ISSN: 2457-0400

Impact Factor: 7.675

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

www.wjahr.com

Volume: 10, Issue: 4

Page N. 276-281

Year: 2026

Original Article

Coden USA: WJAMA3

MATERNAL AND SYSTEMIC OUTCOMES OF HYPERTENSIVE DISORDERS OF PREGNANCY: A CROSS-SECTIONAL STUDY

***[1]Mohammed Jawad Kadhim Al Shijairi, [2]May Abdul Kareem Jbarah Abu Ragheef**

*[1]M.B.Ch.B. D.M. C.A.B.M.S. (Internal Medicine)
[2]M.B.Ch.B. D.G.O. Ph.D. Clinical Infertility

Article Received: 05 March 2026 **Article Revised:** 25 March 2026 **Article Published:** 01 April 2026

***Corresponding Author: Mohammed Jawad Kadhim Al Shijairi**

M.B.Ch.B. D.M. C.A.B.M.S. (Internal Medicine)

DOI: https://doi.org/10.5281/zenodo.19436267

How to cite this Article: *[1]Mohammed Jawad Kadhim Al Shijairi, [2]May Abdul Kareem Jbarah Abu Ragheef. (2026) Maternal And Systemic Outcomes Of Hypertensive Disorders Of Pregnancy: A Cross-Sectional Study. World Journal of Advance Healthcare Research, 10(4), 276–281.

ABSTRACT

Background: Hypertensive disorders of pregnancy are a major cause of maternal and perinatal morbidity and mortality, particularly in low-resource settings, due to delayed diagnosis and inadequate antenatal care. **Objectives:** To assess maternal systemic manifestations, fetal/neonatal outcomes, and predictors of adverse outcomes among women with hypertensive disorders of pregnancy. **Methods:** A hospital-based cross-sectional study was conducted on 200 pregnant women (≥20 weeks gestation) with hypertensive disorders of pregnancy at Um Al-Baneen Private Hospital, Baghdad, during 2025. Data on demographic, clinical, laboratory parameters, and maternal and neonatal outcomes were collected. Logistic regression analysis was performed to identify predictors of adverse outcomes. **Results:** The mean age was 28.3 ± 6.1 years; 28.5% were ≥35 years and 31.5% had no antenatal care. Preeclampsia was the most common subtype (39%), followed by gestational hypertension (26%) and severe preeclampsia (24.5%). Severe hypertension was present in 33.5%, proteinuria in 44%, thrombocytopenia in 17%, elevated liver enzymes in 20.5%, and renal impairment in 14.5%. Systemic complications included hepatic dysfunction (15.5%), ICU admission (13.5%), acute kidney injury (11.5%), and HELLP syndrome (9.5%). Cesarean section was performed in 60.5%, and maternal mortality was 1%. Neonatal outcomes included low birth weight (37%), preterm delivery (34.5%), NICU admission (29%), and low Apgar score (18%). Significant predictors of adverse outcomes included severe hypertension, thrombocytopenia, elevated creatinine, elevated liver enzymes, advanced maternal age, anemia, and inadequate antenatal care ($p<0.05$). **Conclusion:** Hypertensive disorders of pregnancy, particularly severe preeclampsia, is associated with substantial maternal and neonatal morbidity. Early detection, adequate antenatal care, and timely management of high-risk cases are essential to improve outcomes.

KEYWORDS: Hypertensive disorders of pregnancy; Maternal outcomes; Neonatal outcomes; Preeclampsia; Risk factors.

