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Prophylactic Dexamethasone for improving perinatal outcome before elective caesarean section at term pregnancy

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Abstract

Background and objectives: With the increase in the incidence of elective caesarean section, and the absence of onset of labour, the increase in the rate of neonatal respiratory morbidities and admissions to neonatal intensive care unit have also been observed. The objective of the study is to evaluate the role of prophylactic dexamethasone in reducing the occurrence of neonatal respiratory morbidities in term pregnancies before elective caesarean section. **Methods:** The study was a prospective cohort study conducted at Maternity Teaching Hospital at Erbil – Iraq from first September 2017 till first September 2018, 400 term pregnant ladies scheduled for elective caesarean section divided to 200 women who received prophylactic 4 doses of 6 mg dexamethasone, and 200 women who received nothing. We compare the incidence of admissions to neonatal intensive care unit, respiratory distress syndrome, transient tachypnea of newborn and early neonatal death between the two groups. **Results:** Dexamethasone group showed lower incidences of admissions to neonatal intensive care unit 3.5 % and transient tachypnea of newborn 2.5% than control group 10.5% and 7 % respectively with statistically significant differences between them, using Chi-square test. Respiratory distress syndrome and an early neonatal death have lower incidences in dexamethasone group 2.5% and 0% than control group 3.5% and 1% respectively, but statistically were not significant. **Conclusions:** The use of prophylactic antenatal corticosteroid was found significantly to reduce neonatal respiratory morbidities and admissions to neonatal intensive care unit, especially in our center with low neonatal intensive care unit facilities.

Keywords: Dexamethasone; Neonatal respiratory morbidities; Elective caesarean section.

Introduction

Thirty to forty present of all births are delivered by caesarean section in some countries, and nearly half of them are elective at term[1, 2]. Caesarean section found to be a risk factor for the appearance of neonatal respiratory complications in term and preterm infants, mainly respiratory distress syndrome (RDS) and transient tachypnea of the newborn[3, 4], furthermore it's found that babies delivered by caesarean section at term are more likely to develop respiratory complications than those born vaginally, and this risk is more for infants born after elective caesarean section, i.e. before the onset of labour[3,5,6], which is found to be two to fourfold increased risk of overall neonatal respiratory morbidity and even higher relative risks of serious respiratory morbidity in term neoborns[7]. Furthermore; respiratory morbidity risks decrease from 3.9% for the period between 37 weeks to 37 weeks and 6 days to 0.8% for the period between 39 weeks to 39 weeks and 6 days[8], for this reason it's recommended that elective cesarean delivery should be deferred to 39 weeks[9]. although this may not be applicable for every scheduled caesarean section, because of the load of patients and limited waiting lists for elective caesarean sections, especially in developing countries, furthermore 15% of scheduled caesarean section may end with emergency section, in addition deficiency of antenatal care, with lack of early ultrasound and inaccuracy of last menstrual period also have role in wrong calculation of gestational age, adding to this the increase in the rate of cesarean delivery worldwide including developing countries have a role in increasing the significance of attainable perinatal risks[10]. The other confounding factors that contribute to the development of neonatal respiratory complications following cesarean delivery are; the type of anesthesia, fetal weight, fetal gender, and antenatal maternal disorder[11].

The resources are poor in developing countries and it's

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often difficult to provide expensive treatments such as neonatal care[12]. This raises the concept for exogenous glucocorticoid administration to be a good option for elective caesarean section to reduce neonatal respiratory complications[2].

Many studies showed the effectiveness of corticosteroids in prevention of neonatal complications in preterm babies[13], but studies of their role before elective caesarean sections at term are scarce. The objective of this study was to determine the role of prophylactic corticosteroid administration before elective caesarean section at term, compared to the usual management without corticosteroids, in reducing the incidence of neonatal respiratory morbidities like admission to neonatal intensive care unit, respiratory distress syndrome and transient tachypnea of newborn.

Patients and Methods

This study was a prospective cohort study conducted at maternity teaching hospital at Erbil-Iraq from first September 2017 till first September 2018, women with previous caesarean section who scheduled for elective caesarean section were divided in to two groups, first group is Dexamethasone group: 200 women that received prophylactic dexamethasone(Dexamethasone Sodium Phosphate, Furen Pharmaceutical Group Company, USA) by their senior; four doses of 6 mg intramuscularly 12 hours apart in the 48 hours before elective caesarean section[14]; and second group is control group: 200 women who their senior didn't give them dexamethasone. The research proposed was submitted to and agreed by research ethics committee of Kurdistan board for medical specialties. Informed consent was obtained from all women to participate in the study. The inclusion criteria for the study were those women with singleton pregnancy who have previous caesarean sections that scheduled for elective caesarean section at term (completed 37 weeks till completed 40 weeks calculated from first day of last menstrual period).

The exclusion criteria were women with chronic disease (renal disease, diabetes mellitus and hypertensive disorders), women with preoperative infections and obstetric complications like preeclampsia and antepartum hemorrhage, pregnant women with fetal abnormality were also excluded.

