



Original Article

Perinatal outcomes of hypertensive disorders of pregnancy

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ABSTRACT

Objectives: Hypertensive disorders of pregnancy (HDP) are multisystem diseases, which include chronic (pre-existing) hypertension, gestational hypertension, pre-eclampsia, eclampsia, and pre-eclampsia superimposed on chronic hypertension. These disorders may complicate 5%–10% of all pregnancies and are leading causes of maternal and perinatal mortality and morbidity worldwide. This study was done to assess the incidence of HDP and perinatal outcomes in comparison to normal pregnancy. The objectives of this study were to assess the incidence of HDP and its correlation with perinatal outcome.

Materials and Methods: Eighty patients were enrolled for the study, Group A (cases) – 40 patients of HDP and Group B (controls) – 40 normotensive controls, these 40 normotensive controls were properly matched with Group A with respect to age and gestational age. The collected data were analyzed with IBM SPSS statistics software 23.0 Version XVII.

Results: In Group A, 45% were gestational hypertensive patients, 35% were pre-eclamptic patients, 12.5% eclampsia, and 7.5% chronic hypertension. Perinatal morbidity and mortality were increased in HDP when compared with age and gestational age-matched controls. Perinatal mortality was seen in 10% in Group A. In Group B (controls) there were no perinatal mortalities.

Conclusion: The study demonstrated that high parity, low gestational age, lack of antenatal care, having eclampsia, pre-delivery onset of HDP, vaginal delivery, low fetal birth weight, and maternal death were independent predictors of perinatal mortality. The majority of perinatal mortality predictors were also predictors of stillbirths. The strong association of perinatal mortality with eclampsia (a late complication of HDP in the majority) and lack of antenatal care is an indirect evidence for the delay in the utilization of obstetric services.

Keywords: Hypertensive disorders of pregnancy, Perinatal outcome, Birth weight, Apgar

INTRODUCTION

Hypertensive disorders of pregnancy (HDP) are the most significant problem in obstetrics. The incidence of pre-eclampsia in hospital practice in India varies from 5% to 15% and that of eclampsia about 1.5%.^[1] The incidence of HDP varies in the range of 1–35%.^[2] They represent one of the most common problems of pregnancy and lead to increased maternal and perinatal morbidity and mortality. Pre-eclampsia is a multisystem and multifactorial disease and causes cellular death. The objectives of this study were to assess the incidence of HDP and its correlation with perinatal outcome.

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Definitions

Gestational hypertension

Blood pressure of more than 140/90 mmHg after 20 weeks in previously normotensive women and hypertension resolves by 12 weeks postpartum.

Pre-eclampsia

Hypertension with proteinuria (≥ 300 mg/day or persistent dipstick 1+ or urine protein:creatinine ratio ≥ 0.3) or thrombocytopenia (platelet $< 100,000/\mu\text{L}$), renal insufficiency (creatinine > 1.1 mg/dl), liver involvement (serum transaminase levels twice normal), cerebral symptoms (headache, visual disturbances, convulsion), and pulmonary edema.

Chronic hypertension

Blood pressure more than 140/90 mmHg before pregnancy or before 20 weeks gestation or both.

Eclampsia

In women with pre-eclampsia, a convulsion that cannot be attributed to another cause is termed as eclampsia.

MATERIALS AND METHODS

Study was conducted in the Department of Pediatrics in Kempegowda Institute of Medical Sciences, Bangalore, for a period of 18 months. The study comprised 80 pregnant women. Forty patients with HDP (Group A) were included for the study, and the results were compared with 40 normotensive patients (Group B). It was purposive sampling.

Inclusion criteria

Forty pregnant women diagnosed with HDP admitted under Obstetrics and Gynecology department in Kempegowda Institute of Medical Sciences (Group A). Results in Group A were compared with 40 normotensive patients and they were selected according to the age of the patient and gestational age of the cases at the time of delivery for proper matching.

Exclusion criteria

In Group A and Group B, patients with medical comorbidities such as diabetes mellitus, liver disorder, renal disease, and cardiovascular disease were excluded from the study.

