

Epidemiology and perinatal outcomes of multiple gestation pregnancies in a tertiary care centre in the Himalayan region of India

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Abstract

Background: Multiple gestation pregnancy is considered a high-risk pregnancy due to increased maternal and perinatal morbidity as compared to singleton pregnancy. Their management becomes even more challenging in hilly areas due to difficult terrain and frequent natural disasters. Objective of this study is to identify risk factors and fetomaternal outcomes of twins/triplets in Himalayan region. **Material and Methods:** Hospital based retrospective study which included all twin/triplet deliveries done in the hospital with period of gestation >24 weeks. Maternal and foetal outcome were studied. **Results:** Multiple-gestation delivery rate was 1.29%. Most women were aged 20–29 years. The mean period of gestation (POG) at delivery was 34.97 ± 3.64 weeks. 59.0% were dizygotic and 41% were monozygotic. LSCS rate was 47.5% with malpresentation being most common indication. Spontaneous pre term labour was most common maternal complication followed by PPH. Developmental delay was recorded on follow up of pre term babies in 33.3% cases. **Conclusion:** Twin pregnancy is a high-risk pregnancy associated with increased maternal and foetal morbidity. Management of such cases become more difficult in resource limited and geographically difficult areas. Early identification of high-risk factors and timely referral to an equipped centre are essential for better maternal and foetal outcomes.

Keywords: Twin/ triplet pregnancy, pre term labour, malpresentation.

Received: 22 August 2026

Revised: 03 September 2026

Accepted: 26 September 2026

Published: 30 September 2026

INTRODUCTION

Multiple gestation pregnancy is considered a high-risk pregnancy due to increased maternal and perinatal morbidity as compared to singleton pregnancy. The rate of identical (monozygotic) twins is 3 to 4 per 1,000 births worldwide,^[1] but fraternal (dizygotic) twin rates vary in different regions. Dizygotic twinning is affected by maternal age, maternal race, parity, heredity, use of oral contraceptives and use of assisted reproductive techniques.^[2,3] South east Asian countries have very low natural multiple gestation pregnancy rates, often staying below 9 per 1,000 births. Multiple gestation pregnancy rate in North India varies from 1.9% to 2.8% in different studies but accounts for >20% perinatal morbidity.^[4-6] This study was conducted in a tertiary care teaching hospital in the hills of Kumaon, Uttarakhand, situated at an elevation of 1,638 meters (5,374 feet) above sea level. Difficult terrain and frequent natural disasters in the area make the management of high-risk pregnancies even more challenging. There is late booking of pregnant women, difficult transport, irregular ANC visits and a high prevalence of anaemia and thyroid disorders among pregnant women in the Himalayan region.^[7,8] There is limited data from the Himalayan region regarding risk factors and fetomaternal outcomes of twins/triplets. This study will help in early identification of risk factors and better resource planning.

MATERIALS AND METHODS

This is a hospital-based retrospective study done in a tertiary

care hospital in the Himalayan region of Uttarakhand. All multiple gestation pregnant women (twin/ triplet) delivering in the hospital from April 2022 to July 2026 with gestation age >24 weeks were included in the study. Patients with gestation age < 24 weeks and incomplete hospital records were excluded from the study.

Data on epidemiology, maternal complications, and neonatal outcome were collected retrospectively from labour room/OT records, patient files, and NICU records, with long term follow-up via phone calls.

Outcome measures were twin/triplet delivery rate in the hospital, Maternal complications occurring during pregnancy and delivery, Cesarean rate and indication of cesarean in multiple gestation pregnancies. Perinatal outcomes were gestational age at delivery, birth weight, NICU admission, congenital anomalies, perinatal mortality, and twin delivery interval and its relation to the perinatal outcome of the second twin.

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DOI:

10.21276/amit.2026.v13.i3.1084

How to cite this article: Punetha M, Shweta, Sountiyal M. Epidemiology and perinatal outcomes of multiple gestation pregnancies in a tertiary care centre in the Himalayan region of India. *Acta Med Int.* 2026;13(3):427-432.