1-INTRODUCTION

Hypertensive disorders of pregnancy (HDP) are a major global health concern, accounting for a significant portion of maternal and perinatal morbidity and mortality, particularly in low- and middle-income countries.[1] These conditions are divided into four categories: gestational hypertension, preeclampsia, eclampsia, and chronic hypertension with preeclampsia.[2] The burden of HDP is disproportionately larger in contexts with limited resources where delayed diagnosis, insufficient antenatal care, and restricted access to advanced monitoring all contribute to poor results.[3]

Preeclampsia is a multisystem condition with a complicated pathophysiology that includes endothelial dysfunction, abnormal placentation, and systemic inflammatory responses. It is distinguished by new-onset hypertension after 20 weeks of gestation, as well as proteinuria or end-organ damage.[4,5] Beyond its obstetric consequences, HDP has a major impact on several organ systems, including the renal, hepatic, hematological, and

cardiovascular systems. These systemic manifestations can lead to life-threatening consequences such acute renal injury, HELLP syndrome (hemolysis, high liver enzymes, low platelet count), pulmonary edema, and cerebrovascular events.[6,7]

From an internal medicine point of view, HDP is a one-of-a-kind model of acute systemic disease caused by pregnancy, with long-term effects including chronic hypertension, cardiovascular disease, and renal impairment.[8] Early detection of systemic involvement and risk stratification are crucial for better maternal outcomes.[9] HDP has a negative impact on fetal and neonatal outcomes, increasing the risk of intrauterine growth restriction, preterm birth, low birth weight, and perinatal mortality.[10] The interaction of maternal systemic illness and placental insufficiency emphasizes the significance of a comprehensive maternal-fetal assessment.[11]

Despite the significant burden of HDP, there is a scarcity of local data on the range of systemic participation and its influence on maternal and perinatal outcomes in resource-limited environments like Iraq. Understanding these linkages is critical for creating context-appropriate management strategies and enhancing therapeutic results. The aim of this study is to assess the maternal systemic symptoms and associated fetal outcomes of hypertensive disorders of pregnancy, as well as to identify predictors of bad outcomes.

2-PATIENTS AND METHODS

This was a hospital-based cross-sectional study conducted at Um Al-Baneen private Hospital in Baghdad during the period from January 2025 to December 2025. A total of 200 pregnant lady (gestational age ≥ 20 weeks) were targeted based on hospital admission rates and feasibility. Consecutive sampling was used to include all eligible patients during the study period. Patients with hypertensive disorders of pregnancy, including; gestational hypertension, preeclampsia, eclampsia, chronic hypertension with superimposed preeclampsia were included in the study. The study patients aged should be more than or equal to18 years. On the other hand, patients with known chronic kidney disease prior to pregnancy or chronic liver disease, or those with pre-existing cardiovascular disease and incomplete medical records were excluded from the study.

Data collection form was used to collect information such as age, parity and body mass index (BMI). In addition to obstetric data including; gestational age at diagnosis, type of hypertensive disorder and antenatal care status. Moreover, clinical parameters such as blood pressure reading, presence of edema, neurological symptoms (headache, visual disturbance). Furthermore, laboratory parameters such as, complete blood count (CBC), renal and liver functions tests and urine analysis (proteinuria by dipstick or quantitative measurement if available) was included in the questionnaire of the study. Lastly, the questionnaire included questions about, systemic complications such as acute kidney injury, HELLP syndrome, Hepatic dysfunction, pulmonary edema and ICU admission.

Gestational hypertension is defined as systolic blood pressure of ≥140 mmHg and/or diastolic blood pressure of ≥90 mmHg on two occasions. Preeclampsia is defined as hypertension with proteinuria ≥300 mg/24 hours or evidence of end-organ dysfunction, while severe preeclampsia is defined as blood pressure of ≥160/110 mmHg or significant organ involvement, acute kidney injury was defined as serum creatinine ≥1.1 mg/dL or doubling from baseline and HELLP syndrome was the collection of hemolysis, elevated liver enzymes, and platelet count <100,000/mm³.

The study outcomes include maternal outcomes (mode of delivery, length of hospital stay and maternal mortality) and fetal/ neonatal outcomes (birth weight, gestational age at delivery, Apgar score at 5 minutes, neonatal intensive care unit admission and intrauterine fetal death).

