International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Kar SR et al. Int J Reprod Contracept Obstet Gynecol. 2025 Jan;14(1):158-164
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20243943

Original Research Article

Study of feto-maternal outcomes of pregnant women with severe pre-eclampsia and eclampsia attending a tertiary care hospital of Kolhan region

Soumya R. Kar*, Anjali Srivastava, Manju M. Bara, Ela Jha

Department of Obstetrics and Gynecology, Mahatma Gandhi Memorial Medical College and Hospital, Jamshedpur, Jharkhand, India

Received: 12 November 2024
Accepted: 04 December 2024

***Correspondence:**
Dr. Soumya R. Kar,
E-mail: dr.karms91@gmail.com

ABSTRACT

Background: Hypertensive disorders in pregnancy, particularly severe pre-eclampsia and eclampsia, are significant contributors to maternal morbidity and mortality, especially in developing regions. In India, these conditions are the third leading cause of maternal mortality. This study aims to evaluate maternal and fetal outcomes in women with severe pre-eclampsia and eclampsia in a tertiary care hospital serving Jharkhand's Kolhan region, focusing on rural and tribal populations to understand demographic and clinical risk factors.
Methods: This hospital-based, prospective cohort study was conducted from September 2022 to September 2024 at Mahatma Gandhi Memorial Medical College and Hospital, Jamshedpur, India. A total of 120 pregnant women diagnosed with severe pre-eclampsia (blood pressure ≥160/110 mmHg with organ damage) or eclampsia (seizures associated with pre-eclampsia) were included. Data on sociodemographic characteristics, clinical presentations, and outcomes were collected and analysed using descriptive and inferential statistics, with a p-value <0.05 considered significant.
Results: Of the participants, 73.33% were from rural areas, 73.33% were tribal, and 40.83% were under 20 years of age. Severe pre-eclampsia was present in 61.7% of cases, while eclampsia affected the rest. High rates of maternal complications, including HELLP syndrome (20.83%), acute renal failure (15%), and postpartum hemorrhage (15%), were observed. Adverse fetal outcomes included low birth weight (43.33%), preterm births (69.17%), and NICU admissions (26.67%).
Conclusions: Severe pre-eclampsia and eclampsia in Jharkhand's Kolhan region disproportionately affect young, rural, and tribal women. Findings underscore the need for improved antenatal care, early diagnosis, and community health interventions to reduce maternal and neonatal morbidity in high-risk populations.

Keywords: Severe pre-eclampsia, Eclampsia, Maternal outcomes, Fetal outcomes, Kolhan region

INTRODUCTION

Developing countries have made considerable improvement in health indicators and life expectancy. Nevertheless, the developing countries are still struggling with high MMR.[1] Maternal deaths are mainly due to risks attributable to pregnancy and childbirth and also from the poor-quality care from health services.[2] About 10 % of all pregnancies worldwide are complicated by hypertensive disorder. Hypertension, infection and haemorrhage form a deadly triad accounting for a major share of maternal morbidity and mortality.[3] In India hypertensive disorders account for the third most significant cause of maternal mortality.[4] Hypertensive disorder of pregnancy is diagnosed when blood pressure is 140/90 mmHg or higher. Pre-eclampsia is considered severe if blood pressure is

160/110 mmHg or higher, or if there are other symptoms such as headache, visual problems, epigstric pain, decreased urine output, seizures, abnormal liver or kidney function. Proteinuria is no longer used to classify pre-eclampsia as severe or non-severe pre-eclampsia.[5] Eclampsia is defined as convulsions and /or unexplained coma in pregnancy or post- partum period in a woman with pre-eclampsia.[6]