RESULTS

There were 4716 deliveries from April 2022 to July 2026. Of these, 60 were twin pregnancies, and 1 was a triplet pregnancy. Thus, the multiple-gestation delivery rate in our study was 1.29%. Among 61 twin/triplet deliveries, the mean maternal age was 26.20 ± 5.03 years. Most women were aged 20–29 years. The mean period of gestation (POG) at delivery was 34.97 ± 3.64 weeks. Family history of twins was reported in 12 (19.7%) women. Infertility treatment was reported in 2 (3.3%) cases [Table 1]. Regarding booking status, 26 (42.6%) were booked cases. 14 (23.0%) pregnancies were unbooked, while 21 (34.4%) cases were referred to the study centre.

Among 61 twin pregnancies, 36 (59.0%) were dizygotic, while 25 (41.0%) were monozygotic [Figure 1]. Zygosity was determined clinically. Regarding period of gestation, 25 (41.0%) were term, while a significant 27 (44.3%) were preterm at 32–36 weeks, and 9 (14.8%) were very preterm (<32 weeks) [Figure 2]. This highlights the critical need for neonatal preparedness and resource allocation in managing preterm births.

Vaginal delivery was the most frequent mode of delivery with 52.4% cases. Lower segment caesarean section (LSCS) was performed in 27 cases. In 2 cases first twin was delivered vaginally and LSCS was done for second twin due to malpresentation (Transverse lie) [Table 2].

Among study cases, 29 (47.5%) underwent lower-segment caesarean section (LSCS). The most common indication for LSCS was malpresentation, accounting for 11 (37.9%) cases. Most common malpresentation was breech followed by transverse lie. Foetal distress was indication in 8 (27.6%) cases and previous LSCS in 6 (20.7%) cases. Pre-eclampsia was the indication in 2 (6.9%) cases, while triplet pregnancy and post-dated pregnancy accounted for 1 (3.4%) case each. Overall, the caesarean rate was 47.5% in our study [Figure 3]. Birth weight categories were comparable between Twin 1 and Twin 2. In Twin 1, the most common birth weight category was 2–2.5 kg, with 22 (36.1%) neonates, followed by 1.5–2 kg with 17 (27.9%) neonates. A total of 11 (18.0%) Twin 1 neonates weighed 1–1.5 kg, while 8 (13.1%) weighed >2.5 kg. Birth weight <1 kg was observed in 3 (4.9%) Twin 1 neonates. The difference in categorical distribution was not statistically significant ($p > 0.05$). (Figure 4)

Among the 123 babies in the study, 7 (5.7%) were IUD (intrauterine death), while 116 (94.3%) were live births. Of the live births, 3 were from triplet pregnancy and 113 were from twin pregnancies. Among the 60 live Twin 1 neonates assessed after birth, 30 (50.0%) were healthy (mother side), while 30 were admitted in NICU. Among the 55 live Twin 2 neonates assessed after birth, 24 (43.6%) were healthy (mother side), 31 were admitted in NICU. [Table 3]

We compared birth weight between monozygotic and dizygotic twins using the Mann–Whitney U test. For Twin 1, the mean birth weight was 1.937 ± 0.553 kg among monozygotic twins and 1.931 ± 0.550 kg among dizygotic twins, with a mean difference of 0.006 kg. This difference was not statistically significant ($p = 0.968$). For Twin 2, the mean birth weight was 1.878 ± 0.482 kg in monozygotic

twins compared with 1.826 ± 0.519 kg in dizygotic twins, giving a mean difference of 0.052 kg. This difference was also not statistically significant ($p = 0.688$). Thus, birth weight for both Twin 1 and Twin 2 was comparable between monozygotic and dizygotic twin groups. [Table 4]

