Section: Obstetrics and Gynaecology

Original Research Article

MATERNAL AND FETAL OUTCOME OF HYPERTENSIVE DISORDERS OF PREGNANCY

Leena A Joseph[1], Reeba Sara Mathew[2], Anjali Prem[3]

[1]*Associate Professor, CAP Department of Obstetrics and Gynaecology, Government Medical College Kottayam, India.*
[2]*Associate Professor, CAP Department of Obstetrics and Gynaecology, Government Medical College Kottayam, India.*
[3]*Associate Professor, CAP Department of Obstetrics and Gynaecology, Government Medical College Kottayam, India.*

Received *: 05/10/2025*
Received in revised form *: 16/11/2025*
Accepted *: 04/12/2025*

Corresponding Author:
Dr. Leena A Joseph
Associate Professor, CAP Department of Obstetrics and Gynaecology Government Medical College Kottayam, India.
Email: leenaajoseph@gmail.com

DOI: 10.70034/ijmedph.2025.4.539

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (4); 3011-3015

ABSTRACT

Background: Hypertensive disorders of pregnancy contribute significantly to maternal and perinatal morbidity and mortality especially in low and middle income countries. Aim and Objectives: The aim of the study was to determine the feto maternal outcome of hypertensive disorders of pregnancy.

Materials and Methods: An analytical cross-sectional study was conducted among 302 pregnant women diagnosed with hypertensive disorders of pregnancy admitted to a tertiary care centre in Central Kerala from January 2021 to June 2022.The demographic, clinical and obstetric data were collected from the medical records. The details of gestational age at diagnosis, risk factors, mode of delivery, development of maternal complications, apgar score at 1 and 5 minutes and nicu admission were gathered.

Results: About 52.65% had gestational hypertension,11.26% had chronic hypertension and 36.09% had preeclampsia. The mean age of the participants was29.65+5.72 with age range of 18 to 53 yrs. The most common comorbidity associated with HDP was diabetes mellitus. Maternal complications, preterm delivery, low birth weight, NICU admissions were more in the preeclampsia group.

Conclusion: Early identification and appropriate management of HDP are crucial to improve fetomaternal outcomes.

Keywords: Hypertension, preeclampsia, fetomaternal outcome, Intrauterine growth retardation.

INTRODUCTION

Hypertensive disorders of pregnancy (HDP) are one among the lethal triads along with hemorrhage and infections which contribute to significant mortality and morbidity.[1] The prevalence of hypertension during pregnancy has ranged from 6.9% as reported in a community based study to 15% as compared to hospital based studies.[2,3] American College of Obstetrics and Gynecology defines hypertension in pregnancy as systolic BP (SBP) ≥140mmHg and or a diastolic BP (DBP) ≥90mm Hg ;and when either or both of these criteria occurs at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure it is termed gestational hypertension. Severe hypertension is said to occur when systolic BP is ≥160 mm Hg or diastolic ≥110 mm Hg.[4] Diagnosis of preeclampsia (≥140/90 mm Hg) / severe pre eclampsia (≥160/110 mm Hg) is made when hypertension arises after 20 weeks of gestation and is accompanied by one or more signs of organ involvement. These signs include renal (significant proteinuria with protein/creatinine ratio≥ 30 mg/mmol and serum creatinine > 90 µmol/L, Oliguria); hepatic (Raised serum transaminase levels, Severe epigastric and/or right upper quadrant pain); Neurological [Convulsions (eclampsia), Hyperreflexia with sustained clonus, persistent, new headache, Persistent visual disturbances (photophobia, scotomata, cortical blindness, posterior reversible encephalopathy syndrome, retinal vasospasm), Stroke] and hematological involvements (Thrombocytopenia, LDH.> 600mIU/L and Disseminated intravascular coagulation).[5]

The pregnant women in the low- and middle-income countries are at a higher risk of developing fetomaternal complications when diagnosed with HDP. There is a need for early detection and

treatment of HDP for better health outcomes. Only very scanty data is available as published literature in the Indian context regarding the risk factors, fetal and maternal outcome of hypertensive disorders in pregnancy. The paucity of research in Kerala regarding the outcomes of the same pose a significant gap in the translation of knowledge to action. This study aims to describe the various maternal and fetal outcomes due to hypertensive disorders of pregnancy at 300 bedded Obstetrics and Gynecology department of a tertiary care centre.

