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Original Research Article

Effect of antenatal corticosteroid on early neonatal outcome in preterm neonates: a prospective observational study

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ABSTRACT

Background: Respiratory distress syndrome (RDS) is the most common complication observed in preterm neonates. It has been observed in many studies done till date that neonates born to mothers who have received antenatal corticosteroids (ACS) have shown significantly lesser incidence in developing RDS as compared to neonates born to mothers who have not received ACS. The aim of the present study is to observe and compare the outcome of the neonates born to the mothers who have received and not received ACS between 24 weeks + 0 days to 36 weeks + 6 days of gestation.
Methods: This was a hospital based prospective observational study, consisting of 201 neonates born to the mothers who have received and not received ACS between 24 weeks + 0 days and 36 weeks + 6 days of gestation. The outcome of neonates was observed and the data was analyzed by using frequency percentage and pearson's chi square test.
Results: Two hundred and one neonates were included in our study. It was concluded that the need of surfactant (P=0.004), CPAP (P=0.001) was significantly less and the rate of survival (P=0.000) was better in babies born to mothers who have received ACS in comparison to neonates born to mothers who have not received ACS.
Conclusions: It was observed that in neonates there was significantly lesser incidence of respiratory distress syndrome, use of surfactant, CPAP, ventilation and number of deaths. But there was no significant statistical difference in incidence of necrotizing enterocolitis, sepsis, and PDA as compared to neonates born to mothers who have not received ACS. Hence it will require further study and analysis in a larger population.

Keywords: Antenatal corticosteroids, Respiratory distress syndrome, Pearson's chi square test, Sepsis

INTRODUCTION

Prematurity represents a serious problem for healthcare services throughout the world. Respiratory distress syndrome continues to be the most important pulmonary problem during the neonatal period, affecting a large number of premature infants.[1] Corticosteroids interact with specific receptor proteins in the target tissue as it regulates the expression of the genes that are responsive to corticosteroids and hence, disposition of the proteins synthesized by the various target tissues are altered.[2] In this way, corticosteroids assist in achieving a successful transition from fetal to extra-uterine life, accelerating fetal maturation as a whole.[3] The acceleration of lung development leads to a reduction in the incidence of respiratory distress syndrome and its severity. In view of this, our study attempts to compare the early neonatal outcome in the mothers who have received and not received corticosteroids in the antenatal period.

The objective of the study was to study the outcome of the neonates born to mothers who have received ACS and not received ACS between 24weeks + 0 days to 36 weeks + 6 days of gestation.

METHODS

A prospective study was performed in tertiary care hospital beginning from March 2016, for over a period of six months. All neonates born to mothers who have received antenatal corticosteroids and not received ACS, with gestational age between 24 weeks + 0 days and 36 weeks + 6 days were included in the study. Neonates with major congenital malformations and neonates whose mother had been received corticosteroids for a purpose other than fetal maturation were excluded. Data was collected from the maternal and neonatal records which included certain characteristics. The maternal charts were reviewed for characteristics such as-age, parity, gestational age, complications associated with pregnancy (pregnancy induced hypertension, abruption placenta and placenta praevia, premature rupture of membranes) and multiple pregnancy, diabetes, and mode of delivery. The neonatal characteristics considered in the study were-survival, birth weight, head circumference, APGAR score, need of surfactant, need of intubation, duration of mechanical ventilation, presence of Patent Ductus Arteriosus (PDA), neonates with PDA who have received treatment or not, intraventricular hemorrhage, sepsis, necrotizing enterocolitis, the day by which feeds were initiated and the day of discharge from the hospital. Neonates were followed up until they got discharged from the hospital. Data was analyzed using frequency, percentage and chi square test.

RESULTS

In our study, a total of 201 babies were born to mothers with gestational age 24 weeks + 0 days and 36 weeks +6 days of gestation.

Table 1: Comparison of neonates on CPAP, surfactant and ventilation care with maternal history of having received steroids with those who have not received.

Parameters	Received steroids (n=144)	Not received steroids (n=57)	P value
CPAP	52	05	0.001
Ventilation			
< 24 hours	02	07	0.095
24-48hours	28	02	
>48 hours	03	01	
Not ventilated	111	47	
Surfactant	42	04	0.004

Table 2: Dose of corticosteroid received by mother with different gestational age.

