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Original Research Article

Fetal and Maternal Outcome in Women with Chronic Hypertension with Superimposed Pre-Eclampsia

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Abstract:

Objective: To evaluate maternal and fetal outcomes in women with chronic hypertension complicated by superimposed pre-eclampsia.

Methods: A total of 162 eligible women was enrolled using convenience sampling during their antenatal or inpatient visits. The primary outcomes assessed were maternal complications such as eclampsia, HELLP syndrome, placental abruption, acute renal failure, and pulmonary oedema. Secondary outcomes included gestational age at delivery, birth weight, APGAR scores, NICU admissions, and perinatal mortality.

Results: The study revealed that most participants were Multigravida women aged between 26–30 years, from rural and lower socioeconomic backgrounds. Most had uncontrolled blood pressure despite antihypertensive therapy, and more than half experienced preterm deliveries. Significant maternal complications included postpartum hemorrhage (19.13%), pulmonary oedema (20.37%), HELLP syndrome (11.72%), and a maternal mortality rate of 3.7%, all more prevalent among those with uncontrolled BP (p-values <0.05 for PPH, pulmonary oedema, and HELLP syndrome). Around 52.6% required ICU care, and 78.29% received magnesium sulphate. Neonatal outcomes were also adversely affected—29.61% had fetal growth restriction, 50% required NICU admission, and perinatal mortality was high at34.56%, with Prematurity and low birth weight being major contributors.

Conclusion: The findings highlight the need for early diagnosis, timely initiation of antihypertensive therapy, and close monitoring to reduce the high burden of complications and mortality, These results emphasize that strict BP control is crucial in reducing adverse perinatal outcomes in this population, BP monitoring at periphery level and regular follow up post postpartum till 12 weeks is very essential in early diagnosis of chronic hypertension and decreasing complications in future pregnancies.

Keywords: Postpartum Hemorrhage, Pulmonary Oedema, HELLP Syndrome, Maternal Mortality Rate Neonatal Outcomes, Fetal Growth Restriction, NICU Admission.

Introduction

Chronic hypertension affects approximately 3–5% of pregnancies globally, with variations depending on geographic location, socioeconomic status, and access to healthcare**.** In India, hypertensive disorders in pregnancy account for a significant proportion of maternal deaths, highlighting the need for targeted research and interventions in such regions. Understanding the regional epidemiology of these conditions is crucial for tailoring effective clinical and public health strategies.

Chronic hypertension during pregnancy is a significant contributor to maternal and perinatal morbidity and mortality. It predisposes women to a variety of complications, including superimposed pre-eclampsia, placental abruption, preterm delivery, and increased rates of cesarean section. The presence of uncontrolled hypertension can lead to progressive end-organ damage, particularly affecting the cardiovascular, renal, and cerebrovascular systems. Furthermore, it places considerable strain on the placental blood flow, impairing fetal development and increasing the risk of adverse neonatal outcomes.

Hypertensive disorders in pregnancy, particularly chronic hypertension with superimposed pre-eclampsia, impose a substantial burden on healthcare systems. The increased need for antenatal monitoring, hospital admissions, high- risk obstetric care, and neonatal intensive care translates into significant healthcare costs. In low- and middle-income countries, the lack of adequate resources and access to specialized care exacerbates the burden, contributing to higher rates of maternal and perinatal mortality. Addressing these challenges requires

concerted efforts to improve awareness, enhance diagnostic capabilities, and optimize management protocols to mitigate the public health and economic impact Continuous monitoring during pregnancy helps detect disease progression, allowing for individualized management strategies. Effective surveillance and early treatment not only reduce complications but also improve overall maternal and neonatal prognosis.

This study aims to provide insights into the maternal and fetal impacts of chronic hypertension with superimposed pre-eclampsia, contributing to evidence- based obstetric practices and improved healthcare outcomes. This study aims to bridge critical knowledge gaps by generating evidence on the maternal and fetal outcomes associated with chronic hypertension with superimposed pre-eclampsia in a tertiary care setting in central India. By identifying the key factors influencing outcomes, this research will provide valuable insights for clinicians and policymakers to optimize antenatal care, enhance early diagnosis, and refine management protocols.

Materials and Methods

Study Design: A single centre, hospital-based, cross-sectional observational study conducted in the Department of Obstetrics and Gynecology, Gandhi Medical College, Bhopal to evaluate the maternal and fetal outcomes in women with chronic hypertension complicated by superimposed pre-eclampsia.

Study Duration: June 2023 To December 2024.

Study Population: The participants for the present study were pregnant women diagnosed with chronic hypertension with superimposed pre- eclampsia. Eligible participants were those meeting the inclusion criteria and providing written informed consent to participate in the study.