MATERIALS AND METHODS

An analytical cross-sectional study was conducted in the Department of Obstetrics and Gynecology, of a 300-bedded referral department of a tertiary care centre in central Kerala. The study period extended from January 2021 to June 2022. All pregnant women admitted with hypertensive disorders of pregnancy (HDP) during the study period were included. HDP was classified according to American College of Obstetricians and Gynecologists (ACOG) criteria into gestational hypertension, preeclampsia/eclampsia chronic hypertension and chronic hypertension with super imposed preeclampsia. Women with incomplete medical records were excluded. Approval was obtained from the Institutional Review Board of Government Medical College, Kottayam (IRB 7/2021 dated 21/01/2021) Data were collected maintaining confidentiality and anonymity throughout the study. A sample size of 379 was calculated using the formula 4pq/d2 (p = 9.4%-proportion of patients with maternal complication, q = 90.6%, absolute precision 3).6 Data were collected from 302 records meeting inclusion criteria which included sociodemographic characteristics, obstetric history, clinical presentation, type of HDP, BMI, family history, diabetes mellitus, hypothyroidism, PCOS and other comorbidities. Maternal outcomes assessed included gestational age at delivery, mode of delivery, intrapartum and postpartum complications (placental abruption, postpartum hemorrhage, DIC, HELLP syndrome, hepatic or renal dysfunction and pulmonary edema), ICU admission and maternal mortality. Fetal outcomes included birth weight, APGAR scores, NICU admission and perinatal mortality. Data were entered in Microsoft Excel and analyzed using SPSS version 16. Continuous variables were expressed as mean ± SD or median (IQR). Categorical data were presented as frequencies and percentages. Associations between different HDP and outcomes were assessed using Chi-square or Fisher's exact test for categorical variables. For continuous variables ANOVA was done. A p-value <0.05 was considered statistically significant.

RESULTS

Sociodemographic and reproductive characteristics
A total of 302 pregnant women with HDP were included:159(52.65%) with gestational hypertension, 34(11.26%) with chronic hypertension and 109(36.09%) with preeclampsia/eclampsia. Of the 109, 80(26.49%) had preeclampsia, 19(6.9%) chronic hypertension with super imposed preeclampsia, 6(1.99%) with severe preeclampsia and 4(1.32%) with eclampsia. Mean age of the participants was 29.65± 5.72 with an age range of 18 to 53 years. In the gestational hypertension group 103 were multigravida and 56 were primigravida, the parity ranged from 1-3, however there were 42 multigravida with abortions, two of whom had no live children despite conceiving for 4th or 5th time and 1 had Intrauterine death. In the chronic hypertension group 27 were multigravida with 14 having history of abortions and 2 had no live children. In the preeclampsia/eclampsia group,60 where multigravida with history of abortion in 25 and 1 had no live child despite conceiving for the sixth time. As shown in table 1, the median age of onset of hypertension was 12 weeks in patients who had chronic hypertension and 33 for those in preeclampsia/eclampsia group and 37 for those with gestational hypertension. The gestational age at delivery was the least for the preeclampsia group with a median of 35.3 weeks. The most common comorbidity associated with HDP was diabetes mellitus 112(37.09%).

