The role of corticosteroids in prevention of neonatal respiratory morbidity in term elective cesarean section: A prospective: observation study

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Abstract

Background : Caesarean sections continue to increase day by day in both developed and developing countries, which is associated with increased respiratory distress syndrome (RDS), the key reason for early neonatal morbidity and mortality.

Objective: To assess the effect of routine prophylactic corticosteroids before elective caesarean section after 37 weeks of gestational age, on neonatal respiratory morbidity. Methods: A prospective observational study was conducted on all pregnant women undergoing elective caesarean sections between 37-42 weeks at Ain Shams University Maternity Hospital. Over an 8- month period (from November 2020 to June 2021), 1105 cases were divided into the exposed group (A), (N = 877) who received prophylactic dexamethasone, and 228 cases in the non-exposed group (B) who did not receive dexamethasone. Outcome measures were the incidence of transient tachypnea of the newborn, and NICU admissions due to respiratory morbidity. Data were analyzed using SPSS 22.

Results: Overall, there was no statistically significant difference in the incidence of TTN or RDS. No cases of TTN were found in exposed subgroup, versus 1 (0.4%) in non-exposed group (p= 0.745). The respiratory distress (RDS) in the exposed subgroup was 4 cases (16.7%) versus 18 (7.9%) in

non-exposed group (p = 0.148). While the admission to the neonatal intensive care unit (NICU) due to respiratory morbidity after an elective caesarean section was 4 cases (16.7%) in the exposed subgroup versus 19 cases (8.3%) in the non-exposed group (p = 0.178).

Conclusion: Routine administration of prophylactic antenatal corticosteroids before elective caesarean sections at term does not reduce the risk of admission to the NICU compared to non- administration.

Key Words: elective cesarean delivery; antenatal corticosteroid; respiratory morbidity.

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INTRODUCTION

Caesarean section is the most common major surgical intervention in many countries and a lifesaving intervention for women and newborns when complications arise, such as antepartum hemorrhage, fetal distress, abnormal presentation of the fetus, and hypertension. Therefore, the global concern about caesarean section rates is understandable when it is medically justified. [1]

According to a WHO survey, the percentage of caesarean sections (CS) performed around the world is constantly rising, with a recent upward trend, when compared to newborns delivered vaginally or by emergency cesarean delivery. [2]

Term pregnancy is defined as a delivery between 37 and 42 weeks (259–293 days) of gestation, according to the international classification of diseases, which is optimal timing for a good outcome for the mother and babies. However, neonatal outcomes vary within this wide gestational age [3,4].

Furthermore, the guidelines issued by the American Council of Obstetricians and Gynecologists, the Royal College of Obstetricians and Gynecologists (RCOG), and (NICE) recommend that an elective lower segment caesarean section (EL-LSCS) should be planned at 39 weeks [5, 6].

A systematic review of the literature and meta-analysis by Tefera et al. 7 showed that, babies born at term (at or after 37 weeks) by planned (elective) caesarean section and before onset of labour are more likely to develop respiratory complications than babies born vaginally.

Steroids are effective drugs with a variety of side effects, even if they improve outcomes when used appropriately. If not, side effects such as decreased fetal and placental growth, brain apoptosis, and increased infection may occur. On the other hand, steroid side effects appear to be related to both average dosage and cumulative duration of usage [8, 9].

The World Health Organization recommends that antenatal corticosteroids should not be routinely administered in instances where the gestational age cannot be verified (especially when thought to be more than 34 weeks) because the risk of harm would exceed the benefits 10. While, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists **RANZCOG** [11], advised that, if an elective lower segment caesarean section (EL-LSCS) is required before 39 weeks, prophylactic dexamethasone should be administered at least 48 hours before the caesarean section to reduce the incidence of infant respiratory morbidity (NRM).

The evidence for administration of corticosteroids after 34 weeks is still controversial since there is a lack of properly conducted trials of antenatal corticosteroids in mothers delivered by elective caesarean section at this gestational age. This current study is planned to compare the incidence and pattern of neonatal respiratory morbidity in neonates delivered by elective caesarean section between 37+ 0 to 41+ 6 weeks, whether they received antenatal routine prophylactic corticosteroids, or not.

