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Antenatal corticosteroids use before elective cesarean sections in term pregnancies

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Abstract: Background: Elective term birth by caesarean section (CS) is accountable for half of all neonatal respiratory distress cases that could have been avoided. The most prevalent cause of Neonatal Respiratory Morbidity is transient tachypnea in newborns, followed by Respiratory distress syndrome. Iatrogenic Respiratory distress syndrome [after elective CS] persists as a cause of mortality and morbidity in neonates. **Objective:** The aim of this research was to assess the efficacy of intramuscular dexamethasone administered at term pregnancies delivered by elective caesarean section in reducing neonatal complications. **Patients and methods:** On the basis of their trustworthy date and early ultrasound measurements of crown rump length, this prospective randomized controlled trial was undertaken at Al-Azhar University hospital and Akhmim hospital and comprised 100 pregnant women presenting for elective CS following 37 weeks of pregnancy. **Results:** The recorded neonatal respiratory complications were transient tachypnea of the newborn (TTN), neonatal respiratory distress syndrome (RDS), and neonatal intensive care unit (NICU) admission were decreased. As regard to Apgar score, the mean and the median of Apgar score at 1st minute were (8.12±0.72) and 8(7:9) respectively for study group and (5.5±1.02) and 5(4:7) respectively for control group with a significant difference between the studied group. Also, the mean and the median of Apgar score at 5th minute were (8.56±0.50) and 9(8:9) respectively for study group and (7.48±0.58) and 7(7:9) respectively for control group with a significant difference between the studied group. **Conclusion:** Prophylactic corticosteroid therapy prior to elective caesarean section at term reduced newborn respiratory morbidity and admission to special care unit.
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Keywords: Dexamethasone, Respiratory Morbidity, Elective Caesarean Section

1. Introduction:

There is a rising trend towards elective Caesarean section [CS] worldwide in the past decades. The major contribution is pervious scar due to drastic decline in trial of vaginal delivery after CS scar. Other reasons for this increased trend are elective Caesarean for breech presentation and maternal request. Dramatic decline in trial of scar is most likely owing to concern that labour trial will be associated with higher risk of maternal and perinatal mortality [(1)].

Neonatal Respiratory Morbidity [NRM] is one of the known complications of elective CS conducted between 37-38+6 weeks of pregnancy. It ranges from transient tachypnoea [TTN] of newborn to respiratory failure. For the first time, the association between NRM and term elective CS was noted in 1964. A great number of studies have been conducted since then to establish their correlation. A recently cohort study further strengthened this association [(2)].

Neonatal respiratory failure occurs as a result of surfactant deficiency, poor anatomical development of lung, as well as immaturity in other organs. Neonatal survival after preterm birth improves with length of gestation, reflecting improved maturity of organ systems [(3)].

In singleton preterm deliveries, prophylactic corticosteroids help the newborn's lungs mature faster and reduce the incidence of RDS [(4)]. Therefore, antenatal corticosteroids are currently recommended between 24 and 33^6 weeks of pregnancy in ladies who are at risk of preterm birth within seven days. the American College of Obstetricians and Gynecologists recommended antenatal corticosteroids for women who were at risk of late preterm birth at more than 34 weeks' gestation but not for women undergoing planned cesarean at term [(5)], whereas according to the Royal College of Obstetricians and Gynaecologists antenatal corticosteroids ought to be administered to all ladies who have a scheduled elective cesarean section prior to 38^6 weeks' gestation [(6)].

The aim of this study was to assess the efficacy of intramuscular dexamethasone administered at term pregnancies delivered by elective caesarean section in reducing neonatal complications.

3. Patient and methods:

A prospective Randomized controlled study was conducted at Al-Azhar university hospital and Akhmim hospital and included 100 pregnant women presented for elective CS after completed 37 weeks gestation, based on their reliable dates and confirmed by early ultrasound measurement of crown rump length. The study design was approved by Al-Azhar Faculty of Medicine's Ethical Committee.

The study population was divided into two groups: Ladies in **Group I (study group)** got 2 intramuscular dosages of 12 mg dexamethasone (Dexamethasone 8 ml, Sigma) at 12 hr intervals, 48 hrs prior to elective CS, whereas ladies in **Group II (control group)** did not receive the planned dosage.

Inclusion Criteria:

Depending on their trustworthy dates and verified by early ultrasound measurements of crown rump length, all pregnant women presented for elective CS after completing 37 weeks of gestation.

Exclusion Criteria:

1. Fetuses with major congenital anomalies, medical problems that can affect fetal well-being.
2. Medical or obstetric conditions (preeclampsia, diabetes mellitus, antepartum hemorrhage) that necessitate immediate or early birth.
3. Ladies who were given Dexamethasone as a prophylactic throughout their present pregnancy and those who developed a spontaneous labour.