Statistical analysis involved descriptive statistics. Continuous values were reported as mean ± standard deviation, and categorical variables as frequencies and percentages. Chi-square test for categorical variables. Independent t-test or Mann–Whitney U test for continuous variables. Logistic regression analysis to identify independent predictors of adverse maternal outcome. A p-value < 0.05 was considered statistically significant. Results were reported with Odds Ratios (OR) and 95% Confidence Intervals (CI).

3- RESULTS

The study includes 200 pregnant women with a mean age of 28.3 ± 6.1 years. Of them, 57 (28.5%) patients were age more than 35 years, 91 (45.5%) patients were primigravida, 73 (36.5%) patients having body mass index (BMI) of more than 30 kg/m^2, and 63 (31.5%) patients had no antenatal care.

Table 1 shows types of hypertension disorders. It's evident that preeclampsia was prevalent among 78 (39%) patients, gestational hypertension among 52 (26%) patients, severe preeclampsia among 49 (24.5%) patients, eclampsia among 15 (7.5%) patients and chronic hypertension superimposed to preeclampsia among 6 (3%) patients.

Table 1: Types of hypertension disorders (number = 200).

Diagnosis	Number	Percent
Gestational hypertension	52	26%
Preeclampsia(non-severe)	78	39%
Severe preeclampsia	49	24.5%
Eclampsia	15	7.5%
Chronic hypertension + superimposed preeclampsia	6	3%

Table 2 shows clinical and laboratory findings of the study patients. Systolic blood pressure more than 160 mmHg was prevalent among 67 (33.5%) patients, while diastolic blood pressure of more than 110 mmHg was prevalent among 61 (30.5%) patients. Moreover, proteinuria ≥ 2+ was prevalent among 88 (44%) patients, platelets < 100000/mm^3 was prevalent among 34 (17%) patients, elevated AST/ALT was prevalent among 41 (20.5%) and serum creatinine ≥ 1.1 mg/dL was prevalent among 29 (14.5%) patients.

Table 2: Clinical and laboratory findings of the study patients (number = 200).

Diagnosis	Number	Percent
Systolic blood pressure ≥ 160 mmHg	67	33.5%
Diastolic blood pressure ≥ 110 mmHg	61	30.5%
Proteinuria ≥ 2+	88	44%
Platelets < 100000/mm^3	34	17%
Elevated AST/ALT	41	20.5%
Serum creatinine ≥ 1.1 mg/dL	29	14.5%

Table 3 shows systemic complications of the study patients. Hepatic dysfunction was prevalent among 31 (15.5%) patients, Intensive care unit (ICU) admission among 27 (13.5%) patients, acute kidney injury among 23 (11.5%) patients, HELLP syndrome among 19 (9.5%) patients and pulmonary edema among 14 (7%) patients.

Table 3: Systemic complications of the study patients (number = 200).

Diagnosis	Number	Percent
Acute Kidney injury	23	11.5%
HELLP syndrome	19	9.5%
Hepatic dysfunction	31	15.5%
Pulmonary edema	14	7%
Intensive care unit admission	27	13.5%

Table 4 shows maternal and fetal / neonatal outcomes. The majority of mother did cesarean section (60.5%); to less extend they stay in hospital for more than 5 days (22%) and only 2 (1%) died. On the other hand, 74 (37%) neonates had low birth weight, 69 (34.5%) neonates had preterm delivery, 58 (29%) report NICU admission and 36 (18%) neonates had Apgar score <7 at the fifth minute post-delivery.

Table 4: Maternal and fetal / neonatal outcomes (number = 200).