After history and examination, basic characteristics like maternal age, parity, number of previous caesarean sections, and type of anesthesia, fetal gender and fetal weight of both groups were all compared. We follow and observe their neonates until first week of life, the objectives of this study is to measure the incidence of neonatal admission to intensive care unit because of respiratory problems, transient tachypnea of newborn, respiratory distress syndrome, and early neonatal deaths between the two groups, and to evaluate the APGAR score to determine the role of dexamethasone in reducing neonatal respiratory morbidities. The data were analyzed through using SPSS software for statistical analysis version 23, for calculating descriptive (frequency Percentage, Mean, Mean difference and standard deviation) and inferential (Independent sample-test and Chi-square test) to determine the differences and associations between variables among the study samples.

Results

In this study, we found no statistically significant differences regarding maternal age, gestational age, parity, number of previous caesarean sections and birth weights between mothers received dexamethasone and those not received it as shown in Table (1)

Table (1): The baseline characteristics between those mothers who received and not received dexamethasone for numerical variables.

Baseline Characteristics	Dexamethasone		Mean Difference	t-value Calculated	p-value of Independent t-test
	Not Received	Received			
	M ± SD	M ± SD			
Maternal age	29.60 ± 5.298	29.36 ± 4.509	0.240	0.488	0.626
Gestational age	37.89 ± 0.925	37.82 ± 0.886	0.070	0.773	0.440
Parity	2.45 ± 1.539	2.33 ± 1.093	0.125	0.936	0.350
Number of previous caesarean sections	1.85 ± 0.825	1.88 ± 0.838	- 0.025	- 0.301	0.764
Birth weight (Kg)	3.14 ± 0.383	3.10 ± 0.385	0.036	0.948	0.123

Table (2) showed that 95 babies (47.5%) were male and 105 (52.5%) were female in those mothers who not received dexamethasone compared to 96 (48%) male babies and 104 (52%) female babies in mothers who received dexamethasone, similarly regarding anesthesia type, the general to spinal ratio were 150/50 in non-dexamethasone group, compared to 151/49 in dexamethasone group with no statistical differences between them.

Table (2): The baseline characteristics between those who received and not received dexamethasone for categorical variables.

Baseline Characteristics		Dexamethasone				x^2	p-value
		Not Received		Received			
		No.	%	No.	%		
Gender	Male	95	47.5	96	48	0.010	0.920
	Female	105	52.5	104	52		
Anesthesia type	General	150	75	151	75.5	0.013	0.908
	Spinal	50	25	49	24.5		
Total		**200**	**100**	**200**	**100**		

Table (3) showed statistically high significant differences in neonatal admissions due to respiratory complications to neonatal intensive care unit (NICU) between both groups, the incidence of admissions were 21 newborns (10.5%) in non-dexamethasone group compared to 7 babies (3.5%) in dexamethasone group with p-value <0.01.

Table (3): Comparison of neonatal intensive care unit admission (NICU) among neonates of mothers with and without dexamethasone supplementation.

		Dexamethasone				x^2	p-value
		Not Received		Received			
		No.	%	No.	%		
Admission	No	179	89.5	193	96.5	7.527	0.006
to NICU	Yes	21	10.5	7	3.5		
Total		**200**	**100**	**200**	**100**		

NICU: Neonatal intensive care unit.

We found 7 babies (3.5%) developed respiratory distress syndrome (RDS) in non-Dexamethasone group, although this figure was higher compared to dexamethasone group which were only 2 neonates (2.5%) who developed RDS, but we found no statistical significant differences between them with p-value >0.05 not significant, all babies who developed RDS admitted to NICU, as shown in Table (4)

Table (4): Comparison of respiratory distress syndrome among neonates of mothers with or without dexamethasone supplementation.

RDS	Dexamethasone				x^2	p-value
	Not Received		Received			
	No.	%	No.	%		
No	193	96.5	198	97.5	2.842	0.092
Ye	7	3.5	2	2.5		
Total	**200**	**100**	**200**	**100**		

RDS: Respiratory distress syndrome.

Table (5) showed significant differences regarding development of transient tachypnea of newborns (TTN) between the two groups, 14 neonates (7%) in non-dexamethasone group compared with 5 neonates (2.5%) in dexamethasone group with p-value < 0.05, all of these babies admitted to NICU.

Table (5): Comparison of transient tachypnea of newborn among neonates of mothers with or without dexamethasone supplementation

TTN	Dexamethasone				x^2	p-value
	Not Received		Received			
	No.	%	No.	%		
No	186	93	195	97.5	4.476	0.034
Yes	14	7	5	2.5		
Total	**200**	**100**	**200**	**100**		

This study showed the presence of two (1%) early neonatal deaths in non-dexamethasone group compared of zero in dexamethasone group as illustrated in Table (6) with no statistically significant differences between them.

Table (6): Comparison of early neonatal deaths (ENND) between neonates of mother with or without dexamethasone supplementation.

