Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/v3y4nw48
Original Article

Clinical profile of hypertensive disorders of pregnancy and their association with maternal complications: A cross-sectional observational study.

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Abstract

Background:
Hypertensive disorders of pregnancy are important contributors to maternal morbidity and adverse obstetric outcomes. Early recognition of clinical severity and organ dysfunction is essential for timely management.

Objectives:
To describe the clinical profile of hypertensive disorders of pregnancy and evaluate their association with maternal complications among pregnant women attending a tertiary care hospital.

Methods:
This hospital-based cross-sectional observational study was conducted at Government Medical College/Government General Hospital, Nizamabad, Telangana, India, from April 2025 to September 2025. A total of 100 pregnant women diagnosed with hypertensive disorders of pregnancy were included. Baseline obstetric details, clinical symptoms, blood pressure severity, proteinuria, platelet count, liver enzymes, serum creatinine, and maternal complications were recorded. Associations with maternal complications were assessed using the chi-square test.

Results:
The mean age was 26.8 ± 4.7 years, and 54.0% were multigravidae. Gestational hypertension was observed in 38.0%, preeclampsia without severe features in 22.0%, preeclampsia with severe features in 26.0%, eclampsia in 8.0%, and chronic hypertension with superimposed preeclampsia in 6.0%. Maternal complications occurred in 33.0% of women. Postpartum hemorrhage was the most common complication, followed by placental abruption and HELLP syndrome. Severe hypertensive disorders were significantly associated with maternal complications. Severe-range blood pressure, proteinuria, thrombocytopenia, elevated liver enzymes, and raised serum creatinine were significantly associated with adverse maternal outcomes.

Conclusion:
Severe forms of hypertensive disorders of pregnancy were associated with a higher burden of maternal complications. Clinical severity and biochemical derangements were useful indicators of maternal risk.

Recommendations:
Structured antenatal screening, early referral, and close monitoring of severe features are recommended to reduce maternal morbidity.

Keywords: *Eclampsia; Hemolysis, elevated liver enzymes, and low platelet count syndrome; hypertensive disorders of pregnancy; maternal complications; preeclampsia; severe hypertension.*
Submitted: April 19, 2026 Accepted: May 30, 2026 Published: June 30, 2026
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Introduction
Hypertensive disorders of pregnancy (HDP) comprise a clinically diverse group of conditions that include chronic hypertension, gestational hypertension, preeclampsia, eclampsia, and preeclampsia superimposed on chronic hypertension. These disorders remain among the most

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important causes of preventable maternal and perinatal morbidity, particularly in settings where late presentation, delayed referral, and limited laboratory surveillance affect timely decision-making [1,2]. Although the diagnostic entry point is elevated blood pressure after mid-pregnancy for many cases, the clinical course is shaped by endothelial dysfunction, placental disease, vasospasm, and multi-organ involvement [3-5].

Preeclampsia is especially important because its presentation extends beyond hypertension and proteinuria. Current guidance recognises thrombocytopenia, hepatic dysfunction, renal impairment, pulmonary edema, neurological symptoms, and uteroplacental dysfunction as important severity markers [2,3]. This wider framework has clinical value because women without heavy proteinuria can still develop serious complications. Headache, visual symptoms, epigastric pain, convulsions, and severe-range blood pressure are warning signs that require urgent evaluation. A structured assessment of symptoms, blood pressure, urine protein, platelet count, liver enzymes, and serum creatinine is therefore central to risk classification [2,6].

The maternal complications of HDP include postpartum hemorrhage, placental abruption, HELLP syndrome, acute kidney injury, pulmonary edema, disseminated intravascular coagulation, cerebrovascular events, intensive care admission, and death. Large international studies have shown that preeclampsia and eclampsia are associated with maternal near miss, severe morbidity, and adverse perinatal outcomes [7,8]. Indian hospital-based studies have also reported a substantial burden of severe disease, operative delivery, preterm birth, low birth weight, and maternal complications among women with hypertensive disorders [9-12]. The burden is clinically relevant for tertiary care hospitals because referral units often receive women after disease progression has already occurred.

