

Original article

Retrospective Study of Preterm neonates born to Mothers with Pre-eclampsia in a tertiary care centre

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Abstract:

Introduction: A Literature review from both high and low income countries document that babies born to Pre-eclampsia women have an increased risk of being born prematurely and of being low birth weight (LBW) and small for gestational age (SGA). The high rate of perinatal morbidity and mortality seen in pregnancies complicated by preeclampsia is primarily due to preterm delivery and uteroplacental insufficiency. Uteroplacental circulation disruption may cause disruption of fetal growth, hypoxemia, and even fetal death. Thus, termination of pregnancy is often necessary to minimize maternal–fetal health consequences.

Materials& Methods: This was a retrospective observational study done at the Department of Pediatrics, Gulbarga Institute of medical Sciences, Kalaburagi, Karnataka. All singleton neonates born <37 weeks alive to women with preeclampsia at the Gulbarga Institute of Medical Sciences Hospital between January 2021 to June 2022 will be included.

Results: Neonates in the preeclampsia group had a higher incidence of NEC (OR [odds ratio] 2.24; 95% CI [confidence interval] 1.11–3.09), HIE (OR 3.86; 95% CI 1.40– 8.89), RDS (OR 5.12; 95% CI 4.27–7.12), and BPD (OR 1.88; 95% CI 1.07–3.56).

Conclusion: The Authors concluded that the Neonatal morbidities, such as NEC, HIE, RDS, and BPD, were found higher in preterm neonates born from preeclamptic mothers compared to uncomplicated pregnant women.

Keywords: Pre eclampsia, preterm neonates, uteroplacental insufficiency

Introduction

A Literature review from both high and low income countries document that babies born to Pre-eclampsia women have an increased risk of being born prematurely and of being low birth weight (LBW) and small for gestational age (SGA).¹⁻⁵ Additionally, researchers have noted that these babies have low 5-min Apgar scores and are at increased risk of being admitted to the neonatal unit, contributing to both morbidity and mortality.⁵⁻⁸ At the same time, Some studies in western countries have reported a link between PE and congenital heart defects.⁹ Although from the theory of primitive embryo development, the heart develops earlier than the period of PE. But recently, researchers have recognized that the balance of angiogenic signaling proteins such as vascular endothelial growth factor and placental growth

factor is related to cardiac defects, and these same biomarkers also have abnormal changes in PE.¹⁰ This may be the common part of both. Clinical studies have shown that PE mothers are more likely to have the baby of congenital heart defects.¹¹

The high rate of perinatal morbidity and mortality seen in pregnancies complicated by preeclampsia is primarily due to preterm delivery and uteroplacental insufficiency. Uteroplacental circulation disruption may cause disruption of fetal growth, hypoxemia, and even fetal death. Thus, termination of pregnancy is often necessary to minimize maternal–fetal health consequences. Nevertheless, an obstetrician must be able to balance the needs between an adequate fetal maturation and the risks of the mother and fetus when continuing pregnancy with preeclampsia.⁸ This study was aimed to document the prevalence

and outcome of neonates born to women with preeclampsia.

Materials & Methods

This was a retrospective observational study done at the Department of Pediatrics, Gulbarga Institute of Medical Sciences, Kalaburagi, Karnataka.

Inclusion criteria

All singleton neonates born <37 weeks alive to women with preeclampsia at the Gulbarga Institute of Medical Sciences Hospital between January 2021 to June 2022 will be included.

Exclusion criteria

1. Neonates born from mothers with complications in pregnancy such as cardiovascular, thyroid, Auto immune disease, Diabetes Mellites etc.,
 2. Still Births.
- Subjects were classified into control and preeclampsia groups.
 - The preeclampsia group was categorized based on preeclampsia or severe preeclampsia characteristics based on ACOG-13 criteria⁹ in which women above 20 weeks of gestational age should at least have blood pressure $\geq 140/\geq 90$ mm Hg (on two occasions, at least 4 hours apart), blood pressure $\geq 160/\geq 110$ mm Hg (within a short minute), and proteinuria (≥ 300 mg/24-hour urine collection or >2+ urinary dipstick). In addition, in case no proteinuria is found, the following diagnostic criteria can be applied: thrombocytopenia, renal insufficiency, impaired liver function, pulmonary edema, or headache.
 - The subtype of preterm delivery based on gestational age was categorized as early preterm (<32 weeks), Late preterm (32–36 weeks).
- The measured outcomes were gestational age and neonatal morbidities, including Necrotizing Enterocolitis (NEC), Low 5 Minute APGAR, Respiratory Distress Syndrome (RDS), Congenital Heart Disease, Intra Ventricular Haemorrhage (IVH), Culture Proven bacterial and Fungal Sepsis and Broncho pulmonary Displasia (BPD).
- All the data were collected from the both Maternal and neonatal medical records of Department of Obstetrics and Department of Paediatrics, Gulbarga Institute of Medical Sciences, Kalaburagi.