Studies in India show that the incidence and prevalence of severe pre-eclampsia and eclampsia remain significant contributors to maternal mortality. For example, a study conducted in a tertiary care center reported a prevalence of pre-eclampsia at 5.6% and eclampsia at 0.6% among pregnant women, underlining its public health relevance.[7] In Jharkhand, severe pre-eclampsia and eclampsia contribute substantially to maternal morbidity and mortality, with a higher incidence in rural and underserved areas due to limited healthcare access. For example, a study reported that 32.6% of pregnant women in Jharkhand's underserved villages exhibited symptoms suggestive of pre-eclampsia, highlighting a public health challenge for community health interventions.[8]

In spite of advances in medicine, pre-eclampsia and Eclampsia still remain leading causes of maternal and perinatal mortality and morbidity worldwide. Severe pre-eclampsia can result in multiple life-threatening maternal complications like eclampsia, cerebral haemorrhage, cardiovascular complications, hepatic failure, acute nephropathy, pulmonary oedema, ARDS (adult respiratory distress syndrome), DIC, HELLP syndrome, retinal detachment, cortical blindness, hypoxic cerebral damage and even maternal death.[9] Maternal death is essentially following complications from abruptio placentae, hepatic rupture and eclampsia.[10] Fetal complications related to pre-eclampsia and Eclampsia are prematurity, IUGR and IUD.[11] Perinatal mortality is increased five-fold in patients of pre-eclampsia with iatrogenic prematurity being the essential culprit.[12] The present study is planned to evaluate feto-maternal outcomes of pregnant women with severe pre-eclampsia and eclampsia attending a tertiary care hospital of Kolhan region especially among tribal population. This will facilitate early diagnosis of the conditions and facilitate prevention of adverse outcomes as well as reduce maternal mortality and morbidity

To evaluate maternal and fetal outcomes in pregnant women diagnosed with severe pre-eclampsia and eclampsia admitted to a tertiary care hospital in the Kolhan region. To determine maternal outcomes, focusing on complications and mortality related to pre-eclampsia and eclampsia. To assess fetal outcomes, including prematurity, fetal growth restriction, intrauterine death (IUD), and other complications.

METHODS

This study employed a hospital-based, observational study to evaluate feto-maternal outcomes in pregnant women with severe pre-eclampsia and eclampsia, conducted from September 2022 to September 2024 at Mahatma Gandhi Memorial Medical College and Hospital, Jamshedpur, India. Ethical approval was obtained, and informed consent was given by all participants, ensuring confidentiality through anonymized records. A total of 120 women with severe pre-eclampsia (blood pressure ≥160/110 mmHg with organ damage) or eclampsia (seizures in the context of pre-eclampsia) were included. Exclusion criteria were chronic hypertension, renal disease, connective tissue disorders, molar pregnancies, and mild pre-eclampsia.

Statistical analysis

Data were collected on sociodemographic details, medical history, clinical features, lab results, treatment protocols, and outcomes. The data were entered into a secure database and analysed using SPSS software (version 25.0). Descriptive statistics were employed to summarize demographic and clinical data, while inferential statistical tests such as the Chi-square test and Fisher's exact test were used to assess associations between maternal and fetal outcomes and clinical variables. A p-value of <0.05 was considered statistically significant.

RESULTS

Age distribution showed 49 (40.83%) individuals aged ≤20, 32 (26.67%) aged 21-25, 24 (20.00%) aged 26-30, and 15 (12.50%) over 30. Of the cases, 88 (73.33%) were from rural areas, and 32 (26.67%) were from urban areas. Living conditions indicated that 94 (78.33%) resided in non-slum areas, while 26 (21.67%) lived in slums. Tribal status revealed that 88 (73.33%) were tribal and 32 (26.67%) non-tribal. Socioeconomic status indicated 51 (42.50%) in class III (income range 2729-4549), 31 (25.83%) in class V (income below 1368), 29 (24.17%) in class IV (1368-2728), 8 (6.67%) in class II (4550-9097), and 1 (0.83%) in class I (above 9098). Educational status showed that 71 (59.17%) were literate, while 49 (40.83%) were illiterate. Regarding religion, 79 (65.83%) were Hindu, 37 (30.83%) Muslim, and 4 (3.33%) belonged to other religions (Table 1).

