disorders in pregnancy on fetal and neonatal health. Preterm birth was highest in the preeclampsia/eclampsia group at 75%, compared to 55.5% in gestational/chronic hypertension and 41.6% in chronic hypertension with superimposed preeclampsia. The mean birth weight was lowest in the preeclampsia/eclampsia group at 2950.6 ± 345.6 g, with a 66.7% incidence of low birth weight, suggesting placental dysfunction. Bromfield et al. noted that gestational and chronic hypertension pose minimal risks, while preeclampsia and superimposed preeclampsia notably increase maternal and neonatal risks, including higher NICU admissions and preterm births.[24]

APGAR scores were lower in the preeclampsia/eclampsia group at both 1 and 5 minutes compared to other groups, with a NICU admission rate of 29.2%, indicating a high need for postnatal care. Xavier et al. reported NICU admissions at 22.7% and perinatal mortality at 5.4% in these patients. The incidence of low Apgar scores (<7) was significantly higher at 15.1% at 1 minute and 7.0% at 5 minutes.[12] Additionally, fetal growth restriction (FGR) occurred in 18.8% of cases, and birth asphyxia was noted in 13%.[12] Although stillbirth was only observed in this group, the low rate prevented statistical significance. Mathew et al. confirmed that prematurity and FGR were common negative outcomes (both $p < 0.01$).[4] Abdurrahman et al. found asphyxia and lower birth weight were prevalent among infants of preclamptic mothers, with intrapartum stillbirths nearly doubling antenatal stillbirths in these cases.[8]

5. Conclusion

This study highlights that timely antenatal care can improve outcomes for high-risk hypertensive disorders in pregnancy, including gestational hypertension and preeclampsia. Many women were managed effectively without severe complications, and even in cases of eclampsia, appropriate interventions led to favorable delivery results. The high rates of live births and successful neonatal resuscitation emphasize the importance of early diagnosis and continuous monitoring in enhancing outcomes for hypertensive disorders during pregnancy.

6. Source of Funding

None.

7. Conflict of Interest

None.

8. Ethical Approval

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