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A comparative study on maternal and perinatal outcomes in women delivering within expected date of delivery versus beyond expected date of delivery at a tertiary care hospital

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Abstract

Pregnancy extending beyond the expected date of delivery (EDD) is associated with increased maternal and perinatal morbidity. Postdated pregnancies pose challenges due to placental senescence, reduced amniotic fluid, and increased fetal compromise. This study aimed to compare maternal and perinatal outcomes in women delivering on or before EDD with those delivering beyond EDD.

Methods: This prospective observational comparative study was conducted over six months in the Department of Obstetrics and Gynaecology at Navodaya Medical College Hospital and Research Centre, Raichur. A total of 100 singleton term pregnancies were included and divided into two groups: Group A (≤ EDD, n=50) and Group B (> EDD, n=50). Maternal outcomes, mode of delivery, and perinatal outcomes were analyzed.

Results: Induction of labor was significantly higher in Group B (60%) compared to Group A (30%). Cesarean section rates were higher among postdated pregnancies (40% vs. 20%). Meconium-stained amniotic fluid, low APGAR scores, NICU admissions, and neonatal morbidity were more frequent in Group B. One stillbirth was reported in the postdated group.

Conclusion: Postdated pregnancies are associated with increased maternal and perinatal complications. Accurate gestational dating, vigilant fetal surveillance, and timely induction of labor are essential to improve outcomes.

Keywords: Expected date of delivery, Induction of labor, Maternal and Perinatal outcome, Postdated pregnancy

Introduction

Pregnancy is a physiological process that ideally culminates in spontaneous labor and delivery at term. According to the American College of Obstetricians and Gynecologists (ACOG), term pregnancy is defined as delivery occurring between 37 completed weeks and 42 completed weeks of gestation. Gestational age beyond this period is associated with increasing maternal and perinatal risks, making accurate dating and timely obstetric intervention crucial for optimal outcomes.[1]

Postdated pregnancy is defined as a pregnancy that extends beyond the expected date of delivery (EDD), i.e., beyond 40 completed weeks of gestation, while post-term pregnancy refers to gestation reaching or exceeding 42 completed weeks (≥294 days from the first day of the last menstrual period).[2] Prolongation of pregnancy beyond the EDD is a common obstetric problem and remains a significant contributor to maternal and perinatal morbidity and mortality, especially in developing countries.[3]

The adverse outcomes associated with postdated pregnancy are primarily attributed to progressive placental senescence. With advancing gestational age, placental function gradually declines, leading to reduced uteroplacental perfusion, diminished oxygen and nutrient transfer, and decreased amniotic fluid volume. Oligohydramnios, a frequent finding in prolonged pregnancies, increases the risk of umbilical cord compression, fetal hypoxia, and intrapartum fetal distress.[4]

Maternal complications associated with postdated pregnancy include increased rates of induction of labor, failed induction, prolonged labor, operative vaginal delivery, and cesarean section. Additional maternal risks include postpartum hemorrhage, perineal trauma, and increased psychological stress due to prolonged anticipation of labor. The likelihood of cesarean delivery increases significantly after 40 weeks, largely due to labor dystocia and fetal compromise.[2]

Perinatal complications are more pronounced and clinically significant in postdated pregnancies. These include meconium-stained amniotic fluid, meconium aspiration syndrome, low APGAR scores, birth asphyxia, neonatal seizures, NICU admissions, and increased perinatal mortality. In severe cases, prolonged gestation is associated with post maturity syndrome characterized by loss of subcutaneous fat, dry and peeling skin, and growth restriction due to chronic placental insufficiency.[5,6]

Several factors have been implicated in the etiology of postdated pregnancy. These include inaccurate dating due to uncertain last menstrual period, lack of early first-trimester ultrasonography, primigravidity, maternal obesity, genetic predisposition, male fetal sex, and rare endocrinological causes such as placental sulfatase deficiency. The errors in gestational age assessment remain the most common cause of apparent postdated pregnancy.[3,6]

In India, the incidence of postdated pregnancy remains relatively high due to inconsistent antenatal care utilization, delayed booking, and limited access to early dating scans, particularly in rural and semi-urban populations. This often results in delayed diagnosis and intervention, increasing the risk of adverse outcomes. Accurate assessment of gestational age using first-trimester ultrasonography, along with vigilant fetal surveillance beyond 40 weeks, is therefore essential in reducing fetomaternal complications.

