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A STUDY OF EFFECT OF INJECTION DEXAMETHASONE ON CARDIOTOCOGRAPHY IN WOMEN WITH PRETERM LABOUR IN THE DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY

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ABSTRACT **Background:** Preterm labor, defined as the onset of uterine contractions with cervical changes before 37 weeks of gestation, is a major contributor to neonatal morbidity and mortality, especially in low- and middle-income countries. Antenatal corticosteroids like dexamethasone are widely used to accelerate fetal lung maturation and improve neonatal outcomes. However, their effects on cardiotocography (CTG) parameters remain under evaluation. **Methods:** A prospective analytical study was conducted at SMS Medical College, Jaipur, involving 30 pregnant women between 28–34 weeks of gestation admitted with preterm labor. Participants received four doses of intramuscular dexamethasone (6 mg every 12 hours). CTG monitoring was done for 60 minutes at three time points: baseline (day 0), 48 hours, and 96 hours after the first dose. Parameters evaluated included basal FHR, accelerations, decelerations, variability, and fetal movements. **Results:** A significant decline in basal FHR was observed at 48 hours ($p = 0.05$), which stabilized by 96 hours. Accelerations initially decreased at 48 hours and significantly increased at 96 hours ($p = 0.001$). No significant changes in decelerations were noted. FHR variability significantly decreased from baseline to 96 hours ($p = 0.001$), with no significant change between 48 and 96 hours. **Conclusion:** Dexamethasone administration causes transient alterations in CTG parameters, especially in FHR variability and accelerations. These changes should be interpreted with caution to avoid unnecessary interventions such as cesarean sections. Continuous monitoring and individualized obstetric care remain essential.

KEYWORDS : Preterm labor, Dexamethasone, Cardiotocography (CTG), Fetal heart rate, FHR variability, Accelerations, Antenatal corticosteroids, Neonatal outcomes, Obstetric monitoring, Prematurity.

INTRODUCTION

The Preterm labour is defined as the onset of uterine contractions of sufficient strength and frequency leading to progressive cervical effacement and dilatation before 37 completed weeks of gestation. Preterm birth is a major contributor to infant morbidity and mortality, with a global prevalence ranging from 6–8% in Europe, Australia, and Canada to 9–12% in Asia, Africa, and the United States[2]. It accounts for over 80% of the 1.1 million annual neonatal deaths and nearly 50% of long-term morbidity among survivors.[1]

In approximately 75% of preterm birth cases, no specific cause is identified, though multiple risk factors exist. Non-obstetric factors include poor socioeconomic status, maternal malnutrition, illiteracy, maternal age below 25 or above 35, heavy manual labour, smoking, travel, and trauma. Obstetric risk factors include cervical incompetence, multiple gestation, short inter-pregnancy intervals, abortions, PPROM, and a history of preterm birth. Additionally, conditions such as diabetes mellitus, urinary and genital tract infections, and psychological stress have been linked to preterm birth. [2] Dexamethasone is commonly used to accelerate fetal lung maturation in at-risk pregnancies. It promotes surfactant production, enhancing fetal lung maturity. Dexamethasone is cost-effective and widely used in low-income settings, typically administered as 6 mg intramuscular injections every 12 hours for a total of four doses. [3]

Preterm infants face higher risks of neonatal complications such as RDS, BPD, IVH, PVL, NEC, ROP, renal failure, PDA, and infections, with severity increasing at lower gestational ages. Long-term issues include pulmonary, cardiovascular, metabolic, and neuro developmental disorders. [4]

Antenatal corticosteroids, particularly dexamethasone, enhance neonatal outcomes by promoting lung maturity and reducing IVH, infections, and NEC. Its non-protein-bound nature ensures rapid absorption, with high plasma levels reached within 2–3 hours post-administration. [5]

Some studies have observed alterations in cardiotocography (CTG) parameters following dexamethasone administration, such as changes in baseline fetal heart rate, accelerations, variability, decelerations, and fetal movements. Therefore, the current study aims to assess the effect of injection dexamethasone on these CTG parameters. [6]

MATERIAL AND METHODS

Study: This hospital-based prospective analytical study is conducted in the Department of Obstetrics and Gynecology, SMS Medical College and Hospital, Jaipur. It includes pregnant women with preterm pregnancy (28–34 weeks) admitted to the labor room, selected per inclusion and exclusion criteria. The study started in October 2022 and will continue until the desired sample size or one year, with two months for analysis.

Sample Size: A sample of 30 pregnant women with a gestational age between 28 to 34 weeks will be required, based on a 95% confidence interval and 80% power. This sample size is calculated to detect a minimum expected difference of **3.5 ± 3.1** in fetal heart rate accelerations between day 0 and day 2, as reported in the seed article.

Inclusion Criteria: The study includes pregnant women between 28 to 34 weeks of gestation with preterm labor who are willing to participate, provide informed consent, and are not enrolled in any other study.

Exclusion Criteria: The Participants will be excluded if they have a multiple pregnancy, fetal congenital malformations, premature rupture of membranes, or are known cases of overt diabetes, gestational diabetes mellitus (GDM), or any other chronic disorder.