Outcomes	Number	Percent
Maternal outcomes:		
-Cesarean section	121	60.5%
- Vaginal delivery	79	39.5%
- Hospital stay >5 days	44	22%
- Maternal mortality	2	1%
Fetal/ neonatal outcomes:		
Preterm delivery	69	34.5%
Low birth weight	74	37%
Neonatal intensive care unit admission	58	29%
Intra-uterine fetal demise	11	5.5%
Apgar score <7 (5 minutes)	36	18%

Table 5 showed predictors of bad maternal and fetal/ neonatal outcomes (logistic regression). Maternal age of more than or equal to 35 years, bad antenatal care, severe blood pressure (≥160/110), platelets <100k, creatinine ≥ 1.1, severe preeclampsia/eclampsia, no antenatal care, maternal anemia, elevated liver enzymes were found to have risky association with related maternal and fetal/ neonatal outcomes.

Table 5: Maternal and fetal / neonatal outcomes (number = 200).

Variable	Odds ratio	Confidence interval	P value
Age ≥ 35 years	**1.89**	**1.02-3.51**	**0.041**
BMI ≥ 30	1.76	0.98-3.12	0.058
Bad antenatal care	**2.94**	**1.61-5.37**	**0.001**
Severe blood pressure (≥160/110)	**3.87**	**2.05-7.29**	**<0.001**
Platelets <100k	**4.12**	**2.01-8.43**	**<0.001**
Creatinine ≥ 1.1	**3.45**	**1.72-6.91**	**<0.001**
Severe preeclampsia/eclampsia	**3.68**	**2.01-6.72**	**<0.001**
No antenatal care	**2.57**	**1.45-4.54**	**0.001**
Maternal anemia	**1.94**	**1.08-3.49**	**0.026**
Elevated liver enzymes	**2.21**	**1.17-4.16**	**0.014**

4. DISCUSSION

Hypertensive disorders of pregnancy (HDP) continue to be an important cause of maternal and perinatal morbidity around the world, especially in low- and middle-income countries. The most common subtype in this study was preeclampsia (39%), followed by gestational hypertension (26%), and severe preeclampsia (24.5%). The relatively high rate of severe illness, including eclampsia (7.5%), is due to delayed diagnosis and inadequate antenatal surveillance. These findings are consistent with recent global estimates that show preeclampsia complicates 2-8% of pregnancies and contributes disproportionately to catastrophic maternal outcomes in areas with limited resources.[12,13]

The clinical and laboratory profiles of the patients show a high level of disease severity. Approximately one-third of women had severe hypertension (SBP ≥160 mmHg or DBP ≥110 mmHg), with significant proportions having proteinuria (44%), thrombocytopenia (17%), increased liver enzymes (20.5%), and renal impairment (14.5%). These findings support a late-stage presentation with established end-organ dysfunction. Similar findings have been observed in recent cohort studies, where abnormal laboratory indices, particularly thrombocytopenia and increased creatinine, were significantly related with disease severity and poor outcomes.[14,15]

Systemic problems were frequent, including hepatic dysfunction (15.5%), ICU admission (13.5%), acute renal injury (11.5%), and HELLP syndrome (9.5%). The reported rates of HELLP syndrome and renal injury are clinically substantial and consistent with current literature, which emphasizes the importance of multisystem involvement in severe preeclampsia as a primary cause of maternal morbidity. (16-17) The comparatively high ICU admission rate reflects the advanced disease stage at presentation and the increasing demand for critical care services.

Maternal outcomes showed a high cesarean section rate (60.5%), which is consistent with earlier study in which cesarean section delivery is usually recommended to minimize maternal and fetal deterioration in HDP.[18] Although maternal mortality was low (1%), this finding should be evaluated in light of the sample size and referral patterns. Prolonged hospitalization (more than 5 days in 22%) demonstrates the clinical complexity and resource burden involved with managing severe hypertension diseases.

Neonatal outcomes were particularly bad, with significant rates of low birth weight (37%), preterm birth (34.5%), NICU hospitalization (29%), and low Apgar score at 5 minutes (18%). These findings are consistent with the pathophysiological effects of placental insufficiency and uteroplacental hypoperfusion in HDP, which result in fetal growth restriction and preterm delivery.[19,20] The 5.5% intrauterine fetal death rate emphasizes the seriousness of the condition and probable delays in timely management.

