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Risk Factors and Maternal Complications of Preeclampsia in a Tertiary Care Setting

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Abstract
Background: Preeclampsia is a hypertensive disorder of pregnancy associated with significant maternal morbidity and mortality worldwide. Identifying risk factors and understanding maternal complications are crucial for timely diagnosis and management, especially in tertiary care settings.
Objective: To evaluate the maternal risk factors and complications associated with preeclampsia among pregnant women admitted to a tertiary care hospital.
Methods: This observational study included 100 pregnant women diagnosed with preeclampsia after 20 weeks of gestation. Demographic data, clinical risk factors, severity, and maternal complications were recorded and analyzed using descriptive and inferential statistics.
Results: The majority of patients were primigravida (66%) and aged 21–30 years (58%). Common risk factors included obesity (42%), family history of hypertension (21%), and history of preeclampsia (18%). Severe preeclampsia was noted in 38% of cases, and early-onset disease (<34 weeks) in 26%. Maternal complications occurred in 47%, with eclampsia (14%), HELLP syndrome (9%), and acute renal injury (8%) being most frequent. Cesarean delivery was performed in 64% of cases. No maternal deaths were reported.
Conclusion: Preeclampsia poses a substantial risk for maternal complications, particularly in primigravida and obese women. Early detection and management in tertiary care settings can reduce morbidity and prevent mortality. Enhanced antenatal surveillance is recommended for high-risk groups.

Keywords: Preeclampsia, risk factors, maternal complications, primigravida

Introduction

Preeclampsia is a multisystem hypertensive disorder of pregnancy that typically develops after 20 weeks of gestation and is characterized by elevated blood pressure and proteinuria or evidence of organ dysfunction [1]. It remains a leading cause of maternal and perinatal morbidity and mortality worldwide, particularly in low- and middle-income countries, where timely diagnosis and management are often challenging [2, 3]. Globally, the incidence of preeclampsia ranges from 2% to 8% of pregnancies, with higher rates observed in developing regions due to limited access to antenatal care and specialist obstetric services [4].

Despite advances in obstetric care, the pathophysiology of preeclampsia remains poorly understood. However, it is widely accepted that abnormal placental development, impaired trophoblastic invasion, and systemic endothelial dysfunction play central roles in its pathogenesis [5]. Several maternal risk factors have been associated with an increased likelihood of developing preeclampsia, including nulliparity, advanced maternal age, obesity, pre-existing hypertension, diabetes mellitus, and a history of preeclampsia in previous pregnancies [6, 8].

Preeclampsia can lead to a spectrum of maternal complications ranging from mild hypertension to life-threatening conditions such as eclampsia, HELLP syndrome (Hemolysis, Elevated Liver enzymes, Low Platelets), acute renal failure, pulmonary edema, and cerebral hemorrhage [9]. In resource-limited settings, the burden is often amplified due to delayed diagnosis, inadequate monitoring, and limited intensive care support [10].

Studying the risk factors and maternal complications associated with preeclampsia in specific healthcare contexts is critical to improving clinical outcomes. Tertiary care hospitals often receive high-risk referrals, making them key centers for evaluating the severity and spectrum of preeclampsia-related complications. This study aims to identify the predominant maternal risk factors and complications associated with preeclampsia in a tertiary care setting, thereby contributing to better risk stratification and management strategies.

Material and Methods

This was a hospital-based observational study conducted in the Department of Obstetrics and Gynecology at a tertiary care teaching hospital over a period of one year. The study included pregnant women diagnosed with preeclampsia after 20 weeks of gestation, based on the criteria established by the American College of Obstetricians and Gynecologists (ACOG), which includes systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg on two occasions at least four hours apart, along with proteinuria ≥300 mg in a 24-hour urine sample or protein/creatinine ratio ≥0.3, or in the absence of proteinuria, evidence of systemic involvement such as thrombocytopenia, impaired liver function, renal insufficiency, pulmonary edema, or cerebral/visual disturbances.

All eligible patients admitted with a confirmed diagnosis of preeclampsia during the study period were enrolled after obtaining informed consent. Patients with chronic hypertension, renal disease, or other comorbid conditions diagnosed before pregnancy were excluded to avoid confounding factors. Data were collected using a structured proforma that included demographic details (age, parity, and body mass index), obstetric history, gestational age at diagnosis, and relevant laboratory investigations. Maternal complications such as eclampsia, HELLP syndrome, acute

renal failure, pulmonary edema, placental abruption, and postpartum hemorrhage were recorded.

The data were entered into Microsoft Excel and analyzed using SPSS version [insert version]. Descriptive statistics were used to summarize the baseline characteristics of the study population. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as means and standard deviations. The association between potential risk factors and maternal complications was assessed using chi-square tests or Fisher's exact test where appropriate, and a p-value of <0.05 was considered statistically significant.

Table 1: Demographic Characteristics of Study Participants (n = 100)

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
< 20	14	14%
21–30	58	58%
> 30	28	28%
Gravida		
Primigravida	66	66%
Multigravida	34	34%

Table 2: Risk Factors Associated with Preeclampsia (n = 100)

Risk Factor	Frequency (n)	Percentage (%)
Obesity (BMI ≥30 kg/m²)	42	42%
Family history of hypertension	21	21%
History of preeclampsia	18	18%
Pre-existing diabetes mellitus	12	12%
Advanced maternal age (>35 yrs)	15	15%
Multiple gestation	6	6%

Table 3: Classification of Preeclampsia (n = 100)

Severity	Frequency (n)	Percentage (%)
Mild Preeclampsia	62	62%
Severe Preeclampsia	38	38%

Table 4: Maternal Complications Observed (n = 100)

