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A Cross-Sectional Study of Perinatal Outcome in Various Highrisk Pregnancies in Women Attending Tertiary Health Care Centre

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Background: High-risk pregnancies contribute substantially to maternal and perinatal morbidity and mortality, especially in low-resource settings. Early identification of risk factors and timely obstetric intervention are essential to improving outcomes. This study evaluated perinatal outcomes associated with various high-risk conditions among women attending a tertiary rural healthcare centre.

Methods: A cross-sectional observational study was conducted over 2 years (November 2020–November 2022). A total of 310 high-risk pregnant women were enrolled. Detailed antenatal history, clinical examination, laboratory investigations, and ultrasonography findings were recorded. Perinatal outcomes—including mode of delivery, birth status, birth weight, congenital anomalies, NICU admission, need for surfactant or ventilatory support, and mortality—were documented. Data were analysed using SPSS v21, and associations were tested using the Chi-square test, with $p < 0.05$ considered significant.

Results: The most prevalent high-risk factors were anaemia (8.71%), gestational hypertension (8.06%), pre-eclampsia (9.68%), IUGR (5.80%), and oligohydramnios (6.45%). Caesarean section was the commonest mode of delivery (60%). Of 322 neonates, 294 (91.4%) were live births, 23 (7.14%) were stillbirths, and 5 (1.55%) were neonatal deaths. Abruptio placenta showed a statistically significant association with stillbirth ($p = 0.008$). Preterm delivery and eclampsia were significantly associated with surfactant requirement, while preterm birth, instrumental delivery, and oligohydramnios were significantly associated with pathological jaundice. No significant association was found between congenital anomalies and maternal risk factors.

Conclusion: Hypertensive disorders, anaemia, placental complications, prematurity, and oligohydramnios remain major contributors to adverse perinatal outcomes. Abruptio placenta is strongly linked to stillbirth, while prematurity significantly affects neonatal morbidity. Strengthening antenatal surveillance, early risk stratification, and timely referral can substantially reduce preventable perinatal morbidity and mortality in high-risk pregnancies.

Keywords: *High-risk pregnancy, perinatal outcome, stillbirth, prematurity, hypertensive disorders, oligohydramnios, neonatal mortality.*

INTRODUCTION

High-risk pregnancy is defined as a pregnancy in which the life or health of the mother or fetus is at increased risk due to pre-existing medical conditions, obstetric complications, or environmental and social factors. High-risk pregnancies continue to be a major global public health challenge and are associated with increased rates of maternal morbidity, perinatal mortality, and long-term neonatal complications [1]. The burden is particularly high in low- and middle-income countries, where limited antenatal surveillance and delayed access to tertiary care contribute to preventable adverse outcomes [2].

Hypertensive disorders, gestational diabetes, anemia, intrauterine growth restriction (IUGR), oligohydramnios, and placental abnormalities are among the most frequently reported high-risk factors affecting maternal and neonatal outcomes [3]. Multiple studies have shown that early identification of these conditions, combined with timely intervention, can significantly improve perinatal survival [4].

Stillbirth and neonatal mortality remain key indicators of maternal and child healthcare quality. Globally, approximately 2 million stillbirths occur every year, with a disproportionately higher burden in South Asia and sub-Saharan Africa [5]. Prematurity, birth asphyxia, congenital anomalies, and complications of multiple gestation are major contributors to neonatal death [6].

High-risk pregnancies also increase the likelihood of obstetric interventions such as induction of labour, operative vaginal delivery, and caesarean section. Although caesarean delivery may be life-saving, its rising trend has been associated with fetal distress, malpresentation, hypertensive disorders, and previous uterine scars—conditions commonly observed among high-risk women [7].

Given this background, the present study was undertaken to evaluate the perinatal outcomes associated with various high-risk conditions among pregnant women attending a tertiary rural healthcare centre. Understanding these risk-outcome associations is crucial for developing targeted antenatal interventions, strengthening referral systems, and reducing perinatal morbidity and mortality in resource-constrained settings.

MATERIALS AND METHODS

Study Design

A **cross-sectional observational study** was conducted to assess maternal and neonatal outcomes among high-risk pregnant women.

Study Setting

The study was carried out at a **Tertiary Rural Healthcare Centre**.

Study Duration

The study was conducted over a period of **2 years**, from **November 2020 to November 2022**.