Birth weight was compared across the three modes of delivery—vaginal delivery (VD), lower-segment caesarean section (LSCS), and VD + LSCS—using the Kruskal–Wallis test. For Twin 1, the mean birth weight was 1.735 ± 0.538 kg in the VD group, 2.183 ± 0.454 kg in the LSCS group, and 1.835 ± 0.616 kg in the VD + LSCS group. Birth weight differed significantly among the three delivery-mode groups ($p = 0.003$). For Twin 2, the mean birth weight was 1.711 ± 0.490 kg in the VD group, 2.019 ± 0.467 kg in the LSCS group, and 1.845 ± 0.630 kg in the VD + LSCS group. Differences among the three groups were also statistically significant ($p = 0.018$). Overall, the results indicate significant variation in birth weight across the three modes of delivery for both Twin 1 and Twin 2, with the LSCS group showing the highest mean birth weight for both twins. [Table 5]

Among the 38 women with reported maternal complications, preterm labour was the most commonly observed complication, occurring in 23 (60.5%) cases. Postpartum haemorrhage (PPH) was reported in 11 (28.9%) cases. Pre-eclampsia was observed in 3 (7.9%) women, whereas PPH requiring obstetric hysterectomy was documented in 1 (2.6%) case. Overall, preterm labour constituted the most frequent maternal complication, followed by PPH, pre-eclampsia, and PPH requiring obstetric hysterectomy. [Table 6]

Among the 27 neonates with documented perinatal complications, developmental delay was the most frequently reported complication, occurring in 12 (44.4%) neonates. Death was reported in 7 (25.9%) neonates, while IUGR was observed in 5 (18.5%) neonates. Inguinal hernia was documented in 2 (7.4%) cases, and retinopathy of prematurity was observed in 1 (3.7%) neonate. No congenital anomalies were reported in the study population (0.0%). [Table 7]

Among the 61 twin deliveries, the majority had a twin delivery interval of <10 minutes, observed in 39 (63.9%) cases. A delivery interval of 10–30 minutes was recorded in 17 (27.9%) twin deliveries, while 5 (8.2%) cases had an interval of >30 minutes. [Table 8]

The delivery interval between Twin 1 and Twin 2 was assessed according to the outcome of the second twin. Among 50 2nd twins with a healthy outcome, the mean delivery interval was 13.12 ± 30.93 minutes (median 4.5 minutes; range 0–213 minutes). Among the 7 second twins who developed complications (IUD/referred), the mean delivery interval was 20.71 ± 43.90 minutes, with a median of 1.0 minute and a range of 1–119 minutes. Among the 4 second twin deliveries that resulted in death, the mean delivery interval was 38.75 ± 63.65 minutes, with a median of 9.0 minutes and a range of 3–134 minutes. Overall, across all 61 twin deliveries, the mean interval between delivery of the first and second twin was 15.67 ± 34.93 minutes, with a median of 4.0 minutes and a range of 0–213 minutes. The descriptive findings indicate a longer mean delivery interval among second twins who died or developed complications compared with those who had a healthy outcome. [Table 9]

In 12 of 36 preterm pregnancies (33.3%) delayed achievement of

milestones was reported on follow up. No term babies reported developmental delay. Fisher's exact test showed a statistically significant association between preterm status and developmental delay ($p \approx 0.0008$). [Table 10]

Statistical Analysis

We analysed data from 61 twin/triplet pregnancies using appropriate descriptive and inferential statistical methods. Continuous variables, including maternal age, period of gestation (POG), birth weight of Twin 1 and Twin 2, and the interval between delivery of the first and second twin, were summarized using mean $\pm$ standard deviation (SD), with median and range reported where applicable. We summarised categorical variables such as zygosity, POG category, mode of delivery, birth-weight category, NICU admission, neonatal outcome, maternal complications, and perinatal complications using frequencies and percentages. The study population had a mean maternal age of 26.20 ± 5.03 years and a mean POG at delivery of 34.97 ± 3.64 weeks.

To compare birth weight between monozygotic and dizygotic

twins, we used the Mann–Whitney U test. Birth weight did not differ significantly between the two zygosity groups for either Twin 1 ($p = 0.968$) or Twin 2 ($p = 0.688$).