Table 1: Baseline characteristics

Variable	Chronic Hypertension (n=34)	Gestational Hypertension (n=159)	Preeclampsia/Eclampsia (n=109)
Mean age	**32.47±5.45**	**29.32±5.12**	**29.24± 6.40**
Gestational age at onset (Median, IQR)	**12 (6,12)**	**37(35,37)**	**33(30,33)**
Gestational age at delivery (Median, IQR)	**37.2(36.38, 37.42)**	**37.4(36.6, 38.1)**	**35.3(33,37.2)**
BMI	**26.67±4.83**	**24.61±4.79**	**24.49±5.23**
Polycystic Ovarian Syndrome	**0**	**1(0.62%)**	**1(0.92%)**
Diabetes Mellitus	**19 (55.88%)**	**63(39.62%)**	**30(27.52%)**
Chronic Hypertension	**32(94.12%)**	**0**	**18(16.51%)**
Thyroid Disorders	**3(8.8%)**	**19(11.9%)**	**15(13.8%)**
Renal disease	**2(5.9%)**	**0**	**1(0.92%)**
Family history of hypertension	**15(44.1%)**	**10(6.3%)**	**19(17.4%)**

The maternal outcome is summarized in Table 2. The mode of delivery was caesarian section for 144(47.68%) among all the patients with HDP, however there was no statistically significant result in the mode of delivery across the 3 groups (Chi square-4.71, p=0.095). Hemolysis Elevated Liver Enzymes Low Platelet Count (HELLP) Syndrome occurred in 13(4.3%) all of whom were admitted in the Intensive Care units (2-4 days). The mean hospital stay was the shortest for HDP diagnosed as gestational hypertension followed by those with chronic hypertension and preeclampsia/eclampsia. The analysis with ANOVA showed that there was significant difference in the mean hospital stay between the groups (p=0.024), with a post hoc Bonferroni analysis showing significantly difference among gestational hypertension and preeclampsia/eclampsia (p=0.02).

Table 2: Maternal outcomes in hypertensive disease of pregnancy

Variable	Chronic Hypertension (n=34)	Gestational Hypertension (n=159)	Preeclampsia/Eclampsia (n=109)
Mode of delivery Caesarian Vaginal	 15(44.1%) 19(55.9%)	 68(42.8%) 91(57.2%)	 61(56%) 48(44%)
Abruption	0	3(1.9%)	1(0.9%)
HELLP*	0	2(1.3%)	11(10.1%)
Disseminated Intravascular coagulation	0	1(0.6%)	1(0.9%)
Postpartum Hemorrhage	2(5.9%)	5(3.1%)	3(2.8%)
Acute Renal failure	0	0	1(0.9%)
Pulmonary Edema	0	0	1(0.9%)
PRES#	0	0	1(0.9%)
Intensive Care Unit admission	0	2(1.3%)	11(10.1%)
Mean Hospital Stay	10.09±14.58	8.36±4.63	11.29±10.45

HELLP-Hemolysis Elevated Liver Enzymes Low Platelet Count #PRES-Posterior Reversible Encephalopathy Syndrome

Table 3: Fetal outcomes in hypertensive disease of pregnancy

Variable	Chronic Hypertension (n=34)	Gestational Hypertension (n=159)	Preeclampsia/Eclampsia (n=109)
Preterm Early Late	9(26.5%) 4(11.8) 5(14.7)	38(23.9) 15(9.4) 23(14.5)	66(60.6) 44(40.4) 22(20.2)
Term babies Appropriate for gestational age Small for gestational age	25(73.5) 21(61.8) 4(11.8)	124(77.99) 101(63.5%) 23(14.5%)	46(42.2) 29(26.6) 17(15.6)
Fetal weight (Mean) ≤2.5kg	2.62±0.62 10(29.4)	2.57±0.68 66(41.5)	1.96±0.83 82(75.2)
APGAR Score (Median) 1 min 5 min	 9(9,9) 9(9,9)	 9(9,9) 9(9,9)	 9(8,9) 9(9,9)
APGAR Score ≤7 1 min 5 min	 2(5.9) 2(5.9)	 9(5.7) 4(2.5)	 23(21.1) 14(12.8)
Respiratory distress	2(5.9%)	8(5%)	26(23.9%)
NICU admission	2(5.9%)	16(10.1%)	38(34.9%)
Still birth	2(5.9%)	7(4.4%)	6(5.5%)
Neonatal Death	0	2(1.3%)	6(5.5%)

