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RISK FACTORS FOR EARLY-ONSET PRE-ECLAMPSIA: A CASE-CONTROL STUDY AT A TERTIARY CARE CENTRE

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ABSTRACT

Background: Early-onset preeclampsia (EOPE) is a severe variant of preeclampsia occurring before 34 weeks of gestation, associated with increased maternal and perinatal morbidity and mortality. Early identification of risk factors is important for timely preventive and therapeutic interventions. **Methods:** A prospective case-control study was conducted at Bharati Hospital, Pune, including 120 women (60 EOPE cases and 60 normotensive controls). Maternal sociodemographic factors, clinical history, biochemical parameters, and uterine artery Doppler findings were assessed. Data were analyzed using chi-square test and logistic regression with SPSS software. **Results:** Maternal age >30 years, BMI >25 kg/m², primigravidity, low socioeconomic class, and positive family history of hypertension were significant maternal risk factors. Elevated serum sFlt-1, reduced PlGF, and raised uric acid were biochemical markers significantly associated with EOPE. Abnormal uterine artery Doppler findings were observed in 70% of cases compared to 20% of controls ($p<0.001$). Maternal complications included HELLP syndrome, abruptio placentae, and eclampsia, while perinatal outcomes showed higher rates of preterm birth, low birth weight, and NICU admissions in EOPE cases. **Conclusion:** EOPE is associated with identifiable maternal, biochemical, and Doppler risk factors. Screening women with these markers can facilitate early diagnosis and preventive management.

KEYWORDS : Early-onset preeclampsia; maternal risk factors; biochemical markers; uterine artery Doppler; case-control study

INTRODUCTION

Preeclampsia is a hypertensive disorder of pregnancy characterized by new-onset hypertension and proteinuria after 20 weeks of gestation. Among its subtypes, early-onset preeclampsia (EOPE) is associated with more severe maternal and perinatal outcomes. EOPE, occurring before 34 weeks, has been linked to defective placentation, angiogenic imbalance, and uteroplacental malperfusion. Globally, preeclampsia complicates 2–8% of pregnancies, and EOPE accounts for about one-fourth of these cases (Roberts & Hubel, 2009; ACOG, 2020).

Risk factors for EOPE include advanced maternal age, high BMI, primigravidity, and family history of hypertension (Steegers et al., 2010; Brown et al., 2018). Biochemical markers like elevated sFlt-1, decreased PlGF, and raised uric acid, along with abnormal uterine artery Doppler indices, help in prediction (Levine et al., 2006; Zeisler et al., 2016). Early recognition of such predictors aids timely intervention and improved outcomes.

MATERIALS AND METHODS

This prospective case-control study was conducted at Bharati Hospital, Pune, from October 2023 to October 2025. Ethical approval was obtained, and informed consent was taken. A total of 120 pregnant women were included: 60 with EOPE (diagnosed <34 weeks as per ACOG, 2020) and 60 normotensive controls matched for gestational age.

Inclusion Criteria: Singleton pregnancies, maternal age 18–40 years, complete clinical and lab data.

Exclusion: Chronic hypertension, diabetes, renal/hepatic disease, autoimmune disorders, or multiple gestations.

Parameters studied included sociodemographic data, clinical features, BMI, socioeconomic class (Kuppuswamy scale), family history of hypertension, biochemical markers (serum uric acid, sFlt-1, PlGF), and uterine artery Doppler indices at 20–24 weeks. SPSS v26 was used for statistical analysis with chi-square and logistic regression; $p<0.05$ was significant.

RESULTS

The mean maternal age was higher in EOPE cases (29.6 ± 4.2 years) compared to controls (26.8 ± 3.9 years; $p=0.02$). BMI was significantly greater in cases (27.1 ± 3.8) than controls (23.5 ± 3.1; $p<0.001$). Primigravidity was observed in 58.3% of cases vs. 30% controls. Family history of hypertension was present in 46.7% cases and 20% controls. Low socioeconomic status was more frequent among cases (50% vs. 23.3%).

Table 1: Maternal Risk Factors Associated With EOPE

Risk Factor	Cases (n=60)	Controls (n=60)
Maternal age >30 years	38 (63.3%)	20 (33.3%)
BMI >25 kg/m²	40 (66.7%)	22 (36.7%)
Primigravida	35 (58.3%)	18 (30%)
Family history of hypertension	28 (46.7%)	12 (20%)
Low socioeconomic status	30 (50%)	14 (23.3%)

Biochemical Differences: Elevated sFlt-1 was observed in 75% cases vs. 16.7% controls. Reduced PlGF in 70% vs. 20%, and raised uric acid in 58.3% vs. 25%. Abnormal Doppler findings were seen in 70% of cases vs. 20% controls.

Table 2: Biochemical And Doppler Parameters Associated With EOPE

Parameter	Cases (n=60)	Controls (n=60)
Elevated sFlt-1	45 (75%)	10 (16.7%)
Reduced PlGF	42 (70%)	12 (20%)
Raised uric acid	35 (58.3%)	15 (25%)
Abnormal uterine artery Doppler	42 (70%)	12 (20%)

Maternal Complications: HELLP (8.3%), abruptio placentae (6.7%), eclampsia (5%). Perinatal outcomes: preterm birth (60%), low birth weight (55%), NICU admission (62%), all significantly higher among EOPE cases.

Table 3: Maternal and perinatal outcomes in EOPE cases and controls

Outcome	Cases (n=60)	Controls (n=60)
Preterm birth	36 (60%)	8 (13.3%)
Low birth weight	33 (55%)	10 (16.7%)

NICU admission	37 (62%)	12 (20%)
Abruptio placentae	4 (6.7%)	0
Eclampsia	3 (5%)	0
HELLP syndrome	5 (8.3%)	0

DISCUSSION

This study demonstrated that EOPE is associated with significant maternal, biochemical, and Doppler predictors. Advanced maternal age, high BMI, primigravidity, low socioeconomic class, and family history of hypertension were major maternal risk factors (Steegers et al., 2010; Brown et al., 2018). Biochemical markers such as elevated sFlt-1, reduced PlGF, and raised uric acid confirmed the role of angiogenic imbalance (Levine et al., 2006; Chappell et al., 2013). Abnormal Doppler findings reflect impaired placentation (Poon et al., 2019). Maternal complications like HELLP, abruption, and eclampsia, along with adverse perinatal outcomes, highlight EOPE's burden (Sibai, 2003; Tranquilli et al., 2014).

CONCLUSION

EOPE has identifiable maternal, biochemical, and Doppler predictors. Screening using these factors can help in timely diagnosis and intervention. Strategies integrating maternal history, biochemical markers, and Doppler can improve outcomes.

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