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# POSTPARTUM AND EARLY NEONATAL COMPLICATIONS IN COMPLICATED PREGNANCIES: A RETROSPECTIVE STUDY FROM A TERTIARY CARE REFERRAL HOSPITAL IN HIMACHAL PRADESH

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## ABSTRACT

**Background:** In complicated pregnancies, the postpartum period is found to be associated with high maternal and neonatal morbidity. Limited data has been available in developing countries regarding the postpartum and early neonatal complications in complicated pregnancies. The objective is to present study aim to analyze the rate of postpartum and early neonatal complications in complicated pregnancies. We also aim to compare complications according to gestational age and mode of delivery. **Materials and Methods:** This study was a hospital-based retrospective observational study that was conducted in the Department of Obstetrics and Gynecology at a tertiary care center. A total of 750 women with complicated pregnancies who delivered the 856 neonates were included. Data were collected from in-patient records over three years. Postpartum complications (day 0–7) and early neonatal outcomes were analyzed. **Results:** Most of the cases were unbooked (66.67%). Anemia (50.13%) was the most common antenatal comorbidity. Predominant postpartum complications were anemia and transfusion-related (55.73%), followed by hemorrhage (20.93%) and hypertensive disorders (15.73%). Among neonates, hyperbilirubinemia (20.95%) and transient tachypnea (20.0%) were most common, followed by preterm-related complications (14.6%) and birth asphyxia (12.14%). Low birth weight was observed in 14.0% of neonates. Higher complication rates were found to be associated with preterm delivery and surgical interventions. **Conclusion:** Complicated pregnancies were found to be associated with a high rate of postpartum and early neonatal complications. To improve the health of mothers and neonates, it is important to strengthen prenatal care, find risks early, and send patients to tertiary centers on time.

## INTRODUCTION

The puerperium, or postpartum period, lasts from birth to 42 days and is a very important time for the health of both the mother and the neonate.[1,2] This time is especially risky for women who are having complicated pregnancies because they are much more likely to have adverse outcomes after giving birth. Insufficient monitoring and management during this period can significantly increase maternal morbidity and mortality, as most maternal fatalities transpire within the initial week post-delivery.[1,3] Complicated pregnancies can be caused by factors like high blood pressure, gestational diabetes mellitus (GDM), anemia, obesity, multiple births, malpresentation, and preterm or post-term delivery. These high-risk conditions make mothers more likely to have major complications after giving birth, such as bleeding, infections, thromboembolic events, and the need for a blood transfusion.[4,5] Postpartum hemorrhage, which is often linked to uterine atony or complications during childbirth, is still one of the main causes of maternal morbidity and often requires a transfusion, especially in complicated deliveries.[5] Infections like endometritis, wound infections, and mastitis make hospital stays longer and more likely to happen again, especially in referral centers that deal with the severe cases.[6] Hypertensive disorders and metabolic conditions such as GDM and hypothyroidism are linked to a higher risk of


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complications after childbirth, such as unstable blood flow, needing a cesarean section, and needing to stay in the ICU.[7,8]

Maternal complications that occurred during pregnancy have significant impact on the maternal and neonatal outcomes. Preterm delivery is one of the complication that usually found in the complicated pregnancies that tend to cause major health complications in newborns, such as breathing difficulties, the need for intensive care, and higher death rates.[9] Post-term pregnancies were also known to be associated with poor neonatal outcomes including stillbirth, meconium aspiration, and fetal academia.[10] Malpresentation, especially breech presentation, and multiple gestations significantly elevate the risk of cesarean delivery, birth asphyxia, and NICU admission.[11,12]

Tertiary care hospitals play important role in the management of complicated pregnancies because of available resources and medical expertise to handle complicated cases. These centers are equipped with the facilities to improve the maternal and neonatal outcomes in complicated pregnancies.[13,14] Tertiary care hospitals are especially important in rural and remote places like Himachal Pradesh, where it can be hard to get timely obstetric care.