	Gestational age in weeks				Total	P value
Dose of steroid	26-28	29-30	31-33	34-36		
Not received	2	4	5	45	56	0.000
One dose received	5	17	45	59	126	
Two doses received	2	6	3	8	19	
Total	**9**	**27**	**53**	**112**	**201**	

Table 3: Neonatal outcomes of study population who have been exposed to different doses of antenatal corticosteroids.

Characteristics		One dose ACS N=126	Two doses ACS N=18	P value
Gender	Male	67 (54%)	10 (55%)	0.771
	Female	59 (46%)	08 (45%)	
APGAR <7 in 1min		19 (23%)	01 (0.1%)	0.117
APGAR <7 in 5min		08 (10%)	00 (0%)	
Need of surfactant		36 (45%)	06 (1%)	0.004
CPAP		44 (34%)	08 (1.4%)	0.001
PDA treatment with PCT		06 (7.5%)	01 (0.1%)	
PDA treatment without PCT		03 (3.7%)	00 (0%)	
Sepsis		07 (8.8%)	00 (0%)	0.107
Feeds intiated (<24hours)		49 (61%)	08 (1.4%)	0.485
Feeds intiated (24-48hours)		63 (79%)	07 (1.2%)	
Feeds intiated (>48hours-5days)		14 (17%)	03 (0.5%)	
Necrotizing enterocolitis		02 (2.5%)	01 (0.1%)	0.467
Survival rate		125(99%)	18(100%)	0.000

Fifty-seven mothers (28%) did not receive any antenatal corticosteroids, and 144 (72%) mothers received one or more doses of antenatal corticosteroids (ACS). Among this, 126 (87%) received one dose of ACS and 18 (12.5%) received two doses of ACS. The outcomes of neonates were analyzed with respect to variable characteristics like survival, birth weight, head circumference, APGAR score, need of surfactant, need of intubation, duration of mechanical ventilator, presence of Patent Ductus Arteriosus (PDA), neonates with PDA who have received treatment or not, intraventricular hemorrhage, sepsis, necrotizing enterocolitis, the day by which feeds were initiated and the day of discharge from the hospital.

DISCUSSION

In our study, we mainly observed the effects of ACS (Antenatal Corticosteroid) on the outcome of premature infants and compared the outcome of neonates born to mothers who have received one or multiple doses of ACS to the those who have not received ACS. In our study betamethasone was the medication of choice because it has longer half-lives, crosses the placenta in a biologically active form and has lesser risk of periventricular leukomalacia. Similar kind of efficacy and benefits was observed in a study done at National Institutes of Health and also in a study done by Merrill JD, Ballard RA.[4,5] In our study, neonates born to the mothers who have received one or more doses ACS showed significantly lesser requirement of surfactant (P=0.004) and CPAP ventilation (P=0.001). Studies done by Wang YC, Tseng HI and Sen S, Reghu showed similar results in which preterms who were born to mothers who have received ACS with gestational age between 24 weeks +6 days and 34 weeks had lesser incidence of respiratory distress syndrome as well as requirement of surfactant and CPAP.[6,7] Need of surfactant and CPAP ventilation was less in comparison to neonates born to mothers who have received multiple doses of ACS. This was comparable to results observed in the study done by Wapner RJ, Sorokin Y, Mele L et al.[8]

There was no statistical significance in reduction of incidence of PDA, necrotizing enterocolitis (P=0.467) and sepsis (P=0.107) in neonates born to mothers who have received ACS, similar results were observed in a study conducted by Wang YC, Tseng HI.[6]

In our study, we have observed that neonates born to mothers with single or multiple doses of ACS have showed statistically significant survival rate (P=0.000) as compared to neonates born to mothers who have not received ACS. Similar results were observed in a study done by Abbasi S, Hirsch D et al.[9] Corticosteroids also increase the expression of adrenergic receptors in vessel walls and the myocardium, which assist in cardio-circulatory stabilization at birth.[10] Limitation of study Short duration of six months.

CONCLUSION

In our study, we observed significantly lesser incidence of respiratory distress syndrome, surfactant use, CPAP, ventilation and number of deaths, But, there was no significant statistical difference in incidence of necrotizing enterocolitis, sepsis, and PDA in neonates born to mothers who have received ACS as compared to neonates born to mothers who have not received ACS. Hence to analysis other benefits of corticosteroid will require further study in a larger number population is warranted.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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