PATIENTS AND METHODS

Study setting and design:

A prospective observational study was conducted on all pregnant women undergoing elective caesarean sections between 37-42 weeks, at Ain Shams University Maternity Hospital, over an 8- months' period (from November 2020 to June 2021).

Study participants:

Inclusion criteria: For all patients undergoing elective caesarean sections between 37+^{o} to 42+^{o} weeks an informed written consent was obtained for participation after reading the patient information sheet or having it discussed with patients.

Exclusion criteria: Congenital fetal anomalies conditions as: (Congenital diaphragmatic

hernia (CDH), congenital pulmonary airway malformation (CPAM), tracheo-esophageal fistula (TOF), pulmonary hypoplasia and congenital pneumonia). Also, cases with chorioamnionitis, fetal hydrops, persistant pulmonary hypertension of the newborn, evidence of fetal distress, APH, and maternal DM, or HTN were excluded.

Sample size:

A sample size of 1105 pregnant women achieve 80% power to detect equivalence in NICU admission rate between two groups with margin of equivalence range from (-5% to 5%) with significance level 0.05%.

After enrollment, there will be two groups:

Exposed group (A): 877 pregnant women who received complete or incomplete course of antenatal corticosteroid, in an appropriate manner.

Complete course is defined as: either 2 doses of 12 mg, 24 hours apart of betamethasone (Glomethasone ampoule Betamethasone - 8 mg/2 ml, Global Pharmaceutical Industries, GPI) or, 4 doses of 6 mg, 12 hours apart, of dexamethasone (Dexamethasone ampoule as sodium phosphate, 8 mg/2 ml, Amriya Pharmaceutical Industries). Both are given intramuscularly. Appropriate manner means that, delivery occurred between 24 hour up to one week after last dose of steroids.

Incomplete course is defined as: Failed to complete the above-mentioned doses or delivery before (24 hour) from last dose or after one week from last dose.

Unexposed group (B): 228 pregnant women who have not received any corticosteroids before caesarean section.

Procedure of the study:

All pregnant women undergoing elective caesarean sections between 37+° to 42+° weeks at Ain Shams University Maternity Hospital, (ASUMH) were included, after signing an informed consent to participate in this study [consent form 2] after explaining the study aims and objectives [form 1]. Also, we observed the patient hospital records and interviewed patients, in case of incomplete records to obtain the necessary data as listed in the data record form [form 3].

A neonatology specialist attended all deliveries; details of the resuscitation at the operative theatre were recorded. Apgar scores at 1 and 5 minutes were recorded.

All neonates were assessed for signs of RDS [defined as the presence of at least 2 of the following criteria: tachypnea, central cyanosis in room air, expiratory grunting, and subcostal, intercostal, or jugular retraction, and nasal flaring] or transient tachypnea of the newborn (TTN) [defined as a period of rapid breathing higher than the normal range of 40-60 times per minute].

All neonates admitted to the NICU were subjected to chest X-ray for exclusion of other associated pathologies and confirmation of diagnosis of RDS. All data about the need for admission to the neonatal intensive care unit (NICU) or the need for mechanical ventilation within 24 hours after birth were recorded.

Study outcomes:

Primary outcome: Admission to the NICU for respiratory morbidity.

Secondary outcome: Incidence of TTN, RDS, and need for mechanical ventilation.

Statistical analysis:

The data were analyzed using IBM SPSS advanced statistics version 22 (SPSS Inc., Chicago, IL). Numerical data were expressed as a mean and standard deviation. Qualitative data were expressed as frequency and percentage. Chi-square test (Fisher's exact test) was used to examine the relation between qualitative variables. For quantitative data, comparison between two groups was done using an independent sample t-test. Odd risk (OR) with it 95% confidence interval (CI) were used for risk assessment.

For all the above-mentioned statistical tests done, the threshold of significance was fixed at 5% level. The results were considered significant when $p \leq 0.05$.

RESULTS

The study investigators reviewed the records of 1105 women who met the eligibility criteria and were enrolled in the study as shown in the participant's flow chart; Figure 2.