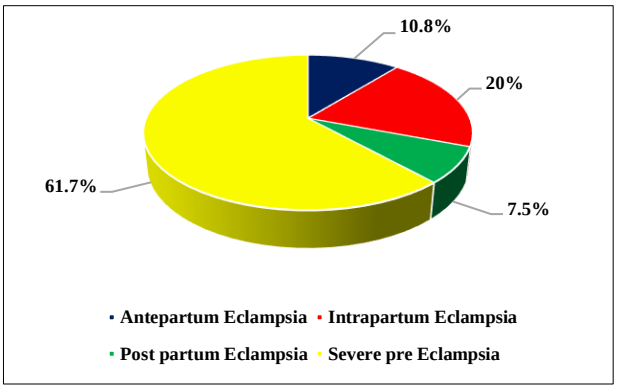

Figure 1: Distributions of study participants of eclampsia and severe pre-eclampsia.

Table 1: Distribution of study participants based on sociodemographic factors.

Category	Frequency (n=120)	Percentage (%)
Age group (years)		
≤20	49	40.83
21-25	32	26.67
26-30	24	20.00
>30	15	12.50
Urban/rural		
Rural	88	73.33
Urban	32	26.67
Slum/non-slum area		
Non-slum	94	78.33
Slum	26	21.67
Tribal/non-tribal		
Non-tribal	32	26.67
Tribal	88	73.33
Socioeconomic status		
I (≥9098)	1	0.83
II (4550-9097)	8	6.67
III (2729-4549)	51	42.50
IV (1368-2728)	29	24.17
V (<1368)	31	25.83
Literate/illiterate		
Literate	71	59.17
Illiterate	49	40.83
Religion		
Hindu	79	65.83
Muslim	37	30.83
Others	4	3.33

Table 2: Distribution of study participants based on maternal factors.

Category	Frequency (n=120)	Percentage (%)
Gravida		
Primigravida	82	68.33
Multigravida	38	31.67
Gestational age		
28-32 weeks	19	15.83
32-36 weeks	64	53.33
>36 weeks	37	30.83
Mode of delivery		
Spontaneous vaginal delivery	11	9.17
Induced vaginal delivery	19	15.83
Instrumental	8	6.67
Caesarean	82	68.33

Table 2 shows the distribution of study participants based on maternal factors. Of the participants, 82 (68.33%) were primigravida and 38 (31.67%) were multigravida. In terms of gestational age, 19 (15.83%) were between 28-32 weeks, 64 (53.33%) were between 32-36 weeks, and 37 (30.83%) were over 36 weeks pregnant. Regarding the mode of delivery, 11 (9.17%) had spontaneous vaginal delivery, 19 (15.83%) had induced vaginal delivery, 8 (6.67%) underwent instrumental delivery, and 82 (68.33%) had a caesarean section.

Figure 1 illustrates that 74 (61.7%) participants had severe pre-eclampsia, 24 (20%) experienced intrapartum eclampsia, 13 (10.8%) had antepartum eclampsia, and 9 (7.5%) had postpartum eclampsia.

Figure 2 highlights maternal outcomes, with 18 (15.00%) experiencing acute renal failure, 25 (20.83%) having partial HELLP syndrome, 18 (15.00%) affected by postpartum hemorrhage, and 9 (7.50%) experiencing postpartum eclampsia. Other complications included full HELLP syndrome in 10 (8.33%) cases, placental abruption in 5 (4.17%), and mortality in 2 (1.67%). Fetal outcomes indicated that 32 (26.67%) neonates required NICU admission, 27 (22.50%) had respiratory distress, 4 (3.33%) had intrauterine death, and 52 (43.33%) had low birth weight. Preterm births accounted for 83 (69.17%) cases, with 3 (2.50%) neonatal deaths reported as reported in Figure 3.