Given the significant clinical implications of prolonged pregnancy and the ongoing debate regarding optimal timing of intervention, this study was undertaken to compare maternal and perinatal outcomes in women delivering on or before the expected date of delivery with those delivering beyond the expected date of delivery at a tertiary care hospital.

Aims and Objectives

Primary Objective

To compare maternal and perinatal outcomes in women delivering on or before the expected date of delivery with those delivering beyond the expected date of delivery.

Secondary Objectives

1. To assess the mode of delivery in both groups

2. To evaluate neonatal morbidity and NICU admissions
3. To identify common maternal complications associated with postdated pregnancy

Materials and Methods

Study Design and Setting

This was a prospective observational comparative study conducted in the Department of Obstetrics and Gynaecology, Navodaya Medical College Hospital and Research Centre, Raichur, Karnataka.

Study Period: Six months.

Study Population and Sample Size

A total of 100 pregnant women were enrolled and divided into two groups:

Group A: Women delivering on or before EDD (n=50)

Group B: Women delivering beyond EDD (n=50)

Inclusion Criteria

Singleton pregnancy, Cephalic presentation, known last menstrual period with regular cycles, dating ultrasound available, Willingness to participate in the study

Exclusion Criteria

Previous cesarean section, Multiple pregnancy, Moderate to severe anemia, Gestational hypertension, Gestational diabetes mellitus, Malpresentation, Antepartum hemorrhage, Fetal anomalies

Data Collection and Analysis

Maternal demographic data, gestational age, onset of labor, mode of delivery, maternal complications, neonatal outcomes, NICU admissions, association of Bishops score with Maternal charecteristics and perinatal outcome were recorded and analyzed.

Statistical analysis

Data were analysed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD) or median (interquartile range, IQR) as appropriate, and compared between groups using the independent-samples t-test or Mann–Whitney U test. Categorical variables were compared using the Chi-square test or Fisher's exact test. Receiver operating characteristic (ROC) curve analysis was used to assess the diagnostic performance of the CRP/Albumin ratio; area under the curve (AUC) with 95% confidence intervals was calculated, and the optimal cut-off point was determined using the Youden index. A p-value <0.05 was considered statistically significant.

Ethical considerations

Ethical clearance for the study was obtained from the Institutional Ethics Committee of Navodaya Medical College Hospital & Research Centre, Raichu. Written informed consent was obtained from all participants prior to enrolment.

Results

A total of 100 pregnant women were enrolled in the study, with 50 in Group A (≤ EDD) and 50 in Group B (> EDD). The results are presented under demographic characteristics, maternal outcomes, perinatal outcomes, and complications.

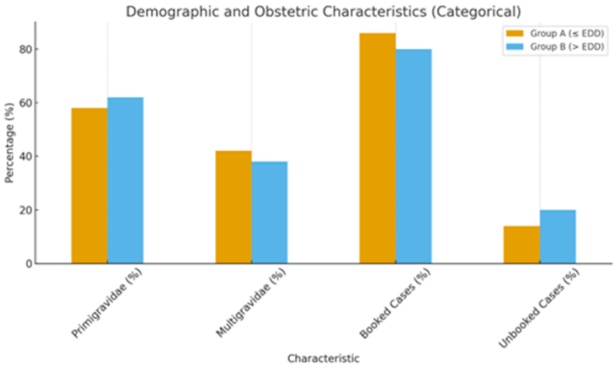
Demographic and Obstetric Characteristics

