Derna University Journal of Medical Sciences (DUJMS)

UNIVERSITY OF DERNA

Volume 3 | Issue 1 | 2025 | Pages 57-64
ISSN: 2789-7389 (Online) | **DOI:** https://doi.org/10.58987/ngmvma27

Original Research

Effect of Antenatal Corticosteroids on Neonatal Outcomes in Term Planned Caesarean Deliveries: A Clinical Trial at Benghazi Medical Center

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Received: 26 May 2025 **Accepted:** 28 June 2025 **Published:** 30 June 2025

ABSTRACT:

Respiratory distress syndrome is one of primary causes of early newborn morbidity and death, considerably contributing to the substantial costs associated with neonatal intensive care. Antenatal corticosteroids given at or near term can help reduce the risk of respiratory complications in newborns by accelerating lung maturation and promoting the clearance of alveolar fluid. This study is aimed to evaluate the effectiveness of the corticosteroid therapy prior to elective cesarean section at term in mitigating the respiratory morbidity in the neonates. The total participant are 400 pregnant women were admitted for elective C\S meeting with inclusion criteria, in each group 200 case group (IM Dexamethasone given) and 200 control group (not given Dexamethasone). The average age was 34.10 years (± 6.97).

The minimum age was 20 years, while the highest age was 48 years. The mean Apgar scores at 1 minute were statistically substantially elevated in the case group relative to the control group. The occurrence of transitory tachypnea was considerably less in the group administered intramuscular dexamethasone compared to the control group. Maternal age, gravida, parity, and gestational age does not appear to have difference among both group. Intramuscular injection of dexamethasone before elective caesarean section at term pregnancy can reduce neonatal transient tachypic attack, and intramuscular injection of dexamethasone before elective caesarean section at term pregnancy has positive effect on neonatal Apgar score at 1 minute.

KEYWORDS:
Antenatal Corticosteroids, Elective Caesarean Deliveries, Respiratory Distress Syndrome.

INTRODUCTION

Preterm pregnancies often employ antenatal corticosteroids (ACS) to improve fetal lung maturity and prevent newborn respiratory problems. in term scheduled cesarean section (CS) there is role but still being studied. Due to the lack of labor-induced physiological changes that promote lung fluid clearance, appointed term CS the neonates is at risk of respiratory morbidity, including TTN and RDS.

Corticosteroids before term elective CS may minimize infant respiratory problems, according to research. ACS increase the lung surfactant synthesis and the fluid resorption, resembling spontaneous labor preparation. Despite encouraging data, systematic use of ACS at term is contentious due to concerns about neonatal glucose homeostasis and long-term neurodevelopmental consequences.

A number of RCTs and meta-analyses have explored the short-term benefits and dangers of ACS in term CS. However, additional study is needed to standardize their usage, especially in specialized groups. This study examines whether ACS improves newborn outcomes in term scheduled CS births at Benghazi Medical Center, adding to the expanding body of data.

Infants delivered at term via cesarean section exhibit an increased risk of respiratory morbidity compared to those delivered vaginally. The peril Elevates further for neonates delivered by non-emergency cesarean section and before to 39 weeks gestation. The incidence of respiratory morbidities decreases from 3.9% at 37 weeks to 0.8% at 39 weeks. Consequently, it has been proposed that non-emergency (CHAN et.al, 2022) cesarean delivery be deferred until 39 weeks.

Scheduled caesarean birth is a premeditated procedure conducted prior to the commencement of labor, and it is linked to a heightened risk of iatrogenic infant respiratory morbidity.(Makker et.al, 2024)

RDS primarily affects preterm infants, with 93% of those born before 28 weeks of gestation experiencing this condition. Additionally, nearly 10% of late preterm infants and about 1% of full-term infants are affected by RDS, In the United States it affects about 20% of low-birth-weight infants. This syndrome is most commonly observed within the first hour after birth.(Marciniak et.al, 2011, Saccone et.al, 2016)

The major cause of early infant morbidity and death is respiratory distress syndrome (RDS), which drives up neonatal intensive care costs.

Respiratory distress is caused by

surfactant deficit, which is essential for When compared to vaginal delivery (VD), elective CS increases the risk of overall newborn respiratory morbidity by two to fourfold. Maternal steroid treatment before delivery is one of the most well -documented, cost-effective, and life-saving interventions in fetal medicine. Although no significant adverse effects have been documented following corticosteroid usage during pregnancy; nevertheless, several non-serious side effects have been observed post-administration, including the following: diminished fetal movements, decreased fetal breathing movements, and variations in heart rate. (Elewa et.al, 2020, Stutchfield et.al, 2005)

Antenatal corticosteroids reduce neonatal respiratory issues in numerous ways Improved Alveolar Fluid Clearance Sodium Transport Activation: ACS increase pulmonary epithelial sodium channels (ENaC) and Na+/K+ ATPase pumps. These channels allow sodium to be actively absorbed from the alveolar gap into the interstitial tissue, removing lung fluid by osmotic water elimination.