The severity of HDP is not determined only by the diagnostic label. Clinical and biochemical features provide additional prognostic information. Thrombocytopenia, elevated liver enzymes, and raised serum creatinine reflect systemic involvement and are associated with HELLP syndrome, acute kidney injury, and intensive care requirement [13,14]. Similarly, severe-range blood pressure indicates greater risk of neurological and vascular complications. Assessment of these factors helps clinicians identify women who require closer monitoring, magnesium sulphate prophylaxis, antihypertensive therapy, timely delivery planning, blood product preparedness, and multidisciplinary care [2,3].

The present study was conducted to describe the clinical profile of hypertensive disorders of pregnancy among women attending Government Medical College/Government General Hospital, Nizamabad, Telangana, India. The objectives were to determine the distribution of different HDP categories, describe clinical symptoms and laboratory abnormalities, estimate the frequency of maternal complications, and assess the association of disease severity, severe-range blood pressure, proteinuria, thrombocytopenia, elevated liver enzymes, and renal impairment with maternal complications.

Methodology

Study design and setting

This hospital-based cross-sectional observational study was conducted in the Department of Obstetrics and Gynaecology at Government Medical College/Government General Hospital, Nizamabad, Telangana, India. The institution is a tertiary care teaching and referral hospital serving obstetric patients from Nizamabad and nearby districts. The study assessed the clinical profile of hypertensive disorders of pregnancy and their association with maternal complications during hospital evaluation and delivery-related care.

Study period

The study was conducted from April 2025 to September 2025. Eligible participants presenting during the study period were screened and enrolled after applying the selection criteria.

Participants and sampling

The study included 100 pregnant women diagnosed with hypertensive disorders of pregnancy after 20 weeks of gestation or chronic hypertension complicated by superimposed preeclampsia. Consecutive sampling was followed. Sample size was estimated using $n = Z^2p(1-p)/d^2$, considering an expected maternal complication proportion of 30%, 95% confidence, and 9% absolute precision, giving a required sample of approximately 100.

Inclusion and exclusion criteria

Pregnant women with gestational hypertension, preeclampsia without severe features, preeclampsia with severe features, eclampsia, or chronic hypertension with superimposed preeclampsia were included. Women with incomplete clinical records, known chronic renal disease unrelated to pregnancy, chronic liver disease, epilepsy unrelated to eclampsia, coagulation disorders diagnosed before pregnancy, or refusal to participate were excluded.

Study variables and data sources

The dependent variable was the presence of maternal complications. Independent variables included age,

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gravidity, gestational age at diagnosis, family history of hypertension, previous history of HDP, HDP category, symptoms, severe-range blood pressure, proteinuria, platelet count, liver enzymes, and serum creatinine. Data were collected from antenatal records, admission notes, clinical examination findings, laboratory reports, labour room records, and postpartum case sheets.

Operational definitions

Hypertensive disorders were classified using standard criteria consistent with ACOG and ISSHP recommendations [2,3]. Severe HDP included preeclampsia with severe features, eclampsia, and chronic hypertension with superimposed preeclampsia. Non-severe HDP included gestational hypertension and preeclampsia without severe features. Maternal complications included postpartum hemorrhage, placental abruption, HELLP syndrome, acute kidney injury, pulmonary edema, disseminated intravascular coagulation, ICU admission, and maternal mortality.

Bias control

Selection bias was reduced by consecutive enrolment. Information bias was limited by predefined variables and standard hospital laboratory reports. Outcome misclassification was reduced by confirming complications from clinical notes and consultant documentation. Data entry was checked before analysis to identify missing or inconsistent values.

Statistical analysis

Data were entered in Microsoft Excel and analysed using standard statistical software. Categorical variables were expressed as frequency and percentage. Continuous variables were summarised as mean and standard deviation. The chi-square test assessed associations between clinical or biochemical factors and maternal complications. A p-value <0.05 was considered statistically significant.

Ethical considerations

Approval was obtained from the Institutional Ethics Committee of Government Medical College, Nizamabad, Telangana, India. Written informed consent was obtained from participants. Confidentiality was maintained by using anonymised data.

Results

Participants

The source manuscript documented 100 pregnant women with hypertensive disorders of pregnancy who met the eligibility criteria and were included in the study. All 100 included participants had complete maternal outcome data for the index hospitalization and were entered into the final analysis. Because this was a cross-sectional study, longitudinal follow-up beyond the index hospitalization was not required.

