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"TO ASSESS THE NEED OF SURFACTANT IN PRETERM NEONATES WHOSE MOTHERS HAD RECEIVED ANTENATAL STEROIDS"

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Abstract

Introduction:

Surfactant therapy has revolutionized the management of respiratory distress syndrome (RDS) in preterm neonates, significantly improving outcomes for this vulnerable population. When assessing the need for surfactant in preterm infants, especially those whose mothers received antenatal steroids, it is crucial to understand the interplay between these two interventions. Antenatal corticosteroids are known to enhance fetal lung maturation and reduce the incidence and severity of RDS. However, despite this benefit, some preterm infants still develop RDS, potentially necessitating surfactant administration. This article explores the factors influencing surfactant requirements in preterm neonates whose mothers have undergone antenatal steroid therapy, aiming to clarify the role of surfactant in this context and optimise neonatal care strategies.

Aim and objective:

To access the need of surfactant in preterm babies whose mother received antenatal steroids.

Material and methods:

The present observational study was conducted in Paediatric outpatient department of Acharya Shri Chander College of Medical Sciences and Hospitals and included a total of 121 babies who were delivered in the hospital over a period of three months, w.e.f. 1st April, 2024 to 31st June, 2024. The data was collected with the help of a structured clinical pro-forma. The collected data was recorded in Microsoft Excel sheet and statistical analysis was done with the help of SPSS version 21.0.

Result:

In our study, a total of 121 babies were delivered to 109 women in the study period with 97 singleton, 12 twins and no triplet or quadruple deliveries. All records were available and retrieved within the study period where only 43 babies

were delivered prematurely between 26 weeks to 34 weeks and the majority of the babies 27 were born at 32-34 weeks of gestation (62.8%) , followed by 14 babies were delivered at 28-32 weeks (32.6%), followed by 2 were delivered between 26-28 weeks (4.6%). Out of 43 babies, 24 babies (55.8%) were exposed to full course of dexamethasone antenatally and 7 babies (16.3%) received single dose of antenatal corticosteroids and remaining 12 babies (27.9%) were delivered prematurely didn't receive antenatal corticosteroids. There was no baby who received a repeat course of antenatal corticosteroids. And it was found that out of 24 babies who received full course of antenatal corticosteroids developed respiratory distress and 18 required surfactant administration and rest 6 babies were managed only on CPAP mode of ventilation.

Conclusion:

The present study concludes reinforced the rationale behind the common practice of giving antenatal corticosteroids in preterm birth and also demonstrated the decrease in respiratory distress syndrome and use of surfactant for lung compliance

Keywords: Surfactant, Corticosteroids, Preterm , Respiratory distress

Introduction

Surfactant therapy has revolutionized the management of respiratory distress syndrome (RDS) in preterm neonates, significantly improving outcomes for this vulnerable population. When assessing the need for surfactant in preterm infants, especially those whose mothers received antenatal steroids, it is crucial to understand the interplay between these two interventions. Antenatal steroids are known to enhance fetal lung maturation and reduce the incidence and severity of RDS (1). However, despite this benefit, some preterm infants still develop RDS, potentially necessitating surfactant administration. This article explores the factors influencing surfactant requirements in preterm neonates whose mothers have undergone antenatal steroid therapy, aiming to clarify the role of surfactant in this context and optimize neonatal care strategies(2).

Several factors influence surfactant requirements in preterm neonates whose mothers have received antenatal steroids:

Gestational Age: Infants born at earlier gestational ages are more likely to require surfactant, as the extent of lung immaturity correlates with the severity of respiratory distress.

Steroid Efficacy: The timing and dosage of antenatal steroid administration can affect surfactant production and lung maturity(3),(4). Suboptimal dosing or late administration may not provide sufficient benefit. Maternal Health Conditions: Conditions such as diabetes or hypertension in the mother can impact fetal lung development and surfactant production.

Fetal Sex: Male infants often have a higher risk of RDS and may require surfactant more frequently than female infants, due to differences in lung development.

(6).