Methodology: This interventional study was conducted in the Obstetrics and Gynecology Department, SMS Medical College, Jaipur. Pregnant women (28–34 weeks) meeting inclusion criteria provided written consent. They received four intramuscular doses of dexamethasone (6 mg every 12 hours). Computerized cardiotocography was performed for 60 minutes on day 0, at 48 hours, and 96 hours after the first dose. Outcomes assessed included basal fetal heart rate, number of accelerations and decelerations, variability, and fetal movements. Data were analyzed statistically.

RESULTS AND OBSERVATIONS

The basal fetal heart rate showed a slight downward trend over the observed period. The mean basal fetal heart rate showed a slight decline from 145.7±3.32 bpm at day 0 to 143.6±3.76 bpm at 48 hours, followed by a mild increase to 144.63±3.18 bpm at 96 hours. The comparison between day 0 and 48 hours was statistically significant (p

= 0.05), indicating a notable initial decrease. However, no significant differences were observed between day 0 and 96 hours (p = 0.45) or between 48 and 96 hours (p = 0.47), suggesting stabilization thereafter.

Table 1: Comparison Of Basal Fetal Heart Rate Over Time

Parameter	Day 0		At 48 hours		At 96 hours		P-Value		
	Mean	SD	Mean	SD	Mean	SD	day 0 vs at 48 hours	day 0 vs 96 hours	48 hours vs 96 hours
Basal Fetal Heart Rate	145.7	3.32	143.6	3.76	144.63	3.18	0.05	0.45	0.47

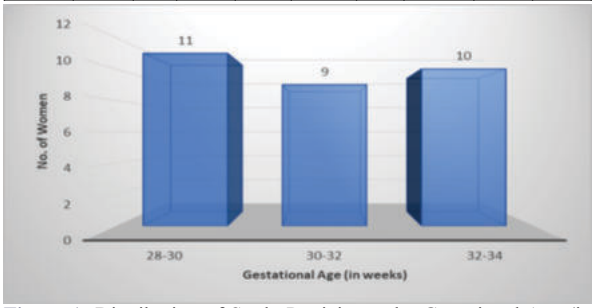

Figure 1: Distribution of Study Participants by Gestational Age (in Weeks)

Table show among the 30 women included in the study, the majority were between 28 and 34 weeks of gestation. Specifically, 36.67% were in the 28–30 week range, 30% between 30–32 weeks, and 33.33% between 32–34 weeks. The mean gestational age was 31.33 ± 1.62 weeks, indicating that most participants were in the early third trimester.

Table 2: Comparison Of Number Of Accelerations Over Time

Parameter	Day 0		At 48 hours		At 96 hours		P-Value		
	Mean	SD	Mean	SD	Mean	SD	day 0 vs at 48 hours	day 0 vs 96 hours	48 hours vs 96 hours
No. of Accelerations	11.26	1.31	9.23	1.13	12.73	0.83	0.001	0.001	0.001

The number of fetal heart rate accelerations showed significant variation over time. At baseline (day 0), the mean number of accelerations was 11.26±1.31. This decreased markedly to 9.23±1.13 at 48 hours, followed by a significant rise to 12.73±0.83 at 96 hours. All comparisons-between day 0 and 48 hours, day 0 and 96 hours, and between 48 and 96 hours-were statistically significant (p = 0.001), indicating dynamic changes in fetal reactivity during the observation period.

Table 3: Comparison Of Decelerations Over Time

Parameter	Day 0		At 48 hours		At 96 hours		P-Value		
	Mean	SD	Mean	SD	Mean	SD	day 0 vs at 48 hours	day 0 vs 96 hours	48 hours vs 96 hours
Deaccelerations	1.26	0.44	1.2	0.4	1.33	0.47	0.85	0.8	0.48

The mean number of decelerations remained relatively stable throughout the study period. On day 0, the mean was 1.26±0.44, slightly decreasing to 1.2±0.4 at 48 hours, and then increasing to 1.33±0.47 at 96 hours. However, none of the comparisons between the time points day 0 vs. 48 hours (p = 0.85), day 0 vs. 96 hours (p = 0.80), and 48 vs. 96 hours (p = 0.48)-were statistically significant, suggesting no meaningful change in deceleration patterns during the observation period.

The Fetal heart rate variability showed a significant decline over the study period. The mean variability decreased from 14.13±2.62 on day 0 to 11.4±2.14 at 48 hours, and further to 10.23±2.01 at 96 hours. The reduction from day 0 to both 48 hours and 96 hours was statistically significant (p = 0.001), indicating a marked decrease in variability. However, the change between 48 and 96 hours was not statistically significant (p = 0.11), suggesting a plateau in variability reduction after the initial decline.