All patients were subjected to:

1. A detailed history included: Personal history, obstetric history, menstrual history, past and present history of illness.
2. Routine antenatal investigations were reviewed and ordered if not done before.
3. Examination (general, obstetrics and possible local examination)
4. Ultrasound was done for all patients and other aids as CTG and possible fetal Doppler indices.
5. Dexamethasone administration before elective CS at term, the decision was depended on the daily shifts' local protocols for hospital units.
6. A senior anesthesia physician administered spinal anaesthetic to all study subjects, and a senior obstetrics physician performed the elective CS.
7. A neonatology specialist was present at all births, and the specifics of the resuscitation in the operating room were documented. At 1 and 5 mins, Apgar scores were.
8. All newborns were evaluated for symptoms of RDS [known as the existence of at least two of the following requirements: tachypnea, central cyanosis in room air, expiratory grunting and subcostal, intercostal, or jugular retraction and nasal flaring or (TTN) [known as a period of quick respiration greater than the range of normal of 40-60 times a minute].
9. Chest X-rays were performed on all newborns referred to the NICU to rule out other related diseases and confirm the RDS diagnosis.
10. All information about the requirement for acceptance to (NICU) or mechanical ventilation was recorded within 24 hrs after delivery

Statistical analysis:

SPSS (Statistical Package for Social Sciences) version 22 for Windows® was used to code, process, and analyze the obtained data (IBM SPSS Inc, Chicago, IL, USA). The Shapiro Walk test was used to check for normal distribution. Frequencies and relative percentages were used to represent qualitative data. To compare two or more groups of qualitative variables, use the Chi square test ($\chi 2$). The quantitative results were presented as mean ± SD (Standard deviation). In order to compare two independent groups of normally distributed variables, the Independent Samples t-test was performed (parametric data). Significant was defined as a P value of < 0.05.

3. Results:

The total sample shows an age range between 22 - 34 years and its median 28. The mean age was (27.6 ± 3.71 years) for study group and (27.78±3.80 years) for control group with no significant difference between groups (p= 0.81). Concerning parity (P=0.64) did not show a significant difference between the two groups studied. Regarding number of parity, most of study group and control group were primiparous 36% and 38% respectively with no significant difference (P=0.91). Regarding indications of CS, the most common indication of CS in study group and control group were previous caesarian section 52% and 40% respectively with no significant difference between the studied groups (P=0.66) (Table 1).

Table (1): Ages, parity, number of parity and Indication of CS of the studied groups.

Variable	Study group N=50	Control group N=50	P value
Age/year Mean ± SD Median (range)	 27.6±3.71 28 (22:34)	 27.78±3.80 28 (22:34)	 0.81
Parity Mean ± SD Median (range)	 1.2±0.99 1 (0:3)	 1.3±1.02 1 (0:3)	 0.64
Number of parity No One Two Three	 14 (28.00%) 18 (36.00%) 12 (24.00%) 6 (12.00%)	 12 (24.00%) 19 (38.00%) 11 (22.00%) 8 (16.00%)	 0.91
Indication of CS: Previous CS Breech presentation Cephalo pelvic disproportion On request	 26 (52.00%) 10 (20.00%) 6 (12.00%) 8 (16.00%)	 20 (40.00%) 11 (22.00%) 8 (16.00%) 11 (22.00%)	 0.66

The mean and the median neonatal gestational age were (38.84±0.65 weeks) and 38.86(38:40) for study group and (38.84±0.64 weeks) and 38.79(38:40) for control group with no significant difference between groups (p= 0.998). Concerning neonatal gender, most of neonates of the study group and control group were females 52% and 54% respectively with no significant difference (P=0.84). The mean and the median birth weight were (3126±260.74 gm) and 3100 (2700:3600) for study group and (3070±220.62 gm) and 3100 (2800:3500) for control group with no significant differences among groups (p= 0.25) (Table 2).

Table (2): Neonatal gestational age, gender and birth weight of the studied groups.

Variable	Study group N=50	Control group N=50	P value
Gestational age/week Mean ± SD Median (range)	 38.84±0.65 38.86 (38:40)	 38.84±0.64 38.79 (38:40)	 0.998
Neonatal gender Female Male	 26 (52.00%) 24 (48.00%)	 27 (54.00%) 23 (46.00%)	 0.84
Birth weight /gm Mean ± SD Median (range)	 3126±260.74 3100 (2700:3600)	 3070±220.62 3100 (2800:3500)	 0.25

As regard to Apgar score, the mean and the median of Apgar score at 1st minute were (8.12±0.72) and 8(7:9) respectively for study group and (5.5±1.02) and 5(4:7) respectively for control group with a significant differences among the studied group (P<0.0001) as in Table (R8) and Figure (R8). Also, the mean and the median of Apgar score at 5th minute were (8.56±0.50) and 9(8:9) respectively for study group and (7.48±0.58) and 7(7:9) respectively for control group with a significant differences among the studied group (P<0.0001) (Table 3).