Participants flow chart:

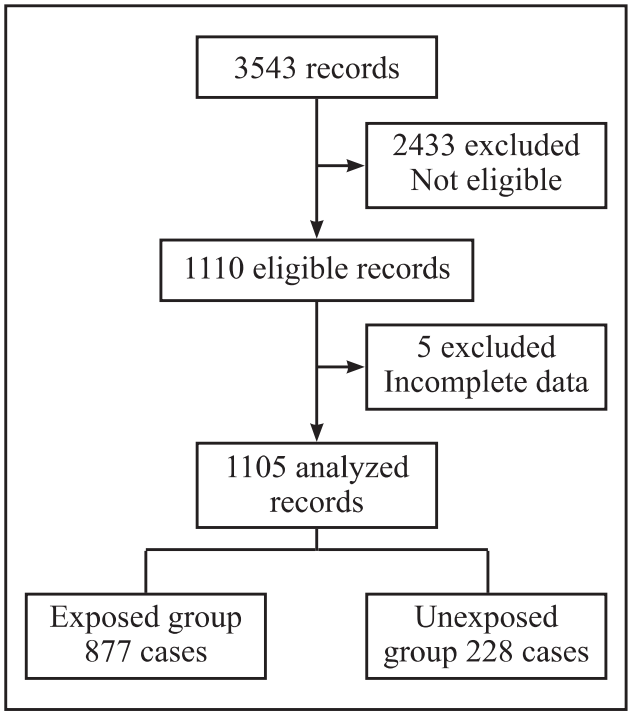

Figure 1. Flow chart of the studied cases.

There were no significant differences between the two groups regarding their age and parity at the time of enrollment table 1.

As shown in figure 2, collective analysis of the indications for elective caesarean section showed that the majority of elective caesarean section in both groups were done for previous caesarean section (72.39%), and the other common indications for caesarean section in patients were found to be malpresentation (3.17%), cephalopelvic disproportion (0.63%), maternal request (0.81%), and others (22.99%) on the study.

Table 2, shows that, there was no statistically significant difference regarding fetal and neonatal parameters.

We reviewed the records for the antenatal steroid courses received. We considered two doses of 12 mg each 24 hours apart of betamethasone, or four doses of 6 mg each 12 hours apart of dexamethasone, given intramuscularly a complete course. Also, we reviewed the interval between antenatal corticosteroids last dose and delivery. We considered 24 hours to 7 days between ANC last dose and delivery is a proper time for ANC administration.

Only 24 (2.74%) women were found to have received a complete course of dexamethasone in an appropriate time. On the other hand, 862 (98.29%) received single course versus 15 (1.71%) repeated courses before caesarean delivery. Regarding the time interval between the last ACS dose and delivery, an ACS-to-delivery interval of less than 7 days was found in 89 (10.15%) of cases, and more than 7 days in 788 (89.85%) of cases table 3.

There were no statistically significant differences between the outcomes of the two groups regarding respiratory distress, TTN, the length of hospitalization after caesarean delivery, and fetal outcomes (discharge from the NICU, neonatal sepsis, or death), as shown in table 4.

Further analysis was performed on the subgroup of patients (N = 24) who received complete (4 doses of 6 mg IM of dexamethasone12 hours apart), and proper (delivery occurred within 24 hours to 7 days after the last dose of dexamethasone) course of ACS. As shown in table 5, there was no statistically significant difference between the outcomes of this subgroup and no corticosteroids group regarding admission to the NICU, respiratory distress, TTN, and fetal outcome.

Furthermore, table 6 shows that there was no statistically significant difference between the outcomes of the subgroup with proper complete ACS and incomplete course of ACS regarding admission to the NICU, respiratory distress, TTN, and fetal outcome.

Table 1: Baseline maternal characteristics among studied groups

Demographic data	Group (A) Corticosteroids (n=877)	Group (B) No corticosteroids (n=228)	Test of Significance	P-value
Age (years)				
Mean ± SD	29.48 ± 5.42	29.28 ± 6.01	t= 0.497	0.619
Min-Max	18-46	18-44		
Age class				
≤25 y	242 (27.6%)	65 (28.5%)	χ^2 = 37.957	**0.079**
>25 y	635 (72.4%)	163 (71.5%)		
Parity				
Primigravida	71 (8.1%)	31 (13.6%)	χ^2 = 9.771	0.135
Multigravida	806 (91.9%)	197 (86.4%)		

χ^2: Chi square test, **t:** Independent sample t-test.