We assessed the distribution of birth-weight categories between Twin 1 and Twin 2 using the McNemar–Bowker test. The difference in categorical birth-weight distribution was not statistically significant ($p > 0.05$).

To compare birth weight across the three delivery-mode groups (VD, LSCS, and VD (1st twin) + LSCS (2nd twin)), we applied the Kruskal–Wallis test. We observed statistically significant differences for both Twin 1 ($p = 0.003$) and Twin 2 ($p = 0.018$). We evaluated categorical associations using the Pearson chi-square test or Fisher's exact test, as appropriate. Neonatal outcomes did not differ significantly between Twin 1 and Twin 2 ($\chi^2 = 4.054$, $df = 3$, $p = 0.256$).

For all statistical tests, we considered $p < 0.05$ statistically significant. The analysis primarily used non-parametric tests for continuous outcomes and chi-square/Fisher's exact tests for categorical variables, based on the distribution and cell frequencies of the available data.

Table 1: Maternal and Pregnancy Characteristics

Variable	N	% / Mean $\pm$ SD
Maternal age (years)	61	26.20 $\pm$ 5.03
Age <20 years	3	4.9%
Age 20–29 years	44	72.1%
Age 30–39 years	13	21.3%
Age ≥ 40 years	1	1.6%
POG at delivery (weeks)		34.97 $\pm$ 3.64
Family history of twins	12	19.7%
Infertility treatment	2	3.3%

Table 2: Distribution based on Mode of Delivery

Mode of delivery	N	%
Vaginal delivery	32	52.45%
LSCS	27	44.26%
VD (1st twin) + LSCS (2nd Twin)	2	3%
Total	61	100%

Table 3: Neonatal outcome

		Twin 1 (IUD=1)	Twin 2 (IUD=6)
Healthy (mother side)		30 (50.0%)	24 (43.6%)
NICU admission	Discharged from NICU (mother side)	26 (43.3%)	26 (47.3%)
	Died in NICU	3 (5.0%)	4 (7.3%)
	Referred from NICU	1 (1.7%)	1 (1.8%)
Total -		60 (100.0%)	55 (100.0%)

Out of 123 babies- 7 were IUD (intrauterine death), n-116 live births. 3 were triplet and 113 were live twin babies

Table 4: Comparison of Birth Weight by Zygosity

Birth Weight	Monozygotic (n=25)	Dizygotic (n=36)	Mean Difference (kg)	P value
Twin 1	1.937 $\pm$ 0.553	1.931 $\pm$ 0.550	0.006	0.968
Twin 2	1.878 $\pm$ 0.482	1.826 $\pm$ 0.519	0.052	0.688

Mann Witney U test for comparison among the two groups.

Table 5: Birth Weight by Mode of Delivery

Parameter	VD (n=34)	LSCS (n=27)	VD (1st twin) + LSCS (2nd twin) (n=2)	P value
Twin 1 birth weight	1.735 $\pm$ 0.538 kg	2.183 $\pm$ 0.454 kg	1.835 $\pm$ 0.616 kg	0.003
Twin 2 birth weight	1.711 $\pm$ 0.490 kg	2.019 $\pm$ 0.467 kg	1.845 $\pm$ 0.630 kg	0.018

Kruskal–Wallis test for comparison among the three delivery-mode groups.

Table 6: Maternal complications (N=38)

	n (38)	%
Preterm labour	23	60.5%
PPH	11	28.9%

PPH requiring obstetric hysterectomy	1	2.6%
Pre-eclampsia	3	7.9%

Table 7: Perinatal complications on follow up

	N (27)	%
Death	7	25.9%
IUGR	5	18.5%
Retinopathy of prematurity	1	3.7%
Inguinal hernia	2	7.4%
Developmental delay	12	44.4%
Congenital anomaly	0	0.0%