Table 1: Demographic and Obstetric Characteristics of Study Participants

Characteristic	Group A (</=EDD)(n=50)	Group B (>EDD) (n=50)	P value
Maternal age (years,Mean+/-SD)	25.6+/-3.4	26.2+/-3.9	0.38
Primigravidae(%)	29(58%)	31(62%)	0.68
Multigravidae(%)	21(4%)	19(38%)	0.72
Booked cases(%)	43(86%)	40(80%)	0.45
Unbooked cases(%)	7(14%)	10(20%)	0.45

The demographic details and obstetric history of the study participants are shown in Table 1. The mean maternal age was 25.6 ± 3.4 years in Group A and 26.2 ±

3.9 years in Group B, with no statistically significant difference (p = 0.38). Primigravidae constituted the majority of participants in both groups (58% in Group A vs. 62% in Group B, p = 0.68). A greater proportion of women were booked cases, with 86% in Group A and 80% in Group B (p = 0.45).



Gestational Age and Onset of Labor

Table 2: Gestational Age and Onset of Labor

Variable	Group A (</=EDD) (n=50)	Group B (>EDD) (n=50)	P-value
Gestational age(weeks,Mean +/-SD)	39.3+/-0.4	41.2+/-0.6	<0.001
Spontaneous Labour(%)	35(70%)	20(40%)	0.002
Induction of Labour(%)	15(30%)	30(60%)	0.003

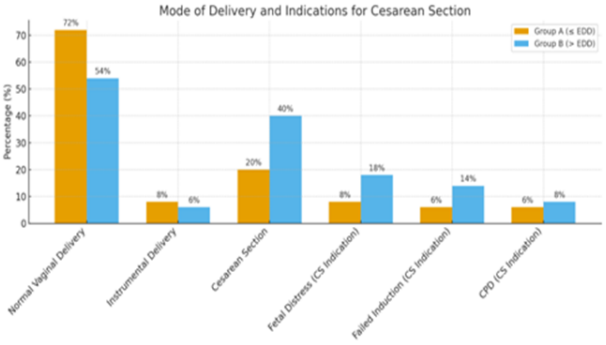
The mean gestational age at delivery was significantly higher in Group B (41.2 ± 0.6 weeks) compared to Group A (39.3 ± 0.4 weeks, p < 0.001). Spontaneous onset of labor occurred more frequently in Group A (70%) compared to Group B (40%, p = 0.002). Conversely, the requirement for induction of labor was significantly higher among women delivering beyond EDD (60%) compared to those delivering on or before EDD (30%, p = 0.003). These findings are summarized in Table 2.

Mode of Delivery and Indications for Cesarean Section

Table 3: Mode of Delivery and Indications for Cesarean Section

Mode of Delivery	Group A (≤ EDD) (n=50)	Group B (> EDD) (n=50)	p-value
Normal Vaginal Delivery (%)	36 (72%)	27 (54%)	0.07
Instrumental Delivery (%)	4 (8%)	3 (6%)	0.69
Cesarean Section (%)	10 (20%)	20 (40%)	0.02
Indication: Fetal Distress (%)	4 (8%)	9 (18%)	0.12
Indication: Failed Induction (%)	3 (6%)	7 (14%)	0.18
Indication: CPD (%)	3 (6%)	4 (8%)	0.69

The distribution of delivery modes and indications for cesarean section are shown in Table 3. Normal vaginal delivery was more frequent in Group A (72%) compared to Group B (54%), although the difference was not statistically significant (p = 0.07). Cesarean section rates were significantly higher in Group B (40%) compared to Group A (20%, p = 0.02). Fetal distress and failed induction were the primary indications for cesarean delivery, both of which were more common in Group B.