Importantly, the logistic regression analysis showed a number of independent predictors of poor mother and newborn outcomes. Maternal age (≥35 years), inadequate antenatal care, severe hypertension, thrombocytopenia, renal impairment, increased liver enzymes, and severe disease types (severe preeclampsia/eclampsia) were significantly associated with negative outcomes. Among them, thrombocytopenia (OR=4.12), severe hypertension (OR=3.87), and high creatinine (OR=3.45) showed the strongest relationships, which is consistent with recent studies identifying these parameters as key markers of illness severity and predictors of consequences.[15,17,21]

Notably, bad or absent prenatal care was identified as a significant modifiable risk factor (OR = 2.94 and 2.57, respectively). This finding is consistent with recent WHO and multicenter studies demonstrating that effective antenatal care allows for early diagnosis, risk stratification, and timely management, resulting in considerable reductions in maternal and neonatal morbidity.[12,22] Furthermore, maternal anemia and obesity had an impact, which is consistent with growing evidence associating metabolic and hematological variables to HDP progression and severity.[23]

The study had many limitations to be mentioned. First, this is a hospital-based, single-center study which is susceptible to selection bias, as more severe cases are likely to be admitted, thereby overestimating complication rates and limiting generalizability. Second, although logistic regression was used, residual confounding cannot be ruled out due to unmeasured

variables such as socioeconomic status and timing of interventions. Third, the lack of long-term follow-up limits the assessment of future maternal cardiovascular risk and neonatal developmental outcomes. Fourth, relying on medical records may add information bias, and several laboratory variables were examined categorically, which could reduce analytical precision.

5- CONCLUSION

Hypertensive disorders of pregnancy, notably preeclampsia and its severe manifestations, play a significant role in poor mother and newborn outcomes. Severe hypertension, thrombocytopenia, renal impairment, high liver enzymes, and insufficient prenatal care were all significant predictors of poor outcomes. Improving antenatal care services is critical for early disease detection and prevention. Implementing risk-based monitoring measures and prompt referral to professional treatment can significantly reduce problems. Increased patient awareness and availability to emergency obstetric services are also crucial. Further study should concentrate on multicenter prospective designs with larger sample sizes and long-term follow-up to validate predictive factors and enhance therapeutic outcomes.

ACKNOWLEDGEMENT

We appreciate the assistance offered by the medical staff at Um Al-Baneen private Hospital in Baghdad to our study project. This study could not have been done without the assistance of each of these people.

Conflict of intertest

About this study, the authors disclose no conflicts of interest.