METHODOLOGY

After taking, informed written consent from all the patients' demographic features such as age, gestation, and parity were

recorder on structured data collection sheet. A detailed medical history of all participants was taken to ensure that they fulfill the inclusion criteria for the study. This was followed by a thorough physical examination of every case and control. Blood pressure of all participants was measured using manual mercury sphygmomanometer twice for each patient at an interval of 15–20 min and then after 2 h of rest, before labeling them as normotensive or with hypertensive disorder of pregnancy.

Statistical data analysis

The collected data were analyzed with IBM SPSS statistics software 23.0 Version. To describe about the data descriptive statistics frequency analysis, percentage analysis was used for categorical variables. To find the significant difference between the bivariate samples in independent groups, the Unpaired sample *t*-test was used. To find the significance in categorical data, Chi-square test was used similarly if the expected cell frequency is < 5 in 2×2 tables; then, the Fisher's exact was used. In all the above statistical tools, the probability value 0.05 is considered as significant level.

RESULTS

A total of 80 cases were studied of which, Group A (cases): 40 patients with hypertensive disorder of pregnancy and Group B (controls): 40 normotensive pregnant women.

In our study group, the majority of the patients belong to 21–25 years age group (age was matched with Group A and Group B for proper matching). The youngest being 18 years and the oldest is 37 years [Table 1].

In Group A (cases), the majority were primigravidas constituting 52.5%. In Group B (controls), the majority were multigravidas constituting 67.5% [Table 2].

Controls were selected according to the gestational age of cases for proper matching. Majority of the patients were between the gestational age of 37 and 39+6 weeks gestation in both Group A and Group B [Table 3].

Majority of the cases were diagnosed with gestational hypertension followed by pre-eclampsia and 5 were cases of eclampsia. Among 14 pre-eclampsia cases, 5 were cases of severe pre-eclampsia [Table 4].

In Group A (cases), among five patients of eclampsia 3 had intrauterine death, other two babies were shifted to neonatal intensive care unit (NICU), of which one baby died on day 6 (neonatal death) due to preterm complication. In Group A (cases), among five patients of eclampsia three had intrauterine death, other two babies were shifted to NICU, of which one baby died on day 6 (neonatal death) due to preterm complication [Table 5].

Indications of elective lower segment cesarean section (LSCS) among cases and controls were previous LSCS not willing for trial of labor after previous cesarean, previous 2 LSCS, malpresentation, cephalopelvic disproportion, etc. In Group A (cases), maximum percentage was seen in emergency LSCS. In Group B (controls), maximum percentage of patients delivered vaginally [Table 6].

In Group A (cases), only seven babies were more than 3 kg, whereas, in Group B (controls), 13 babies were more than 3 kg. In Group B (controls), none of the babies were <1 kg, whereas in Group A (cases) 3 babies were <1 kg [Table 7].

In Group A, among five cases of eclampsia, three had intrauterine fetal demise. In Group B, only two babies had APGAR of <7/10, whereas, in Group A, there were nine babies of APGAR <7/10. All these APGAR represent 1 min APGAR score [Table 8].

In Group A, there were three intrauterine fetal demises; hence, among 37 babies, 24 babies were admitted in NICU. NICU admissions were maximum (64.9%) in Group A, whereas, in Group B, it was only 25% [Table 9].

DISCUSSION

There are numerous pathophysiological abnormalities in HDP. These changes occur in large extent and are translated into a full clinical presentation of pre-eclampsia, during late pregnancy. In this study, controls were selected after proper matching with the cases with respect to the age of the patient

Table 1: Distribution of Group A and Group B according to age.

| Age (years) | Group A (Cases) | Group B (Controls) |
|-------------|-----------------|--------------------|
| 18–20 | 8 (20.0%) | 3 (7.5%) |
| 21–25 | 16 (40.0%) | 21 (52.5%) |
| 26–30 | 11 (27.5%) | 13 (32.5%) |
| Above 30 | 5 (12.5%) | 3 (7.5%) |

Table 2: Distribution of Group A and Group B according to gravidity.

| Gravida | Group A (Cases) | Group B (Controls) |
|---------|-----------------|--------------------|
| Multi | 19 (47.5%) | 27 (67.5%) |
| Primi | 21 (52.5%) | 13 (32.5%) |

