

Antenatal Dexamethasone versus Betamethasone on Maternal and Neonatal Outcomes: A comparative study

Hina Khan¹, Safia Bibi^{2*}, Neelam³, Rafia Qasim⁴

¹Assistant professor Gynaecology Department, Khalifa Gulnawaz Teaching Hospital Bannu

²Associate Professor Physiology, Bannu Medical College

³Medical officer in Gynaecology Department, Khalifa Gulnawaz Teaching Hospital Bannu

⁴Resident in Gynaecology Department, Khalifa Gulnawaz Teaching Hospital Bannu

***Corresponding Author**

Safia Bibi

Associate Professor Physiology, Bannu Medical College

Email: drsafiakhattak@gmail.com

Cite this paper as: Hina Khan, Safia Bibi, Neelam, Rafia Qasim , Antenatal Dexamethasone versus Betamethasone on Maternal and Neonatal Outcomes: A comparative study. . Journal of Neonatal Surgery, 14, (33s) (2025) 392-402

ABSTRACT

Aim: To compare the maternal and neonatal outcomes of antenatal dexamethasone versus betamethasone in women who were at risk of preterm delivery

Material and method: The present prospective comparative study was carried out at the department of Gynaecology Department, Khalifa Gulnawaz Teaching Hospital Bannu from March 2025 to August 2025 after taking approval from the ethical committee of the hospital. Pregnant women attending the hospital for their antenatal visit with gestational age 24 -34 weeks with risk of preterm birth were included in this study. The sample size was determined using the WHO sample calculator. The required sample size was 152(at least 76 in each group). The study participants were divided into A and B. Group A received dexamethasone and Group B received Betamethasone. In both groups these drugs were administered intramuscularly at: 12 mg every 24 hours for two doses.10 Participants were assessed for neonatal and maternal outcomes. SPSS version 22 was used to analyze the data. Frequencies and percentages were used to express categorical variables. The mean $\pm$ standard deviation was used to express continuous variables. The independent-samples t-test was utilized for normally distributed continuous data, while the chi-square test or Fisher's exact test was utilized for categorical variables. Statistical significance was defined as a p-value of less than 0.05.

Results: A total of 152 women were included. The subjects were categorized equally into A and B. Group B received betamethasone and group A received dexamethasone. Maternal ages were similar between the two groups. When neonatal outcomes were assessed, the results showed that the two corticosteroids had generally similar newborn outcomes, however the dexamethasone group had some statistically better results. When maternal outcomes from women on betamethasone and dexamethasone were compared, it was found that 34 (44.7%) of the women who received dexamethasone & 36 (47.4%) of the women got betamethasone had cesarean sections, whereas 42 (55.3%) & 40 (52.6%) had vaginal deliveries, correspondingly. In general, the two therapy groups' maternal outcomes were comparable.

Conclusion: Our study concluded that maternal and newborn outcomes from antenatal dexamethasone and betamethasone are similar..

Keywords: Antenatal dexamethasone, betamethasone , maternal outcomes.

1.INTRODUCTION

Antenatal corticosteroid treatment for women at threat of very preterm birth before 34 weeks gestation is highly effective in preventing various neonatal complications that leads to mortality and morbidity.¹ This is crucial for developing countries with limited resources and difficulty affording costly treatments like neonatal care.² Prematurity is a significant issue in global healthcare. Preterm births make for 10-15% of all births worldwide. Respiratory distress syndrome, newborn mortality, intra-ventricular hemorrhage & low birth weight are continue to be the serious concerns throughout the neonatal era, impacting a large percentage of preterm infants.³ Since 1972, antenatal corticosteroids have been used to hasten the development of the fetal lung in cases of threatened preterm birth. The two corticosteroids that are advised for this purpose are betamethasone and dexamethasone.³ Both are the most successful medications in regard to their effects on the fetus, and both have fewer side effects than benefits. ⁴ Despite the fact that both drugs have the same biological activity and negative effects, there is significant variation in which country medical