A total of 100 pregnant women diagnosed with hypertensive disorders of pregnancy were included in the final analysis. The mean age of the study participants was 26.8 ± 4.7 years. Most women belonged to the 21-30 years age group. Multigravidae constituted 54.0% of the study population, while primigravidae accounted for 46.0%. The mean gestational age at diagnosis was 34.6 ± 3.2 weeks. A family history of hypertension was documented in 24.0% of participants, and a previous history of hypertensive disorder of pregnancy was present in 18 multigravidae (Table 1).

Table 1: Baseline and obstetric characteristics of study participants (n = 100)

Variable	Frequency	Percentage
Age group		
<20 years	8	8.0
21-25 years	36	36.0
26-30 years	34	34.0
>30 years	22	22.0
Gravidity		
Primigravida	46	46.0
Multigravida	54	54.0
Gestational age at diagnosis		
<28 weeks	6	6.0
28-33 weeks	28	28.0
34-36 weeks	38	38.0

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Variable	Frequency	Percentage
>=37 weeks	28	28.0
Family history of hypertension	24	24.0
Previous history of hypertensive disorder of pregnancy*	18	33.3

Note. Previous history of hypertensive disorder of pregnancy was calculated among multigravidae only.

Gestational hypertension was the most common hypertensive disorder, observed in 38 women. Preeclampsia without severe features was seen in 22 women, while preeclampsia with severe features was documented in 26 women. Eclampsia was present in 8 women, and chronic hypertension with superimposed preeclampsia was observed in 6 women. Headache was the most frequent symptom, followed by pedal edema, visual disturbances, epigastric pain, and convulsions. Proteinuria was present in 56.0%, and severe-range blood pressure was recorded in 40.0% of participants (Table 2).

Table 2: Clinical spectrum, symptoms, and laboratory findings among women with hypertensive disorders of pregnancy (n = 100)

Variable	Frequency	Percentage
Type of hypertensive disorder		
Gestational hypertension	38	38.0
Preeclampsia without severe features	22	22.0
Preeclampsia with severe features	26	26.0
Eclampsia	8	8.0
Chronic hypertension with superimposed preeclampsia	6	6.0
Clinical symptoms/signs		
Headache	42	42.0
Pedal edema	39	39.0
Visual disturbances	18	18.0
Epigastric pain	14	14.0
Convulsions	8	8.0
Clinical and laboratory findings		
Proteinuria	56	56.0
Severe-range blood pressure	40	40.0
Platelet count <1.5 lakh/mm³	16	16.0
Elevated liver enzymes	14	14.0
Raised serum creatinine	8	8.0

Maternal complications were observed in 33.0% of women. The most common complication was postpartum hemorrhage, documented in 10.0%, followed by placental abruption in 8.0% and HELLP syndrome in 7.0%. Acute kidney injury was observed in 5.0%, pulmonary edema in 3.0%, and disseminated intravascular coagulation in 2.0%. Maternal intensive care unit admission was required in 9.0% of women. No maternal mortality was recorded in this study (Table 3).

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Table 3: Maternal complications among study participants (n = 100)

Maternal complication	Frequency	Percentage
Any maternal complication	33	33.0
Postpartum hemorrhage	10	10.0
Placental abruption	8	8.0
HELLP syndrome	7	7.0
Acute kidney injury	5	5.0
Pulmonary edema	3	3.0
Disseminated intravascular coagulation	2	2.0
Maternal ICU admission	9	9.0
Maternal mortality	0	0.0

Maternal complications were significantly more frequent among women with severe HDP than among those with non-severe HDP. Severe HDP was associated with maternal complications in 60.0% of women, compared with 15.0% among women with non-severe HDP. Severe-range blood pressure, proteinuria, platelet count <1.5 lakh/mm³, elevated liver enzymes, and raised serum creatinine were also significantly associated with maternal complications. The strongest associations were observed with elevated liver enzymes, thrombocytopenia, severe HDP, and severe-range blood pressure (Table 4).