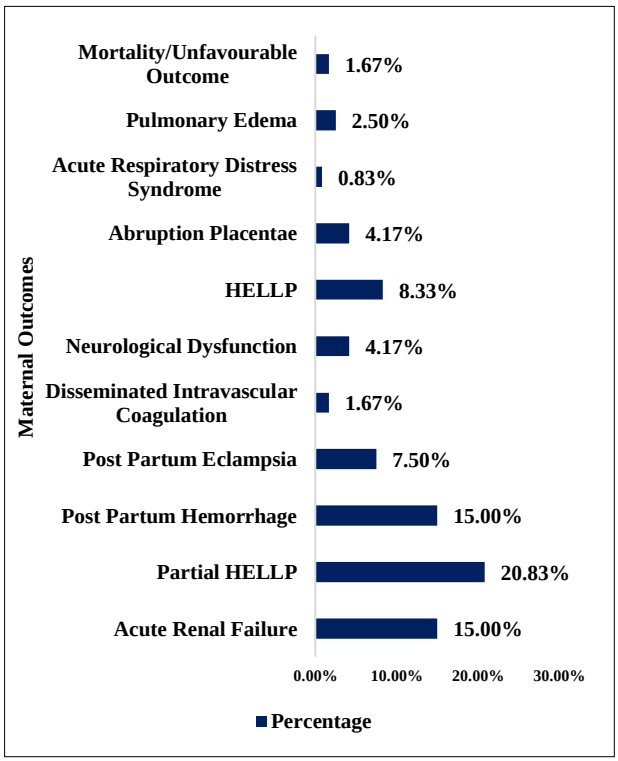

Figure 2: Distribution of study participants based on maternal outcomes.

Table 3 presents the association between outcomes and eclampsia severity. For maternal outcomes, acute renal failure affected 18 participants (8 eclampsia, 10 severe pre-eclampsia; p=0.563), while partial HELLP syndrome was higher in the eclampsia group (14 vs. 11; p=0.041).

Table 3: Association between outcomes with severity of eclampsia.

Outcome	Eclampsia (n=46)	Severe pre-eclampsia (n=74)	Total (n=120)	Chi-square P value
Maternal outcomes				
Acute renal failure	8 (44.4)	10 (55.6)	18 (100)	0.563
Partial HELLP	14 (56)	11 (44)	25 (100)	0.041
Post partum hemorrhage	7 (38.9)	11 (61.1)	18 (100)	0.958
Post partum eclampsia	3 (33.3)	6 (66.7)	9 (100)	0.748
Disseminated intravascular coagulation	1 (50)	1 (50)	2 (100)	0.732
Neurological dysfunction	1 (20)	4 (80)	5 (100)	0.389
HELLP	6 (60)	4 (40)	10 (100)	0.141
Abruption placentae	3 (60)	2 (40)	5 (100)	0.309
Acute respiratory distress syndrome	0 (0)	1 (100)	1 (100)	0.429
Pulmonary edema	1 (33.3)	2 (66.7)	3 (100)	0.857
Mortality/unfavourable outcome	0 (0)	2 (100)	2 (100)	0.261
Fetal outcomes				
Nicu admission	14 (43.8)	18 (56.3)	32 (100)	0.462
Respiratory distress	11 (40.7)	16 (59.3)	27 (100)	0.77
Hypoxic ischaemic encephalopathy	1 (33.3)	2 (66.7)	3 (100)	0.857
Intrauterine death	4 (100)	0 (0)	4 (100)	0.01
IUGR	7 (38.9)	11 (61.1)	18 (100)	0.958
Low birth weight	22 (42.3)	30 (57.7)	52 (100)	0.434
Preterm	33 (39.8)	50 (60.2)	83 (100)	0.63
Meconium aspiration syndrome	6 (50)	6 (50)	12 (100)	0.381
Neonatal death	0 (0)	3 (100)	3 (100)	0.167