Table 3 summarizes the fetal outcomes in different hypertensive disorders of pregnancy. As shown in the table 73.5% babies in chronic hypertension and 77.99% babies in the gestational hypertension were term babies while 57.8% in the preeclampsia/eclampsia group were preterm. The mean weight was lowest 1.96±0.83 in the preeclampsia/eclampsia group with 75.2% babies having body weight ≤ 2.5 kg. There was a statistically significant difference in the mean body weight of babies born to mothers in preeclampsia/eclampsia group (p<0.001) as compared to chronic hypertension and gestational hypertension groups. The median APGAR score at 1 and 5 minutes was 9 across the group, however 23(21.1%) in the preeclampsia/eclampsia group had an APGAR score ≤7 at 1 minute which was statistically significant (p<0.001). Similarly 14(12.8%) in preeclampsia/eclampsia group had an APGAR score ≤7 at 5 minutes which was also statistically significant (p=0.04). There was also significant difference in the NICU admissions of the babies of mothers with preeclampsia/eclampsia. Other outcomes in the gestational hypertension group included Intrauterine growth retardation. absent end diastolic flow[AEDF]reversed end diastolic flow[REDF] and those in the preeclampsia/eclampsia group included IUGR AEDF, IUGR REDF, , meconium stained amniotic fluid and macerated still birth.

DISCUSSION

Women with hypertensive disease of pregnancy have adverse maternal and fetal outcomes. This study was done with an intention of generating more evidence on the different outcomes in the mother and baby especially from central Kerala. The age range of the women who developed HDP during the study was from 18-53 years. HDP is multicausal in origin and associated with a lot of comorbidities and advance in maternal age can be cited as one causative factor.6 Advanced maternal age especially above 35 years has been cited as a risk factor for preeclampsia with eventual adverse maternal and perinatal outcomes resulting in higher morbidity and healthcare costs.[7] In this study the mean age was 29.65± 5.72years, parity ranging from 1-3 and majority (56.9%) were multigravida.

In this study the most common associated comorbidity was diabetes mellitus. Syngelaki et al., found that the women at higher risk of adverse outcomes were older, heavier, black or South Asian women, with history of chronic hypertension or diabetes mellitus.8 Subki et al., found that the mean age of the patients was 31.3±6.7 years, the average gravidity and parity were 4.0 and 3.0 respectively with 56.7% being multigravida.[6] Mathew et al, stated that among the medical disorders seen during pregnancy, hyperglycaemia was a statistically significant risk factor for HDP and gestational diabetes mellitus and gestational hypertension had a conjoint existence.[1] Unlike in the study by Mathew et al in which PCOS was considered a significant predictor of HDP, there were only 2 patients who had PCOS along with HDP in this study.[1]

A study done in Ghana reported that 5.3%, 32.4%, 48.8% and 13.5% women had chronic hypertension, gestational hypertension, pre-eclampsia and eclampsia respectively. Sixteen women with pre-eclampsia had chronic hypertension with superimposed pre-eclampsia, and 6 women with eclampsia developed the condition after delivery.9In this study the profile of HDP included 52.65%, 11.26% and 36.09% with gestation hypertension, chronic hypertension and preeclampsia/eclampsia respectively. Of the 109 patients with preeclampsia/eclampsia 80 had preeclampsia, 19 chronic hypertension with super imposed preeclampsia,[6] with severe preeclampsia and 4 with eclampsia. Xavier et al . found that the gestational age at diagnosis was >27 weeks which was different in this study.10The median age of onset for chronic hypertension, gestational hypertension and preeclampsia/eclampsia were 12, 37 and 33 weeks respectively.