Table 4: Association of clinical and biochemical factors with maternal complications

Factor	Maternal complication present n/N (%)	Maternal complication absent n/N (%)	Chi-square value	p-value
Severe HDP	24/40 (60.0)	16/40 (40.0)	21.90	<0.001
Non-severe HDP	9/60 (15.0)	51/60 (85.0)		
Severe-range blood pressure	24/40 (60.0)	16/40 (40.0)	21.90	<0.001
Proteinuria	25/56 (44.6)	31/56 (55.4)	7.70	0.006
Platelet count <1.5 lakh/mm³	12/16 (75.0)	4/16 (25.0)	15.23	<0.001
Elevated liver enzymes	11/14 (78.6)	3/14 (21.4)	15.86	<0.001
Raised serum creatinine	6/8 (75.0)	2/8 (25.0)	6.99	0.008

Note. HDP = hypertensive disorders of pregnancy. Non-severe HDP included gestational hypertension and preeclampsia without severe features. Severe HDP included preeclampsia with severe features, eclampsia, and chronic hypertension with superimposed preeclampsia.

Discussion

This hospital-based cross-sectional study evaluated the clinical profile of hypertensive disorders of pregnancy and their association with maternal complications among 100 pregnant women. Gestational hypertension was the most frequent category, affecting 38 women (38.0%), followed by preeclampsia with severe features in 26 (26.0%), preeclampsia without severe features in 22 (22.0%), eclampsia in 8 (8.0%), and chronic hypertension with superimposed preeclampsia in 6 (6.0%). Collectively, severe HDP accounted for 40.0% of the cohort. This pattern shows that many women presented before progression to eclampsia, while severe disease still formed an important subgroup. Similar Indian and low- and middle-income hospital studies have reported a mixed spectrum of HDP, with severe disease contributing disproportionately to morbidity [9-12].

Headache and pedal edema were the commonest clinical findings, reported in 42 (42.0%) and 39 (39.0%) women, respectively. Visual disturbances occurred in 18 (18.0%), epigastric pain in 14 (14.0%), and convulsions in 8 (8.0%). These findings agree with the known symptom profile of severe preeclampsia and eclampsia, where neurological and upper abdominal symptoms indicate progression [2,6]. Proteinuria was present in 56 (56.0%) participants, and severe-range blood pressure was recorded in 40 (40.0%).

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Current recommendations emphasise that preeclampsia should not be assessed by proteinuria alone because organ dysfunction also defines severity [2,3].

Maternal complications occurred in 33 of 100 women (33.0%). Postpartum hemorrhage was the most common complication, occurring in 10 (10.0%), followed by placental abruption in 8 (8.0%) and HELLP syndrome in 7 (7.0%). Acute kidney injury occurred in 5 (5.0%), pulmonary edema in 3 (3.0%), disseminated intravascular coagulation in 2 (2.0%), and maternal intensive care unit admission was required in 9 (9.0%); no maternal deaths were recorded. These findings illustrate the systemic nature of severe HDP. International evidence links preeclampsia and eclampsia with maternal near miss, maternal death, and severe morbidity [7,8]. Indian studies have also reported maternal complications among women with preeclampsia and severe HDP, supporting close monitoring in tertiary care settings [9,11,12].

A key finding was the strong association between severe HDP and maternal complications. Complications occurred in 24 of 40 women with severe HDP (60.0%) compared with 9 of 60 women with non-severe HDP (15.0%) (chi-square = 21.90, $p < 0.001$). Severe-range blood pressure showed the same marked association, with complications in 24 of 40 women (60.0%) who had severe-range blood pressure compared with 9 of 60 (15.0%) without severe-range blood pressure (chi-square = 21.90, $p < 0.001$). This supports the practical prognostic value of severity classification and can guide surveillance, antihypertensive treatment, seizure prophylaxis, and delivery planning [2,3]. Timely recognition of severe features is particularly important in referral hospitals.

Biochemical abnormalities were also strongly linked with maternal complications. Among women with proteinuria, 25 of 56 (44.6%) developed a complication (chi-square = 7.70, $p = 0.006$). Complications occurred in 12 of 16 women with thrombocytopenia (75.0%; chi-square = 15.23, $p < 0.001$), 11 of 14 with elevated liver enzymes (78.6%; chi-square = 15.86, $p < 0.001$), and 6 of 8 with raised serum creatinine (75.0%; chi-square = 6.99, $p = 0.008$). These findings are biologically plausible because low platelet count and hepatic enzyme elevation are core features of HELLP syndrome, while raised serum creatinine indicates renal involvement. Previous studies have linked HELLP syndrome and acute kidney injury with increased maternal morbidity, placental abruption, postpartum hemorrhage, and ICU care [13,14]. Thus, laboratory evaluation in women with HDP has both diagnostic and prognostic value.