professionals prefer dexamethasone or betamethasone. These variations are probably due to cost and availability (dexamethasone is less expensive than betamethasone).⁵ Compared to betamethasone, dexamethasone appears to reduce the occurrence of intraventricular hemorrhage (IVH), according to a 2008 Cochrane review that included 10 randomized controlled trials.⁶ Respiratory distress syndrome, severe IVH, broncho-pulmonary dysplasia, periventricular leukemia, perinatal mortality, and mean newborn weight did not vary statistically significantly.⁶⁻⁷ Although biophysical parameter results have been contradictory, most investigations have shown no clinically significant changes.⁸ When comparing prenatal corticosteroids, maternal outcomes are particularly crucial. Maternal blood glucose levels may be momentarily impacted by corticosteroid treatment, especially in women with diabetes and gestational diabetes. Management for maternal hyperglycemia and various side effects is crucial since both dexamethasone & betamethasone are glucocorticoids.⁹ There is no solid proof that one corticosteroid is better than another for overall outcomes for mothers or newborns, according to the WHO's evidence evaluation. However, due to its reduced cost and greater accessibility, dexamethasone may provide useful benefits in certain low-resource environments.¹⁰ The current study was carried out to compare the maternal and neonatal outcomes of antenatal dexamethasone versus betamethasone in women who were at risk of preterm delivery

2.MATERIAL AND METHOD

The present prospective comparative study was carried out at the department of Gynaecology Department, Khalifa Gulnawaz Teaching Hospital Bannu from March 2025 to August 2025 after taking approval from the ethical committee of the hospital. Pregnant women attending the hospital for their antenatal visit with gestational age 24 -34 weeks with risk of preterm birth were included in this study while individuals with contraindication to corticosteroid therapy, known chromosomal abnormalities, incomplete maternal or neonatal records and major fetal congenital anomalies were excluded. The females were selected using a non-probability consecutive sampling procedure. The sample size was determined using the WHO sample calculator.¹¹ The required sample size was 152(at least 76 in each group). The study participants were divided in to A and B. Group A received dexamethasone **and** Group B received Betamethasone. In both groups these drugs were administrated intramuscularly at: **12 mg every 24 hours for two doses.**¹⁰ **Participants were assessed for neonatal outcomes such as,** NICU admission, neonatal sepsis, intraventricular hemorrhage, birth weight and respiratory distress syndrome and Apgar score at 1 and 5 minutes. Maternal outcomes evaluated were Hyperglycemia, postpartum hemorrhage, mode of delivery, maternal infection, and maternal adverse effects and chorioamnionitis. SPSS version 22 was used to analyze the data. Frequencies and percentages were used to express categorical variables. The mean $\pm$ standard deviation was used to express continuous variables. The independent-samples t-test was utilized for normally distributed continuous data, while the chi-square test or Fisher's exact test was utilized for categorical variables. Statistical significance was defined as a p-value of less than 0.05.