Table 8: Twin delivery interval

	N	%
< 10 min	39	63.9%
10-30 min	17	27.9%
>30 min	5	8.2%

Table 9: Twin Delivery Interval and Outcome of the Second Twin

Second-twin outcome	N	Mean $\pm$ SD (min)	Median (min)	Min–Max
Healthy	50	13.12 $\pm$ 30.93	4.5	0–213
Complications (IUD/Refer)	07	20.71 $\pm$ 43.90	1.0	1–119
Died	4	38.75 $\pm$ 63.65	9.0	3–134
Total	61	15.67 $\pm$ 34.93	4.0	0–213

Table 10: Preterm Birth and Recorded Developmental Delay on follow up

POG group	Twin deliveries	Delayed milestones	% with delay
Preterm (<37 wk)	36	12	33.3%
Term ($\geq$ 37 wk)	25	0	0.0%

p < 0.001

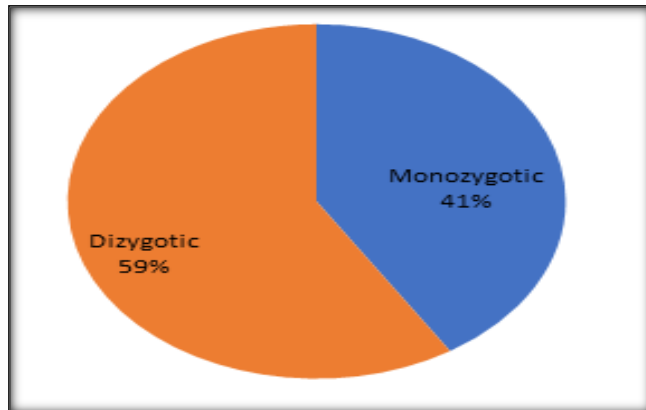


Figure 1: Distribution based on zygosity

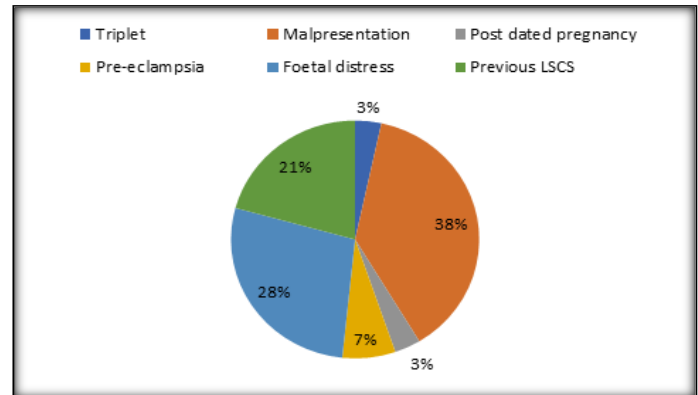


Figure 3: Indication of LS

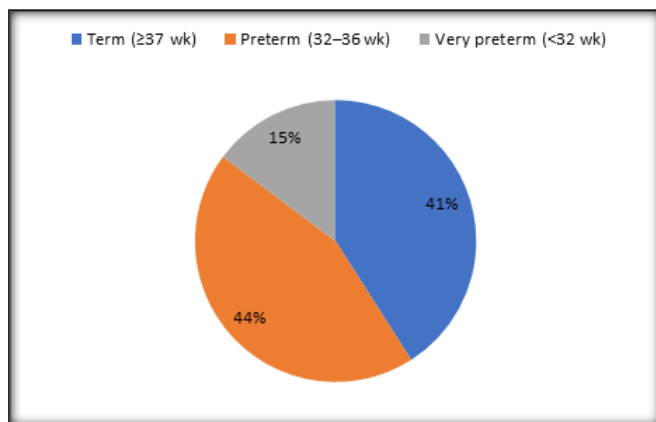


Figure 2: Period of gestation

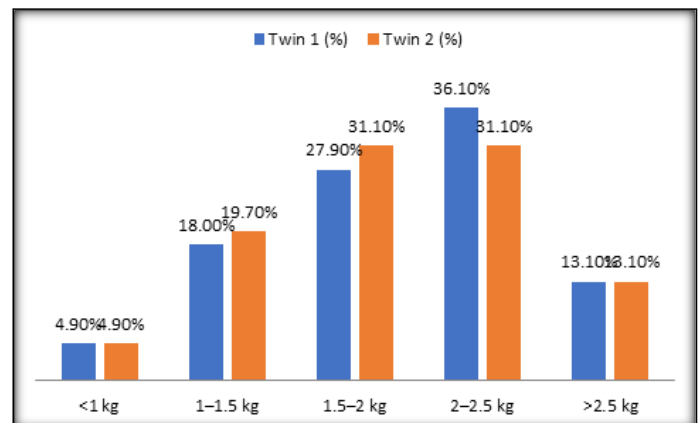


Figure 4: Birth weight distribution

DISCUSSION

In our study, the twin gestation delivery rate was 1.29%, which is considerably lower than in other reported studies.^[4,5]

In our study, history of infertility treatment was reported in only 2 (3.3%) cases, one conceived with ovulation induction and other with IVF. This may also be the reason of low twin delivery rate in our center as infertility treated patient would go to higher center for delivery.

The mean maternal age was 26.20 ± 5.03 years. Most women were aged 20–29 years. This is similar to other previous published studies.^[9,10] In our study 59.0% were dizygotic, while 41.0% were monozygotic twins. Zygosity was determined clinically. Family history of twins was reported in 12 cases (19.7%). The mean gestational age at delivery was 34.97 ± 3.64 , similar to previous studies.^[11]

The cesarean rate was 47.5% in our study, compared with previous studies by Shetty MB et al., Dubey S. et al., and Chowdhury et al., which reported cesarean rates of 68%, 51.9%, and 49%, respectively.^[9,12,13] This may be because our study had only two cases of iatrogenic twinning. Women in this region are highly motivated for vaginal delivery so Cesarean was done for obstetric indications only.

On comparing mean birth weight by mode of delivery, the results indicate significant variation for both Twin 1 and Twin 2, with the LSCS group showing the highest mean birth weight for both twins. This is because spontaneous pre term labor was most common complication, more frequently seen in vaginal delivery group. Mean gestation age in LSCS group was 36.41 ± 1.92 and in vaginal delivery group it was 34.15 ± 3.54 .