Data Collection Period

Data were collected prospectively from **January 1, 2021, to June 30, 2022**.

Sample Size

A total of 310 study participants were included in the sample.

Sample Size Calculation

The sample size was calculated using the formula:

$$n = \frac{Z^2\, P\, Q}{D^2}$$

Where:

- **Z = 1.96** (at 95% confidence level)
- **P = 27.9%**, based on the prevalence reported by Kumar et al.[44]
- **Q = 100 – P = 72.1%**
- **D = 5%** (absolute precision)

The calculated sample size was 310.

Inclusion Criteria

1. All pregnant women admitted for delivery with identified high-risk factors.
2. Booked cases.
3. Unbooked cases (those receiving antenatal care elsewhere but presenting for delivery at the study hospital).

Exclusion Criteria

1. Pregnant women with a previous caesarean section as the **only** high-risk factor.

2. Women who were unwilling to participate or did not give consent.
3. Patients presenting with acute surgical emergencies (e.g., road traffic accident, pancreatitis, appendicitis).

Data Collection Procedure

Approval from the Institutional Ethics Committee was obtained before the initiation of the study. Written informed consent was taken from all participants.

A structured proforma was used to record the data.

Antenatal History

- Marital status and booking status were documented.
- Gestational age was determined using both menstrual history and first-trimester ultrasonography (USG) and cross-verified for consistency.
- Presenting complaints and detailed obstetric history were recorded.
- Presence of high-risk factors was assessed.
- Relevant family, medical, surgical, and drug history was documented.

Clinical Examination

A complete general physical examination was conducted, including assessment of:

- Height, weight
- Pallor, oedema, icterus
- Blood pressure, pulse, temperature, respiratory rate

Systemic examination of the **cardiovascular**, **respiratory**, and **central nervous systems** was performed.

A detailed obstetric examination included:

- **Per abdominal examination:** Fundal height, fetal presentation (via Leopold's manoeuvres), uterine contractions, engagement of the presenting part, and fetal heart rate.
- **Per vaginal examination:** Cervical dilatation, effacement, station, membrane status, and pelvic adequacy.

Investigations

All relevant laboratory investigations and USG findings were reviewed to identify associated risk factors.

Delivery and Neonatal Outcome Assessment

Post-delivery details recorded included:

- Type of delivery
- Live birth or stillbirth status
- Term / preterm / post-term status
- Date and time of birth
- Birth weight
- Presence of congenital anomalies, neonatal jaundice, or sepsis
- Need for NICU admission, surfactant therapy, oxygen supplementation, or ventilatory support

All data were systematically recorded and analysed.

Statistical Analysis

Data entry was performed using **MS Excel**, and statistical analysis was carried out using **Statistical Package for Social Sciences (SPSS), Version 21**.

Data were summarised using appropriate descriptive statistics and represented graphically through bar charts and pie diagrams wherever necessary.

Chi-Square Test

The **Chi-square test of association** was employed to examine relationships between categorical variables.

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where:

- O_i= observed frequencies

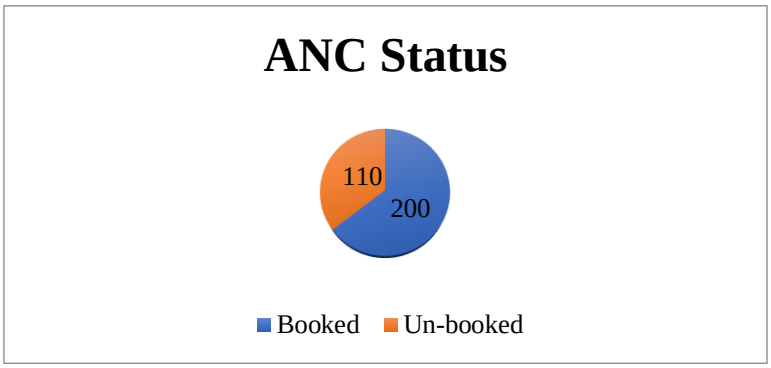
- E_i = expected frequencies
- Degrees of freedom (df) = (r − 1)(c − 1),
  r = number of rows, **c** = number of columns

A **p-value < 0.05** was considered statistically significant.