3.RESULTS

A total of 152 women were included. The subjects were categorized equally into A and B. Group B received betamethasone and group A received dexamethasone. Maternal ages were similar between the two groups. Similarly, women receiving dexamethasone had a mean gestational age of 33.2 ± 2.1 weeks, whereas those receiving betamethasone had a mean gestational age of 33.0 ± 2.1 weeks. Baseline obstetric and demographic parameters were mainly comparable between the two groups. Although differences in maternal attributes or gestational age may potentially affect maternal and newborn outcomes, this comparability is crucial as presented in **table 1**. When neonatal outcomes were assessed, compared to 18 (23.7%) in the betamethasone group, 16 (21.1%) neonates in the dexamethasone group had an Apgar score below 7 at one minute. Seven (9.2%) and nine (11.8%) newborns had poor Apgar scores at five minutes, respectively. In terms of newborn outcomes, 18.4% of neonates exposed to dexamethasone had respiratory distress syndrome, compared to 21.1% of those treated to betamethasone. Similarly, 19 (25.0%) or 22 (28.9%) newborns needed breathing assistance, respectively. In our study the dexamethasone group 3(3.9%) had necrotizing enterocolitis compared to 4 (5.3%) in the betamethasone group. Compared to 32 (42.1%) in the betamethasone group, 29 (38.2%) of the neonates in the dexamethasone group were admitted to the NICU. Neonates in the dexamethasone group had a slightly higher mean birth weight (1.87 ± 0.43 kg) than those in the betamethasone group (1.83 ± 0.41 kg). The dexamethasone group had five neonatal deaths (6.6%), whereas the betamethasone group had six (7.9%). The results show that the two corticosteroids had generally similar newborn outcomes, however the dexamethasone group had some statistically better results as presented in **table 2**. When maternal outcomes from women on betamethasone and dexamethasone were compared, it was found that 34 (44.7%) of the women who received dexamethasone & 36 (47.4%) of the women got betamethasone had cesarean sections, whereas 42 (55.3%) & 40 (52.6%) had vaginal deliveries, correspondingly. 8 (10.5%) of the women who took dexamethasone and 11 (14.5%) of the women who received betamethasone reported having hyperglycemia. 5 (6.6%) of the women in the dexamethasone group and 6 (7.9%) of the women in the betamethasone group had maternal infection. 3 (3.9%) and 4 (5.3%) women, respectively, had chorioamnionitis. 6 (7.9%) of the women in the dexamethasone group and 7 (9.2%) of the women in the betamethasone group experienced hypertension. Maternal adverse effects were recorded in 7(9.2%) of the dexamethasone group and 9(11.8%) of the betamethasone group. 5 (6.6%) and 6 (7.9%) women, respectively, had postpartum hemorrhage. In general, the two therapy groups' maternal problems were comparable as shown in **table 3**.

Table 1. Demographic features of the study participants

Features	Group A n=76	Group B n=76
PPROM	24 (31.6%)	26 (34.2%)
Hypertensive disorder	12 (15.8%)	13 (17.1%)
Gestational diabetes	8 (10.5%)	9 (11.8%)
Previous preterm birth	13 (17.1%)	15 (19.7%)
Mean Gestational age in weeks	33.2 ± 2.1	33.1 ± 2.1
Mean age in years	28.7 ± 5.2	29.3 ± 5.4
Singleton pregnancy	76 (100%)	76 (100%)
Primigravida	32 (42.1%)	34 (44.7%)
Multigravida	44 (57.9%)	42 (55.3%)

Table 2. Neonatal outcomes between the two groups

Outcome	Group A N= 76	Group B N=76	p-value
Respiratory distress syndrome	14 (18.4%)	16 (21.1%)	0.67
Respiratory support	19 (25.0%)	22 (28.9%)	0.59
Neonatal sepsis	8 (10.5%)	10 (13.2%)	0.61
IVH	4 (5.3%)	9 (11.8%)	0.14
necrotizing enterocolitis	3 (3.9%)	4 (5.3%)	0.70
NICU admission	29 (38.2%)	32 (42.1%)	0.63
Neonatal mortality	5 (6.6%)	6 (7.9%)	0.75
Apgar score at 1 min <7	18 (23.7%)	16 (21.1%)	0.76
Apgar score at 5 min <7	7(9.2%)	9(11.8%)	-

Table 1. Demographic features of the study participants

Features	Group A n=76	Group B n=76
PPROM	24 (31.6%)	26 (34.2%)
Hypertensive disorder	12 (15.8%)	13 (17.1%)
Gestational diabetes	8 (10.5%)	9 (11.8%)
Previous preterm birth	13 (17.1%)	15 (19.7%)
Mean Gestational age in weeks	33.2 ± 2.1	33.1 ± 2.1
Mean age in years	28.7 ± 5.2	29.3 ± 5.4
Singleton pregnancy	76 (100%)	76 (100%)
Primigravida	32 (42.1%)	34 (44.7%)
Multigravida	44 (57.9%)	42 (55.3%)