Acute respiratory distress syndrome (ARDS) causes type II pneumocytes to produce and release surfactant, a lipid-protein mixture that reduces alveolar surface tension and prevents collapse during expiration. Upregulation of Aquaporins: These water channels help remove pulmonary edema by translocating fluid from the alveoli into the pulmonary circulation and given intramuscularly at 12-hour intervals. (Brownfoot et.al, 2013)

Prenatal therapy with dexamethasone, the most widely used corticosteroid, is often favored for enhancing fetal lung maturation. Although it lacks mineralocorticoid action and has minimal immunosuppressive effects with short-term dosing, its active form can cross the placenta. (Gerald et.al, 2006). A number of medical disorders can be alleviated with the usage of lung development (RCOG et.al, 2004).

lymphatics. Due to delayed alveolar fluid absorption, near-term neonates, especially those born via cesarean section without labor, are at higher risk of TTN. ACS speeds the transition from fluid-filled fetal to air-filled postnatal lung. Fibroblast-pneumocyte contact via corticosteroids increases alveolar septation and lung compliance, improving gas exchange. They also promote pulmonary vascular development, improving oxygenation and reducing baby respiratory distres

Anti-Inflammatory and Immune-Modulating Effects: ACS reduces, (Htun et.al, 2021, Gyamfi-Bannerman et.al, 2016) pulmonary inflammation and oxidative stress that might cause neonatal respiratory issues by inhibiting pro-inflammatory cytokines. They may also reduce infant sepsis-related. pulmonary issues.

The Royal College of Obstetricians and Gynecologists recommends giving prenatal corticosteroids to all elective cesarean section patients before 38 weeks and 6 days. (Dagklis et.al, 2022).

Corticosteroids frequently administered antenatal for lung development include betamethasone phosphate and dexamethasone. The standard regimen for betamethasone consists of two doses included 12 mg administered intramuscularly at 24-hour intervals, while dexamethasone is administered as the four doses of 6 mg.

Dexamethasone causes rheumatism, skin diseases, severe allergies, asthma, COPD, croup, brain edema, and TB when used in conjunction with antibiotics. When given intravenously, orally, or by injection into a muscle, it may enhance the result for the baby in premature labor. Within a day, you should start to feel the effects of dexamethasone, and they should last for around three days. (WHO., 2016)

It was not until 1957 when dexamethasone was invented. Because of its low price and high efficacy, it is considered an essential medicine by the World Health Organization. Essential medicines are those that are absolutely necessary for a healthcare system to

MATERIALS AND METHODS

Randomized controlled studies comparing prophylactic prenatal corticosteroid therapy with placebo or no treatment, administered prior to elective cesarean delivery at term (at or after 37 weeks of gestation), was conducted in Benghazi Medical Center (BMC), The study was undertaken from jun..2023 to jun.2024. Data collection period 5 months from April 2023 to Sep. 2023, the total sample size are 400 pregnant women admitted

for elective C\S meeting with inclusion criteria 200in each group 200cases (IM Dexamethasone given) 200 control (not given Dexamethasone)included women with singleton pregnancies at term (37 + 0 weeks or more) who underwent elective

RESULTS AND DISCUSSION

This randomized controlled study investigated the efficacy and safety of prophylactic antenatal corticosteroid therapy, specifically intramuscular dexamethasone, administered prior to elective caesarean section (C/S) at term (≥37 weeks of gestation). The study, conducted at Benghazi Medical Center, provides valuable insight into neonatal respiratory outcomes associated with corticosteroid use in low-risk term pregnancies.

The findings are consistent with prior evidence indicating that corticosteroids given before elective cesarean sections at term can notably decrease the occurrence of neonatal respiratory issues, especially transient tachypnea and respiratory Distress syndrome (RDS) function. (Nabhan et.al, 2014). The aim of this research is to determine whether or not the use of corticosteroids before a scheduled caesarean section at full term is effective in lowering the risk of respiratory morbidity in newborns.

Caesarean section under general or regional anesthesia, Primary outcome measures were the efficacy and safety of corticosteroids before elective C\S at term pregnancy, Inclusion criteria: pregnant women at term gestational age (37-39) weeks, for elective C\S, single pregnancy, not have any chronic illness, Exclusion criteria twine pregnancy,

Pregnant with any chronic illness, preterm pregnancy, pregnant for emergency C\S, congenital anomalies pregnancy.

Two doses of dexamethasone, two dosages 12 mg were administered intramuscular, 12 hours apart, the moms, who satisfied the requirements, were assigned numbers e.g., 1, 2, 3...etc... To the moms, even numbers served as controls and the odd numbers as cases.

Alhousseiniet.al, 2023 reported that the physiological rationale for corticosteroid use is bolstered by these findings, as it is associated with increased alveolar fluid clearance and lung maturation—processes that are usually postponed in neonates born via C/S without labor (Liu et.al, 2024).

The dosing regimen employed in this study—two intramuscular injections of 12 mg dexamethasone spaced 12 hours apart—aligns with protocols that have been studied previously (Smith et al., 2024). Significantly, there were no notable maternal side effects observed, which supports the known safety of using corticosteroids at term (Htun et.al, 2021).