Table 3: Distribution of Group A and Group B according to gestational age.

| Gestational age (weeks) | Group A (Cases) | Group B (Controls) |
|-------------------------|-----------------|--------------------|
| ≤33+6 | 10 (25%) | 8 (20%) |
| 34–36+6 | 13 (32.5%) | 10 (25%) |
| 37–39+6 | 14 (35%) | 18 (45%) |
| ≥40 | 3 (7.5%) | 4 (10%) |

and gestational age at the time of delivery. In Group A and Group B, maximum percentage of patients were in the age group of 21–25 years, with the mean age of 25. According to Hazari *et al.*, mean age among cases were 23 and among controls were 25.^[3] In Group A, primigravidas were more compared to multigravidas, constituting 52.5% and 47.5%, respectively, which are consistent with various other studies. Primigravida is a proven risk factor for HDP. According to Sajith, 2014, the highest incidence of hypertension was occurred in primigravida patients (53.8%).^[4] Hansen reported a two- to three-fold increase in the incidence in primigravida, and this was supported by Chesley.^[5] Sibai and his association recently reconfirmed the high risk of developing of pregnancy induced hypertension in primigravidas.^[6–8] Most common hypertensive disorder of pregnancy found in this study was gestational hypertension followed by pre-eclampsia, which is consistent with FOGSI which states that approximately two-third of HDP are due to gestational hypertension and preeclampsia and one-third are due to chronic hypertension. The total number of intrauterine deaths in the study were 3 (7.5 %) due to

Table 4: Distribution of cases according to various types of hypertensive disorders of pregnancy.

| Group A – Cases (n=40) | Frequency | Percentage |
|--------------------------|-----------|------------|
| Gestational hypertension | 18 | 45 |
| Preeclampsia | 14 | 35 |
| Chronic hypertension | 3 | 7.5 |
| Eclampsia | 5 | 12.5 |
| Total | 40 | 100 |

Table 5: Comparison of Group A and Group B according to perinatal outcome.

| Perinatal outcome | Group A (Cases) | Group B (controls) |
|---|-----------------|--------------------|
| Intrauterine growth restriction-preterm | 13 (32.5%) | 2 (5%) |
| Intrauterine growth restriction-term | 6 (15%) | 0 |
| Intrauterine fetal death | 3 (7.5%) | 0 |
| Neonatal death | 1 (2.5%) | 0 |

Table 6: Comparison of Group A and Group B according to mode of delivery.

| Mode of delivery | Group A (Cases) | Group B (Controls) |
|--|-----------------|--------------------|
| Emergency lower segment cesarean section | 19 (47.5%) | 11 (27.5%) |
| Elective lower segment cesarean section | 9 (22.5%) | 10 (25%) |
| Vaginal delivery | 12 (30.0%) | 19 (47.5%) |

Table 7: Comparison of birth weight among Group A and Group B.

| Birth weight | Group A (Cases) | Group B (Controls) |
|--------------|-----------------|--------------------|
| ≤999 g | 3 (7.5%) | 0% |
| 1000–1999 g | 13 (32.5%) | 7 (17.5%) |
| 2000–2999 g | 17 (42.5%) | 20 (50%) |
| ≥3000 g | 7 (17.5%) | 13 (32.5%) |

Table 8: Comparison of Apgar score among Group A and Group B.

| Apgar | Group A (cases) | Group B (controls) |
|-------|-----------------|--------------------|
| 7–10 | 31 (77.5%) | 38 (95%) |
| 4–6 | 6 (15%) | 2 (5%) |
| 0–3 | 3 (7.5%) | 0 |
| Total | 40 | 40 |

Table 9: Comparison of neonatal intensive care unit admission among Group A and Group B.

