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MATERNAL RISK FACTORS AND OUTCOMES IN PRIMIGRAVIDA PATIENTS WITH PRE-ECLAMPSIA AND ECLAMPSIA

Original Research

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ABSTRACT

Background: Pre-eclampsia and eclampsia remain significant contributors to maternal and neonatal morbidity and mortality, especially among primigravida women. Despite global data, region-specific insights remain limited, particularly in developing countries like Pakistan where early detection and management are often delayed.

Objective: To determine the frequency of maternal risk factors and evaluate perinatal outcomes in primigravida patients diagnosed with pre-eclampsia and eclampsia.

Methods: This cross-sectional study was conducted over six months in the Department of Obstetrics and Gynecology at Khyber Teaching Hospital, Peshawar. A total of 287 full-term primigravida women with pre-eclampsia or eclampsia were enrolled through non-probability consecutive sampling. Data on demographics, maternal risk factors (age extremes, intrauterine growth retardation), and perinatal outcomes (postpartum hemorrhage, low birth weight, low APGAR score, NICU admission) were collected. SPSS version 22.0 was used for data analysis; quantitative variables were summarized as mean ± SD, and categorical variables as frequencies and percentages. Chi-square test was applied post-stratification with $p \leq 0.05$ considered statistically significant.

Results: The mean maternal age was 26.4 ± 5.8 years, and gestational age was 38.2 ± 1.1 weeks. Majority were rural residents (56.4%) and housewives (77.7%) from lower socioeconomic status (59.9%). Maternal risk factors included age <20 years (23.0%), age >35 years (11.8%), and intrauterine growth retardation (16.7%). Perinatal outcomes showed postpartum hemorrhage in 14.3%, low birth weight in 23.7%, low APGAR score in 17.1%, and NICU admission in 26.5%.

Conclusion: Primigravida women with pre-eclampsia and eclampsia exhibit high-risk maternal profiles and poor perinatal outcomes. These findings reinforce the importance of early risk identification, targeted antenatal care, and improved healthcare access to mitigate complications.

Keywords: Apgar Score, Eclampsia, Hypertension, Intrauterine Growth Restriction, Neonatal Intensive Care Units, Postpartum Hemorrhage, Pre-Eclampsia.

INTRODUCTION

Pregnancy-induced hypertension remains a major contributor to maternal and perinatal morbidity and mortality, particularly in low- and middle-income countries. Among its clinical manifestations, pre-eclampsia and eclampsia stand out as serious hypertensive disorders that emerge after 20 weeks of gestation and carry significant implications for maternal and neonatal health. Pre-eclampsia is defined by the new onset of hypertension accompanied by proteinuria or signs of end-organ dysfunction, while eclampsia refers to the occurrence of seizures in women with pre-eclampsia (1). Globally, pre-eclampsia complicates approximately 4.6% of pregnancies, and its diagnosis traditionally relies on elevated blood pressure and proteinuria (2). Two distinct forms of pre-eclampsia are recognized based on gestational age at onset. Early-onset pre-eclampsia, developing before 34 weeks, is associated with higher risks of maternal complications such as placental abruption, pulmonary edema, and acute renal failure, as well as severe neonatal outcomes. These include increased risks of neonatal death, seizures, low Apgar scores, and admission to neonatal intensive care units (3,4). In contrast, late-onset pre-eclampsia, occurring after 34 weeks, although more common, is generally linked to less severe consequences. The dual burden of maternal and neonatal complications necessitates a deeper understanding of risk factors and outcomes, especially in vulnerable populations such as primigravida women (5,6).