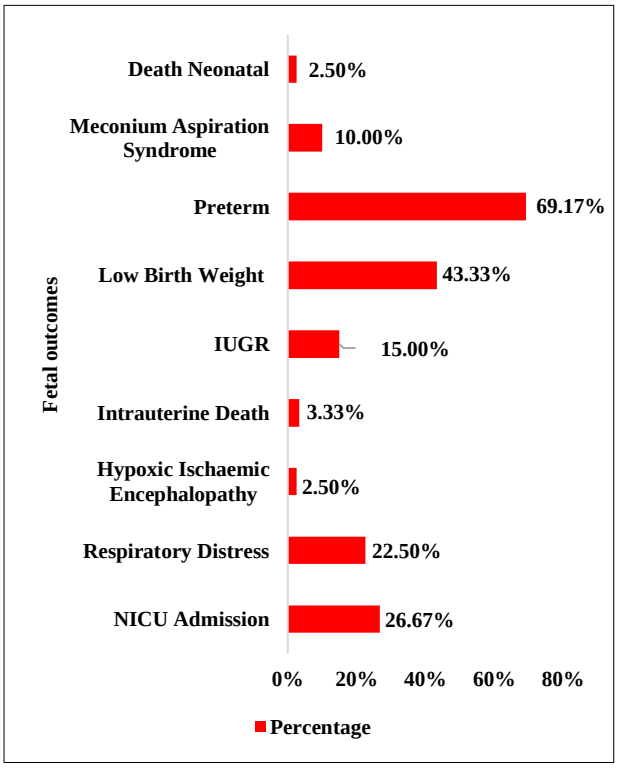

Figure 3: Distribution of study participants based on fetal outcomes.

Postpartum haemorrhage (18 cases) and postpartum eclampsia (9 cases) showed no significant differences (p=0.958 and p=0.748, respectively). Other outcomes like disseminated intravascular coagulation, neurological dysfunction, HELLP syndrome, and placental abruption showed no significant associations. Regarding fetal outcomes, NICU admission for 32 newborns, respiratory distress in 27, and hypoxic ischemic encephalopathy in 3 showed no significant differences (p=0.462, p=0.77, and p=0.857, respectively). Intrauterine death occurred in 4 cases, all in the eclampsia group (p=0.01). Other fetal outcomes did not differ significantly between groups.

DISCUSSION

Severe preeclampsia and eclampsia remain significant contributors to maternal and fetal morbidity and mortality, despite of recent improvement in maternal health care. The precise etiology of preeclampsia remains unclear. In mothers, severe complications such as eclampsia, HELLP syndrome, renal dysfunction, and postpartum hemorrhage increase the risk of maternal morbidity and mortality. Traditionally, severe preeclampsia has been an indication for immediate delivery, regardless of gestational age. However, early delivery can have severe fetal consequences, including prematurity and its associated complications.[13]

The ACOG 2020 criteria for distinguishing severe from non-severe pre-eclampsia classify severe cases based on clinical markers such as diastolic BP ≥110 mmHg and systolic BP ≥160 mmHg, whereas non-severe cases have diastolic BP <110 mmHg and systolic BP <160 mmHg. In our study, cases meeting these criteria were prioritized for urgent intervention, which aligns with the global standards aimed at reducing risks associated with uncontrolled hypertension. Furthermore, severe pre-eclampsia cases often presented with symptoms like headache, visual disturbances, and upper abdominal pain, corroborating the criteria and highlighting the increased neurological risk in severe cases, such as the 7.50% incidence of eclampsia and 4.17% rate of neurological dysfunction observed in our cohort.[3]

