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**Original Article**

# EFFECTS OF PRENATAL DEXAMETHASONE ON TERM INFANTS IN CASES OF MATERNAL ANTEPARTUM HEMORRHAGE: A CROSS-SECTIONAL STUDY

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## Abstract

### Background

In the past 25 years, the use of prenatal corticosteroids in pregnant women who are about to give birth, typically between 24 and 34 weeks of gestation, has been one of the most important advancements in perinatal medicine.

### Objectives

In this investigation, the effects of maternal antepartum hemorrhage (APH) on the results of term children who were exposed to dexamethasone during pregnancy and those who were not.

### Materials and Methods

The study was a retrospective study that was carried out at Hi-Tech Medical College, Bhubaneswar, Odisha, India. Information about 800 patients was extracted. Records pertaining to female patients suffering from APH who gave birth to a single child at 37 weeks or more. Exclusion criteria included those with premature rupture of the membranes or those who did not receive a full course of dexamethasone.

### Results

The study included 800 pregnant women, 40 receiving antenatal dexamethasone and 760 not. The dexamethasone group had a lower mean maternal age (31.5±4.3 vs. 34.2±4.2 years; $p<0.001$) and higher rates of gestational diabetes (25% vs. 10.2%; $p<0.001$) and asthma (7.5% vs. 1.57%; $p<0.05$). APH, primarily due to placenta previa, was more common (20% vs. 5.2%). Dexamethasone exposure was linked to lower birth weight, Apgar scores, and gestational age at delivery ($p<0.05$).

### Conclusion

The study concluded that while antenatal dexamethasone for APH was linked to a higher rate of surgical vaginal delivery, an earlier delivery, and a lower neonatal birthweight, it was not linked to SGA newborns, NICU admission, or a low Apgar score.

### Recommendation

Antenatal dexamethasone use should be carefully considered, balancing neonatal benefits against risks like lower birth weight and early delivery, particularly in pregnancies complicated by APH.

***Keywords:*** *Dexamethasone, Antenatal, Maternal, Antepartum Hemorrhage (APH), Antepartum hemorrhage.*
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## Introduction

In the past 25 years, the use of prenatal corticosteroids in pregnant women who are about to give birth, typically between 24 and 34 weeks of gestation, has been one of the most important advancements in perinatal medicine [1, 2]. Pregnant women who get antenatal corticosteroids within seven days of a premature delivery can lower their risk of fetal prematurity, which includes breathing difficulties, intraventricular hemorrhage (IVH), necrotizing enterocolitis, and even neonatal mortality [3, 4].

In addition to lowering the risk of respiratory distress syndrome and IVH, a single course of prenatal steroids has been linked to a decrease in immediate newborn systemic morbidity and death following preterm birth [2, 5].

Preterm delivery is linked to antepartum hemorrhage (APH); despite placenta abruption or significant bleeding linked to placenta praevia, an unexplained APH increases the chance of premature delivery by three times [6].

Additionally, APH could be a precursor to preterm labor. Even if lower genital tract bleeding is the most likely source of spotting, patients may think about taking prenatal corticosteroids, but it's uncertain what the best course of action is and how corticosteroids affect term babies [7, 8]. Pregnancy-related betamethasone exposure is associated with a higher risk of neonatal intensive care

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unit (NICU) admission and small-for-gestational-age (SGA) newborns [9].

In this investigation, the effects of maternal antepartum hemorrhage (APH) on the results of term children who were exposed to dexamethasone during pregnancy and those who were not.

## Methodology

### Study Design

This cross-sectional study was conducted retrospectively at Hi-Tech Medical College, Bhubaneswar, Odisha, India, which is a private medical institution offering undergraduate and postgraduate medical education, research, and healthcare services.

### Study Population

Information about 800 patients was extracted from the documents. Records about female patients suffering from APH who gave birth to a single child at 37 weeks or more. Exclusion criteria included those with premature rupture of the membranes or those who did not receive a full course of dexamethasone.

### Data Collection

Age at delivery, birth method, and prenatal problems (such as APH, GDM, and hypertension) were among the maternal characteristics gathered. Gestational age at birth, birth weight, and Apgar score at 5 minutes were among the neonatal characteristics gathered.

### Study Procedure

Ultrasonography, speculum examination, physical examination, and history collection were the foundations for the diagnosis and treatment of APH. Patients who experienced extensive vaginal hemorrhage showed signs of fetal impairment, or were pregnant at term were evaluated for delivery. Women who experienced significant vaginal bleeding between 24+0- and 33+6-weeks gestation were treated with antenatal corticosteroids. The attending obstetrician determined the dexamethasone regimen, which included two intramuscular doses of dexamethasone 12 mg every 12 hours or three intramuscular doses of dexamethasone 8 mg every 8 hours. The second course of dexamethasone was administered by qualified obstetricians only to women who had a recurrent risk of preterm birth within 7 days of 33 weeks of gestation, with a gap of more than 14 days after the previous round.

