

A Hospital Based Prospective Observational Study Assessing the Interventions Required and Outcome in Pregnancy Induced Hypertension Patients in ICU

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Abstract

Aim: The aim of the present study was to determine the characteristics, diagnoses, interventions and outcome of obstetric patients with pregnancy induced hypertension admitted in our Critical care unit (CCU).

Methods: It was a prospective, observational study conducted in 100 obstetric patients diagnosed with PIH who got admitted to the CCU in Department of Anaesthesiology and Critical Care at SNMMCH, DHANBAD, Jharkhand, India for one year. after approval from the Institutional Scientific and Ethics Committee after meeting the inclusion and exclusion criteria.

Results: It was observed that 70% (n=70) of our study population were diagnosed with severe preeclampsia alone (Group 1), while 20% (n=20) of them were diagnosed with eclampsia (Group 2), 8% (n=8) were Eclampsia with HELLP syndrome and 2% (n=2) were HELLP syndrome without eclampsia). 80% (n=80) of the patients belonged to the age group of 21-30 years, while 12% (n=12) were less than 20 years of age and 8% (n=8) were more than 30 years of age. 54% (n=54) of the women were nulliparous and the remaining were multiparous. 85% (n=85) of the women had unregistered status and 15% (n=15) were booked from the initial time of pregnancy. It was seen that blood pressure was raised among all the study groups and this increase is statistically significant with a P value of 0.03 and 0.01 for systolic blood pressure and diastolic blood pressure respectively. Overall, mortality was 10% (n=10) and the remaining 90% (n=90) were discharged.

Conclusion: It was observed that preeclampsia, nulliparity, unbooked status, and lower segment cesarean section were prevalent among the subjects. Most common intervention required was transfusion of blood products. Pulmonary edema and HELLP syndrome were the most common complications. Overall mortality was low. Neonatal mortality was more in severe preeclampsia patients with term gestation.

Keywords: Pregnancy, Hypertension, ICU, Maternal and fetal outcome.

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Introduction

Hypertensive diseases of pregnancy, particularly preeclampsia/eclampsia, remains one of the leading causes of maternal morbidity and mortality worldwide. [1,2] This figure is further accentuated in developing countries for which the sub-Saharan African has a disproportionate representation when compared with the developed worlds. [3] The burden of hypertensive diseases on the healthcare institution is enormous given to the high reproductive activities in this region. Preeclampsia/eclampsia is associated with several maternal complications that could be acute or chronic. Eclampsia, when grand mal seizures occur in a woman with the gestational hypertension or preeclampsia, [4] accounts for up to 12% of deaths during pregnancy. [5] Quite often, further care for these women in the Intensive Care Unit (ICU) becomes necessary for the treatment of preeclampsia/eclampsia or for the management of associated complications. It has been suggested that intensive care management of the woman with preeclampsia/eclampsia may lead to better outcome and consequent improvement in the maternal mortality rate. [6]

Severe preeclampsia and its associated complications are considered as the leading main indications for intensive care unit (ICU) admission. [7-10] The most common indications for admission to the ICU of patients with pregnancy-induced hypertension include but are not limited to refractory hypertension, neurological dysfunction (intracranial hemorrhage, seizures, and elevated intracranial pressure), liver or kidney dysfunction, pulmonary edema, HELLP syndrome, and/or disseminated intravascular coagulation (DIC). [11-14] There are several studies of critically ill obstetric patients, but little has been studied on the maternal and perinatal outcomes of

patients with preeclampsia, eclampsia or HELLP syndrome. [11,15]

Risk factors for pregnancy induced hypertension include extremes of maternal age, nulliparity, multiple gestation, molar pregnancy, previous history of preeclampsia or eclampsia, pre-existing hypertension, obesity, diabetes mellitus, chronic renal disease, urban or rural domicile, availability and utilization of health facilities. Major maternal complications include pulmonary aspiration, pulmonary edema, cerebrovascular accident, venous thromboembolism, acute renal failure, liver failure, disseminated intravascular coagulation (DIC), sepsis, cardiopulmonary arrest and death. Perinatal complications include fetal growth restriction, perinatal asphyxia, iatrogenic prematurity, stillbirths, preterm delivery and neonatal mortality.