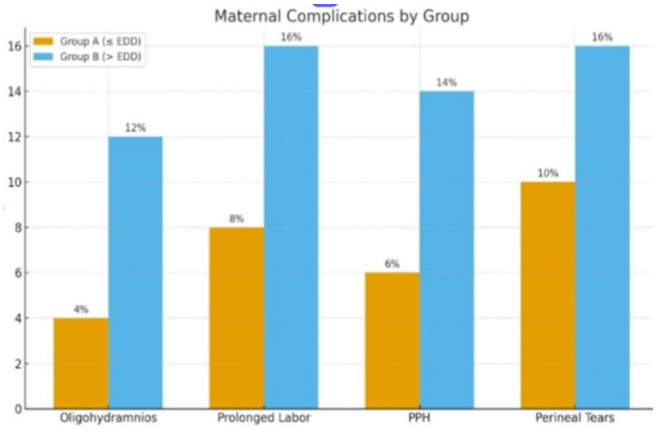


Maternal Outcomes and Complications

Table 4: Maternal Outcomes and Complications

Maternal complications	Group A(</=EDD) (n=50)	Group B(>EDD) (n=50)	P value
Oligohydramnios	2 (4%)	6 (12%)	0.14
Prolonged labour	4 (8%)	8 (16%)	0.21
PPH	3 (6%)	7 (14%)	0.18
Perineal Tears	5 (10%)	8 (16%)	0.38

Maternal outcomes, including complications, are presented in Table 4. Oligohydramnios was more common in postdated pregnancies (12% vs. 4%), though this was not statistically significant (p = 0.14). The incidence of postpartum hemorrhage (PPH) and perineal tears was higher in Group B (14% and 16%, respectively) compared to Group A (6% and 10%, respectively). Prolonged labor was observed in 16% of women in Group B versus 8% in Group A.

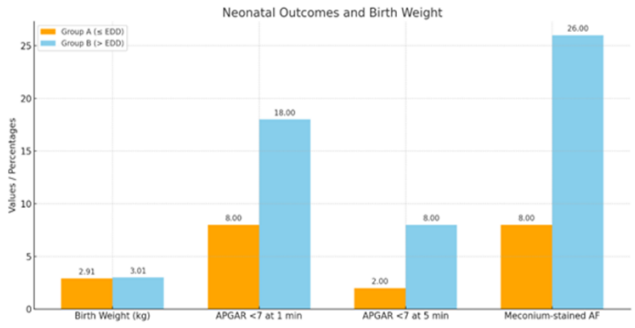


Neonatal Outcomes and Birth Weight

Table 5: Neonatal Outcomes and Birth Weight

Neonatal Outcome	Group A(</=EDD) (n=50)	Group B (>EDD) (n=50)	P value
Birth weight(kg,mean+/-SD)	2.91+/- 0.324	3.01+/- 0.35	0.12
APGAR <7 at 1 min (%)	4 (8%)	9 (18%)	0.14
APGAR <7 at 5 min (%)	1 (2%)	4 (8%)	0.18
Meconium stained AF (%)	4 (8%)	13 (26%)	0.02

As shown in Table 5, the mean neonatal birth weight was slightly higher in Group B (3.01 ± 0.35 kg) compared to Group A (2.91 ± 0.32 kg), although this difference was not statistically significant (p = 0.12). Low APGAR scores (<7 at 1 minute) were more frequent in Group B (18% vs. 8%), indicating increased fetal compromise in postdated deliveries. The incidence of meconium-stained amniotic fluid (MSAF) was significantly higher in Group B (26% vs. 8%, p = 0.02).

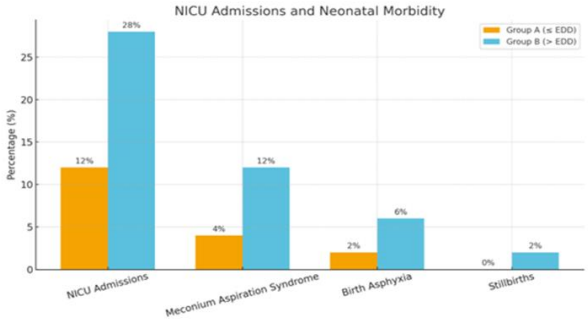


NICU Admissions and Neonatal Morbidity

Table 6: NICU Admissions and Neonatal Morbidity

Neonatal Morbidity	Group A (</=EDD) (n=50)	Group B (>EDD) (n=50)	P value
NICU Admissions (%)	6 (12%)	14 (28%)	0.04
Meconium aspiration syndrome (%)	2 (4%)	6 (12%)	0.15
Birth Asphyxia (%)	1 (2%)	3 (6%)	0.31
Still births (%)	0	1 (2%)	0.31