REFERENCES

1. Escobar MF, Benitez-Díaz N, Blanco-Londoño I, Cerón-Garcés C, Peña-Zárate EE, Guevara-Calderón LA, Libreros-Peña L, Galindo JS. Synthesis of evidence for managing hypertensive disorders of pregnancy in low middle-income countries: a scoping review. BMC pregnancy and childbirth, 2024 Oct 1; 24(1): 622.
2. Gunderson EP, Greenberg M, Najem M, Sun B, Alexeeff SE, Alexander J, Nguyen-Huynh MN, Roberts JM. Severe maternal morbidity associated with chronic hypertension, preeclampsia, and gestational hypertension. JAMA network open, 2025 Jan 28; 8(1): e2451406.
3. Nguru Musese C, Maroyi R, Ganywamulume B, Maha AB, Ngeleza ON, Mukwege DM. Challenges and Prospects in Managing Hypertensive Disorders of Pregnancy in Sub-Saharan Africa: A Narrative Review. International Journal of Women's Health, 2026 Dec 31; 593155.
4. Okikiade A, Kanu C, Iyapo O, Omitogun O, Adetoye R, Adetoye S, Grace A, Nwanevu IS. Revised Pathophysiology of Pregnancy-induced Hypertension (Pre-eclampsia): A Multisystemic Spectrum of the Maternal Complications. International Journal of Research and Reports in Gynaecology, 2025 Aug 1; 8(1): 176-95.
5. Dodampahala SH, McCully B. Update on preeclampsia. Sri Lanka Journal of Obstetrics and Gynaecology, 2024 Aug 7; 46(2).
6. Enrico F, Di Martino D, Sabattini E. Hypertensive Disorders of Pregnancy (HDP). InMaternal Hemodynamics 2026 Jan 21 (pp. 91-105). Cham: Springer Nature Switzerland.
7. Giannubilo SR, Marzioni D, Tossetta G, Ciavattini A. HELLP syndrome and differential diagnosis with other thrombotic microangiopathies in pregnancy. Diagnostics, 2024 Feb 6; 14(4): 352.
8. Khosla K, Heimberger S, Nieman KM, Tung A, Shahul S, Staff AC, Rana S. Long-Term Cardiovascular Disease Risk in Women After Hypertensive Disorders of Pregnancy: Recent Advances in Hypertension. Hypertension, 2021 Sep; 78(4): 927-935.
9. Fan L, Ding L, Nie J, Wang J, Zhang M, Zhang J. Hypertensive disorders of pregnancy: A comprehensive review of pathophysiology, diagnosis, treatment, and long-term cardiovascular implications. Clinical and Experimental Hypertension, 2026 Dec 31; 48(1): 2641542.
10. Mecacci F, Romani E, Clemenza S, Zullino S, Avagliano L, Petraglia F. Early fetal growth restriction with or without hypertensive disorders: A clinical overview. Reproductive Sciences, 2024 Mar; 31(3): 591-602.
11. Yagel S, Cohen SM, Goldman-Wohl D. An integrated model of preeclampsia: a multifaceted syndrome of the maternal cardiovascular-placental-fetal array. American journal of obstetrics and gynecology, 2022 Feb 1; 226(2): S963-72.
12. World Health Organization. WHO recommendations for prevention and treatment of pre-eclampsia and eclampsia. Geneva: WHO; 2023.
13. Magee LA, Brown MA, Hall DR, et al. The 2022 international society for the study of hypertension in pregnancy (ISSHP) classification and management recommendations. Pregnancy Hypertens,. 2022; 27: 148–169.
14. Rana S, Lemoine E, Granger JP, Karumanchi SA. Preeclampsia: pathophysiology, challenges, and perspectives. Circ Res., 2019; 124(7): 1094–1112.
15. Hauspurg A, Countouris ME, Catov JM. Hypertensive disorders of pregnancy and future maternal health. Curr Opin Cardiol., 2022; 37(4): 389–395.
16. Abalos E, Cuesta C, Grosso AL, et al. Global and regional estimates of preeclampsia and eclampsia. Eur J Obstet Gynecol Reprod Biol., 2013; 170(1): 1–7.
17. American College of Obstetricians and Gynecologists (ACOG). Gestational hypertension and preeclampsia: Practice Bulletin No. 222. Obstet Gynecol., 2020; 135(6): e237–e260.

18. Knight M, Bunch K, Tuffnell D, et al. Saving Lives, Improving Mothers' Care 2022. Oxford: National Perinatal Epidemiology Unit, 2022.
19. Burton GJ, Redman CW, Roberts JM, Moffett A. Pre-eclampsia: pathophysiology and clinical implications. BMJ., 2019; 366: l2381.
20. Mol BWJ, Roberts CT, Thangaratinam S, et al. Pre-eclampsia. Lancet., 2016; 387(10022): 999–1011.
21. von Dadelszen P, Magee LA. Preventing deaths due to hypertensive disorders of pregnancy. Best Pract Res Clin Obstet Gynaecol., 2016; 36: 83–102.
22. WHO. WHO antenatal care recommendations for a positive pregnancy experience. Geneva: WHO, 2023.
23. Spracklen CN, Smith CJ, Saftlas AF, et al. Maternal obesity and risk of preeclampsia. Paediatr Perinat Epidemiol., 2018; 32(2): 154–161.