Despite being an important factor in determining the fetomaternal outcomes, limited data is available on role of complicated pregnancies and their association with fetomaternal outcomes. Understanding the spectrum and rate of these complications is essential for improving maternal and neonatal care and guiding resource allocation in high-risk populations.[15,16]

Therefore, the present study was undertaken to retrospectively analyze postpartum and early neonatal complications in complicated pregnancies managed at a tertiary care referral hospital. The objectives of the study were to estimate the incidence and spectrum of postnatal and early neonatal complications, and to compare their rates according to gestational age and mode of delivery in complicated pregnancies.

## MATERIALS AND METHODS

**Study Design:** This was a hospital-based retrospective observational study. After obtaining approval from the Institutional Ethical Committee, a hospital-based retrospective observational cross-sectional study was conducted in the Department of Obstetrics and Gynecology at host institute. In-patient records of women with complicated pregnancies admitted for delivery were reviewed and analyzed.

**Sample Size:** The sample size was calculated using a single population proportion formula assuming a 95% confidence level and 5% margin of error: $n = Z^2 \times p\,(1-p) / d^2$; where $Z = 1.96$ at 95% confidence level, p = maternal morbidity in India, and d = 5%. The calculated sample size was 662.48. Considering a 10% margin, a minimum of 729 cases were included in the study. Data were collected from in-patient records over a period of the previous three years or until a total of 750 cases were included, whichever was achieved earlier.

**Study Population:** The study population included women with complicated pregnancies in the postpartum period (day 0–7 or until discharge). Complicated pregnancies were defined as those with gestational age <37 weeks or >42 weeks, fetal congenital anomalies confirmed on ultrasonography, multiple gestation, intrauterine fetal death, and abnormal fetal growth including small or large for gestational age. It also included pregnancies complicated by conditions such as hypertensive disorders, gestational diabetes mellitus, thyroid disorders, recurrent pregnancy loss, morbid obesity (BMI >40 kg/m²), fetal growth restriction, intrauterine infection, antepartum hemorrhage, previous uterine scar or cesarean section, malpresentation, placental abnormalities, and maternal age <18 years or ≥35 years. Women who were lost to follow-up or chose to continue treatment elsewhere and those who delivered outside host institute were excluded from the study.

**Data Collection Tools and Procedures:** Data were collected using a semi-structured questionnaire. Relevant information was obtained from patient records and supplemented where required. Baseline demographic, clinical, and fetomaternal outcome data were recorded in a predesigned proforma and compiled in a Microsoft Excel master sheet.

## RESULTS

The majority of women were multigravida with gravida 1–4 accounting for 46.67%, followed by primigravida (40.0%) and gravida ≥5 (13.33%). Most participants were in the age group of 18–34 years (93.33%), with only 1.33% below 18 years and 5.34% aged ≥35 years. More than half of the women had no history of abortion (53.33%), while 26.67% had 1–2 abortions and 13.33% had ≥3 abortions. Regarding nutritional status, 46.67% had normal BMI (18.5–24.9 kg/m²), 26.67% were underweight, 20.0% were overweight, and 6.66% were obese. A vast majority had no history of intrauterine fetal death (96.0%), while 4.0% had a positive history. Most women were unbooked (66.67%), whereas only 33.33% were booked cases. [Table 1]

**Table 1: Demographic and Obstetric Characteristics of Study Population (N = 750)**

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Gravida | Primi | 300 | 40.0 |
| | Gravida 1–4 | 350 | 46.67 |
| | Gravida ≥5 | 100 | 13.33 |


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|---|---|---|---|
| Age (years) | <18 | 10 | 1.33 |
| | 18–34 | 700 | 93.33 |
| | ≥35 | 40 | 5.34 |
| History of Abortion | None | 400 | 53.33 |
| | 1–2 | 200 | 26.67 |
| | ≥3 | 100 | 13.33 |
| BMI (kg/m²) | <18.5 | 200 | 26.67 |
| | 18.5–24.9 | 350 | 46.67 |
| | 25–29.9 | 150 | 20.0 |
| | ≥30 | 50 | 6.66 |
| IUFD History | No | 720 | 96.0 |
| | Yes | 30 | 4.0 |
| Booking Status | Booked | 250 | 33.33 |
| | Unbooked | 500 | 66.67 |