Quite often, further care of these women in the ICU becomes necessary for the treatment of preeclampsia/eclampsia and its complications. Initial management includes protecting the airway, breathing adequacy and circulation. Other measures include hemodynamic monitoring, use of intravenous fluids, blood transfusion, plasma expanders, antibiotics, control of seizures and blood pressure. Oxygen supplementation to improve the oxygen saturation, assisted ventilation, respiratory support is commonly required. The outcomes vary because of the different severity of complications associated with preeclampsia/eclampsia.

The aim of the present study was to determine the characteristics, diagnoses, interventions and outcome of obstetric patients with pregnancy induced hypertension admitted in our Critical care unit (CCU).

Materials and Methods

It was a prospective, observational study conducted in 100 obstetric patients diagnosed with PIH who got admitted to the CCU in Department of Anaesthesiology and Critical Care at SNMMCH, DHANBAD, Jharkhand, India for one year. after approval from the Institutional Scientific and Ethics Committee after meeting the inclusion and exclusion criteria.

Inclusion criteria

Females with Pregnancy induced hypertension (PIH) admitted to ICU.

Exclusion criteria

1. Non eclamptic causes of fits, including hysterical causes and epilepsy.
2. Patients having chronic hypertension.
3. History of pre-existing liver & kidney disease.
4. Haematological abnormalities.
5. Structural or functional cardiac problems.
6. Sickle cell disease or trait.

The record of the ICU of the institution was taken to identify all women with PIH who got admitted during antenatal period and delivery or puerperium (restricted to 6 weeks postpartum) during the study duration. The subjects were divided into four groups - Group 1: Severe preeclampsia without HELLP syndrome, Group 2: Eclampsia without HELLP syndrome, Group 3: Eclampsia with HELLP syndrome, Group 4: HELLP syndrome without eclampsia. For each eligible patients for the study, the following information was collected on a data collection sheet: Socio demographic characteristics namely, age, parity, booking status, marital status, educational status, place of delivery, gestational age at the time of diagnosis, indication for ICU admission and timing of admission to ICU (antepartum or postpartum).

On ICU admission, the parameters recorded were

- indication of patient admission, gestational age, obstetric and menstrual history, duration of complications, therapeutic interventions during ICU admission, maternal outcome - mortality or transfer out of the unit and foetal outcome -IUGR/term/preterm, Apgar score and follow up till 7th post-natal day. Laboratory monitoring of patients included complete blood count, liver function tests, coagulation profile, renal function tests, arterial blood gas analysis (ABG), imaging (Chest X-ray/ CT, neuro-CT/ MRI), ECG, 2D Echo, USG abdomen. Interventions required in the ICU were hemodynamic monitoring (heart rate, non-invasive blood pressure, respiratory rate, SpO₂), mechanical ventilation, renal replacement therapy, transfusion of blood and its products and use of vasoactive drugs. The frequency of maternal complications like pulmonary edema, renal impairment, HELLP syndrome, sepsis, postpartum haemorrhage, aspiration, posterior reversible encephalopathy syndrome (PRES), postpartum cardiomyopathy and neurological deficits were noted. Maternal follow-up up to 6 weeks postpartum was done.

The statistical analysis was carried out using IBM SPSS (Statistical Package for Social Sciences) statistical version 21. The analysis includes frequency table, bar, pie chart, association of variables based on Chi-square, odd ratio, incidence with 95% confidence interval. All quantitative variables were estimated using measures of central location (mean and median) and measures of dispersion (standard deviation). For normally distributed data, Mean was compared using independent t-test (for two groups) ANOVA (for two or more groups). For not normally distributed data, Median was compared using Mann Whitney U test (for two groups). For relationship, Pearson Correlation method was used. Non parametric Chi square test was used to find association between variables.