Sample Size: 162.

Inclusion Criteria

- Chronic hypertension diagnosed before 20 weeks of gestation.
- New-onset proteinuria (≥300 mg/24 hours) after 20 weeks.
- Sudden worsening of previously controlled blood pressure (≥160/110 mmHg).
- Evidence of end-organ damage (elevated liver enzymes, renal dysfunction, thrombocytopenia, pulmonary edema, or neurological disturbances).

Exclusion Criteria:

- Women with other types of hypertensions, such as gestational hypertension, pre-eclampsia, and eclampsia.
- Women with co-existing medical conditions, such as gestational diabetes mellitus [GDM], overt diabetes, or severe anemia.
- Women with chronic kidney disease, asthma, epilepsy, or polio.
- Women with multiple pregnancies.

Following consent, data collection was carried out. A detailed clinical history was obtained, including information on age, socioeconomic background, obstetric and menstrual history, as well as relevant past and family medical history. A thorough general, systemic, and obstetric examination was conducted, complemented by appropriate laboratory and imaging investigations such as complete blood count (CBC), liver function tests (LFT), renal function tests (RFT), urine microscopy, ultrasonography, and color Doppler studies. Magnesium sulphate was administered following Pritchard's regimen. Continuous intrapartum monitoring of both maternal and fetal parameters was undertaken to ensure optimal care. Maternal and fetal outcomes, including morbidity and mortality, were meticulously recorded and documented

Maternal Outcomes

- Eclampsia,
- HELLP syndrome,
- Placental Abruption,
- Acute Renal Failure,
- Pulmonary Edema.
- Maternal Mortality

Foetal Outcomes

- Birth Weight,
- Gestational Age at Delivery,
- Neonatal Apgar Scores, For NICU Admission, And
- Perinatal Mortality.

Observation Chart

Table 1: Distribution of Participant Patients According to Age

S. No.	Age	Frequency	Percentage
1.	18-20	6	3.70
2.	21-25	38	23.45
3.	26-30	54	33.33
4.	31-35	35	21.60
5.	36-40	26	17.90
6.	Total	162	100.00

Table 2: Premonitory Symptoms of the Study Participant Patients					
Premonitory Symptoms	Controlled BP		Uncontrolled BP		P-value
	Frequency	Percentage	Frequency	Percentage	
Headache	14	8.64	26	16	0.017
Vomiting	08	4.93	17	10.49	
Epigastric Pain	06	3.7	14	8.64	
Blurring of Vision	04	2.46	21	12.96	

Table 3: Maternal Complications of the Study Participants					
Maternal Complications	Controlled BP		Uncontrolled BP		P-value
	Frequency	Percentage	Frequency	Percentage	
APH[Abruption]	02	1.23	18	11.11	0.023
PPH	04	2.46	31	19.13	0.041
ARF	00	00	09	5.55	0.084
CVA	00	00	03	1.85	0.65
Pulmonary Edema	01	0.61	33	20.37	0.002
HELLP Syndrome	02	1.23	19	11.72	0.023
Intrapartum Eclampsia	00	00	01	0.61	0.83
Antepartum Eclampsia	00	00	06	3.7	0.132
Postpartum Eclampsia	00	00	02	1.23	0.28
Maternal Mortality	00	00	06	3.7	0.132

Table 4: Causes of Maternal Mortality Amongst the Paticipant Patients										
Serial Number	POG In Weeks	Uncontrolled BP	IPE	APE	PPE	Pulmonary Edema	AKI	Jaundice	Anemia	HELLP SYN.
1.	27+4	200/130	No	Yes	No	No	No	Yes	Yes	Yes
2.	30+1	180/120	No	No	Yes	Yes	Yes	No	Yes	No
3.	33+5	186/128	No	No	Yes	Yes	Yes	Yes	No	Yes
4.	29+6	190/122	No	Yes	No	Yes	Yes	Yes	Yes	Yes
5.	36+02	200/140	No	Yes	No	Yes	No	No	No	No
6.	38+0	196/126	Yes	No	No	Yes	Yes	No	Yes	No

Table 5: Apgar Score at Birth Amongst the Study Participants		
APGAR Score	Frequency	Percentage
7-10	114	70.37
4-6	20	12.34
0-3	12	7.4
Total Live Birth	146	-

Table 6: Perinatal Mortality Amongst the Study Participant Patients					
Perinatal Mortality	Controlled BP		Uncontrolled BP		P- value
	Frequency	%	Frequency	%	
IUD	04	2.46	12	7.4	0.040
SB	00	00	03	1.85	0.246
Early Neonatal Death	06	3.7	31	19.13	0.001
Total perinatal mortality	10	6.17	46	28.39	-