Compared to other studies on severe pre-eclampsia and eclampsia, findings from this study in a tertiary care hospital in the Kolhan region of Jharkhand revealed consistent patterns while highlighting specific regional differences. The age distribution showed a majority of cases in the ≤20 age group (40.83%) and 21-25 age group (26.67%), aligning with research by Shivalingappa et al and Naz et al, which emphasized younger maternal age as a significant factor for pre-eclampsia.[14,15] The study noted a high prevalence of cases from rural areas (73.33%), consistent with findings that women in underserved regions face greater risks due to limited healthcare access. This aligns with Goyal et al which linked inadequate antenatal care in rural populations to adverse outcomes.[16] Additionally, the high representation of tribal women (73.33%) reflects regional health disparities, as highlighted by Hassan et al.[17]

Socioeconomic status was another significant factor, with 67.50% of cases belonging to lower classes (III, IV, and V), mirroring Trivedi et al which linked poverty to worsened maternal health outcomes.[18] Educational disparities were also evident, with 40.83% of women being illiterate, reinforcing previous findings that lower education levels correlate with poorer pregnancy outcomes. The maternal factors of gravidity, gestational age, and mode of delivery observed in this study were consistent with another research. The high prevalence of primigravida cases (68.33%) aligns with studies like Goyal et al indicating that first-time pregnancies are more likely to experience pre-eclampsia due to various biological factors, particularly the immunological responses in first pregnancies.[16] Overall, these findings underscore the need for targeted interventions in rural and socio-economically disadvantaged populations to improve maternal and fetal outcomes.

In terms of gestational age, our data showed that the majority of cases (53.33%) occurred between 32-36 weeks, with 30.83% beyond 36 weeks. This aligns with findings from Naz et al who noted that pre-eclampsia frequently presents in late gestation.[15] Similarly, Hassan et al reported that the late second and early third trimesters are critical for the onset of severe pre-eclampsia, posing significant risks for maternal and fetal health.[17] The high caesarean section rate (68.33%) in our study corresponds with results from Shivalingappa et al and Trivedi et al which also found a predominance of caesarean deliveries in severe pre-eclampsia and eclampsia cases.[14,18] This trend often stems from the need for urgent delivery to mitigate complications. The lower rates of spontaneous vaginal delivery (9.17%) and instrumental delivery (6.67%) reflect standard practices favouring caesarean sections in severe cases.

The distribution of eclampsia types showed that the majority of cases presented with severe pre-eclampsia (61.7%), consistent with global patterns. Goyal et al also found severe pre-eclampsia more common than eclampsia, while our study indicated that intrapartum eclampsia (20%) remains a serious complication.[16] The higher rate of intrapartum eclampsia observed in our study parallels findings from other regional studies, where inadequate antenatal care and delayed recognition of pre-eclampsia symptoms lead to complications during labor. Overall, our findings regarding gravidity, gestational age, mode of delivery, and eclampsia types largely align with existing literature, underscoring the importance of timely diagnosis, appropriate management, and delivery decisions to improve maternal and fetal outcomes in cases of severe pre-eclampsia and eclampsia.

The maternal and fetal outcomes observed in our study closely mirrored those found in other research on severe pre-eclampsia and eclampsia. The occurrence of acute renal failure in 15.00% of participants is consistent with findings by Shivalingappa et al who also reported significant renal complications, highlighting the condition's impact on kidney function. Similarly, the incidence of partial HELLP syndrome (20.83%) and full HELLP syndrome (8.33%) aligns with research by Naz et al, which identified HELLP syndrome as a critical complication requiring urgent medical intervention to prevent maternal morbidity.[14,15] The rates of postpartum hemorrhage (15.00%) and placental abruption (4.17%) in our study reflect the high risk of maternal bleeding disorders, as noted by Goyal et al.[16] Neurological complications, including eclampsia and neurological dysfunction (7.50% and 4.17%, respectively), correspond with findings from Hassan et al, who reported similar patterns.[17] The occurrence of pulmonary oedema (2.50%) and acute respiratory distress syndrome (0.83%) was lower but consistent with other studies, which highlight these as rare yet life-threatening complications. Fetal outcomes also reflected patterns in similar research. The high incidence of low birth weight (43.33%), preterm births (69.17%), and NICU admissions (26.67%) aligns with findings by Trivedi et al, emphasizing that severe pre-eclampsia is associated with adverse fetal outcomes.[18] The occurrence of neonatal respiratory distress (22.50%) and intrauterine growth restriction (15.00%) corroborates these associations, as noted in studies by Naz et al.[15] Neonatal deaths (2.50%) and hypoxic ischemic encephalopathy (2.50%) observed in our study align with severe