Results

Table 1: Distribution of the patients according to diagnosis

| Study groups | N% |
|--|---------|
| Group 1 (Pre-eclampsia without HELLP syndrome) | 70 (70) |
| Group 2 (Eclampsia without HELLP syndrome) | 20 (20) |
| Group 3 (Eclampsia with HELLP syndrome) | 8 (8) |
| Group 4 (HELLP syndrome without eclampsia) | 2 (2) |

It was observed that 70% (n=70) of our study population were diagnosed with severe preeclampsia alone (Group 1), while 20% (n=20) of them were diagnosed with eclampsia (Group 2), 8% (n=8) were Eclampsia with HELLP syndrome and 2% (n=2) were HELLP syndrome without eclampsia).

Table 2: Demographic details

| Age groups | N% |
|------------------------|---------|
| Less than 20 years | 12 (12) |
| 21-30 years | 80 (80) |
| More than 30 years | 8 (8) |
| Parity | |
| Nulliparous | 54 (54) |
| Multiparous | 46 (46) |
| Booking | |
| Booked | 85 (85) |
| Unregistered | 15 (15) |
| Gestation weeks | |
| <37 weeks of gestation | 35 (35) |
| >37 weeks of gestation | 65 (65) |
| Delivery | |
| FTNVD | 4 (4) |
| PTNVD | 6 (6) |
| LSCS | 90 (90) |

80% (n=80) of the patients belonged to the age group of 21-30 years, while 12% (n=12) were less than 20 years of age and 8% (n=8) were more than 30 years of age. 54% (n=54) of the women were nulliparous and the remaining were multiparous. 85% (n=85) of the women had unregistered status and 15% (n=15) were booked from the initial time of

pregnancy. 35% (n=35) of the patients in our study had not completed 37 weeks of gestation, while 65% (n=65) were appropriate for the weeks of gestation. 4% (n=4) had full term normal vaginal delivery (FTNVD), 6% (n=6) patients had preterm normal vaginal delivery (PTNVD) while 90% (n=90) had lower segment caesarean section (LSCS).

Table 3: Comparison of BP among various groups

| | BP (mmHg) | |
|--------------|--------------|---------------|
| | SBP | DBP |
| Group 1 n=70 | 150.05 ±8.77 | 101.09 ±7.20 |
| Group 2 n=20 | 146.4 ±25.35 | 106.60 ±16.04 |
| Group 3 n=8 | 160 ±16.60 | 100 ±15.25 |
| Group 4 n=2 | 99 | 75 |
| P value | 0.03 | 0.01 |

It was seen that blood pressure was raised among all the study groups and this increase is statistically significant with a P value of 0.03 and 0.01 for systolic blood pressure and diastolic blood pressure respectively.

Table 4: Distribution of patients according to therapeutic interventions

| Therapeutic interventions | N% |
|-------------------------------|---------|
| Mechanical ventilation | 8 (8) |
| Renal replacement therapy | 2 (2) |
| Transfusion of blood products | 40 (40) |
| Vasoactive drugs | 4 (4) |

40% (n=40) patients required transfusion of blood products, 8% (n=8) required mechanical ventilation, 4% (n=4) required vasoactive drugs and 2% (n=2) needed renal replacement therapy.

Table 5: Distribution of patients according to maternal outcome

| | Maternal outcome | | |
|--------------|------------------|-----------|-------|
| | Discharge | Mortality | Total |
| Group 1 n=70 | 63 | 7 | 70 |
| Group 2 n=20 | 18 | 2 | 20 |
| Group 3 n=8 | 7 | 1 | 8 |
| Group 4 n=2 | 2 | 0 | 2 |
| Total | 90 | 10 | 100 |

Overall, mortality was 10% (n=10) and the remaining 90% (n=90) were discharged.