SD; Standard deviation

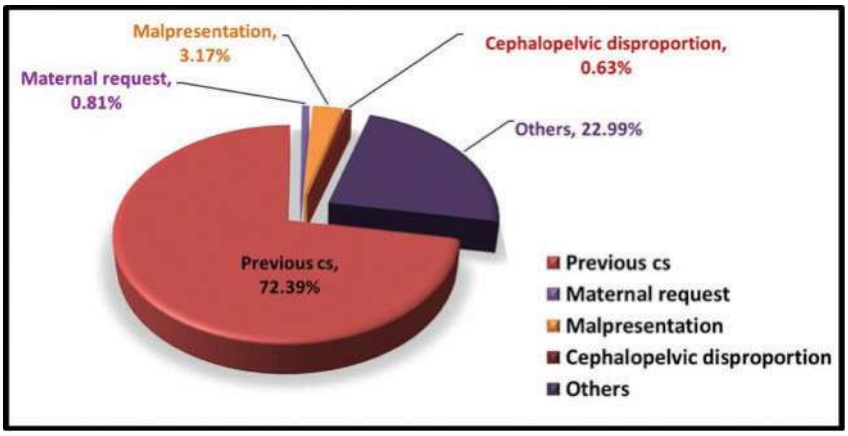

Figure 2 Indication of caesarean section among the studied groups.

Table 2: Baseline neonatal characteristics among the studied cases.

Characteristics	Group (A) Corticosteroids (n=877)	Group (B) No corticosteroids (n=228)	Test of Significance	P-value
Gestational age,				
Mean ±SD (week)	38.3 ± 6.91	38.5 ± 7.95		
Neonatal deliveries				
Single, no. (%)	856 (97.6%)	227 (99.6%)	χ^2= 3.548	0.060
Twins, no. (%)	21 (2.4%)	1 (0.4%)		
Neonatal gender				
Male, no. (%)	435 (48.4%)	112 (48.9%)	χ^2= 0.044	0.835
Female, no. (%)	463 (51.6%)	117 (51.1%)		
Birth weight				
Mean ±SD (gram)	3012.87±465.94	3071.51±489.61	t= 1.675	0.094
Range	1600-4800	1950-5300		

χ^2: Chi square test, **t:** Independent sample t-test.

SD; Standard deviation

Table 3: Corticosteroids characteristics received among the studied cases.

Characteristics		N	%
Dexamethasone received intramuscularly	Complete course & proper dose *	24	2.74%
	Incomplete course	853	97.29%
	Single course	862	98.29%
	Repeated course	15	1.71%
The time between last ACS dose and delivery > 7 days		788	89.85%
The time between last ACS dose and delivery ≤ 7 days		89	10.15%

Total =877
***Complete course:** means 4 doses of 6 mg IM of dexamethasone 12 hours apart.
***Proper dose:** means delivery occurred within 24 hours to 7 days after the last dose.

Table 4: Outcome of the two-studied groups and odds ratio of the dexamethasone treated group.

Outcome	Group (A) Corticosteroids (n=877)	Group (B) No corticosteroids (n=228)	OR	95% CI	p-value
Admission to NICU	104 (11.9%)	19 (8.3%)	1.48	0.887-2.470	0.132
RD	100 (11.4%)	18 (7.9%)			
Grade I	56 (6.3%)	10 (4.4%)			
Grade II	28 (3.2%)	4 (1.8%)	1.50	0.889-2.537	0.127
Grade III	16 (1.8%)	4 (1.7%)			
Grade IV	0 (0.0%)	0 (0.0%)			
TTN	4 (0.5%)	1 (0.44%)	1.04	0.116-9.351	0.972
Mechanical ventilation	15 (1.7%)	3 (1.3%)	0.77	0.220-2.670	0.675
Apgar - score					
At 1-min, mean ±SD	6.69 ± 1.18	6.71 ± 1.21			0.885
At 5-min, mean ±SD	8.83 ± 0.53	8.85 ± 0.55			0.679
NICU- stay					
<6h	12 (1.4%)	3 (1.3%)			0.476
6-48h	47 (5.4%)	8 (3.5%)			
>48h	45 (5.1%)	8 (3.5%)			
Fetal outcome					
Discharge	93 (89.42%)	17 (89.47%)			0.321
Sepsis	7 (6.73%)	3 (15.78%)			
Death	11 (10.58%)	2 (10.53%)			