Table 7: Distribution According to Reason of Refferal To NICU		
Reason	Frequency	Percentage
Prematurity	59	36.41
ARDS	26	16
LBW	61	37.65
Hypoglycemia	10	6.17
Jaundice	12	7.4

Table 8: Distribution According to Cause of Early Neonatal Death (Within 7 Days)		
Reason	**Frequency**	**Percentage**
Premature Birth	25	15.43
VLBW	10	6.17
Hypoxic Ishchemic Injury	04	2.46
ARDS	06	3.7
Septicemia	02	1.23

Results

33.33% women with chronic hypertension and superimposed pre- eclampsia were in the 26–30year age group, indicating the condition commonly affects women in their late twenties. A majority [62.96%] of the patients were from rural areas, suggesting possible disparities in antenatal care access.64.78% referred patients came from outside study institution, reflecting the importance of tertiary care referral centers. A considerable number [64.19] of women had low education levels, which may influence health awareness and healthcare-seeking behaviour.74% women belonged to lower and lower-middle socioeconomic classes, indicating a possible link between low economic status and adverse pregnancy outcomes.

ICU admission was significantly more common [78.82%] in those with uncontrolled BP.ICU stay was longer [11.11%] in uncontrolled BP cases, showing severity and poor BP control increase complications. Complications like PPH -19.13%[p-0.041], pulmonary oedema-20.37%[p- 0.002], HELLP syndrome-11.72%[p-0.023], and maternal mortality- 3.7%[p-0.132] were more common in uncontrolled BP cases. Dialysis was required only in 5.55% patients with uncontrolled BP, indicating renal failure as a severe outcome of poor control.

Fetal growth restriction was present in29.61% of pregnancies, showing a high burden of placental insufficiency. Preterm delivery was significantly more common in uncontrolled BP [35.18%], reflecting disease severity.18.8% of neonates had low birth weight, contributing to high neonatal morbidity and mortality. Most babies had a good APGAR score of 70.37%, but a significant number had low scores of 7.4 %, indicating compromised birth conditions. 146 babies were born alive, a high rate of 9.82% IUFD and 1.85 % stillbirth was seen, indicating poor perinatal outcomes.28.50% of the neonates required NICU care, showing high neonatal morbidity. Most, 36.41 % NICU admissions occurred within 24 hours, indicating early postnatal complications.

Prematurity [36.41%] and LBW [37.65%] were major reasons for NICU admission, indicating the consequences of uncontrolled maternal hypertension. One in ten neonates needed ICU care for over a week, reflecting the burden of long-term neonatal care [7.4%]. Perinatal mortality was high (34.56%), underlining the grave impact of this condition. Total perinatal mortality was significantly higher in the uncontrolled BP group (28.39%) compared to the controlled BP group (6.17%, $p < 0.001$). Prematurity 36.41% was the leading cause of neonatal death, followed by HIE and sepsis

Statistical Analysis: The study hypothesis tested whether chronic hypertension with superimposed pre-eclampsia significantly affected maternal and fetal outcomes. All statistical and graphical analyses for this study were undertaken using Stata software version 17.0. Descriptive statistics were used to summarize demographic and clinical data. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as means and standard deviations. Inferential statistics were applied to test the association between chronic hypertension with superimposed pre-eclampsia and maternal/fetal outcomes. Chi-square tests were used for categorical variables, and t-tests or ANOVA were employed for continuous variables. A p-value < 0.05 was considered statistically significant.

Discussion

Chronic hypertension is a recognized risk factor for adverse maternal and perinatal outcomes during pregnancy. Studies from Brazil and other regions consistently highlight that women with chronic hypertension have higher tendencies toward developing preeclampsia, undergoing cesarean sections, experiencing prematurity, and facing increased neonatal complications compared to normotensive pregnancies. This underlying hypertensive state not only predisposes to poor placental function but also increases the risk of organ damage, particularly affecting renal and vascular health. In a five-year cohort from a tertiary referral center, most women with chronic hypertension were found to be over 30 years old, multiparous, often obese, and a significant proportion had a prior history of preeclampsia.

The onset of superimposed preeclampsia (SPE) in women with chronic hypertension dramatically escalates both maternal and fetal risk. Research comparing women with chronic hypertension who developed SPE versus those who did not shows that SPE is associated with significantly higher rates of adverse outcomes. These include small-for-gestational-age infants, low birth weight, higher neonatal intensive care unit (NICU) admissions, and greater incidence of fetal growth restriction.

Notably, the prevalence of fetal growth restriction in SPE cases was more than double that in women with chronic hypertension only. Such findings underscore the critical importance of early identification and multidisciplinary management in this high-risk population.