RESULTS AND OBSERVATIONS;

Table 1: High Risk Factors

Sl. No.	High Risk Factors	No of cases	Percentage (%)
1	Abruptio placenta	8	2.58
2	IUD	15	4.84
3	Haemorrhagic shock	4	1.29
4	BOH	7	2.25
5	CPD	10	3.23
6	Breech presentation	8	2.58
7	non re assuring NST	8	2.58
8	Breast abscess	1	0.32
9	Gestational HTN	25	8.06
10	IUGR	18	5.80
11	Hypothyroidism	15	4.84
12	Oligohydramnios	20	6.45
13	Inadequate / Contracted pelvis	6	1.94
14	Meconium stained liquor	5	1.61
15	Chronic HTN	4	1.29
16	Renal failure	2	0.65
17	COVID Positive	10	3.23
18	Elephantiasis	1	0.32
19	Eclampsia	10	3.23
20	Pre eclampsia	30	9.68
21	Previous 2 LSCS	10	3.23
22	GDM	8	2.58
23	ITP	2	0.65
24	Epilepsy	4	1.29
25	Heart Diseases	4	1.29
26	Anaemia	27	8.71
27	HBsAg reactive	5	1.61
28	Post dated pregnancy	12	3.87
29	HIV Reactive	4	1.29
30	Rh negative pregnancy	10	3.23
31	Twin Pregnancy	12	3.87
32	Elderly Mother (>35 years)	5	1.61
Total		**310**	**100**



Graph 1: ANC Status

Table 2: Obstetric score

Sl. No.	Obstetric score	No of cases	Percentage (%)
1	Primi gravida	107	34.52
2	Multi gravida	203	65.48
Total		**310**	**100**

In this study, out of 310 cases, the Multigravida Obstetric score was found in 203 (65.48%) cases, where the Primigravida Obstetric score was found in 107 (34.52%) cases.

Table 3: Mode of delivery

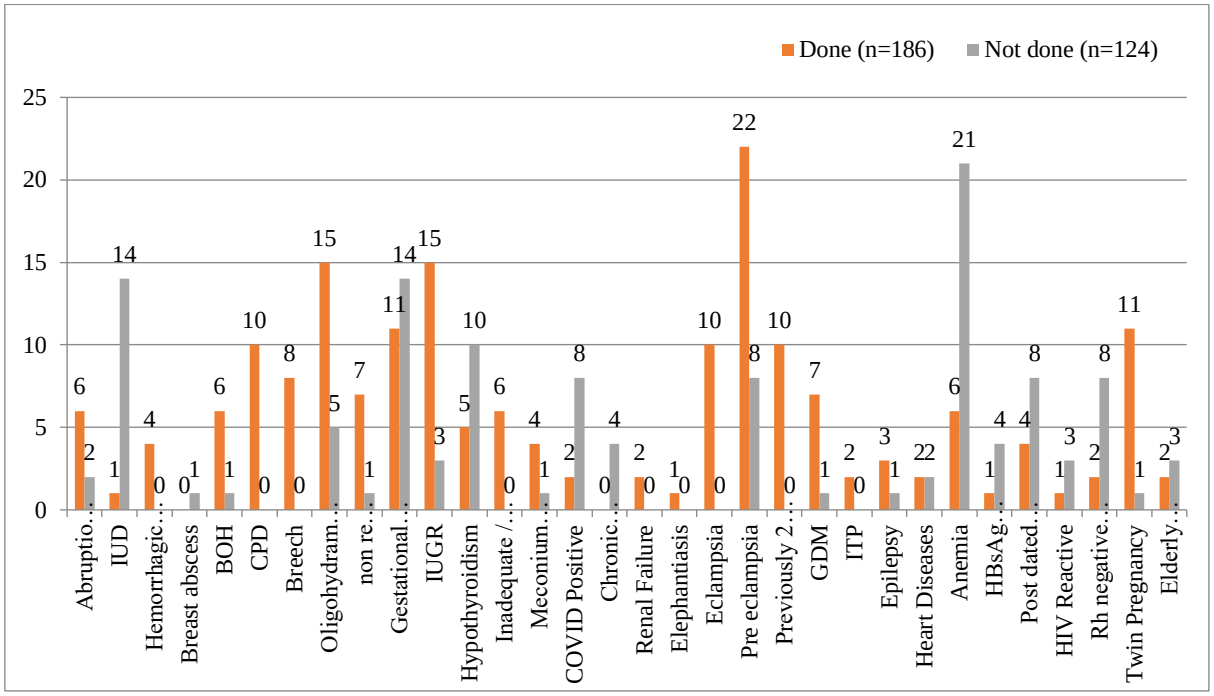
Sl. No.	Mode of delivery	No of cases	Percentage (%)
1	Normal Delivery	110	35.484
2	LSCS	186	60.000
3	Forceps Delivery	2	0.645
4	Vacuum-assisted delivery	12	3.871
Total		**310**	**100**