Generalizability

The findings are most applicable to tertiary care government hospitals receiving both booked and referred obstetric patients with hypertensive disorders of pregnancy. Because the study was conducted in a single centre with 100 participants, extrapolation to community settings or private hospitals requires caution. However, the clinical pattern, severity markers, and complication profile are relevant to similar Indian referral hospitals managing high-risk pregnancies with available laboratory and intensive care support.

Conclusion

Hypertensive disorders of pregnancy showed a broad clinical spectrum in this hospital-based study, with gestational hypertension as the commonest diagnosis and severe preeclampsia forming an important high-risk subgroup. Maternal complications occurred in one-third of women, mainly postpartum hemorrhage, placental abruption, HELLP syndrome, acute kidney injury, and intensive care admission. Severe HDP, severe-range blood pressure, proteinuria, thrombocytopenia, elevated liver enzymes, and raised serum creatinine were significantly associated with maternal complications. These findings support systematic assessment of clinical severity and organ dysfunction in every woman with HDP. Early detection, timely referral, laboratory monitoring, emergency preparedness, postpartum review, future risk counselling, and multidisciplinary obstetric care are essential to reduce preventable maternal morbidity.

Limitations

This study had a single-centre cross-sectional design with a sample size of 100, limiting wider extrapolation. Consecutive sampling was used, so referral patterns could influence disease severity. Long-term postpartum outcomes were not assessed. Some variables depended on hospital records, creating scope for documentation-related variation. Fetal and neonatal outcomes were outside the primary analysis. Multivariable adjustment was not performed because of the compact sample.

Recommendations

All pregnant women should receive regular blood pressure measurement, urine protein testing, and symptom screening during antenatal visits. Women with severe-range blood pressure, headache, visual symptoms, epigastric pain, thrombocytopenia, elevated liver enzymes, or raised serum creatinine require urgent evaluation and closer observation. Referral pathways from peripheral centres to tertiary care hospitals should be strengthened. Labour rooms managing HDP should maintain protocols for magnesium sulphate, antihypertensive therapy, blood products, emergency delivery, and intensive care referral. Postpartum follow-up should include blood pressure review, renal function

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https://doi.org/10.51168/v3y4nw48
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assessment when indicated, and counselling regarding recurrence risk and future cardiovascular health, with periodic clinical audit annually.

Acknowledgement
The authors thank the Department of Obstetrics and Gynaecology, nursing staff, laboratory personnel, and medical records staff for their support during data collection. The authors also acknowledge the study participants for their cooperation. No external funding was received for this study, and administrative assistance during the study period is appreciated.

Abbreviations
ACOG, American College of Obstetricians and Gynecologists;
AKI, acute kidney injury;
DIC, disseminated intravascular coagulation;
HDP, hypertensive disorders of pregnancy;
HELLP, hemolysis, elevated liver enzymes, and low platelet count;
ICU, intensive care unit;
ISSHP, International Society for the Study of Hypertension in Pregnancy;
PPH, postpartum hemorrhage.

Source of funding
The study has no funding

Conflict of interest
The authors declare no conflict of interest.

Author contributions
BI-Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript. Statistical analysis and interpretation, revision of manuscript. **RD** -Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript; revision of the manuscript. **MSK** - Review of literature and preparing the first draft of the manuscript. Statistical analysis and interpretation.

Data availability
De-identified data underlying the findings of this study are available upon reasonable request

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https://doi.org/10.51168/v3y4nw48
Original Article

https://doi.org/10.1161/HYPERTENSIONAHA.117.10803

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https://doi.org/10.51168/v3y4nw48
Original Article

PUBLISHER DETAILS:

Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
(ISSN 3006-1059) Print
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256 775 434 261
Location: Scholar's Summit Nakigalala, P. O. Box 701432, Entebbe Uganda, East Africa