Results

Neonates in the preeclampsia group had a higher incidence of NEC (OR [odds ratio] 2.24; 95% CI [confidence interval] 1.11–3.09), HIE (OR 3.86; 95% CI 1.40– 8.89), RDS (OR 5.12; 95% CI 4.27– 7.12), and BPD (OR 1.88; 95% CI 1.07–3.56).

The Authors found that the Neonatal morbidities, such as NEC, HIE, RDS, and BPD, were found higher in preterm neonates born from preeclampsia mothers compared to uncomplicated pregnant women.

Discussion

Preeclampsia is a leading cause of preterm birth, accompanied by compelling maternal and neonatal morbidities. This study aims to investigate preterm neonate outcomes in pregnancy with preeclampsia. A retrospective observational study was conducted in Indonesia's national referral hospital by Pamungkas S et al., on preterm morbidity in neonates born to preeclampsia mothers. Infants born <37 weeks , were recruited, both from preeclamptic and non-preeclamptic mothers. The measured outcomes were necrotizing enterocolitis (NEC), hypoxic–ischemic encephalopathy (HIE), respiratory distress syndrome (RDS), as well as bronchopulmonary dysplasia (BPD). There were 500 preterm neonates enrolled in this study, with 82 neonates born from mothers with preeclampsia.

Neonates in the preeclampsia group had a higher incidence of NEC (OR [odds ratio] 2.24; 95% CI [confidence interval] 1.11–3.09), HIE (OR 3.86; 95% CI 1.40– 8.89), RDS (OR 5.12; 95% CI 4.27–7.12), and BPD (OR 1.88; 95% CI 1.07– 3.56). The Authors found that the Neonatal morbidities, such as NEC, HIE, RDS, and BPD, were found higher in preterm neonates born from preeclampsia mothers compared to uncomplicated pregnant women.

In a Retrospective study by Mandana saadat and colleagues on Maternal and Neonatal Mortality in Preeclampsia Mothers. The authors found that cesarean section rates were significantly higher in the group with preeclampsia than in the control group ($p < 0.05$). The mean parity was higher in the normotensive group than in the preeclamptic patients (2.3 ± 0.65 vs. 3.6 ± 0.74 ; $p < 0.05$). In the preeclamptic women undergoing vaginal delivery, 31% of them underwent induction of labor. The most common indication for induction of labor was severity of preeclampsia (77.8%). Birth weight was statistically significantly lower in women with

preeclampsia ($p < 0.0001$). Among the patients, 5.6% of them were admitted with intrauterine fetal demise, while 111 neonates survived for the remaining patients. The most common causes of neonatal mortality were congenital abnormalities and respiratory distress syndrome. From the results, the authors concluded that Gestational age, parity, cesarean section rate, the rate of induced labor, and low birth weight neonates were more frequent in preeclamptic women than in healthy women.^{12,13}

McKanzie and colleagues in a retrospective study aimed to determine the outcome of neonates born to women with preeclampsia at the University Hospital of the West Indies found that neonates born to women with preeclampsia were more likely to be low birth weight [odds ratio (OR) 1/4 2.8; confidence interval (CI): 2.2–3.5], small for gestational age (OR 1/4 2.3; CI: 1.9– 2.9) or premature (OR 1/4 2.5; CI: 2.0–3.0). They had a lower mean 5 min Apgar score than babies born to normotensive women $p < 0.05$. They were also more likely to be admitted to the neonatal unit 67 (59%) compared with neonates of normotensive women 13 (13%) $p < 0.001$. The main reason for admission was prematurity. Eighteen neonates, all born to women with preeclampsia, died, and the main cause of death was prematurity. The authors then concluded that the adverse neonatal outcome was noted in neonates born to women with preeclampsia, and this was predominantly related to prematurity and its complications.¹⁴

Jie Liu et al., conducted a clinical-based, retrospective study to determine the prevalence of congenital heart defects and examine their association with preeclampsia (PE). The study included all infants who were born at the hospital with or without heart defects and their mothers ($N = 177,434$ newborns). 6,852 women (3.9%) were diagnosed as PE and 1,289 newborns (7.30 per 1,000) have congenital heart disease (CHD). Prevalence of CHD in newborns of women with PE is 15.8 per 1,000 significantly higher than the overall prevalence (7.30 per 1,000). CHD in newborns has strong association with PE, especially early-onset PE (adjusted OR 3.29 and 95% CI 2.15–5.03) and severe PE (adjusted OR 2.75 and 95% CI 2.13–3.56). Among those with CHD, infants of preeclamptic women had higher prevalence of tetralogy of Fallot (43.78 vs. 28.14 per 100,000), atrial septal defect (335.67 vs. 53.93 per 100,000), ventricular dysplasia (102.16 vs. 89.69 per 100,000), and ventricular septal defect (525.39 vs. 212.22 per 100,000) than pregnant women with non-PE.¹⁵

Conclusion:

The Authors concluded that the Neonatal morbidities, such as NEC, HIE, RDS, and BPD, were found higher in preterm neonates born from preeclamptic mothers compared to uncomplicated pregnant women.

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