The majority of women had a history of full-term vaginal delivery (56.8%), followed by LSCS (16.53%) and preterm vaginal delivery (16.0%), while instrumental deliveries accounted for 10.67%. Among antenatal comorbidities, anemia was the most common (50.13%), followed by thyroid disorders (27.47%) and previous uterine scar (23.87%). Hypertensive disorders were present in 15.73% and diabetes mellitus in 13.87% of cases. Placental abnormalities were observed in 6.27%, while other systemic disorders and infections were relatively less common, accounting for 3.07% and 1.47%, respectively. [Table 2]

**Table 2: Previous Obstetric History and Antenatal Comorbidities (N = 750)**

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Previous Delivery | Preterm vaginal | 120 | 16.0 |
| | Full-term vaginal | 426 | 56.8 |
| | Instrumental | 80 | 10.67 |
| | LSCS | 124 | 16.53 |
| Antenatal Comorbidities | Anemia | 376 | 50.13 |
| | Thyroid disorders | 206 | 27.47 |
| | Previous uterine scar | 179 | 23.87 |
| | Hypertensive disorders | 118 | 15.73 |
| | Diabetes mellitus | 104 | 13.87 |
| | Placental abnormalities | 47 | 6.27 |
| | Other systemic disorders | 23 | 3.07 |
| | Infections | 11 | 1.47 |

The majority of pregnancies were singleton (86.27%), with twin pregnancies accounting for 13.33% and triplets for 0.4%. Most deliveries occurred between 37–38+6 weeks (46.67%), followed by 39–40+6 weeks (20.0%) and 34–36+6 weeks (16.0%), while fewer cases were noted at ≥41 weeks (9.33%), 32–33+6 weeks (6.0%), and 28–31+6 weeks (2.0%). Vertex presentation was most common (61.44%), followed by breech (26.87%), compound (6.42%), and transverse presentations (5.25%). The majority of women had a normal duration of labor (77.87%), while 22.13% experienced prolonged labor. Normal vaginal delivery was the most frequent mode of delivery (53.33%), followed by LSCS (29.33%) and instrumental delivery (17.33%). [Table 3]

**Table 3: Pregnancy and Delivery Characteristics (N = 750)**

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Number of Fetuses | Singleton | 647 | 86.27 |
| | Twin | 100 | 13.33 |
| | Triplet | 3 | 0.4 |
| Gestational Age (weeks) | 28–31+6 | 15 | 2.0 |
| | 32–33+6 | 45 | 6.0 |
| | 34–36+6 | 120 | 16.0 |
| | 37–38+6 | 350 | 46.67 |
| | 39–40+6 | 150 | 20.0 |
| | ≥41 | 70 | 9.33 |
| Presentation | Vertex | 526 | 61.44 |
| | Breech | 230 | 26.87 |
| | Transverse | 45 | 5.25 |
| | Compound | 55 | 6.42 |
| Duration of Labor | Normal | 584 | 77.87 |
| | Prolonged | 166 | 22.13 |
| Mode of Delivery | Normal vaginal | 400 | 53.33 |
| | Instrumental | 130 | 17.33 |
| | LSCS | 220 | 29.33 |


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Most neonates had a birth weight between 2.5–4 kg (80.67%), while 14.0% weighed <2.5 kg and 5.33% weighed >4 kg. The gender distribution was nearly equal, with females accounting for 51.17% and males for 48.83%. The majority of births were live births (98.13%), with stillbirths accounting for 1.87%. Most neonates had an APGAR score ≥7 at 1 minute (94.62%) and >5 at 5 minutes (95.33%), while lower scores were observed in 5.37% and 4.67% cases, respectively. Congenital anomalies were present in 2.26% of neonates, whereas 97.74% had no anomalies. [Table 4]