Epidemiological data from the World Health Organization highlight several maternal risk factors significantly associated with the development of pre-eclampsia and eclampsia. These include maternal age over 30 years, low educational attainment, high body mass index, nulliparity, and lack of antenatal care. Additionally, chronic hypertension, gestational diabetes, renal or cardiac disease, urinary tract infections, and severe anemia further amplify the risk and contribute to poor neonatal outcomes (7,8). The interplay between these factors underscores the importance of identifying high-risk individuals, particularly among first-time mothers, who may be more vulnerable due to lack of physiological adaptation to pregnancy. A study found a substantial proportion of pre-eclampsia and eclampsia cases among primigravida women, with 42% of affected patients being first-time mothers. Young maternal age, particularly below 20 years, and intrauterine growth restriction (IUGR) were also highlighted as notable risk factors (9,10). In terms of perinatal outcomes, the same study reported postpartum hemorrhage in 14.3% of cases, low birth weight in 7.9% of neonates, low Apgar scores in 4.9%, and NICU admissions in 22.4%, indicating significant neonatal morbidity (11). Despite the global burden of these disorders, there remains a scarcity of localized data in many regions, including Pakistan, where sociocultural and healthcare disparities may influence both the prevalence and outcomes of hypertensive disorders of pregnancy. Given the high frequency and potential severity of pre-eclampsia and eclampsia in primigravida patients, and the absence of comprehensive regional data, it becomes imperative to explore maternal risk factors and perinatal outcomes in this population. The objective of the current study is therefore to determine the frequency of maternal risk factors and the associated maternal and neonatal outcomes in primigravida patients diagnosed with pre-eclampsia and eclampsia, thereby equipping clinicians with contextual evidence for improved risk stratification, patient counselling, and management strategies.

METHODS

This cross-sectional study was conducted in the Department of Obstetrics and Gynecology at Khyber Teaching Hospital, Peshawar. The study spanned a minimum duration of six months following the formal approval of the synopsis by the institutional ethical review board (IRB). The sampling technique employed was non-probability consecutive sampling, ensuring that every eligible patient presenting during the study period was enrolled. A total of 287 participants were included, with the sample size calculated using the WHO sample size calculator, assuming a 95% confidence interval, 2.5% absolute precision, and a 4.9% proportion of low Apgar scores based on previous findings (6). Participants were recruited based on well-defined inclusion and exclusion criteria. Women aged 15 to 40 years with full-term singleton pregnancies who were primigravida and diagnosed with pregnancy-induced hypertension, as defined by the operational criteria, were included. Exclusion criteria encompassed women with multiple pregnancies, those who were multigravida, and those carrying fetuses with congenital anomalies detected via ultrasound. Eligible participants were identified and enrolled from the labor room after obtaining written informed consent (12,13). The consent process involved a thorough explanation of the study's purpose, ensuring patient autonomy and ethical compliance. Demographic data such as maternal age, gestational age, residence, educational level,

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occupation, socioeconomic status, and booking status were collected. A detailed medical and obstetric history was obtained, followed by a complete physical examination to identify any maternal risk factors relevant to pre-eclampsia and eclampsia.

All participants underwent delivery under the supervision of a consultant obstetrician with a minimum of five years' post-fellowship clinical experience. The mode of delivery—including spontaneous vaginal delivery, induction, operative vaginal delivery, or cesarean section—was decided based on clinical indications. The maternal and perinatal outcomes, including postpartum hemorrhage, low birth weight, low Apgar score, and NICU admission, were recorded based on predefined operational definitions. Data were compiled using a structured proforma and subsequently analyzed using SPSS version 22.0. Continuous variables such as maternal age and gestational age were summarized using means and standard deviations, while categorical variables like booking status, residence, education, profession, maternal risk factors, and perinatal outcomes were presented as frequencies and percentages. To examine the influence of potential effect modifiers such as maternal age, gestational age, and booking status on perinatal outcomes, stratification was performed. Post-stratification analysis was carried out using the chi-square test, with a p-value of ≤ 0.05 considered statistically significant.