Table (3): Apgar score of the studied groups.

Variable	Study group N=50	Control group N=50	P value
Apgar score at 1st minute Mean ± SD Median (range)	 8.12±0.72 8 (7:9)	 5.5±1.02 5 (4:7)	 <0.0001
Apgar score at 5th minute Mean ± SD Median (range)	 8.56±0.50 9 (8:9)	 7.48±0.58 7 (7:9)	 <0.0001

The most of study group wasn't admitted to NICU 80% while, Most of control group was admitted to NICU 56% that caused a statistical differences among the studied groups (P<0.0001). The most of the admitted cases of the study group was respiratory distress syndrome (RDS) (12%), while most of the admitted cases of the control group was transient tachyapnea of newborn (TTN) (34%) with significant differences among studied groups (P=0.003). 80% of the admitted cases of the study group and 78.57% of the admitted cases of the control group were discharged while, 20% of the admitted cases of the study group and 21.43% of the admitted cases of the control group were died (Table 4).

Table (4): Admission, causes and outcome in NICU of the studied groups.

Variable	Study group N=50	Control group N=50	P value
Admission in NICU			
No	40 (80.00%)	22 (44.00%)	<0.0001
Yes	10 (20.00%)	28 (56.00%)	
Causes in NICU			
RDS	6 (12.00%)	12 (24.00%)	0.003
TTN	4 (8.00%)	16 (34.00%)	
Outcome if NICU=Yes	**N= 10**	**N=28**	
Discharged	8 (80.00%)	22 (78.57%)	1.00
Died	2 (20.00%)	6 (21.43%)	

Table (5) showed that: 0% of the study group and just 8 % of the control group were on nasal oxygen with no significant differences between the studied groups (P=0.12). 8% of study group and 32% of control were needed CPAP with a significant difference between the studied groups (P=0.003). 12% of study group and 24% cases of control group were needed mechanical ventilation with no significant difference between the studied groups (P=0.12).

Table (5): Management of the studied groups.

Variable	Study group N=50	Control group N=50	P value
Nasal oxygen			
No	50 (100%)	46 (92.00%)	0.12
Yes	0	4 (8.00%)	
CPAP			
No	46 (92.00%)	34 (68.00%)	0.003
Yes	4 (8.00%)	16 (32.00%)	
Mechanical ventilation			
No	44 (88.00%)	38 (76.00%)	0.12
Yes	6 (12.00%)	12 (24.00%)	

4. Discussion:

The current study reported that the mean age was (27.6 ± 3.71 years) for study group and (27.78±3.80 years) for control group with no significant difference between groups. This agreed with **El-Berry et al.** [2] study conducted on 100 pregnant females divided into group 1 (control), group 2 (single steroid course) and group 3 (multiple steroid course) which reported that the average age for groups 1, 2, and 3 were (28.4±4.5), (26.18±4.08) and (26.81±2.92) respectively with no significant difference.

There were no significant differences in parity between the two groups studied, as the mean and the median of parity of the study group was (1.2±0.99) and 1(0:3) respectively and (1.3±1.02) and 1(0:3) for control group. This was in accordance to **Porto et al.** [7] study conducted on 143 pregnant female divided into corticosteroid group and placebo group which reported that the median number of pregnancy was 1(1:3) and 1.5(1:3) with no significant difference. **On contrary to, Kirshenbaum et al.** [8] who found the median of parity of the corticosteroid group and control group were 2(0:9) with no significant difference and **Nada et al.** [9] randomized prospective placebo control trial was conducted on 645 pregnant females split into 2 groups: the 55 dexamethasone group and the control group that reported that the median of parity of the corticosteroid group and control group were 2(1:3) with no significant difference.

As regard number of parity, most of study group and control group were primiparous 36% and 38% respectively with no significant difference. This is in agreement with **Porto et al.** [7] who found that 50% of study group and control group were primigravidas with no significant difference between groups. While, **El-Berry et al.** [2] who

reported that most of corticosteroid groups and control group were multigravida.

The most common indication of CS in study group and control group were previous caesarian section 52% and 40% respectively with no significant difference between the studied groups. This was in obedience to **El-Berry et al.** [2], **Kirshenbaum et al.** [8] **and Nada et al.** [9] who reported that same result. Unlike **Üstün et al.** [10] who found that the most common indication of elective CS in both group was preterm delivery. It may be speculated as the current study included only term pregnancy. Also due to drastic decline in trial of vaginal delivery after CS scar [1].