| Neonatal intensive care unit admission | Group A (cases) | Group B (controls) |
|--|-----------------|--------------------|
| No | 13 (35.1%) | 30 (75%) |
| Yes | 24 (64.9%) | 10 (25%) |

eclampsia. One case of neonatal death on day 6 of life was due to preterm complications. Perinatal mortality in my study was 10%. The mean birth weight of babies in Group A (cases) was 2.21 and standard deviation of 0.87; the mean birth weight of babies in Group B (controls) was 3.01 and standard deviation of 0.43. The magnitude of fetal growth restriction is more in Group A (cases) than Group B. In this study, in Group A (cases), 12 delivered vaginally (30 %) and 28 by cesarean section (70%). In Group B (controls), 19 delivered vaginally (47.5%) and 21 by cesarean section (52.5%). In the study by M.R. Dutta, Luna Pant (2002), 45% were vaginal deliveries, and cesarean section rate was 62 %. Iqbal *et al.* reported an incidence of cesarean as 43% and vaginal as 57 %. In Group A (cases), 55% were preterm deliveries and remaining were term. An observational study on maternal and neonatal outcome in Thrissur Medical college, conducted in 2017 by Kennady G *et al.* showed 52.4% preterm.^[9] In Group A, only seven babies were more than 3 kg, whereas, in Group B, 13 babies were more than 3 kg. In Group B, none of the babies were <1 kg, whereas, in Group A, there were three babies. In Group A, there were 19 fetal growth restriction babies, whereas, in group B, there were only two cases of fetal growth restriction suggesting that IUGR is a common finding in HDP as seen by Odegard *et al.*^[10] In Group A, among five cases of eclampsia, three had intrauterine fetal demise. In Group B, only two babies had APGAR of <7/10, whereas, in Group A, there were nine babies of APGAR <7/10. Limitations of our study – the sample size was small (as patients in Group A

[cases] were selected only with HDP and patients with other comorbidities like diabetes, liver disorder, renal disease and cardiovascular disorders were excluded from the study), we did not correlate the levels of the parameter in different classification of HDP and its complications.

CONCLUSION

HDP are common in India. The basic management objectives included obstetric management, adequate fetal surveillance, antihypertensive management, anticonvulsant therapy, safe analgesia, anesthetic management of labor, and anesthesia for delivery. ISSHP recommends that women with established strong clinical risk factors for preeclampsia be treated, ideally before 16 weeks but definitely before 20 weeks with low-dose aspirin (75–162 mg/d as studied in randomized controlled trials). In normal pregnancy, there is decreased blood pressure response to pressor substances, but in pre-eclampsia, there is marked response to vasopressin, norepinephrine, and angiotensin. This response of arterial system leads to generalized vasoconstriction and hypertension in pre-eclampsia. These alterations secondarily lead to many pathophysiological changes which adversely affect maternal and fetal wellbeing. Such cases need special attention with early detection and referral to higher center with better facilities of NICU set up to reduce the complications and mortality. Hypertensive disorders remain among the most significant and intriguing unsolved problems in obstetrics. In further studies, it is critical to find early diagnostic markers which are also cost effective, markers which help us to know the prognosis, effective interventions, and preventions of HDP which are particularly important to reduce maternal and perinatal complications and ensure both pregnant women and neonates to be healthy and safe.

In Group A and Group B, maximum percentages of patients were in the age group of 21–25 years, with the mean age of 25. In Group A, primigravidas were more compared to multigravidas, constituting 52.5% and 47.5%, respectively, whereas, in Group B, multigravidas were more compared to primigravidas constituting 67.5% and 32.5%, respectively. Most common hypertensive disorder of pregnancy found in this study was gestational hypertension followed by pre-eclampsia. The total number of intrauterine deaths in the study were 3 (7.5%) due to eclampsia. One case of neonatal death on day 6 of life due to preterm complication. Perinatal mortality in my study was 10%. The mean birth weight of babies in Group A (cases) was 2.21 and standard deviation of 0.87; the mean birth weight of babies in Group B (controls) was 3.01 and standard deviation of 0.43 In this study, in Group A (cases), 12 delivered vaginally (30%) and 28 by cesarean section (70%). In Group B (controls), 19 delivered vaginally (47.5%) and 21 by cesarean section (52.5%). In Group A, only seven babies were more than 3 kg, whereas, in

Group B, 13 babies were more than 3 kg. In Group B, none of the babies were <1 kg, whereas, in Group A, there were three babies. In Group A, there were 19 fetal growth restriction babies, whereas in Group, B there were only two cases of fetal growth restriction. In Group B, only two babies had APGAR of <7/10, whereas, in Group A, there were nine babies of APGAR <7/10.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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