Intrauterine Growth Restriction (IUGR): Infants who are growth-restricted may have less mature lungs and higher surfactant needs, even with antenatal steroids. Postnatal Clinical Factors: Factors such as meconium aspiration, pneumonia, or persistent pulmonary hypertension can increase the need for surfactant despite antenatal steroid exposure.

Respiratory Status at Birth: The immediate respiratory status of the neonate, including the need for mechanical ventilation or CPAP, can influence surfactant administration decisions. Antenatal corticosteroids are well-documented to promote fetal pulmonary maturation and attenuate the incidence and severity of RDS(7),(8). Nevertheless, despite these prophylactic benefits, a subset of preterm infants may still manifest RDS, necessitating surfactant replacement. This article delves into the determinants affecting surfactant need in preterm neonates whose mothers have undergone antenatal steroid administration, aiming to elucidate surfactant's role in this context and refine neonatal care approaches.

Aim and objective

To access the need of surfactant in preterm babies whose mother received antenatal steroids.

Material and Methods

The present observational study was carried out in outpatient department in department of pediatrics at Acharya Shri Chander college of medical sciences and hospitals after obtaining Ethical permission from Institution with ref no. ASCOMS/ IEC/24/Meeting-I/ FM/19, over a period of three months, w.e.f. 1st April, 2024 to 31st June, 2024. A total of 121 babies delivered at this time period were included in the study after obtaining the informed consent from their parents / guardians.

Inclusion criteria:

Preterm babies attending well baby clinic who were born between 26 to 34 weeks of gestation.

Exclusion criteria:

1. Study subjects whose parents / guardians refused to participate.
2. Study subjects with congenital defects.
3. Children with renal disease.
4. Children with endocrine disease.

A detailed history including antenatal, natal and postnatal history, date of birth, gender, birthweight, length, gestational weeks (26-28 weeks, 28-32 weeks, and 32-34 weeks), normal delivery or cesarean delivery, maternal age ≥ 35 years (yes or no), multiple birth (yes or no), timing and dosing of antenatal corticosteroids to mothers, surfactant requirement, days of NICU stay were collected with the help of a structured clinical proforma. The collected data was recorded in Microsoft Excel sheet and statistical analysis was done with the help of SPSS version 21.0.

Results and observations

In our study, a total of 121 babies were delivered to 109 women in the study period with 97 singleton, 12 twins and no triplet or quadruple deliveries. All records were available and retrieved within the study period where only 43 babies were delivered prematurely between 26 weeks to 34 weeks and the majority of the babies 27

were born at 32-34 weeks of gestation (62.8%) , followed by 14 babies were delivered at 28-32 weeks (32.6%), followed by 2 were delivered between 26-28 weeks (4.6%). Out of 43 babies, 24 babies (55.8%) were exposed to full course of dexamethasone antenatally and 7 babies (16.3%) received single dose of antenatal corticosteroids and remaining 12 babies (27.9%) were delivered prematurely didn't receive antenatal corticosteroids. There was no baby who received a repeat course of antenatal corticosteroids. And it was found that out of 24 babies who received full course of antenatal corticosteroids developed respiratory distress and 18 required surfactant administration and rest 6 babies were managed only on CPAP mode of ventilation.

Table 1. Gestational age

Gestational Weeks	No.	%age
26-28weeks	2	4.6%
28-32 weeks	14	32.6%
32-34 weeks	27	62.8%

The majority of the babies were born at 32-34 weeks of gestation (62.8%), followed by 28-32 weeks (32.6%), followed by 26-28 weeks (4.6%) as shown in table 1.

Table 2. Gender distribution

Gender	No.	%age
Male	24	55.8%
Female	19	44.2%

Table 2 and figure 1 showed that there was male predominance as the majority of the subjects were males (55.7%) followed by 44.2 % females. The male to female ratio was 1.26:1

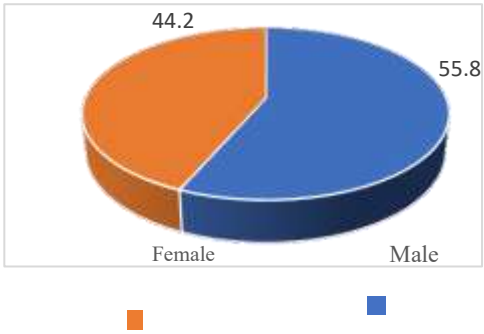

Figure 1. Gender distribution Table 2. Antenatal Corticosteroids

Exposure to Antenatal corticosteroids	No.	%age
Full course	24	55.8%
Single dose	7	16.3%
Did not receive	12	27.9%