NICU: Neonatal intensive care unit. **OR:** Odds ratio.
TTN: Transient tachypnea of newborn. **CI:** Confidence interval.
RD: Respiratory distress.

Table 5: Complete ACS versus no ACS group regarding neonatal outcomes.

Outcome	Complete ACS (n=24)	Group (B) No corticosteroids (n=228)	OR	95% CI	p-value
Admission to NICU	4 (16.7%)	19 (8.3%)	2.200	0.682-7.101	0.178
RD	4 (16.7%)	18 (7.9%)			
Grade I	1 (4.2%)	10 (4.4%)			
Grade II	2 (8.3%)	4 (1.8%)	2.333	0.719-7.567	0.148
Grade III	1 (4.2%)	4 (1.7%)			
Grade IV	0 (0.0%)	0 (0.0%)			
TTN	0 (0.00%)	1 (0.44%)	1.004	0.996-1.013	0.745
Fetal outcome					0.242
Discharge	3 (75.0%)	17 (89.47%)			
Death	1 (25.0%)	2 (10.53%)			

NICU: Neonatal intensive care unit. **OR:** Odds ratio.
TTN: Transient tachypnea of newborn. **CI:** Confidence interval.
RD: Respiratory distress. **ACS:** Antenatal corticosteroids.

Table 6 Complete course versus incomplete course of ACS regarding neonatal outcomes.

Outcome	Complete course (n=24)	In complete course (n=853)	OR	95% CI	p-value
Admission to NICU	4 (16.7%)	100 (11.72%)	1.506	0.505-4.495	0.460
RD	4 (16.7%)	96 (11.25%)			
Grade I	1 (4.2%)	55 (6.4%)			
Grade II	2 (8.3%)	26 (3.0%)	1.577	0.528-4.711	0.411
Grade III	1 (4.2%)	15 (1.8%)			
Grade IV	0 (0.0%)	0 (0.0%)			
TTN	0 (0.00%)	4 (0.47%)	1.005	1.000-1.009	0.737
Fetal outcome					0.403
Discharge	3 (75.0%)	90 (90.0%)			
Death	1 (25.0%)	10 (10.0%)			

NICU: Neonatal intensive care unit. **OR:** Odds ratio.
TTN: Transient tachypnea of newborn. **CI:** Confidence interval.
RD: Respiratory distress. **ACS:** Antenatal corticosteroids.

DISCUSSION

According to a recent guideline by the Royal College of Obstetricians and Gynaecologists **(RCOG),** [6] for a planned caesarean section between 37+0 and 38+6 weeks an informed discussion should take place about the potential risks and benefits of a course of antenatal corticosteroids. Although antenatal corticosteroids may reduce admission to the neonatal intensive care unit for respiratory morbidity, it is uncertain if there is any reduction in respiratory distress syndrome, transient tachypnea of the newborn, or NICU admission overall, antenatal corticosteroids may result in harms to the neonate, which include hypoglycaemia and potential developmental delay.

Furthermore, a study by **Crowther et al**. [12] reported increased rates of SGA with repeated doses ≥4 courses.

This prospective observational study was conducted at Ain Shams University Maternity Hospital to assess the effect of routine prophylactic corticosteroids before elective caesarean section, at 37-42 weeks of gestation on neonatal respiratory morbidity.

The present study compared neonatal respiratory morbidity between 877 cases in group (A), whose mothers received prophylactic antenatal dexamethasone, and 228 cases in group (B), whose mothers did not receive dexamethasone.

The majority of elective caesarean sections in both groups were done for previous caesarean section (72.39%), malpresentation (3.17%), cephalopelvic disproportion (0.63%), maternal request (0.81%), and others (22.99%).