Discussion

Hypertension is the most common medical disorder of pregnancy, affecting 6% to 10% pregnancies. It is cause of maternal mortality, together with hemorrhage it accounts for about one half of all maternal deaths worldwide and significant neonatal complications. Hypertensive disorders of pregnancy encompass a range of conditions- chronic hypertension, gestational hypertension, preeclampsia, preeclampsia superimposed on chronic hypertension and eclampsia. It is difficult to differentiate because clinical presentation is often similar despite complex differences in their underlying pathophysiology and prognosis. Severe pregnancy induced hypertension is a disorder which is now treated in ICU. A better knowledge of the pathophysiology of preeclampsia allows for better and more effective management of these patients. [16] As with other reports, hypertensive disorders of pregnancy with their varying

single or multiple organ system involvement are one of the main causes of ICU admission. [7-10]

It was observed that 70% (n=70) of our study population were diagnosed with severe preeclampsia alone (Group 1), while 20% (n=20) of them were diagnosed with eclampsia (Group 2), 8% (n=8) were Eclampsia with HELLP syndrome and 2% (n=2) were HELLP syndrome without eclampsia). The findings were similar to the studies done by Lapinsky SE et al, [17] Singh K et al, [18] Aabidha PM et al, [19] Seyom E et al. [20] 80% (n=80) of the patients belonged to the age group of 21-30 years, while 12% (n=12) were less than 20 years of age and 8% (n=8) were more than 30 years of age. 54% (n=54) of the women were nulliparous and the remaining were multiparous. 85% (n=85) of the women had unregistered status and 15% (n=15) were booked from the initial time of pregnancy. Our findings can be compared with the studies of Aali BS et al, [21] Agida ET al, [22] Imarengiaye et al, [23] Sailaja K et al. [24]

Critical care management has been advised for pregnancies complicated by preeclampsia. [7] This is necessary as preeclampsia is a multisystem disorder requiring a multidisciplinary approach to management. Mechanical ventilatory support and advanced monitoring were the major interventions in this study. Specifically, preeclamptics/eclamptics with altered consciousness would often require the intervention to maintain the adequate oxygenation while minimizing metabolic activities in other organs. It may have been necessary to determine the duration of ventilation for each patient so as to provide insight into the severity of the respiratory impairment. However, a study that had a relatively high incidence of mechanical ventilation observed that the patients had the intervention for a short duration. [17]

It was seen that blood pressure was raised among all the study groups and this increase is statistically significant with a P value of 0.03 and 0.01 for systolic blood pressure and diastolic blood pressure respectively which was similar to the study conducted by Seyom E et al. [20] 40% (n=40) patients required transfusion of blood products, 8% (n=8) required mechanical ventilation, 4% (n=4) required vasoactive drugs and 2% (n=2) needed renal replacement therapy. Imarengiaye et al [25] observed that mechanical ventilatory support and advanced monitoring were the major interventions in their study. In the study conducted by Sailaja K et al, [26] 54.9% of patients were mechanically ventilated, blood products were transfused in the ICU in 42 patients (46%), twenty patients (22%) had unstable hemodynamics requiring vasopressor support and had significantly high risk for mortality (p=0.000).

The development of pulmonary edema alone or with any other complication of preeclampsia was a risk factor for poor outcome. The mechanism for the development of pulmonary edema is

important to understand the course of the disease. A study showed that 89% of women who developed acute pulmonary edema had preeclampsia. [27] It is therefore, a common complication of preeclampsia and several factors have been implicated. These include endothelial damage and consequent fluid leakage, [28,29] maternal age, cesarean delivery, increased body mass index and unrecognized cardiomyopathy. [30] Endothelial damage is a recognized etiopathogenesis in preeclampsia, and a good proportion of patients also had cesarean delivery; two factors that have been implicated in the development of pulmonary edema in preeclampsia/eclampsia. [31] Preeclampsia/eclampsia presents the patient with global hypoproteinemia. It may have been necessary to determine volume and type of fluid used for the peripartum treatment of these women prior to admission to ICU.

Conclusion

It was observed that preeclampsia, nulliparity, unbooked status, and lower segment cesarean section were prevalent among the subjects. Most common intervention required was transfusion of blood products. Pulmonary edema and HELLP syndrome were the most common complications. Overall mortality was low. Neonatal mortality was more in severe preeclampsia patients with term gestation. Furthermore, women who developed pulmonary edema in the course of treatment had a poor outcome. To reduce maternal morbidity and mortality, these patients require early admission and management in the ICU is appropriate. Efforts to prevent and detect complications that can occur due to preeclampsia are important.

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