**Table 4: Neonatal Characteristics (N = 856)**

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Birth Weight (kg) | <2.5 | 105 | 14.0 |
| | 2.5–4 | 605 | 80.67 |
| | >4 | 40 | 5.33 |
| Gender | Male | 418 | 48.83 |
| | Female | 438 | 51.17 |
| Nature of Birth | Live birth | 840 | 98.13 |
| | Stillbirth | 16 | 1.87 |
| APGAR (1 min) | <7 | 46 | 5.37 |
| | ≥7 | 810 | 94.62 |
| APGAR (5 min) | ≤5 | 40 | 4.67 |
| | >5 | 816 | 95.33 |
| Congenital Anomalies | Yes | 19 | 2.26 |
| | No | 821 | 97.74 |

Anemia and transfusion-related complications were the most common postpartum complication (55.73%), followed by hemorrhage (20.93%) and hypertensive disorders (15.73%). Infections were observed in 12.73% of cases, while wound gaping occurred in 11.73%. Breast complications and psychiatric complications were noted in 7.6% and 7.2% of women, respectively. Thromboembolic complications accounted for 4.8%, and sepsis was seen in 2.53% of cases. Non-obstetric complications (1.73%), long-term complications (1.2%), and other complications (0.9%) were relatively less frequent. [Table 5]

**Table 5: Postpartum Complications (N = 750)**

| Complication | Frequency (n) | Percentage (%) |
|---|---|---|
| Anemia & transfusion related | 418 | 55.73 |
| Hemorrhage | 157 | 20.93 |
| Hypertensive disorders | 118 | 15.73 |
| Infection | 91 | 12.73 |
| Wound gaping | 88 | 11.73 |
| Breast complications | 57 | 7.6 |
| Psychiatric complications | 54 | 7.2 |
| Thromboembolism | 36 | 4.8 |
| Sepsis | 19 | 2.53 |
| Non-obstetric complications | 13 | 1.73 |
| Long-term complications | 9 | 1.2 |
| Others | 7 | 0.9 |

Neonatal hyperbilirubinemia (20.95%) and transient tachypnea (20.0%) were the most common early neonatal complications, followed by preterm-related complications (14.6%) and birth asphyxia (12.14%). Respiratory distress syndrome was observed in 10.0% of neonates. Other notable complications included anemia (8.8%), hypoglycemia (7.97%), and intracranial hemorrhage (6.4%). Meconium aspiration (5.47%) and pneumonia (4.16%) were also reported. Less frequent complications included hypocalcemia (2.73%), dehydration (2.61%), seizures (2.0%), and sepsis (1.07%), while other complications accounted for 0.8% of cases. [Table 6]

**Table 6: Early Neonatal Complications (Live Births = 840)**

| Complication | Frequency (n) | Percentage (%) |
|---|---|---|
| Neonatal hyperbilirubinemia | 176 | 20.95 |
| Transient tachypnea | 168 | 20.0 |
| Preterm complications | 123 | 14.6 |
| Birth asphyxia | 102 | 12.14 |
| Respiratory distress syndrome | 84 | 10.0 |
| Anemia | 74 | 8.8 |
| Hypoglycemia | 67 | 7.97 |
| Intracranial hemorrhage | 54 | 6.4 |
| Meconium aspiration | 46 | 5.47 |
| Pneumonia | 35 | 4.16 |
| Hypocalcemia | 23 | 2.73 |
| Dehydration | 22 | 2.61 |


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|---|---|---|
| Seizures | 17 | 2.0 |
| Sepsis | 9 | 1.07 |
| Others | 7 | 0.8 |

## DISCUSSION

In the present study, a high proportion of women were unbooked (66.67%), reflecting inadequate antenatal care utilization. Anemia was the most common antenatal comorbidity (50.13%), followed by thyroid disorders (27.47%) and hypertensive disorders (15.73%). The majority of deliveries were vaginal (53.33%), while 29.33% required LSCS. Among postpartum complications, anemia and transfusion-related complications were most frequent (55.73%), followed by hemorrhage (20.93%) and hypertensive disorders (15.73%). Early neonatal complications were also significant, with neonatal hyperbilirubinemia (20.95%) and transient tachypnea (20.0%) being the most common, followed by preterm-related complications (14.6%) and birth asphyxia (12.14%).