A study done in Malaysia has reported that pregnant women with preeclampsia had a higher risk of preterm delivery, instrumental and cesarean delivery.[7] Similarly studies done in Saudi Arabia and Ghana also reported increased cesarean deliveries.[6,9] In line with studies done elsewhere, the mode of delivery was caesarian section nearly 47.68% of patients with HDP, however this outcome did not vary based on type of HDP. The proportion of patients who developed complications like HELLP and who required Intensive care unit admission were more in the preeclampsia/eclampsia group as compared to the GDM or chronic hypertension group. The proportion of patients who developed abruption, postpartum hemorrhage, DIC, PRES were very small in numbers.

The preeclampsia/eclampsia group had greater proportion of babies who had various complications like preterm deliveries, weight < 2.5kg, small for gestational age, an APGAR score <7 at 1 minute and 5 minutes, respiratory distress, NICU admissions and neonatal deaths. Lugobe HM et al, states that the adverse perinatal outcomes could be because of the delay in the diagnosis of HDP eventually leading to poor control of blood pressure and seizure.[11] They attributed preterm delivery in many instances so as to ensure definitive management for HDP. Low birth weight was attributed to intrauterine fetal growth restriction. They also pointed out that babies born to women with HDP require prompt and specialized care as evidenced in this study. There were a total of 56 NICU admissions, 15 still births and 8 neonatal deaths among all patients with HDP. Greenberg et al., found that compared with normotensive women those with stage 1 hypertension had an increased risk of neonatal intensive care unit admissions and preterm birth at <37 weeks' gestation.12Maducolil MK et al, found that the in preeclampsia the risk of preterm births had an odds ratio (OR) of 8.67, NICU admissions an OR of 4.41 and low birth weight an OR of 7.93 which corroborates with our findings.[13] Browne et al., also found that the adverse fetal outcomes included pre-term birth, low birthweight, low Apgar scores, small for gestational age and mortality in women with HDP.[14] Pregnant women identified at high risk of preeclampsia with a competing-risks model were found to be at an increased risk of gestational hypertension, caesarean section, stillbirth, small for gestation age and neonatal admission for more than two days.8 Compared with children who have 5-minute Apgar scores of 7 to 10, children who had scores of 0 to 3 were found to have high risk of neonatal death and cerebral palsy.15In this study there were 20 neonates with an APGAR score <7 at 5 minutes which is a cause of concern.

Limitations of this study include the cross sectional nature of this study which could not look into the long term outcomes, the sample size could not be achieved because of the restricted time span and additional parameters like the number of antenatal visits, the presence of anemia, the treatment of HDP, the objective values of control of blood pressure were not included in this study.

CONCLUSION

Amongst the hypertensive disorders of pregnancy, gestational hypertension was the most common and the most common associated comorbidity was gestational diabetes mellitus. HELLP was the major adverse maternal outcome seen causing prolonged hospital stay and ICU admissions. Preterm deliveries and NICU admissions were the major adverse fetal outcomes. There is a need to conduct multicentric studies with bigger sample size assessing the presence of multiple co-morbidities to determine the association better and generalization for external validity. Appropriate management hypertension and education about the risk of preeclampsia will help in early identification and probably overcoming the adverse outcomes through early interventions

Acknowledgement: We thank all our patients and the department of Obstetrics and Gynecology who helped us complete this study. We also thank Dr S P Dhanya, Professor CAP Pharmacology who helped in various stages of this study.