RESULTS

The study enrolled a total of 287 primigravida women diagnosed with pre-eclampsia or eclampsia at term. The mean maternal age was 26.4 ± 5.8 years, and the mean gestational age at delivery was 38.2 ± 1.1 weeks. Most participants were from rural areas (56.4%), and a significant proportion had either primary (34.1%) or middle-level education (39.0%). A majority of the women were housewives (77.7%) and belonged to lower socioeconomic status (59.9%). Regarding maternal risk factors, 66 participants (23.0%) were under 20 years of age, and 34 participants (11.8%) were over 35 years. Intrauterine growth retardation (IUGR) was documented in 48 cases (16.7%). These risk factors were identified through clinical assessment and documented in the structured data collection form. In terms of perinatal outcomes, postpartum hemorrhage was observed in 41 women (14.3%), while 68 neonates (23.7%) had low birth weight (<2500 g). A low APGAR score (<7 at 5 minutes) was noted in 49 neonates (17.1%). The need for neonatal intensive care unit (NICU) admission within the first 24 hours of birth was documented in 76 cases (26.5%), primarily due to respiratory distress or poor feeding. Two visual charts were created to illustrate the frequencies of maternal risk factors and perinatal outcomes respectively. These charts provide a clear visual summary of the burden of complications among this study cohort.

Table 1: Demographic Characteristics of Participants (n = 287)

Variable	Value
Age (mean ± SD)	26.4 ± 5.8 years
Gestational age (weeks) (mean ± SD)	38.2 ± 1.1 weeks
Residence	
Rural	162 (56.4%)
Urban	125 (43.6%)
Education	
Primary	98 (34.1%)
Middle	112 (39.0%)
Higher	77 (26.8%)
Profession	
Housewife	223 (77.7%)
Employed	64 (22.3%)
Socioeconomic Status	
Lower Class	172 (59.9%)
Middle Class	93 (32.4%)
Upper Class	22 (7.7%)

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Table 2: Distribution of Maternal Risk Factors

Risk Factor	Yes (n, %)	No (n, %)
Age < 20 years	66 (23.0%)	221 (77.0%)
Age > 35 years	34 (11.8%)	253 (88.2%)
Intrauterine Growth Retardation (IUGR)	48 (16.7%)	239 (83.3%)

Table 3: Perinatal Outcomes in the Study Population

Perinatal Outcome	Yes (n, %)	No (n, %)
Postpartum Hemorrhage	41 (14.3%)	246 (85.7%)
Low Birth Weight (<2500g)	68 (23.7%)	219 (76.3%)
Low APGAR Score (<7 at 5 mins)	49 (17.1%)	238 (82.9%)
NICU Admission	76 (26.5%)	211 (73.5%)

Table 4: Stratification of Low Birth Weight by Maternal Age Groups

Maternal Age Group	Low Birth Weight (n, %)	Normal Birth Weight (n, %)
< 20 years (n=66)	24 (36.4%)	42 (63.6%)
20–35 years (n=187)	36 (19.3%)	151 (80.7%)
> 35 years (n=34)	8 (23.5%)	26 (76.5%)