ENND	Dexamethasone				x^2	p-value
	Not Received		Received			
	No.	%	No.	%		
No	198	99	200	100	2.010	0.156
Yes	2	1	0	0		
Total	**200**	**100**	**200**	**100**		

* Fisher's Exact Test. ENND: Early neonatal death.

Regarding APGAR score in 1st minute, our study showed (6.62 ± 1.581) in non-dexamethasone group compared to (6.85 ± 1.389) in dexamethasone group, while APGAR score in 5th minute was (8.42 ± 0.989) and (8.58 ± 0.853) respectively with no statistically significant differences between both groups as appear in Table (7).

Table (7):comparison of APGAR score both in one and five minutes among neonates of mothers with or without dexamethasone supplementation.

APGAR SCORE	Dexamethasone		Mean Difference	t-value Calculated	p-value of Independent t-test
	Not Received M ± SD	Received M ± SD			
APGAR 1st min	6.62 ± 1.581	6.85 ± 1.389	- 0.23	- 1.545	0.123
APGAR 5th min	8.42 ± 0.989	8.58 ± 0.853	- 0.16	- 1.733	0.084

Discussion

In our study, we found no significant differences in terms of age, parity, number of caesarean sections , birth weight, gender, and anesthesia type between the two groups, which is found to be similar to other studies[15-17], the mean of gestational age in our study was 37.82 in dexamethasone group, and 37.89 in the control group, these were 38.7 and 38.5 respectively in Salem et al[16] and 35.2 and 34.9 in Nabhan et al [17] study, although in all of these studies have no statistically significant difference between the two groups , the gestational age in Nabhan et al.[17] study was smaller than in the other studies, this is because they include both term and near term babies.

Calculation of APGAR score in first minute showed 6.62 ± 1.581 in non- dexamethasone compared to 6.85 ± 1.389 in those received it, which was not significant, this finding

was different from Salem. et al.16 study which were 6.95 ± 2.24 and 8.63 ± 1.4 respectively and was statistically significant with p-value 0.0001, this may be due to larger sample size and different types of anesthesia, as in our study the general anesthesia and spinal anesthesia were nearly equal in both dexamethasone and non- dexamethasone group, while in Salem et al.[16] study all participant were subjected to spinal anesthesia , on the other hand APGAR score in fifth minute was 8.42 ± 0.989 in those not received dexamethasone compared to 8.58 ± 0.853 in those received it ,with no statistical significant difference between them , which found to be parallel with Salem et al[16].

In our study, we found three fold higher admission rate to neonatal intensive care units in women who not received dexamethasone 21 babies (10.5%) than those received it 7 babies (3.5%), which have high statistical significant difference between them, the findings were similar to Ammar et al.[15] study which was 24 versus 7 admissions respectively. A significant decrease in admission found also in dexamethasone group in Cochrane Pregnant and Childbirth group trial in 2009 (RR-15, CI 0.3-64) [21], Nada et al.[19] found significant lower admission to NICU in dexamethasone group 3.1% compared to control group 6.7% with p=0.003, similarly these findings were also observed in Ismail study[20] which was done locally at Sudan in 2011 found 9 babies 7.3% admitted in control versus no admission in corticosteroid group, but our study not agree with Nabhan et al.[17] study which found no significant difference of admissions between the two groups, 8 (12.7%) in dexamethasone group and 10 (16.7%) in control group with p-value 0.535, this is because the study included different gestational ages from our study (34 to 37 weeks).

Transient tachypnea of newborn TTN was the most frequent respiratory problems observed in these neonates post elective caesarean section, the occurrence of TTN was lower in those received prophylactic corticosteroid 14 (7%) versus 5 (2.5%) in non- dexamethasone group, these findings were parallel to Ammar et al[15] and Salem. et al.[16] which also found to be significant , on the other hand our study showed decrease in the incidence of reparatory distress syndrome RDS in dexamethasone group 7 (3.5%) versus 2 (2.5 %) in non-dexamethasone group, but statistically was not significant p- value (0.092), in agreement with Salem et al.[16] which also show reduction in the rate from 13 (4.7%) in non-dexamethasone group to 2 (0.8%) in dexamethasone group but not agree statistically, as in Salem. et al[16] statistically was significant p-value 0.001, this may be due to larger sample of the study. Both Ammar et al[15] and Nabhan et al[17] studies are parallel to the current study as the incidence of RSD is lower in dexamethasone group compared to control group but statistically was not significant.

There were only two neonatal deaths in the current study, both of them were in non- dexamethasone group , and both of them were admitted because of RDS , and both of them were 37 weeks gestation, no reported deaths observed in Sortiriads et al [2], Salem et al[16], Ammar et al.[15] and Nabhan et al.[17] studies which disagrees with our study, this may be attributed to the lack of ideal neonatal care unit in which neither mechanical ventilation, CPAP (continuous positive airway pressure), nor surfactant were available in our neonatal care unit.

Conclusions

It seems worthy to use dexamethasone prophylactically before elective caesarean section in term pregnancies, because we found it reduces the incidence of neonatal respiratory morbidities and admissions to neonatal intensive care unit, especially in our center in which mechanical ventilation and surfactant is not available.

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