Among maternal complications, spontaneous preterm labor was the most commonly observed complication seen in 23 patients. This is comparable to previous studies by Dubey S et al and Nandmer G et al,^[9,14] where the rate of preterm delivery was up to 70%. Other complications were atonic PPH requiring blood transfusion and one case requiring obstetric hysterectomy. Atonic PPH is common in twin/triplet pregnancy due to overdistended uterus and increased instrumentation.^[15] Preeclampsia was noted in 3 cases. Antenatal anemia, hypothyroidism and GDM were not reported in any case. This may be due to small sample size in our study.

Seven babies died in early neonatal period. Developmental delay was reported in 12 pre term babies. None of the term babies reported developmental delay. Hence developmental delay is associated with pre maturity. It is in accordance with previous study by Jain S et al.^[16]

In our study, twin delivery interval of <10 minutes, was observed in majority of cases (63.9%). 8.2% cases had delivery interval of >30 minutes. Longer mean delivery interval was noted among second twins who died or developed complications compared with those who had a healthy outcome. Results are similar to previous studies by Erdemoglu E et al and Stein, W et al.^[17,18]

Limitation of study - study is conducted in resource limited setting so most of monochorionic twins with twin-twin transfusion syndrome or infertility treated patient requiring specialized care were preemptively referred to higher center

during antenatal period. Due to small sample size maternal and perinatal complications were reported in few cases only.

CONCLUSION

Multiple gestation pregnancies are high risk pregnancies with frequent maternal and perinatal complications. Management of such cases become more difficult in resource limited and geographically difficult areas. Early identification of high-risk factors and timely referral to an equipped centre are essential for better maternal and foetal outcomes.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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