consequences highlighted in similar research. The ACOG 2020 criteria's inclusion of thrombocytopenia (<100,000/µl) aligns with our findings of HELLP syndrome and related complications, stressing the need for early identification.[3]

Analysis of maternal and fetal outcomes in relation to eclampsia severity revealed important associations. The incidence of acute renal failure showed no significant difference between eclampsia and severe pre-eclampsia groups, consistent with Naz et al and Goyal et al.[15,16] However, partial HELLP syndrome was significantly higher in the eclampsia group, supported by Hassan et al who noted that HELLP syndrome is more frequently associated with severe forms of eclampsia.[17] The lack of significant differences in outcomes such as postpartum hemorrhage and neurological dysfunction between the two groups reflects findings from Trivedi et al.[18] The slightly higher occurrence of full HELLP syndrome in the eclampsia group aligns with the tendency for HELLP to develop in more severe cases, as reported by Shivalingappa et al.[14]

In terms of fetal outcomes, the lack of significant differences in NICU admissions and other complications suggests that while fetal morbidity is high in both conditions, maternal severity does not always translate into poorer neonatal outcomes. However, the significant association between intrauterine death and eclampsia in our study (p=0.01) underscores the higher risk of fetal mortality associated with eclampsia, a finding similarly reported in Goyal et al and Naz et al.[15,16] Overall, our study's findings are consistent with existing literature, emphasizing that while complications like partial HELLP syndrome and intrauterine death are more common in eclampsia, other severe maternal and fetal outcomes can occur irrespective of whether the patient presents with eclampsia or severe pre-eclampsia.

CONCLUSION

The findings of our study highlight the disproportionate burden on younger, rural, and tribal populations, emphasizing the need for tailored strategies in antenatal care, early diagnosis, and education. The high incidence of caesarean sections, significant maternal complications like HELLP syndrome, and adverse fetal outcomes such as preterm births and low birth weight, underline the urgency of adopting innovative, community-focused healthcare models that integrate local cultural sensitivities with modern medical practices. A multidimensional approach combining digital health platforms for remote monitoring, mobile clinics for rural outreach, and education campaigns on pre-eclampsia warning signs could revolutionize maternal care in underserved regions like Kolhan. By leveraging telemedicine and improving healthcare accessibility, we can empower communities to detect and manage pre-eclampsia earlier, potentially reducing maternal and neonatal morbidity. Our study calls for a shift towards more proactive, personalized care models that not only address the immediate risks but also aim to disrupt the cycles of poor maternal health outcomes, ensuring healthier futures for both mothers and their children in high-risk areas.

ACKNOWLEDGEMENTS

Authors extend our heartfelt gratitude to Mahatma Gandhi Memorial Medical College and Hospital, Jamshedpur, for providing the resources and support necessary for conducting this study. We are deeply appreciative of the medical staff and administrative personnel for their invaluable assistance and dedication, especially in facilitating data collection and patient management. We would also like to thank all the participants in the study for their cooperation and willingness to share their experiences, which made this research possible. Special thanks go to the Department of Obstetrics and Gynecology for their guidance and clinical insights, which greatly enhanced the quality and relevance of our work.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee No. IEC/14/22 dated 22/08/2022

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Cite this article as: Kar SR, Srivastava A, Bara MM, Jha E. Study of feto-maternal outcomes of pregnant women with severe pre-eclampsia and eclampsia attending a tertiary care hospital of Kolhan region. Int J Reprod Contracept Obstet Gynecol 2025;14:158-64.