It is observed that the Mode of Delivery of the maximum cases (n=186, %=60) was LSCS, where the least cases (n=2, %=.64) were done through Forceps delivery. The second highest number (n=110, %=35.48) of cases were done through Normal Delivery, and 12 (2.87%) cases were done by vacuum-assisted delivery.

Table 4: Period of gestation

Sl. No.	Period of Gestation	No of Cases	Percentage
1	Term delivery	278	89.677
2	Pre-term delivery	20	6.452
3	Post-term delivery	12	3.871
Total		**310**	**100**

In this study, it is found that the Period of gestation of most cases (n=278, %=89.67) was Term Delivery, where preterm delivery & Post Term delivery were very few, that is, 20 (6.4%) & 12 (3.8%), respectively.

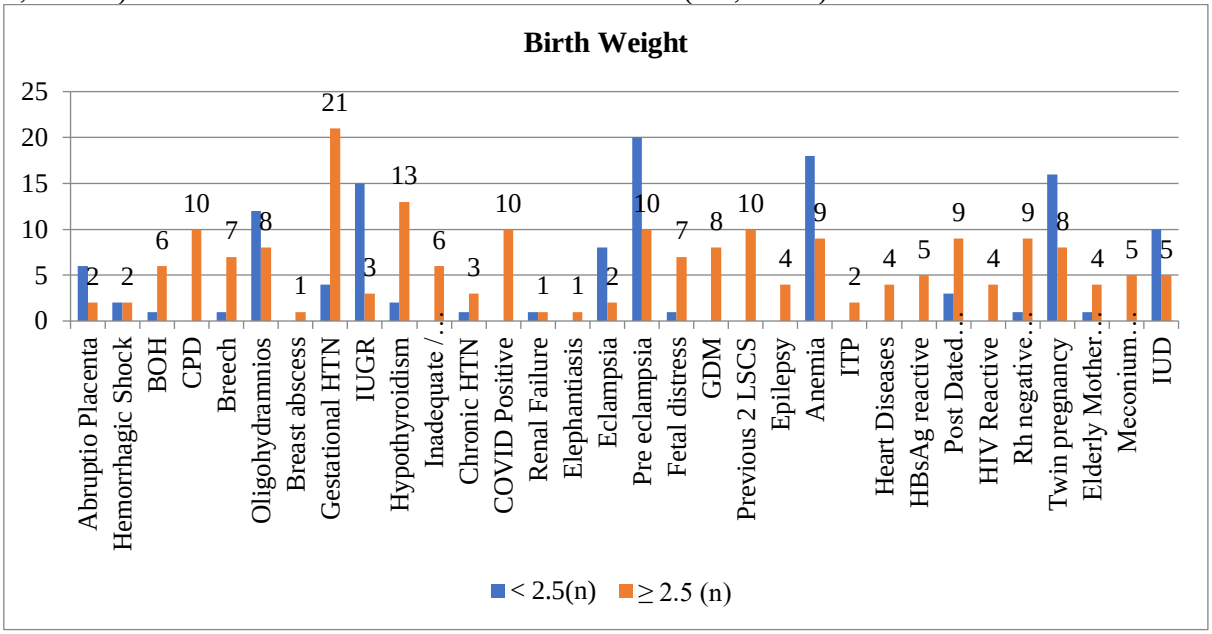


Graph 2: Caesarean section and risk factors

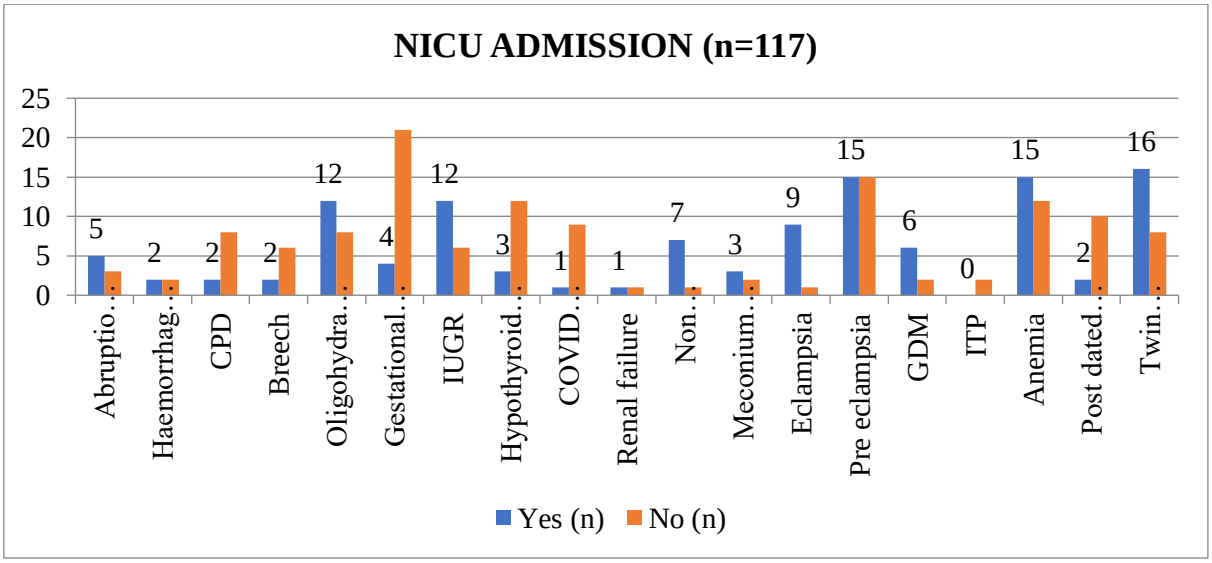
Table 5: Outcome of Pregnancy

Sl. No.	Outcome of Pregnancy	No of Cases (Total no of babies= 322; 298 singleton pregnancies + 12 twin pregnancies)	Percentage
1	Live Birth	294	91.4
2	Still Birth	23	7.14
3	Neonatal Death	5	1.55
Total		**322**	**100**

It is observed that the Outcome of Pregnancyin cases (n=294, %=91.4) were found to be Live Birth, whereas stillbirth (n=23, %=7.14) and the least cases were found to be neonatal death (n=5, %=1.5).