4.DISCUSSION

One of the most crucial treatments for improving the prognosis of prematurely delivered newborns is antenatal corticosteroid medication. Accelerating fetal lung development and minimizing problems related to underdeveloped organ systems are the main goals of therapy.¹²⁻¹³ Both betamethasone and dexamethasone have been widely used for this reason, and according to current WHO guidelines, either medication is suitable when premature delivery is anticipated.¹⁰ A total of 152 women were included in this study. The subjects were categorized equally into A and B. Group B received betamethasone and group A received dexamethasone. Maternal ages were similar between the two groups. Similarly, women receiving dexamethasone had a mean gestational age of 33.2 ± 2.1 weeks, whereas those receiving betamethasone had a mean gestational age of 33.0 ± 2.1 weeks. Baseline obstetric and demographic parameters were mainly comparable between the two groups. This comparability is crucial since variations in pregnancy issues, gestational age, or maternal traits may have an independent impact on newborn outcomes. When neonatal outcomes were assessed in terms of newborn outcomes, 18.4% of neonates treated with dexamethasone had respiratory distress syndrome, compared to 21.1% of those treated to betamethasone. There was no statistically significant difference. Our study findings are similar to the randomized BETACODE study, which revealed no discernible difference in the incidence of respiratory distress syndrome between dexamethasone and betamethasone.¹⁴ In our study the dexamethasone group 3(3.9%) had necrotizing enterocolitis compared to 4 (5.3%) in the betamethasone group. Compared to 32 (42.1%) in the betamethasone group, 29 (38.2%) of the neonates in the dexamethasone group were admitted to the NICU. Dexamethasone vs betamethasone were similar for necrotizing enterocolitis, according to Elimian et al.'s randomized study, which involved 299 women.¹⁴ These conclusions are mostly supported by the current findings. Other observational data, however, has not consistently shown that the two corticosteroids vary in Intraventricular hemorrhage. Dexamethasone and betamethasone did not significantly vary in terms of Intraventricular hemorrhage,

periventricular leukomalacia, respiratory distress syndrome, necrotizing enterocolitis, retinopathy of prematurity, or bronchopulmonary dysplasia in a retrospective cohort of 550 low-birth-weight babies.¹⁵ This statement are mostly supported by the current findings. Maternal outcomes across the two corticosteroid groups were basically comparable, according to the current study. 6.6% of women on dexamethasone and 7.9% on betamethasone had maternal infection, and 3.9% and 5.3%, respectively, experienced chorioamnionitis. These results are in line with the WHO evidence assessment, which concluded that there is no solid proof that one corticosteroid is better than another in terms of maternal infection.¹⁰ In the current study, 10.5% of women taking dexamethasone & 14.5% receiving betamethasone experienced maternal hyperglycemia. Maternal blood glucose levels may temporarily rise as a result of corticosteroids; this impact is especially significant for women with diabetes and gestational diabetes.⁹ While most other maternal and newborn outcomes were not statistically different, a recent randomized clinical study in women with moderate gestational diabetes found that dexamethasone resulted in lower blood glucose levels and fewer hyperglycemic episodes than betamethasone.¹⁶ Our study revealed that 34 (44.7%) of the women who received dexamethasone & 36 (47.4%) of the women got betamethasone had cesarean sections, whereas 42 (55.3%) & 40 (52.6%) had vaginal deliveries, correspondingly. Therefore, the manner of delivery in the current investigation was likewise generally comparable amongst the groups. Our study findings are similar to the study conducted by Chhatrala et al in which the effects of both the steroids were comparable.¹⁷ Because both betamethasone and dexamethasone are strong glucocorticoids that cross the placenta and promote fetal lung development, the similar results across the two groups are biologically feasible. Therefore, when identical total corticosteroid dose is given, its main therapeutic impact is anticipated to be roughly comparable. However, a number of factors, including accessibility, price, dosage form, local protocols, and physician preference, may influence the decision between betamethasone and dexamethasone. While dexamethasone may provide benefits linked to cheaper cost and greater availability in some areas, there is no clear comparative data showing preference for one medicine over the other. The present study's key strength is its direct comparison of two routinely used prenatal corticosteroids while taking into account both neonatal and maternal results. Because prior comparison studies have mostly concentrated on newborn endpoints, it is crucial to include maternal outcomes.