The frequency of NICU admissions and neonatal complications is summarized in Table 6. NICU admissions were significantly higher in Group B (28% vs. 12%, p = 0.04). Meconium aspiration syndrome (MAS) was also more frequent among postdated neonates (12% vs. 4%). Birth asphyxia was observed in 6% of Group B compared to 2% in Group A. One stillbirth was reported in Group B, whereas there were none in Group A.

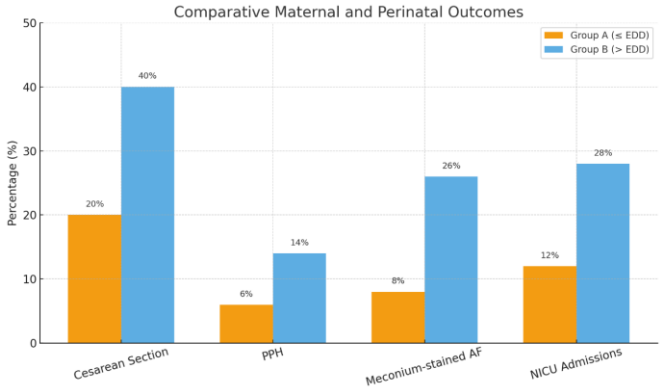


Comparative Analysis of Outcomes

Table 7: Comparative Maternal and Perinatal Outcomes

Outcome	Group A (≤ EDD) (n=50)	Group B (> EDD) (n=50)	p-value
Cesarean Section (%)	10 (20%)	20 (40%)	0.02
PPH (%)	3 (6%)	7 (14%)	0.18
Meconium-stained AF (%)	4 (8%)	13 (26%)	0.02
NICU Admissions (%)	6 (12%)	14 (28%)	0.04

A summary of key maternal and perinatal outcomes comparing both groups is shown in Table 7. There was a statistically significant increase in cesarean section rates (40% vs. 20%, p = 0.02), meconium-stained amniotic fluid (26% vs. 8%, p = 0.02), and NICU admissions (28% vs. 12%, p = 0.04) in Group B. Although PPH was more frequent in Group B (14% vs. 6%), this difference was not statistically significant (p = 0.18).



Association of Bishop Score with Maternal Characteristics and Fetal Outcomes

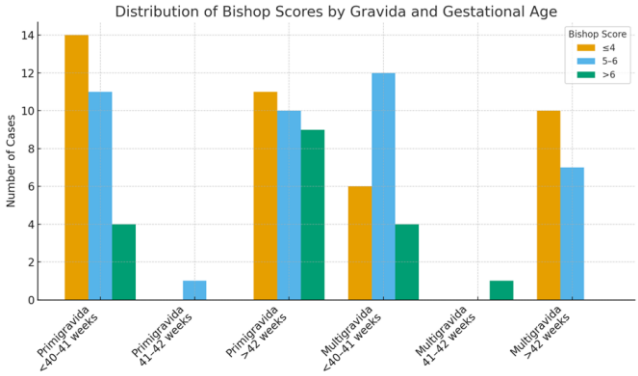
Table 8: Distribution of Bishop Scores by Gravida and Gestational Age

Gravida	Gestational Age	≤4	5–6	>6
Primigravida	<40–41 weeks	14	11	4
	41–42 weeks	0	1	0
	>42 weeks	11	10	9
Multigravida	<40–41 weeks	6	12	4
	41–42 weeks	0	0	1
	>42 weeks	10	7	0

Table 8 demonstrates the distribution of Bishop Scores categorized as ≤4, 5–6, and >6 across different gravidity statuses and gestational age ranges. Among primigravidae, the highest proportion of unfavorable Bishop Scores (≤4) was observed in the 40–41 weeks and >42 weeks categories, with 14 and 11 cases respectively. Conversely, Bishop Scores >6 were relatively uncommon in primigravidae, indicating lower cervical favorability in this group, especially in late gestation.