Graph 3: Risk factors and Birth weight



Graph 4: NICU Admission

Table 6: Risk factors and surfactant use

Sl. No.	High Risk Factors	Surfactant use (n=69)				Total cases	Chi-square	df	p-value
		Yes (n)	Percentage (%)	No (n)	Percentage (%)				
1	Pre term Delivery	16	23.19	4	5.13	20	10.16	1	0.001
2	Pre eclampsia	15	21.74	15	19.23	30	0.142	1	0.706
3	Eclampsia	9	13.04	1	1.28	10	7.989	1	0.005
4	IUGR	10	14.49	8	10.26	18	0.0611	1	0.434
5	Gestational Hypertension	2	2.9	23	29.49	25	18.338	1	0.000
6	Twin Pregnancy	12	17.39	12	15.38	12 pairs of twins (12* 2= 24)	0.108	1	0.743
7	Oligohydroamnios	5	7.25	15	19.23	20	4.47	1	0.034
Total		**69**	**100**	**78**	**100**	**147**			

Table 7: High Risk factors and pathological Jaundice

Sl. No.	High Risk Factors	Pathological Jaundice (n=21)				Total cases	Chi-square	df	p-value
		Yes (n)	Percentage (%)	No (n)	Percentage (%)				
1	GDM	1	5.56	7	16.67	8	1.094	1	0.296
2	Pre-term delivery	2	11.11	18	42.86	20	4.454	1	0.033
3	Instrumental delivery (Vacuum and Forceps delivery)	12	66.67	8	19.05	20	13.942	1	0.000
4	Twin Pregnancy	6	16.67	18	21.43	12 pairs ie 24 babies	0.0180	1	0.671
Total		**21**	**100**	**51**	**100**	**72**			