Conflict of Interest: Nil

Funding: Nil

REFERENCES

1. Mathew R, Devanesan BP, Srijana, Sreedevi NS. Prevalence of hypertensive disorders of pregnancy, associated factors and pregnancy complications in a primigravida population. Gynecol Obstet Clin Med. 2023 June 1;3(2):119–23.
2. Mehta B, Kumar V, Chawla S, Sachdeva S, Mahopatra D. Hypertension in pregnancy: A community-based study. Indian J Community Med. 2015;40(4):273.
3. Upadya M,Rao ST. Hypertensive disorders in pregnancy. Ind J Anaesth 2018; 62(9):675-81 [Internet]. [cited 2025 Dec 5]. Available from: https://journals.lww.com/ijaweb/fulltext/2018/62090/hypertensive_disorders_in_pregnancy.4.aspx
4. American College of Obstetrics and Gynecology. ACOG Practice Bulletin. Clinical Management Guidelines for Obstetrician–Gynecologists. Obstetrics and Gynecology 2020;135(6):e237-e259 [Internet]. [cited 2025 Dec 5]. Available from: https://www.preeclampsia.org/frontend/assets/img/advocacy_resource/Gestational_Hypertension_and_Preeclampsia_ACOG_Practice_Bulletin,_Number_222_1605448006.pdf
5. Directorate of Women's Health, Ministry of Health, Trinidad and Tobago. Hypertension-in-Pregnancy-Clinical-Guideline. 2018 [Internet]. [cited 2025 Dec 5]. Available from: https://platform.who.int/docs/default-source/mca-documents/policy-documents/guideline/TTO-CC-31-04-GUIDELINE-2018-eng-MOH-Hypertension-in-Pregnancy-Clinical-Guideline-2018.pdf
6. Subki AH, Algethami MR, Baabdullah WM, Alnefaie MN, Alzanbagi MA, Alsolami RM, et al. Prevalence, Risk Factors, and Fetal and Maternal Outcomes of Hypertensive Disorders of Pregnancy: A Retrospective Study in Western Saudi Arabia. Oman Med J. 2018 Sept;33(5):409–15.
7. Sutan R, Aminuddin NA, Mahdy ZA. Prevalence, maternal characteristics, and birth outcomes of preeclampsia: A cross-sectional study in a single tertiary healthcare center in greater Kuala Lumpur Malaysia. Front Public Health. 2022;10:973271.
8. Syngelaki A, Magee LA, von Dadelszen P, Akolekar R, Wright A, Wright D, et al. Competing-risks model for pre-eclampsia and adverse pregnancy outcomes. Ultrasound Obstet Gynecol Off J Int Soc Ultrasound Obstet Gynecol. 2022 Sept;60(3):367–72.
9. Dassah ET, Kusi-Mensah E, Morhe ESK, Odoi AT. Maternal and perinatal outcomes among women with hypertensive disorders in pregnancy in Kumasi, Ghana. PloS One. 2019;14(10):e0223478.
10. Xavier IM, Simões ACZ, Oliveira R de, Barros YE, Sarmento ACA, Medeiros KS de, et al. Maternal-fetal outcomes of women with hypertensive disorders of pregnancy. Rev Assoc Médica Bras. 2023 June 2;69(6):e20230060.
11. Lugobe HM, Muhindo R, Kayondo M, Wilkinson I, Agaba DC, McEniery C, et al. Risks of adverse perinatal and maternal outcomes among women with hypertensive disorders of pregnancy in southwestern Uganda. PloS One. 2020;15(10):e0241207.
12. Greenberg VR, Silasi M, Lundsberg LS, Culhane JF, Reddy UM, Partridge C, et al. Perinatal outcomes in women with elevated blood pressure and stage 1 hypertension. Am J Obstet Gynecol. 2021 May;224(5):521.e1-521.e11.
13. Maducolil MK, Al-Obaidly S, Olukade T, Salama H, AlQubaisi M, Al Rifai H. Pre-eclampsia: incidence, determinants, and pregnancy outcomes from maternity hospitals in Qatar: a population-based case-control study. J Matern-Fetal Neonatal Med Off J Eur Assoc Perinat Med Fed Asia Ocean Perinat Soc Int Soc Perinat Obstet. 2022 Dec;35(25):7831–9.
14. Browne JL, Vissers KM, Antwi E, Srofenyoh EK, Van der Linden EL, Agyepong IA, et al. Perinatal outcomes after hypertensive disorders in pregnancy in a low resource setting. Trop Med Int Health TM IH. 2015 Dec;20(12):1778–86.
15. Moster D, Lie RT, Irgens LM, Bjerkedal T, Markestad T. The association of Apgar score with subsequent death and cerebral palsy: A population-based study in term infants. J Pediatr. 2001 June 1;138(6):798–803.