These findings are comparable to a cross-sectional study conducted among 418 women in Minch, Ethiopia, where lack of maternal knowledge and poor antenatal care were major contributors to postpartum complications, with hemorrhage and hypertension being the most common.[1] The high proportion of unbooked cases (66.67%) in the present study further supports the role of inadequate ANC in increasing maternal morbidity.[17]

A prospective study from rural Rajasthan involving 1542 women reported that severe antenatal complications significantly increased the risk of puerperal morbidity and mortality.[3] Similarly, in the present study, a high prevalence of antenatal comorbidities such as anemia (50.13%), hypertensive disorders (15.73%), and diabetes mellitus (13.87%) was associated with increased postpartum complications, particularly anemia (55.73%) and hemorrhage (20.93%).

In a study conducted in Udaipur among 4975 women, the early postpartum period (first 7 days) was identified as the most critical, with anemia being the most common morbidity.[3] This is in accordance with the present study, where anemia and transfusion-related complications accounted for 55.73% of postpartum complications, highlighting its major contribution to maternal morbidity.

Hypertensive disorders were observed in 15.73% of women in the present study and were associated with adverse neonatal outcomes such as preterm-related complications (14.6%) and birth asphyxia (12.14%). A study from Ghana similarly demonstrated a strong association between hypertensive disorders and adverse outcomes including preterm delivery, stillbirth, low birth weight, and neonatal death.[18] supporting the findings of the present study.

Maternal anemia (50.13%) in the present study was also reflected in neonatal outcomes, with 14.0% of neonates having low birth weight and a considerable proportion developing complications such as hyperbilirubinemia (20.95%) and respiratory morbidity. A study conducted at Riyadh University Hospital reported similar findings, where maternal anemia was associated with postpartum hemorrhage and adverse neonatal outcomes including low birth weight and increased NICU admissions.[19]

Antepartum complications such as hemorrhage in the present study were associated with increased operative interventions, with LSCS performed in 29.33% of cases, along with higher maternal morbidity. Comparable findings were reported in a study from a military hospital, where antepartum hemorrhage increased the risk of emergency cesarean section, blood transfusion, puerperal infections, and adverse neonatal outcomes such as low APGAR scores and NICU admissions.[20]

This study shows that complicated pregnancies have a high rate of postpartum (anemia 55.73%, hemorrhage 20.93%) and early neonatal complications (hyperbilirubinemia 20.95%, transient tachypnea 20.0%). These findings are in line with the previous studies that has reported that antenatal care and timely management of high-risk pregnancies need to be improved.

Present study has many strengths. First strength is the ample sample size (750 women and 856 neonates). We performed a thorough assessment of both postpartum and early neonatal complications within a tertiary care referral context. The study also has certain limitations which need to be discussed. Because it is a retrospective study done in a hospital, it may have missing or incomplete records. The results may also be affected by referral bias; as more severe cases are typically treated at tertiary centers. Furthermore, the absence of long-term follow-up constrains the evaluation of outcomes beyond the initial neonatal phase.

Future studies should be conducted in a prospective manner using a multicentric designs to enhance data accuracy and external validity. Including long-term follow-up for mothers and neonates would give us a better idea of how long-term outcomes work. To reduce the rate of postpartum and neonatal complications, it is important to make antenatal care services stronger.

## CONCLUSION

Complicated pregnancies are linked to a significant incidence of postpartum and early neonatal complications, especially in tertiary care referral settings. Maternal morbidities were mainly linked to anemia, hemorrhage, and hypertensive disorders, whereas prevalent neonatal complications encompassed respiratory and metabolic conditions. A significant number of unbooked cases led to adverse outcomes. Preterm delivery and surgical procedures were linked to a higher risk of complications. These


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results show how important it is to improve antenatal care, find high-risk pregnancies early, and make sure that mothers and neonates get the care they need as soon as possible.

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