Graph 5: High Risk factors and Oxygen / Ventilator support

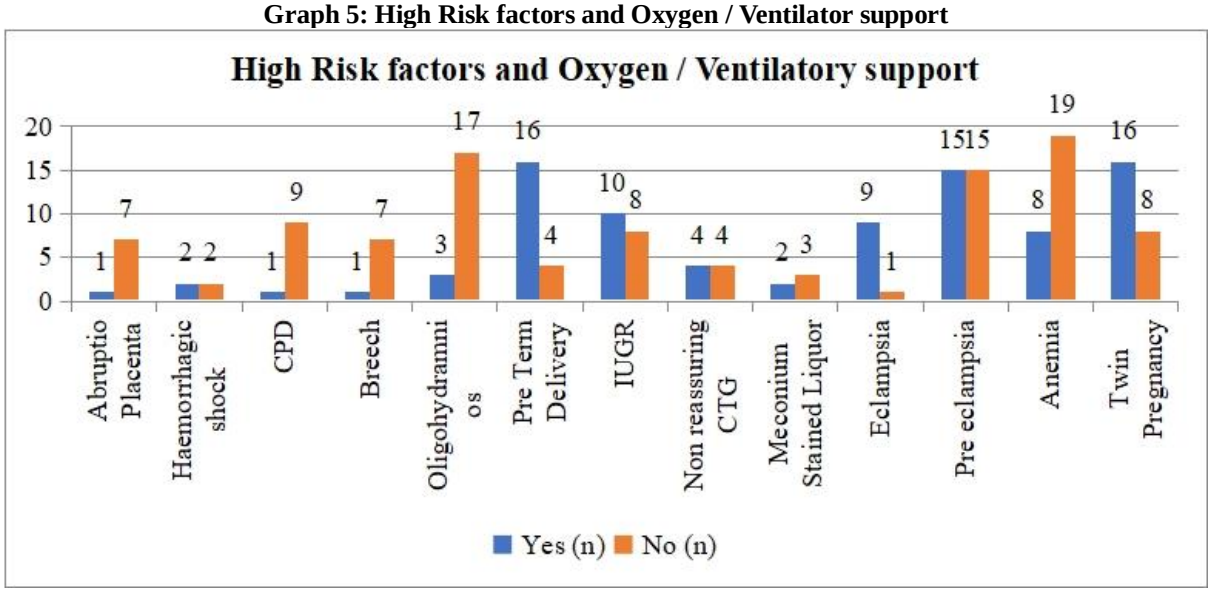


Table 8: Congenital anomalies

Sl. No.	High Risk Factors	Congenital anomalies (n=5)				Total cases	Chi-square	Df	p-value
		Yes (n)	Percentage (%)	No (n)	Percentage (%)				
1	GDM	2	40	6	16.67	8	1.522	1	0.217

2	Polyhydroamnios	1	20	7	19.44	8	0.001	1	0.977
3	Oligohydroamnios	1	20	19	52.78	20	1.888	1	0.169
4	Elderly Mother (>35 years)	1	20	4	11.11	5	0.324	1	0.569
Total		**5**	**100**	**36**	**100**	**41**			

In Table 8 given above, we can see that there are 5 congenital anomalies found with high risk factors: GDM, Polyhydroamnios, Oligohydroamnios, and Elderly Mother (>35 years). However, no risk factor is significantlyassociated with the congenital anomalies

Table:9 High-Risk Factors and Perinatal Mortality Outcomes

Sl. No.	High-Risk Factor	Stillbirth Yes (%)	No (%)	Neonatal Death Yes (%)	No (%)	Total Cases	Chi-square	df	p-value
1	Twin Pregnancy	2 (8.70)	22 (18.80)	1 (20)	23 (35.38)	24	1.383 / 0.788	1	0.240 / 0.466
2	IUGR	3 (13.04)	15 (12.82)	1 (20)	17 (26.15)	18	0.001 / 0.092	1	0.977 / 0.762
3	Elderly Mother (>35 years)	1 (4.35)	4 (3.42)	–	–	5	0.048	1	0.826
4	Epilepsy	1 (4.35)	3 (2.56)	–	–	4	0.220	1	0.639
5	GDM	2 (8.70)	6 (5.13)	–	–	8	0.454	1	0.500
6	Non-reassuring NST	1 (4.35)	7 (5.98)	1 (20)	7 (10.77)	8	0.095 / 0.391	1	0.757 / 0.532
7	Meconium-Stained Liquor	1 (4.35)	4 (3.42)	–	–	5	0.048	1	0.826
8	COVID-19 Positive	2 (8.70)	8 (6.84)	–	–	10	0.100	1	0.752
9	Abruptio Placenta	4 (17.39)	4 (3.42)	–	–	8	**6.965**	1	**0.008***
10	Oligohydramnios	3 (13.04)	17 (14.53)	–	–	20	0.035	1	0.852
11	Pre-eclampsia	3 (13.04)	27 (23.08)	–	–	30	1.149	1	0.284
12	Pre-term Delivery	–	–	2 (40)	18 (27.69)	20	0.345	1	0.557
TOTAL	–	**23**	**117**	**5**	**65**	**(varies)**	–		