### Statistical Analysis

SPSS version 24 was used for statistical analysis. The data were displayed as either n (%) or mean±SD. Chi-squared and t tests were used to compare the dexamethasone and control groups. A P-value was considered significant if it was less than 0.05.

### Ethical Considerations

The study was approved by the Institutional Ethics Committee of Hi-Tech Medical College, Bhubaneswar, Odisha, India. Ethical clearance was granted on [Approval Date] under ethical clearance number [Ethical Clearance Number].

## Results

The study included a total of 800 pregnant women, with 40 receiving antenatal dexamethasone and 760 not receiving it. The mean maternal age was significantly lower in the dexamethasone group (31.5±4.3 years) compared to the non-dexamethasone group (34.2±4.2 years; $p<0.001$). Women who received antenatal dexamethasone had higher insulin use for GDM (15% vs. 5.3%, $p<0.05$) and antibiotic use (20% vs. 11.2%, $p<0.05$). Antihypertensive use was slightly higher in the dexamethasone group (5% vs. 2.3%, $p=0.12$), though not statistically significant. Smoking (7.5% vs. 5.9%, $p=0.63$) and alcohol use (5% vs. 3.9%, $p=0.74$) were similar between the groups. These findings suggest that medication use, particularly for GDM management, was more common among women who received dexamethasone (Table 1).

**Table 1. Socio-demographic Characteristics of Patient Cohort**

| Characteristics | With Antenatal Dexamethasone (n=40) | Without Antenatal Dexamethasone (n=760) | p-value |
|---|---|---|---|
| **Maternal age (years)** | 31.5 ± 4.3 | 34.2 ± 4.2 | <0.001 |
| **Use of Other Medications** | | | |
| - Antihypertensives | 2 (5%) | 18 (2.3%) | 0.12 |
| - Insulin for GDM | 6 (15%) | 40 (5.3%) | <0.05 |
| - Antibiotics | 8 (20%) | 85 (11.2%) | <0.05 |
| **Smoking During Pregnancy** | 3 (7.5%) | 45 (5.9%) | 0.63 |
| **Alcohol Use During Pregnancy** | 2 (5%) | 30 (3.9%) | 0.74 |

Among maternal conditions, gestational diabetes mellitus was more prevalent in the dexamethasone group (25%) compared to the non-dexamethasone group (10.2%; $p<0.001$). Maternal asthma was also higher in the dexamethasone group (7.5% vs. 1.57%; $p<0.05$). The primary cause of antepartum hemorrhage was placenta

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previa, occurring in 20% of women in the dexamethasone group compared to 5.2% in the non-dexamethasone group.

For fetal outcomes, infants exposed to dexamethasone had a significantly lower birth weight (3001.4±353.2 g vs. 3149.6±351.9 g; $p<0.05$) and lower Apgar scores at 5 minutes (7.44±0.45 vs. 8.12±0.24; $p<0.001$). Gestational age at delivery was also lower in the dexamethasone group (38.2±0.97 weeks vs. 39.2±0.97 weeks; $p<0.001$) (Table 2).



**Table 2. Characteristics of maternal and fetal clinical characteristics, along with the outcomes of antenatal dexamethasone:**

| Characteristics | With antenatal dexamethasone (n=40) | Without antenatal dexamethasone (n=760) | p-value |
|---|---|---|---|
| **Gestational Diabetes Mellitus** | 10 (25%) | 78 (10.2%) | **<0.001** |
| **Hypertensive Disorder** | 00 (0%) | 00 (0%) | NA |
| **Maternal Asthma** | 03 (7.5%) | 12 (1.57%) | **<0.05** |
| **Mode of Delivery** | | | |
| **Normal Vaginal Delivery** | 20 (50%) | 500 (65.7%) | 0.11 |
| **Operative Vaginal Delivery** | 06 (15%) | 70 (9.21%) | |
| **Caesarean** | 14 (35%) | 190 (25%) | |
| **Cause of antepartum hemmorhage** | | | |
| **Unknown Origin** | 32 (80%) | 700 (92.1%) | **<0.001** |
| **Placenta praevia** | 08 (20%) | 40 (5.2%) | |
| **Others** | 00 (0%) | 20 (2.6%) | |
| **Fetal characteristics** | | | |
| **Gestational weeks at delivery** | 38.2±0.97 | 39.2±0.97 | **<0.001** |
| **Birthweight in grams** | 3001.4±353.2 | 3149.6±351.9 | **<0.05** |
| **Apgar score at 5 min** | 7.44±0.45 | 8.12±0.24 | **<0.001** |
| **Indications for caesarean section** | | | |
| **Placenta praevia** | 05 (12.5%) | 75 (9.86%) | **<0.05** |
| **Previous uterine scar** | 04 (10%) | 16 (2.1%) | |
| **Failed induction** | 03 (7.5%) | 89 (11.7%) | |
| **Cephalopelvic disproportion** | 01 (2.5%) | 09 (1.18%) | |
| **Other** | 01 (2.5%) | 78 (10.2%) | |
| **Operative vaginal delivery** | 07 (17.5%) | 92 (12.1%) | 0.15 |