The mean and the median neonatal gestational age were (38.84±0.65 weeks) and 38.86(38:40) for study group and (38.84±0.64 weeks) and 38.79 (38:40) for control group with no significant difference between groups. A similar result was reported by **Nada et al.** [9] who found that the average gestational age has been 38^{+4} weeks (SD 3 days) (range 38–38^{+6} weeks) for the studied groups and **El-Berry et al.** [2] who reported that the mean and median gestational age for group 1, group 2 and group 3 were 38.1±5d [37-38+6], 37.8±4d [37-38+6] and 38.4±6d [37-38+6] respectively. While, **Kirshenbaum et al.** [8], **Üstün et al.** [10] **and Masoli et al.** [11] who found that the rage of gestational age was 34:36 weeks as they conducted their study on preterm and late preterm pregnancy.

The mean and the median birth weight were (3126±260.74 gm) and 3100 (2700:3600) for study group and (3070±220.62 gm) and 3100 (2800:3500) for control group with no significant difference between groups. This agreed with **El-Berry et al.** [2] **and Nada et al.** [9].

This wasn't in agreement with **Kirshenbaum et al.** [8] **and Üstün et al.** [10] who stated that the average birth weight had been (2540 ± 370 for study group and 2630 ± 425for control) and (2648.7 ± 277.8 for study group and 2707.8 ± 236.9 for control) respecyively as they conducted their study on preterm and late preterm pregnancy.

As regard to Apgar score, the mean and the median of **Apgar score at 1st minute were** (8.12±0.72) and 8(7:9) respectively for study group and (5.5±1.02) and 5(4:7) respectively for control group with significant differences between the studied group **(P<0.0001)**. Also, the mean and the median of **Apgar score at 5th minute** were (8.56±0.50) and 9(8:9) respectively for study group and (7.48±0.58) and 7(7:9) respectively for control group with significant differences between the studied group **(P<0.0001)**. Unlike **Nada et al.** [9] **and Masoli et al.** [11] who found no significant difference between the studied groups.

This may be explained by the fact that Apgar scores might differ depending on GA, BW, maternal medicine, drug usage or anesthesia, and congenital abnormalities. Many of the score's components are also subjective and sensitive to inter-rater variation. [12].

The most of study group wasn't admitted to NICU 80% while, Most of control group was admitted to NICU 56% that caused a statistical difference between the studied groups.

This disagreed with **Kirshenbaum et al.** [8], **Nada et al.** [9], **Üstün et al.** [10] **and de la Huerga López et al.** [13], who found that most of the study group and control group weren't admitted to NICU.

This could be speculated since prophylactic betamethasone significantly reduced the risk of NICU admissions for respiratory morbidity while having no effect on total NICU admissions rates for either reason (which includes both respiratory and non-respiratory causes) [9].

The most of the admitted cases of the study group was respiratory distress syndrome (RDS) (12%), while most of the admitted cases of the control group was transient tachypnea of newborn (TTN) (34%) with significant differences between studied groups **(P=0.003).** This wasn't in conformity with **El-Berry et al.** [2], **Nada et al.** [9] **and Üstün et al.** [10] who found that most of the admitted cases of the studied groups was transient tachypnea of newborn (TTN). This may be because of that neonatal respiratory morbidity is increased by various risk factors including gender of the newborn, birth weight, type of anesthesia given to mother at the time of C-section, maternal medical conditions like premature rupture of membranes [PROM], maternal fever, and history of maternal medication use [2].

Concerning outcome of NICU admission, 80% of the admitted cases of the study group and 78.57% of the admitted cases of the control group were discharged while, 20% of the admitted cases of the study group and 21.43% of the admitted cases of the control group were died. This agreed with **El-El-Berry et al.** [2] **and Nada et al.** [9] who reported reduction in mortality in neonates. Thia was because of that the prophylatic corticosteroids decrease the respiratory morbidity in neonates [4].

Regarding management, 0% of the study group and just 8 % of the control group were on nasal oxygen with no significant difference between the studied groups . while, 8% of study group and 32% of control were needed CPAP with a significant difference between the studied groups **(P=0.003),** also 12% of study group and 24% cases of control group were needed mechanical ventilation with no significant difference between the studied groups. This disagreed with **El-Berry et al.** [2], **Kirshenbaum et al.** [8], **Nada et al.** [9] **and Masoli et al.** [11], who reported reduction in requiring ventilation intervention.

This may be explained by the fact that antenatal corticosteroid therapy was ineffective in lowering the rate of other complications [8].

Conclusion:

Prophylactic corticosteroid therapy prior to elective caesarean section at term reduced neonatal respiratory morbidity and admission to special care unit.

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