Beyond fetal growth restriction, prematurity is another frequent complication in women with chronic hypertension, especially in those who develop SPE. The mean gestational age at delivery among these cases is consistently lower, indicating a greater likelihood of early-onset preeclampsia and the need for iatrogenic preterm birth to safeguard maternal or fetal health. Further complicating the scenario, high rates of cesarean delivery (upwards of 70% in some cohorts) are observed, often performed due to worsening maternal status or history of repeated cesarean deliveries. This propensity for early and surgical intervention contributes to shorter gestation and associated neonatal complications.

Maternal morbidity in chronic hypertension and SPE is notably high. A significant proportion of women experience severe features of preeclampsia, such as severe hypertension, headaches, visual disturbances, and even HELLP syndrome, a life-threatening obstetric complication. However, rigorous monitoring and protocolized management, including the use of magnesium sulfate, have demonstrated efficacy in preventing progression to eclampsia and reducing maternal mortality in tertiary settings. Importantly, prophylactic interventions like aspirin and calcium supplementation are prevalent in specialized care protocols, aiming to reduce the onset and severity of preeclampsia, although their effectiveness in chronic hypertension remains debated.

Perinatal outcomes are correspondingly affected. Nearly a third of neonates born to women with chronic hypertension experience complications, including respiratory distress, jaundice, or low birth weight necessitating NICU admission. Mean birth weights for infants in the SPE group are significantly lower compared to those born to mothers with chronic hypertension only. Furthermore, the risk of a low Apgar score at 5 minutes is heightened, reflecting greater neonatal distress at delivery. In some settings, the observed rate of perinatal complications remains high despite robust preventive measures, highlighting intrinsic risks tied to the underlying maternal condition.

The role of specialized, multidisciplinary antenatal care is emphasized throughout the literature. Close monitoring—covering blood pressure control, timely adjustment of antihypertensive therapy, frequent fetal growth and wellbeing assessments, and early detection of end-organ dysfunction—enables earlier intervention and improved outcomes. Advanced care settings also facilitate comprehensive postpartum follow-up. However, there are notable challenges: nearly half of the women fail to attend postpartum visits, limiting opportunities to address sustained hypertension, provide contraception advice, and offer long-term cardiovascular risk counseling. Comparative studies reiterate that superimposed preeclampsia in the context of chronic hypertension portends worse maternal and perinatal outcomes than de novo preeclampsia alone. Adverse outcomes are compounded by persistent hypertension, obesity, renal dysfunction, and social factors such as inadequate prenatal care. This burden is especially acute in low-resource settings, where access to specialist services may be limited. The combined evidence advocates for health system strengthening, including better-trained providers, enhanced emergency obstetric care, and consistent prenatal counseling about warning signs and preventive strategies.

Pregnancies complicated by chronic hypertension—especially when superimposed preeclampsia develops—require vigilant, multidisciplinary management to improve maternal and neonatal outcomes. Clinical protocols that encompass early prophylactic interventions, regular maternal and fetal assessments, and seamless postpartum care are essential. At the same time, health education and equitable access to quality prenatal services remain pivotal in reducing the high burden of morbidity and mortality in these high-risk pregnancies. The gathered literature underscores the ongoing need for integrated, evidence-based care models and robust follow-up to address both immediate and long-term risks for mother and child.

Conclusion

This study underscores the serious implications of superimposed pre-eclampsia on maternal and neonatal health, particularly in cases with poorly controlled hypertension. The findings highlight the need for early diagnosis, timely initiation of antihypertensive therapy, and close monitoring to reduce the high burden of complications and mortality, These results emphasize that strict BP control is crucial in reducing adverse perinatal outcomes in this population, BP monitoring at periphery level and regular follow up post postpartum till 12 weeks is very essential in early diagnosis of chronic hypertension and decreasing complications in future pregnancies . These results add to existing evidence and emphasize the importance of strengthening antenatal care services, especially in resource-limited settings, to improve pregnancy outcomes in high-risk groups. The study advocates for enhanced antenatal care protocols, including intensive BP monitoring, early identification of superimposed preeclampsia using biomarkers and ultrasound, and multidisciplinary approach involving obstetricians, cardiologists, and

neonatologists. Additionally, public health measures such as community education and training for healthcare providers can improve maternal and neonatal outcomes.

Declarations:

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Availability of data and material: Department of Obstetrics and Gynecology, Gandhi Medical College, Bhopal

Code availability: Not applicable

Consent to participate: Consent taken

Ethical Consideration: There are no ethical conflicts related to this study.

Consent for publication: Consent taken

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