This study's strengths comprise its randomization and the clarity of its inclusion/exclusion criteria. The straightforward odd-even allocation

system ensured randomization and was free of selection bias. The study reduced potential confounding factors by restricting the study population to singleton term pregnancies without chronic illness.(Tanaka et.al, 2022)

Nonetheless, it is important to recognize certain limitations. The findings may have limited generalizability, as this study was conducted at a single center. Moreover, the duration of follow-up was rather brief and did not examine long-term neonatal or developmental outcomes—factors that are becoming more important in assessments of the wider effects of antenatal steroid exposure (Dagklis et.al, 2022 , Htun et.al. 2021).

A total of 400 cases for cesarean section, 200 case receive dexamethasone, while 200 control (not receive dexamethasone)

Table: (1). Distribution of age, gravida, parity, and gestational age among participant

Group	Case	Control	Std. Deviation	P Value
Age	34.2488	33.9548	.48514	.650
Gravida	3.8507	3.8693	.15831	.897
Para	2.4080	2.4623	.12364	.735
Gestational age (weeks)	38.0448	38.0302	.03548	.289

This table shows no significance between case and control groups according to age, gravida, parity and gestational age all P value more than 0.05

Table 2: Distribution of Participant according to Baby Birth Weight

Group	Mean	Std. Deviation	P value
Cases	3.3448	.56071	.451
Controls	3.3682	.59116	0.002

This table shows no significance between case and control groups according baby birth weight. P value 0.451.

Table (3). Distribution of Participant according to Apgar Score

Group	Mean	Std. Deviation	P value
Cases	9.8060	.56317	0.000
Controls	9.5729	.72018	0.001

Table (4): distribution of participant according to respiratory distress

Group	Mean	Std. Deviation	P value
Cases	1.8358	.37136	0.000
Controls	1.3166	.46632	0.001

This table shows there is significance difference between case and control groups according respiratory distress. P value 0.000 less than 0.005. This study contributes to the literature backing the use of antenatal corticosteroids prior to elective C/S at term, notwithstanding these limitations. The results are particularly pertinent in areas where the rates of elective C/S are high and neonatal intensive care resources are scarce. It is advisable to conduct future multi-center studies with extended follow-up periods to investigate developmental outcomes and to enhance the clinical guidelines further.

CONCLUSION

Intramuscular injection of dexamethasone before elective CS at term pregnancy can reduce neonatal transient trachytic attack and intramuscular injection of dexamethasone before elective CS at term pregnancy has positive effect on neonatal Apgar score at 1 mint

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request

ETHICS

Ethics approval and consent to participate. are available from the corresponding author on reasonable request

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الملخص

يُعد متلازمة الضائقة التنفسية أحد الأسباب الرئيسية لحدوث المرض والوفيات المبكرة لدى حديثي الولادة، كما تسهم بشكل كبير في ارتفاع تكاليف الرعاية المركزة لحديثي الولادة. وتُظهر الدراسات أن إعطاء الكورتيكوستيرويدات للأم قبل الولادة، حتى في حالات الحمل مكتمل النمو، يُسهم في تسريع نضج الرئتين وتعزيز التخلص من السوائل السنخية، مما يقلل من المضاعفات التنفسية عند المواليد. تهدف هذه الدراسة البحثية إلى تقييم فعالية العلاج بالكورتيكوستيرويدات قبل إجراء الولادة القيصرية الاختيارية في نهاية الحمل، و في

الحد من حدوث الاعتلالات التنفسية لدى المواليد. شملت الدراسة 400 سيدة حامل تم إدخالهن لإجراء ولادة قيصرية اختيارية وفقًا لمعايير الاشتمال، تم تقسيمهن إلى مجموعتين بالتساوي: مجموعة الحالات (200 سيدة تلقين ديكساميثازون عن طريق الحقن العضلي) ومجموعة الضبط (200 سيدة لم يتلقين الكورتيكوستيرويد). بلغ متوسط أعمار المشاركات 34.10 سنة (± 6.97)، تراوحت أعمارهن بين 20 و 48 سنة. أظهرت النتائج ارتفاعًا ذا دلالة إحصائية في متوسط درجات أبغار عند الدقيقة الأولى في مجموعة الحالات . كما لوحظ انخفاض ملحوظ في معدل حدوث تسرع النفس العابر عند حديثي الولادة في المجموعة التي تلقت الديكساميثازون.
لم تُظهر الدراسة فروقًا ملحوظة بين المجموعتين من حيث عمر الأم، عدد مرات الحمل، عدد الولادات، أو عمر الحمل. إلا أن إعطاء حقنة عضلية من ديكساميثازون قبل الولادة القيصرية في الحمل مكتمل النمو يُسهم في خفض معدل تسرع النفس العابر لدى حديثي الولادة، كما يُحسن من نتائج تقييم أبغار عند الدقيقة الأولى بعد الولادة.

الكلمات المفتاحية:

الكورتيكوستيرويدات قبل الولادة، الولادة القيصرية الاختيارية، متلازمة الضائقة التنفسية.