Complication	Frequency (n)	Percentage (%)
Eclampsia	14	14%
HELLP syndrome	9	9%
Acute renal injury	8	8%
Placental abruption	6	6%
Postpartum hemorrhage	5	5%
Pulmonary edema	3	3%
ICU admission	11	11%

Table 5: Delivery and Pregnancy Outcomes (n = 100)

Outcome	Frequency (n)	Percentage (%)
Cesarean section	64	64%
Vaginal delivery	36	36%
Preterm delivery (<37 wks)	39	39%
Maternal deaths	0	0%

Results

Demographic Characteristics of Study Participants

This table presents the age distribution and parity of the 100 women diagnosed with preeclampsia. The majority (58%) of the participants were between 21 and 30 years of age, indicating that preeclampsia predominantly affects women in their reproductive prime. A smaller proportion (14%) were below 20 years, while 28% were over 30. Notably, 66% of the women were primigravida (first pregnancy), which is a well-established risk factor for preeclampsia.

Risk Factors Associated with Preeclampsia

This table summarizes the maternal risk factors observed in the study population. Obesity was the most common risk factor, seen in 42% of patients, followed by a family history of hypertension (21%) and a history of preeclampsia in previous pregnancies (18%). Other contributing factors included pre-existing diabetes mellitus (12%), advanced maternal age (>35 years, 15%), and multiple gestation (6%). These findings underscore the multifactorial nature of preeclampsia and highlight the importance of targeted risk screening during antenatal care.

Classification of Preeclampsia by Severity and Onset

This table classifies preeclampsia into mild and severe forms and categorizes it based on gestational age at onset. Mild preeclampsia was more prevalent (62%) compared to severe preeclampsia (38%). Regarding the timing of onset, late-onset preeclampsia (≥34 weeks) was observed in the majority (74%) of cases, while early-onset preeclampsia (<34 weeks), which is typically associated with worse outcomes, occurred in 26% of patients. This classification is important for guiding management and predicting complications.

Maternal Complications Observed

This table details the maternal complications associated with preeclampsia among the study participants. Nearly half (47%) experienced at least one complication. The most common was eclampsia (14%), followed by HELLP syndrome (9%) and acute renal injury (8%). Placental abruption and postpartum hemorrhage occurred in 6% and 5% of patients, respectively. Pulmonary edema, though less common (3%), represents a serious complication. ICU admission was required for 11% of patients, reflecting the severity and resource needs associated with complicated preeclampsia.

Delivery and Pregnancy Outcomes

This table outlines the mode of delivery and pregnancy outcomes. Cesarean section was performed in 64% of cases, primarily due to obstetric indications such as fetal distress or severe disease. Vaginal delivery occurred in 36% of cases. Preterm delivery (<37 weeks of gestation) was noted in 39% of patients, consistent with the known association between preeclampsia and iatrogenic or spontaneous preterm birth. Importantly, no maternal deaths were reported in this cohort, suggesting that timely intervention in a tertiary care setting can significantly reduce mortality.

Discussion

This study aimed to identify the common maternal risk factors and complications associated with preeclampsia in a tertiary care setting. Our findings support the well-established understanding that preeclampsia is a multifactorial disorder with significant maternal morbidity, particularly among high-risk populations.

In the present study, primigravida women constituted 66% of the cases, reinforcing previous findings that primiparity is a major risk factor for preeclampsia [11]. The majority of patients were in the 21–30-year age group, yet advanced

maternal age (>35 years) was present in 15% of cases, suggesting that both ends of the reproductive age spectrum carry risk [12]. Obesity (42%) emerged as the most prevalent risk factor, consistent with global evidence linking elevated body mass index to endothelial dysfunction and placental abnormalities contributing to preeclampsia [13].

A family history of hypertension (21%) and a personal history of preeclampsia (18%) further emphasize the genetic and recurring nature of the disease, aligning with previous research indicating that women with a prior history are at 2–8 times higher risk in subsequent pregnancies [14]. Pre-existing diabetes mellitus (12%) and multiple gestations (6%) also contributed to the risk profile, both of which are known to increase placental demands and predispose to vascular complications [15, 16].

In terms of disease classification, 38% of cases were classified as severe preeclampsia, and 26% were early-onset (<34 weeks). Early-onset preeclampsia is often associated with worse maternal and fetal outcomes, and its relatively high prevalence in this study reflects the tertiary care nature of the hospital, which typically receives more complicated referrals [17].

Nearly half (47%) of the women experienced maternal complications, highlighting the serious nature of the disease even with institutional care. The most common complication was eclampsia (14%), followed by HELLP syndrome (9%), acute renal injury (8%), and placental abruption (6%). These findings are consistent with studies conducted in similar low- and middle-income settings, where late presentation and limited antenatal care are key contributors to complications [18, 19].

The high cesarean section rate (64%) in this study reflects the need for urgent delivery in many cases due to maternal or fetal indications. Additionally, the preterm delivery rate of 39% underscores the obstetric challenges in balancing disease progression with fetal maturity. Importantly, there were no maternal deaths recorded, which may be attributed to timely diagnosis, effective management protocols, and the availability of intensive care services a testament to the benefits of delivering care in a well-equipped tertiary setting.

Conclusion

Preeclampsia remains a significant contributor to maternal morbidity, especially among primigravida women and those with identifiable risk factors such as obesity, advanced maternal age, and a family history of hypertension. Early recognition and close monitoring of high-risk pregnancies are essential to prevent severe complications like eclampsia, HELLP syndrome, and acute renal injury. Our study underscores the critical role of tertiary care facilities in managing preeclampsia effectively, reducing maternal mortality, and improving pregnancy outcomes. Strengthening antenatal care services and promoting timely referral to specialized centers can further mitigate the burden of this complex hypertensive disorder in pregnancy.

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