Meticulous review of the dose regimens and ACS- delivery interval revealed that only 24 women was (2.74%) received the ACS doses strictly according to the guidelines and delivered within 24 hours to 7 days after the last dose.

In our study, there was no statistically significant difference in the incidence of TTN or RDS. No cases of TTN were found in exposed subgroup, versus 1 (0.4%) in non-exposed group (p = 0.745). The respiratory distress (RDS) in the exposed subgroup was 4 cases (16.7%) versus 18 (7.9%) in non-exposed group (p = 0.148). While the admission to the neonatal intensive care unit (NICU) due to respiratory morbidity after elective caesarean section was 4 cases (16.7%) in the exposed subgroup versus 19 cases (8.3%) in the non- exposed group (p = 0.178).

Jayawardane et al. [13] conducted a retrospective cohort study to investigate the effects of corticosteroid administration for respiratory morbidity in neonates delivered by elective caesarean section (ELCS) between 37 and 38+6 weeks. Of the 560 patients included, 23.2% received antenatal corticosteroids. The incidence of RD, NICU admissions in the study cohort was 10%, 0.9%, and 2.7% respectively. Relative risk for developing RD in the steroid group compared to no steroid group was 2.67 (95% CI 1.64-4.35). While 4.6% of the steroid group and 3.3% of the non-steroid group needed to be admitted to the NICU (p = 0.464). They agreed with the results of the present study and even stated that, there was an increase in respiratory morbidity in the dexamethasone-administered mothers. However, this effect had no clinical significance since the admissions to the NICU was not significantly different.

El-Berry and colleagues, [14] compared neonatal respiratory morbidity among exposed and non-exposed groups. They found that there were no significant difference between the corticosteroid exposed group and non-exposed group regarding admission to the NICU (p = 0.570), respiratory distress syndrome (no cases of RDS have been recorded), transient tachypnea of the neonate, need for mechanical ventilation (p = 0.701), outcome, and length of hospital stay. They agreed with our study that antenatal corticosteroids for elective caesarean delivery between 37 and 39 weeks is not effective in improving neonatal outcomes.

Also, **Ahmadpour-kacho and colleagues,** [15] compared an overall of 200 infants, with the age of 39-42 weeks, in two groups a control group (n = 100) and betamethasone group (n =100). They reported that nine neonates (9%) in the steroid group and 8 neonates (8%) in the control group had TTN (p = 0. 64), and one (1%) neonate in the steroid group and one neonate (1%) in the control group had RDS (p = 1). They found that, there were no significant differences in outcomes between the two groups.

In line with our results **Tan and colleagues,** [16] conducted a retrospective study of 674 patients undergoing elective caesarian sections between 37±0 and 38±6 and compared the respiratory morbidities before and after the implementation of single dose 12 mg IM dexamethasone given at least 24 hours before the elective caesarean section. They found that IM dexamethasone injection did not show any significant benefit with regards to reducing the admission to neonatal care (OR 0.97, p = 0.69), admission to the neonatal intensive care unit (OR 0.91, p = 0.80), the need for mechanical ventilation (OR 0.98, p = 0.95), and the incidence of transient tachypnea of the newborn (OR 1.01, p = 0.96). Also, there was no significant difference in the duration of admission to the neonatal intensive care unit for both groups (p = 0.17).

Arsad and colleagues, [17] conducted a study on women with singleton pregnancies planned for elective caesarean section between 37+0 and 38+6 weeks gestation.

Overall, 189 patients were recruited, 93 women in the intervention group and 96 as controls. In their study, infants with respiratory morbidities were primarily due to transient tachypnea of newborns (9.7% vs. 6.3%), but none had respiratory distress syndrome. Only four infants required NICU admission (2.2% vs. 3.1%, p = 0.63). Their average length of stay was not statistically different between the two groups; 3.5 ±2.1 days vs. 5.7 ± 1.5 days (p = 0.27).

They agreed with our results that antenatal dexamethasone did not diminish the number of infants needing respiratory support, NICU admission or the length of NICU stay.

In our study, the overall mortality in exposed group was 1 out of 24 (4.17%), while in non-exposed group was 2 out of 228 (0.88%). However, this was not a statistically significant difference (p = 0.242).