Among multigravidae, favorable Bishop Scores (>6) were predominantly seen in the 40–41-week range, suggesting better cervical readiness for labor in this group compared to primigravidae. Interestingly, in the >42 weeks subgroup of multigravidae, no cases had a Bishop Score >6, indicating that post-dated pregnancies,

regardless of parity, are associated with reduced cervical favorability



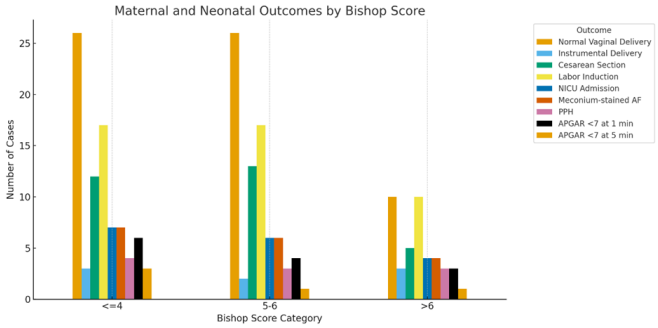
Comparison of Maternal and Neonatal Outcomes Based on Bishop Score.

Table 9: Maternal and Neonatal Outcomes According to Bishop Score Category

Maternal and Fetal Outcomes	≤4	5–6	>6
Gestational Age (weeks) (mean ± SD)	41.1 (1.9)	41.0 (1.9)	40.7 (1.9)
Spontaneous Onset of Labor	24	24	8
Induced Onset of Labor	17	17	10
Normal Vaginal Delivery	26	26	10
Cesarean Delivery	12	13	5
Instrumental Delivery	3	2	3
APGAR Score <7 at 1 min	6	4	3
APGAR Score <7 at 5 min	3	1	1
Meconium-stained Amniotic Fluid	7	6	4
NICU Admission	7	6	4
Postpartum Hemorrhage (PPH)	4	3	3
Prolonged Labor	3	6	3
Oligohydramnios	3	3	2

Table 9 summarizes the comparative maternal and fetal outcomes based on the Bishop Score categories. It was observed that women with lower Bishop Scores (≤4) had a slightly higher mean gestational age (41.1 ± 1.9 weeks), increased rates of labor induction, and a higher incidence of cesarean deliveries (12 cases) compared to those with scores >6 (5 cases). Normal vaginal deliveries were more frequent among those with higher Bishop Scores, highlighting the role of cervical favorability in predicting the mode of delivery.

Fetal outcomes such as low APGAR scores (<7 at 1 and 5 minutes), NICU admissions, and meconium-stained amniotic fluid were more frequent in the ≤4 and 5–6 Bishop Score groups. This suggests that a lower Bishop Score may correlate with a higher risk of adverse neonatal outcomes. Similarly, maternal complications such as postpartum hemorrhage, prolonged labor, and oligohydramnios were more prevalent in those with lower Bishop Scores.



Discussion

Postdated pregnancy continues to be a common obstetric problem and is associated with increased maternal and perinatal morbidity. The present study compared maternal and perinatal outcomes in women delivering on or before the expected date of delivery (≤ EDD) with those delivering beyond the expected date of delivery (> EDD) and demonstrated significantly adverse outcomes in the postdated group.

Maternal demographic and obstetric characteristics

In the present study, the mean maternal age was comparable between the two groups, and the majority of women in both groups were primigravidae. Similar

observations have been reported in studies by Patel and Rathod and Pipaliya et al., where postdated pregnancies were more frequently observed among primigravidae, possibly due to delayed onset of spontaneous labor and prolonged latent phase.[7,8] The proportion of booked cases was slightly lower in the postdated group, though this difference was not statistically significant.