Table 4: Comparison Of Fetal Heart Rate Variability Over Time

Parameter	Day 0		At 48 hours		At 96 hours		P-Value		
	Mean	SD	Mean	SD	Mean	SD	day 0 vs at 48 hours	day 0 vs 96 hours	48 hours vs 96 hours
Variability	14.13	2.62	11.4	2.14	10.23	2.01	0.001	0.001	0.11

Table 5: Comparison Of Fetal Movement Over Time

Parameter	Day 0		At 48 hours		At 96 hours		P-Value		
	Mean	SD	Mean	SD	Mean	SD	day 0 vs at 48 hours	day 0 vs 96 hours	48 hours vs 96 hours
Fetal Movement	3.02	0.88	1.94	0.62	2.71	0.86	0.001	0.001	0.001

The Fetal movements showed significant fluctuations during the observation period. A significant decrease in fetal movement was observed at 48 hours (mean = 1.94 ± 0.62) compared to baseline (mean = 3.02 ± 0.88), followed by a notable increase by 96 hours (mean = 2.71 ± 0.86). All comparisons between the time points—Day 0 vs 48 hours, Day 0 vs 96 hours, and 48 hours vs 96 hours—were statistically significant (p = 0.001), indicating dynamic changes in fetal movement over the observed period.

DISCUSSION

In the present study, the basal fetal heart rate (FHR) showed a slight but statistically significant decrease from 145.7 ± 3.32 bpm at day 0 to 143.6 ± 3.76 bpm at 48 hours ($p = 0.05$), followed by a mild increase to 144.63 ± 3.18 bpm at 96 hours ($p = 0.45$ compared to day 0). Similarly, **Ahmed AA et al. (2021)**[7] found no significant change (143.3 ± 4.4 bpm at baseline versus 142.7 ± 10.1 bpm at 48 hours, $p = 0.18$). Contrastingly, **Arnna Ananya (2023)**[2] observed a slight increase in basal FHR from 133.77 ± 7.64 bpm before dexamethasone to 135.85 ± 7.7 bpm after the fourth dose.

In the present study, the mean age of the participants was 26.36 ± 4.48 years, with the majority (33.33%) falling within the 23–32 year age group. This aligns closely with findings from other similar studies. Similarly, **Ahmed AA et al. (2021)**[7] observed a slightly higher mean age of 27.5 ± 5.3 years, while **Mohamed A. Ali et al. (2021)**[8] reported a mean age of 28.8 ± 3.9 years. Overall, the age distribution across studies indicates that the majority of participants belonged to the reproductive age group.

The accelerations, in our study noted a significant reduction from 11.26 ± 1.31 at baseline to 9.23 ± 1.13 at 48 hours ($p = 0.001$), followed by a recovery to 12.73 ± 0.83 at 96 hours ($p = 0.14$ compared to baseline). **Meenakshi Kandoria et al. (2025)**[1] also reported a decrease from 94.1% to 79.4% cases showing accelerations at 48 hours ($p = 0.002$), with return to baseline at 96 hours ($p = 0.774$). Similarly, **Mohamed A. Ali et al. (2021)**[8] reported similar findings with significant reduction post dexamethasone, though exact values were not specified.

The decelerations, no significant changes were observed in present study, with values of 0.17 ± 0.39 at baseline, 0.10 ± 0.31 at 48 hours, and 0.13 ± 0.34 at 96 hours ($p > 0.05$). This aligns with **Ahmed AA et al. (2021)**[7], where decelerations changed non-significantly from 1.2 ± 1.3 to 0.9 ± 1.3 ($p = 0.1$).

In terms of fetal heart rate variability (FHRV), the current study showed a significant decrease from 14.13 ± 2.62 at baseline to 11.4 ± 2.14 at 48 hours ($p = 0.001$), with a slight further decrease to 10.88 ± 2.11 at 96 hours ($p = 0.11$ compared to 48 hours). This corresponds with findings by **Nazia Ishrat et al. (2024)**[9] where variability dropped from 13.73 ± 3.07 to 11.28 ± 2.57 ($p < 0.05$) at 48 hours, and **Ahmed AA et al. (2021)**[7] who reported significant reduction in short-term variation from 11.3 ± 3.3 at baseline to 9.9 ± 2.9 at 48 hours ($p = 0.01$). On the other hand.

The fetal movements, in currunt study recorded a significant decrease

from 3.02 ± 0.88 at baseline to 1.94 ± 0.62 at 48 hours ($p = 0.001$), then a return to 3.0 ± 0.73 at 96 hours ($p = 0.98$ compared to baseline). Similarly, **Meenakshi Kandoria et al. (2025)**[1] found that 53.9% of participants reported decreased fetal movements at 48 hours ($p < 0.001$), returning to normal in 98% at 96 hours ($p = 0.498$). **Ahmed AA et al. (2021)**[7] also documented significant reduction in fetal movements at 48 hours (23.5 ± 4.6 baseline vs. 19.7 ± 4.2, $p = 0.0001$), with normalization by day 4.

CONCLUSION

Injection dexamethasone is used very commonly to prevent complication of prematurity. but there are possible transient disturbances in CTG monitoring rather than ongoing fetal compromises due to it. So continued monitoring and individualized obstetric care remain critical to prevent unnecessary cesarean section.

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