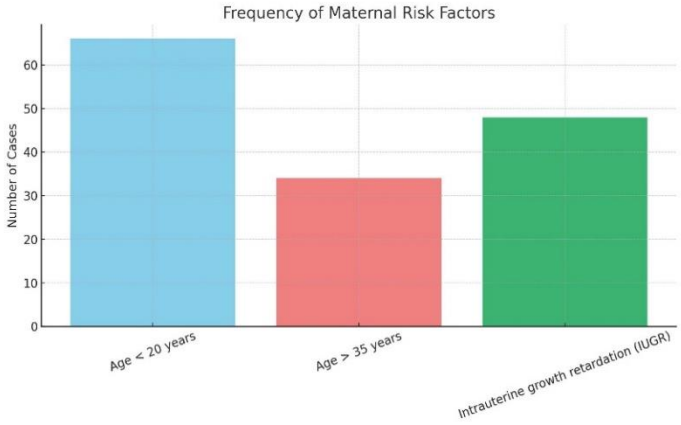

Figure 1 Frequency of Maternal risk Factors

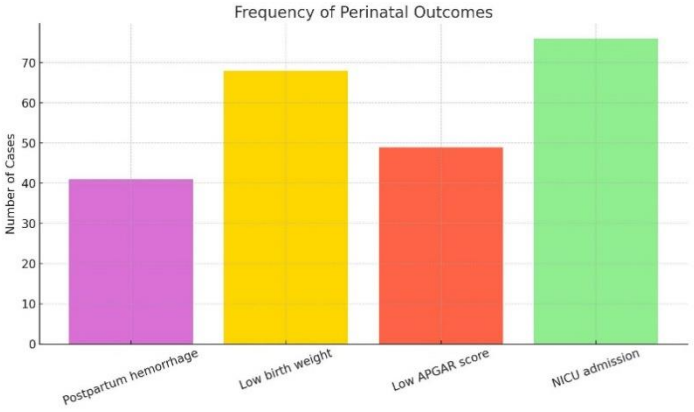

Figure 2 Frequency of Perinatal Outcomes

DISCUSSION

The findings of this study reinforce the existing evidence that primigravida women with pre-eclampsia and eclampsia constitute a high-risk group with substantial maternal and neonatal morbidity. The majority of participants were young, unbooked, from rural areas, and belonged to low socioeconomic backgrounds, echoing patterns observed in multiple large-scale investigations across developing regions. A predominance of postpartum hemorrhage, low birth weight, and NICU admissions among neonates, and a notable proportion of women under 20 years and over 35 years, align with previous research outcomes in similar populations (14,15). Primigravida status itself emerged as a significant contributor to both the onset of pre-eclampsia and its complications, which is corroborated by studies from tertiary centers across India and Nigeria. In an analysis, over 53% of pre-eclamptic and eclamptic cases were primigravida, and nearly 70% of neonates required NICU admission, matching the 26.5% NICU admission rate in the current study (16-18), Similarly, a study emphasized increased maternal complications, including renal dysfunction and PPH, among eclamptic primigravida women (19).

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The frequency of low birth weight in this study (23.7%) aligns with findings from a study where nearly half of neonates born to hypertensive mothers required intensive care, and a significant portion were born preterm (20,21). This emphasizes the persistent issue of intrauterine growth restriction associated with hypertensive disorders, often resulting from compromised placental perfusion. A notable strength of the present study is its focus exclusively on primigravida patients at term, minimizing variability linked to parity and gestational age. Additionally, the use of a uniform protocol for delivery under specialist supervision enhanced consistency in maternal management. Furthermore, the comprehensive data collection on demographic, clinical, and perinatal outcomes allow a holistic understanding of the burden in this vulnerable population. Nevertheless, several limitations warrant discussion. The study's cross-sectional design prevents causal inferences, and the use of non-probability sampling may limit generalizability. Being a single-center study, results might not reflect regional or national trends. Furthermore, despite the detailed assessment, certain potential confounders like BMI, antenatal care quality, or biochemical markers were not incorporated, which might have influenced both maternal risk and neonatal outcomes.

Moreover, the NICU admission criteria, defined by early signs like poor feeding or respiratory distress, may reflect varying clinical thresholds and institutional policies, which can differ across healthcare settings. Consequently, outcome frequencies such as NICU admission may not be directly comparable across studies without standardized criteria. Future research should aim for multi-center longitudinal designs that explore a broader range of maternal parameters, including dietary, psychosocial, and environmental factors (22,23). Additionally, stratification of outcomes based on early versus late onset of pre-eclampsia could provide clearer insights into gestational timing effects. Interventional studies evaluating the effectiveness of targeted antenatal surveillance or risk-based therapeutic protocols in primigravida women would also be instrumental in improving outcomes. In conclusion, this study adds to the growing body of evidence that primigravida women with pre-eclampsia and eclampsia face significant risks of adverse maternal and neonatal outcomes, particularly in resource-constrained settings. The findings reiterate the critical importance of early detection, comprehensive antenatal care, and risk-specific counseling in improving prognosis for both mothers and neonates.

CONCLUSION

This study highlights that primigravida women with pre-eclampsia and eclampsia are at heightened risk for adverse maternal and neonatal outcomes, including postpartum hemorrhage, low birth weight, and NICU admissions. Early identification of maternal risk factors such as age extremes and intrauterine growth restriction is critical. The findings underscore the need for enhanced antenatal care, timely intervention, and targeted education to improve outcomes in this high-risk population.

AUTHOR CONTRIBUTION

Author	Contribution
Huma Khalil	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Sundas Gul*	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Saba Gul	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Mahnoor Habib	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Uzma Rashid	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

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