Contrary to our study, a recent cochrane review by **Sotiriadis et al.** [18] suggested that the administration of 2 doses of betamethasone 48 hours, before planned CS at term probably reduces neonatal respiratory morbidity compared with a placebo or no treatment. The incidence of TTN was 2.3% versus 5.4% (RR 0.43, 95% CI 0.29–0.65), RDS was 2.6% versus 5.4% (RR 0.48, 95% CI 0.27–0.87), and admission to the NICU for respiratory morbidity was 2.3% versus 5.1% (RR 0.45, 95% CI 0.22–0.90). However, they stated that the risk of bias for selective outcomes was unclear, and the overall certainty of the evidence for the primary outcomes was found to be low or very low.

Also, **Khushdil and colleagues,** [19] conducted a non-randomized experimental study and compared 240 patients (44.8%) who received steroids before their elective caesarean section at 37-39 weeks, to 295 patients (55.2%) who did not receive steroids. They reported that, 4.74% of newborns in group (2) developed transient tachypnea of newborns (TTN), which was higher than the newborns in group (1) (1.66%), (p = 0.049). Also, the number of neonates being admitted to the NICU was greater in group (2) than in group (1) [23 (7.79%) versus 6 (2.5%), respectively, p = 0.007]. They disagreed with our study that steroids significantly reduce the risk of respiratory morbidity in babies delivered by elective caesarian section between 37-39 weeks. However, this disagreement might be

due to the difference in gestational age, and the smaller sample size.

Similarly, **Elewa and colleagues,** [20] compared 200 cases who received two intramuscular doses of 12 mg dexamethasone 12 hours apart, 24 hours before elective caesarean section. To 200 cases who received IM saline as a placebo in the same regimen as the steroid group at gestational age 37-39 weeks. They reported that both TTN admission to the NICU, and neonatal need for CPAP were statistically significantly lower among group (A) than in group (B). However, their study used a prophylactic intramuscular injection of 12 mg of dexamethasone rather than 6 mg. The dexamethasone dose, and the gestational age of the study participants, may be behind the difference with our results.

Srinivasjois and colleagues, [21] conducted a systematic review and meta- analysis, including three randomized controlled trials (N = 2740 patients). They concluded that although steroid administration reduces neonatal morbidities, routine administration of steroids prior to scheduled cesarean section should be done cautiously because of the long-term risks related to steroids.

A recently published systemic review and meta-analysis by **Ninan et al.** [22] further alerts us to the potential long-term effects on neurodevelopment of antenatal exposure to corticosteroids. In this review, a total of 30 studies (more than 1.25 million children) were included, where the authors highlighted the risk of associated mental, behavioral, and neurocognitive disorders in late-preterm and full-term birth with antenatal corticosteroid exposure. The postulated explanation was that fetuses near term are exposed to an intrinsic increment of cortisol from self and from the maternal side. The dose of the injected exogenous corticosteroids is supraphysiological, which may interfere in the brain developmental programming, as well as the hypothalamic– pituitary–adrenal axis.

Among the strengths of this study is the large sample size (1105 patients). Furthermore, we observed the patients' hospital records and interviewed the patients in case of incomplete records to minimize recall bias. Also, we meticulously reviewed the dose regimens and ACS- delivery intervals to further target the subgroup of patients who received ACS strictly as per the guidelines.

Finally, we followed up the neonates admitted to the NICU, traced their respiratory needs (nasal oxygen, CPAP, mechanical ventilation), until they were either discharged home, or sadly perished.

The limitations of the current study is it's observational nature, that made it dependent on patient recall and self-reported exposure. So, a risk of bias may be found. However, the outcomes were objective, depending on the diagnosis made by clinicians at the time of delivery rather than radiological features. Also, we tried to minimize bias by confirmation of the data in the records by direct interview of the patient. Furthermore, the current study focused on short-terms rather than long-terms follow–up of babies whose mothers received dexamethasone.

CONCLUSION

According to our findings, routine administration of prophylactic antenatal corticosteroids before elective caesarean sections at term does not reduce the risk of admission to the NICU compared to non-administration.

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