DISCUSSION

The present study demonstrates that a wide range of maternal high-risk factors contribute to adverse perinatal outcomes. Among the 310 high-risk pregnant women, anemia, gestational hypertension, pre-eclampsia, IUGR, and oligohydramnios were among the most prevalent risk factors. These findings are consistent with studies conducted in similar rural setups, which identify hypertensive disorders and anemia as leading contributors to maternal and fetal complications [1–3].

A notable finding was the high proportion of multigravida women (65.48%), reflecting demographic patterns described by Patel et al. in rural Indian populations [2]. The caesarean section rate in the current study (60%) also aligns with observations by Joseph et al., who reported rising caesarean deliveries among high-risk pregnancies due to fetal distress, PIH, IUGR, and prior cesarean scars [7].

In terms of perinatal outcome, the study reported **stillbirths (7.14%)** and **neonatal deaths (1.55%)**. Among all high-risk variables analysed, **abruptio placenta** showed a statistically significant association with stillbirth (p = 0.008). This is consistent with the literature, where placental abruption is strongly linked to fetal hypoxia, preterm birth, and perinatal loss [4,8].

Prematurity accounted for **40% of neonatal deaths**, highlighting its importance as a major determinant of neonatal survival. The WHO identifies prematurity as the leading cause of neonatal mortality globally, especially in low-resource

settings [6]. Although preterm delivery did not show significance in stillbirth analysis, its clinical relevance remains undeniable.

Regarding neonatal morbidity, preterm delivery, instrumental delivery, and oligohydramnios were significantly associated with **pathological jaundice**, confirming prior findings that traumatic deliveries and prematurity increase bilirubin production and reduce hepatic clearance [9].

Surfactant therapy requirement was significantly associated with preterm delivery and eclampsia, consistent with previous studies showing that neonates of eclamptic mothers have increased respiratory morbidity due to placental insufficiency and delayed lung maturation [8].

Although congenital anomalies were observed in association with GDM, oligohydramnios, polyhydramnios, and maternal age >35 years, none of these associations were statistically significant. Sharma et al. also observed similar patterns, attributing the lack of statistical significance to the low prevalence of congenital anomalies in hospital-based cross-sectional studies [10].

Twin pregnancies contributed to both stillbirth and neonatal death; however, the associations were not statistically significant. Multiple gestation is known to increase the risk of preterm birth, low birth weight, and perinatal mortality, but detection of significance is often limited by sample size [11].

Overall, the findings of this study reinforce that hypertensive disorders, placental complications, prematurity, and oligohydramnios remain key contributors to poor perinatal outcomes. Early detection, improved antenatal surveillance, and timely obstetric intervention can significantly reduce preventable perinatal morbidity and mortality in high-risk populations.

CONCLUSION

This study highlights that high-risk pregnancies are associated with a significant burden of adverse perinatal outcomes, particularly in rural tertiary care settings. Hypertensive disorders, anaemia, IUGR, oligohydramnios, and placental complications were the most frequent contributors to maternal and neonatal morbidity. Abruptio placenta showed a strong and statistically significant association with stillbirth, emphasising the need for early identification and rapid obstetric intervention. Prematurity emerged as a major determinant of neonatal morbidity, including the need for surfactant therapy and pathological jaundice.

Although several high-risk conditions were observed, many adverse outcomes remain preventable through improved antenatal surveillance, timely referral, and evidence-based intrapartum management. Strengthening maternal healthcare services—particularly in resource-limited settings—can substantially reduce perinatal mortality and improve neonatal survival among high-risk pregnancies.

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