***Data was presented as either mean±SD or n (%)***

## Discussion

The study aimed to assess the impact of antenatal dexamethasone on maternal and fetal outcomes. Women who received dexamethasone were younger and had higher rates of gestational diabetes mellitus (GDM) and maternal asthma. Medication use, particularly insulin for GDM and antibiotics, was more common in this group. Fetal outcomes showed significantly lower birth weight, lower Apgar scores, and earlier gestational age at delivery in the dexamethasone group. Additionally, placenta previa was a more frequent cause of antepartum hemorrhage in the dexamethasone group. These findings highlight potential associations between antenatal dexamethasone use and adverse perinatal outcomes.

The findings of this study indicate that antenatal corticosteroid administration for antepartum hemorrhage (APH) was not associated with an increased risk of low Apgar scores, NICU admissions, or small-for-gestational-age (SGA) infants. However, prior research has suggested that exposure to antenatal betamethasone may elevate the likelihood of NICU hospitalization and SGA status in term infants [9]. This discrepancy may be attributed to differences in patient selection criteria, as the present study only included individuals who experienced clinically significant APH and received prenatal dexamethasone. Another study similarly reported no significant increase in neonatal morbidities following in-utero corticosteroid exposure [10].

Neonatal birth weight was significantly lower in the dexamethasone group, a finding that aligns with previous reports linking prenatal corticosteroid exposure to reduced fetal growth [11]. In the present study, this reduction in birth weight was associated with earlier gestational age at delivery, though the clinical significance of a one-week difference at term remains uncertain. Additionally, women who received prenatal dexamethasone demonstrated an increased likelihood of undergoing operative vaginal delivery, a finding warranting further investigation to determine potential underlying mechanisms.

For patients with a history of APH, the observed inverse relationships between gestational age, SGA prevalence, and Caesarean section rates suggest that an expectant approach at term may be beneficial unless there are clear indicators of fetal compromise, such as abnormal cardiotocography or sonographic evidence of fetal growth restriction. Prior studies have also linked a higher rate of Caesarean deliveries to the presence of gestational diabetes mellitus (GDM) [12]. The actual prevalence of GDM in both study groups might be underestimated, as routine post-dexamethasone oral glucose tolerance testing was not consistently performed.

While the benefits of antenatal corticosteroids for preterm neonates are well-documented, their impact on term infants remains a subject of debate. If there is a substantial risk of preterm birth, corticosteroid administration is warranted. However, reliable predictors of preterm labor, such as uterine contractions, transvaginal ultrasound assessment of cervical length, and fetal fibronectin testing, should guide clinical decision-making [13, 14, 15]. Careful timing of a single course of antenatal corticosteroids is essential [16], as the long-term risks and benefits of repeated corticosteroid regimens remain insufficiently understood and should be approached with caution.

## Conclusion

The study concluded that while antenatal dexamethasone for APH was linked to a higher rate of surgical vaginal delivery, an earlier delivery, and a lower neonatal birthweight, it was not linked to SGA newborns, NICU admission, or a low Apgar score. Any possible consequences on term newborns exposed to prenatal corticosteroids require further research.

## Limitations

The small percentage of patients exposed to dexamethasone may be one of the drawbacks. This could be a sign of obstetricians' trustworthy clinical experience in anticipating preterm birth in patients with APH. There was no information on long-term consequences, such as the newborn's neurological deficiencies or respiratory difficulties.

## Recommendations

More observational studies are required to determine whether in-utero exposure to dexamethasone is associated with an earlier spontaneous onset of labor and a higher proportion of iatrogenic deliveries.

## Generalizability

The findings of this study provide valuable insights into the effects of antenatal dexamethasone administration in pregnant women with antepartum hemorrhage (APH). However, the generalizability of the results may be limited due to the study's single-center design and the relatively small sample size in the dexamethasone group. Additionally, variations in clinical practices, demographic differences, and gestational age at corticosteroid administration may influence the applicability of the results to broader populations. Future multicenter studies with larger cohorts are recommended to validate these findings.

## Acknowledgment

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## Conflict of Interest

The authors declare no conflicts of interest in this study.

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## Author Contributions

All authors contributed equally to this study.

## Data Availability

The data supporting the findings of this study are available upon reasonable request from the corresponding author.

## List of Abbreviations

NA- not available
APH- Antepartum haemorrhage
IVH- Intraventricular hemorrhage
GDM- Gestational Diabetes Mellitus
NICU- neonatal intensive care unit
SGA- small-for-gestational-age

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