Gestational age and onset of labor

The mean gestational age at delivery was significantly higher in women delivering beyond EDD. Spontaneous onset of labor was significantly more common in the ≤ EDD group, whereas induction of labor was significantly higher in the postdated group. These findings are consistent with studies by Caughey et al. and Olesen et al., who reported a progressive increase in induction rates with advancing gestational age.[3,4]

Mode of delivery

The rate of normal vaginal delivery was higher in the ≤ EDD group, while cesarean section rates were significantly increased in postdated pregnancies. Fetal distress and failed induction were the most common indications for cesarean delivery in the postdated group. Similar trends have been observed by Yasmin and Pipaliya et al., who reported increased cesarean section rates beyond 40 weeks of gestation.[8,9] Williams Obstetrics also emphasizes the increased likelihood of cesarean delivery in prolonged pregnancies due to labor dystocia and fetal intolerance.[1,2]

Maternal complications

Maternal complications such as prolonged labor, postpartum hemorrhage, and perineal trauma were more frequently observed in the postdated group. Although these differences were not statistically significant, similar findings have been reported by Patel and Rathod and Olesen et al., indicating increased maternal morbidity with advancing gestational age.[3,9]

Neonatal outcomes

Neonatal birth weight was slightly higher in the postdated group, reflecting continued fetal growth beyond term. However, postdated pregnancies were associated with a significantly higher incidence of low APGAR scores at 1 minute and meconium-stained amniotic fluid. These findings are consistent with studies by Daisy et al. and Marahatta et al., who reported increased fetal compromise in postdated deliveries.[10,11]

NICU admissions and perinatal morbidity

NICU admissions were significantly higher in the postdated group, with increased incidence of meconium aspiration syndrome and birth asphyxia. One stillbirth was observed in the postdated group. Divon et al. patel et al, pipaliya et al reported a two- to threefold increased risk of perinatal mortality in postterm pregnancies, emphasizing the importance of timely intervention.[5,8,7]

Maternal and perinatal outcome according to BISHOP score

In addition to comparing maternal and perinatal outcomes between ≤EDD and >EDD groups, our study also analyzed the predictive value of the Bishop score at admission. Cesarean delivery was more common in women with low Bishop scores (≤4: 32.4%) compared to those with favorable scores (>6: 16.1%). This finding supports the established understanding that a low Bishop score is associated with an unripe cervix and increased likelihood of failed induction or labor arrest. Our results align with studies by Vrouenraets et al. and Calder et al., which emphasized the Bishop score's predictive value for successful vaginal delivery

Regarding perinatal outcomes, low Bishop scores were associated with higher rates of meconium-stained amniotic fluid (MSAF), NICU admissions, and low Apgar scores. For instance, NICU admission occurred in 13.7% of cases with Bishop ≤4, compared to only 9.6%

in the Bishop >6 group. Similarly, MSAF was observed in 13.7% of Bishop ≤4 cases vs. 12.9% in Bishop >6.[12,13]

Conclusion

The present study demonstrates that pregnancies extending beyond the expected date of delivery are associated with increased maternal and perinatal morbidity when compared to pregnancies delivering on or before the expected date of delivery. Postdated pregnancies showed a significantly higher requirement for induction of labor, increased rates of cesarean section, and a greater incidence of intrapartum complications such as fetal distress and failed induction.

Perinatal outcomes were notably poorer in women delivering beyond the expected date of delivery, with higher incidences of meconium-stained amniotic fluid, low APGAR scores, NICU admissions, and neonatal morbidity. Although neonatal birth weight was slightly higher in postdated pregnancies, this did not translate into improved neonatal outcomes and was associated with increased perinatal compromise.

These findings emphasize the importance of accurate gestational age assessment, preferably through early ultrasonography, vigilant fetal surveillance beyond 40 weeks of gestation, and timely induction of labor to minimize adverse maternal and neonatal outcomes. Implementation of standardized protocols for the management of postdated pregnancies can significantly contribute to improved fetomaternal outcomes, particularly in resource-limited settings.

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