Limitations of the study

The sample size was small to identify minute changes between treatment groups was limited. Second, treatment allocation may be influenced by physician choice and drug availability if the trial is observational rather than comparative, thus leading to selection bias.

5.CONCLUSION

Our study concluded that maternal and newborn outcomes from antenatal dexamethasone and betamethasone are similar. Both seem to be suitable and successful choices for prenatal corticosteroid treatment.

REFERENCES

1. Roberts D and Dalziel S (2017): Antenatal corticosteroids for accelerating fetal maturation for women at risk of preterm birth. Syst. Rev. Cochrane Database, 3: 4454.
2. Mwansa-Kambafwile J, Cousens S, Hansen T et al. (2010): Antenatal steroids in preterm labour for the prevention of neonatal deaths due to complications of preterm birth. Int. J. Epidemiol., 39(I): 122-133
3. Lee MJ, Guinn D. Antenatal use of glucocorticoids in women at risk for preterm delivery. Up-to-datejournal 2015
4. Ward RM. Pharmacologic enhancement of fetal lung maturation. Clin Perinatol. 1994;21:523–42.
5. Henderson-Smart DJ, Lumbiganon P, Festin MR, Ho JJ, Mohammad H, McDonald SJ, et al. Optimising reproductive and child health outcomes by building evidence-based research and practice in South East Asia (SEA-ORCHID): Study protocol. BMC Med Res Methodol. 2007;7:43.
6. Brownfoot FC, Crowther CA, Middleton P. Different corticosteroids and regimens for accelerating fetal lung maturation for women at risk of preterm birth. Cochrane Database 7.Syst Rev. 2008;CD006764.
7. Mushkat Y, Ascher-Landsberg J, Keidar R, Carmon E, Pauzner D, David MP. The effect of betamethasone versus dexamethasone on fetal biophysical parameters. Eur J Obstet Gynecol Reprod Biol. 2001;97:50–2.
8. Shareef, F. S., Hong, J., Saaid, R., Hamdan, M., Omar, S. Z., & Tan, P. C. (2025). Antenatal dexamethasone vs betamethasone on glycemic control in mild gestational diabetes: a randomized clinical trial. American Journal of Obstetrics & Gynecology MFM, 7(8), 101715.)
9. . World Health Organization. (2025). WHO recommendations on maternal health: guidelines approved by the WHO

Guidelines Review Committee. World Health Organization.

10. .Chen CY, Wang KG, Chang TY, Chen CP. Effects of antenatal betamethasone and dexamethasone in preterm neonates. *Taiwanese Journal of Obstetrics and Gynaecology*. 2005;44(3):247–51
11. Roberts, D. (2007). Antenatal corticosteroids for accelerating fetal lung maturation for women at risk of preterm birth. *Cochrane Database Syst Rev*, 4..
12. Crowther, C. A., McKinlay, C. J., Middleton, P., & Harding, J. E. (2011). Repeat doses of prenatal corticosteroids for women at risk of preterm birth for improving neonatal health outcomes. *The Cochrane database of systematic reviews*, (6), CD003935..
13. Campbell, W. A. (2007). Antenatal betamethasone compared with dexamethasone (betacode trial): a randomized controlled trial. *Obstetrics & Gynecology*, 110(4), 930.
14. .Bar-Lev, M. R. R., Maayan-Metzger, A., Matok, I., Heyman, Z., Sivan, E., & Kuint, J. (2004). Short-term outcomes in low birth weight infants following antenatal exposure to betamethasone versus dexamethasone. *Obstetrics & Gynecology*, 104(3), 484-488.
15. Gan, X., & Huang, Z. (2025). Antenatal dexamethasone vs betamethasone on glycemic control in mild gestational diabetes: a randomized clinical trial. *American Journal of Obstetrics & Gynecology MFM*, 7(12).
16. Chhatrala, J. J., & Chawada, R. (2015). Comparative study of dexamethasone and betamethasone for women at risk of preterm birth. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, 4(4), 1000-1004.