It was found that out of 43 babies, 24 babies (55.8%) were exposed to full course of dexamethasone antenatally and 7 babies (16.3%) received single dose of antenatal corticosteroids medicine and remaining 12 babies (27.9%) were delivered prematurely didn't receive antenatal corticosteroids as shown in table 2.

Table 3. Respiratory distress in those preterm babies who received full course of antenatal corticosteroids and surfactant administration

Respiratory distress	No.	%age
Surfactant administration	18	75%
No surfactant administration	6	25%

It was found that out of 24 babies who received full course of antenatal corticosteroids, all babies developed respiratory distress and 18 required surfactant administration and rest 6 babies were managed on CPAP mode of ventilation as shown in table 3.

Table 4. Respiratory distress in those preterm babies who received single dose of antenatal corticosteroids and surfactant administration

Respiratory distress	No.	%age
Surfactant administration	7	100%
No surfactant administration	—	—

It was found that out of 7 babies who received single dose of antenatal corticosteroids, surfactant requirement was seen in all babies as shown in table 4.

Table 5. Respiratory distress in those preterm babies who didn't receive any dose of antenatal corticosteroids and surfactant administration

Respiratory distress	No.	%age
Surfactant administration	12	100%
No surfactant administration	—	—

It was found that out of 12 preterm babies who didn't receive antenatal corticosteroids, surfactant requirement was seen in all babies as shown in table 5.

Discussion

In our study period where only 43 babies were delivered prematurely between 26 weeks to 34 weeks and the majority of babies were males (55.7%) followed by 44.2 % females. The male to female ratio was 1.26:1. Like ours, the study by Anadkat et al.'s which shows that male is a risk factor for developing respiratory distress disorders (6).

Out of 43 babies, 24 babies (55.8%) were exposed to full course of dexamethasone antenatally and only 18 required surfactant administration and rest were managed on cpap mode of ventilation. Also, Cochrane Review on ACS in 2006, RDS was found to be decreased when steroids were administered at 33+0 to 34+6 weeks (RR 0.52, 95% CI 0.31–0.91, two studies, 434 infants) (8). In our study we found single course of antenatal corticosteroids were ineffective in reducing respiratory distress syndrome as we had 7 babies whose mother had received single course of antenatal corticosteroids and all babies developed respiratory distress syndrome and required surfactant administration but there is a study by Robert et al.'s which supports the continued use of a single course of antenatal corticosteroids to accelerate fetal lung maturation in women at risk of preterm birth (8).

In the present study, the exposure of antenatal corticosteroids would helpful in reducing respiratory distress disorder and in the study by Gary et al.'s which shows that the exposure of singleton pregnancies to antenatal corticosteroids between 24 and 34 weeks of gestation is associated with a significantly lower incidence of respiratory disorders among neonates born at 34 to 36 weeks of gestation (9).

In the study by Waters et al.'s found that delivery more than a week after ACS exposure is associated with higher frequency of RDS among neonates born at 30–33+6 weeks(10), but no association is found with use

of surfactant therapy. Our results also shows benefit of administering ACS will reduce respiratory disorders in preterm babies.

Conclusion

The present study concludes reinforced the rationale behind the common practice of giving antenatal corticosteroids in preterm birth and also demonstrated the decrease in respiratory distress syndrome and use of surfactant for lung compliance but gestational age and birth weight remains an important factor for development of respiratory distress syndrome. There is a definitive requirement for a multicentric, randomized trial to rigorously evaluate the risks and benefits—both maternal and fetal—of administering single versus multiple doses of antenatal corticosteroids. Many investigations are either planned or underway across countries. In the interim, pending the outcomes of these studies, it is recommended that a single course of antenatal corticosteroids should be administered to all women at risk of preterm birth between 24 and 36 weeks of gestation.

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