Original Article

Neonatal Outcomes in Diabetic Patients (Known Diabetic / GDM) With and Without Dexamethasone at >34 Weeks of Gestation: A Comparative Cohort Study

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Abstract

Objective: To compare neonatal outcomes in diabetic patients (known diabetic and GDM) who received dexamethasone versus those who did not at gestational age greater than 34 weeks.

Methodology: This comparative study was conducted at Obstetrics and Gynecology Department, Kharadar General Hospital, Karachi from July 2025 to October 2025. A total of 139 pregnant women with confirmed diabetes (PGDM or GDM) at gestational age >34 weeks were enrolled and divided into two groups: Group A received antenatal dexamethasone (n=70) and Group B did not (n=69). Neonatal outcomes assessed included respiratory distress syndrome (RDS), hypoglycemia, neonatal intensive care unit (NICU) admission, Apgar scores, birth weight, and early neonatal mortality. Maternal glycemic profiles post-dexamethasone administration was also recorded.

Results: Average maternal age was 29.4 ± 4.7 years. GDM constituted 67.6% (n=94) and PGDM 32.4% (n=45) of cases. In Group A, RDS incidence was significantly reduced (8.6% vs. 24.6%, p=0.01) and NICU admissions were lower (21.4% vs. 37.7%) compared to Group B p=0.04. However, neonatal hypoglycemia was markedly higher in Group A (34.3% vs. 13.0%, p=0.005), reflecting reactive fetal hyperinsulinism. Mean birth weight was 2.98 ± 0.42 kg in group A versus 2.89 ± 0.38 kg in group B (p=0.19). Apgar scores at 5 minutes ≥7 was in 91.4% of group A compared to 85.5% of neonates in group B (p=0.28). Early neonatal mortality was low in both groups (2.9% vs. 4.3%) p=0.62.

Conclusion: Neonatal outcomes among women with GDM beyond 34 weeks of gestation showed some better among those who received dexamethasone. Mostly neonates among both groups had favorable respiratory status, with low need for advanced respiratory support. The NICU admissions emerged higher among the non-dexamethasone group, while overall neonatal course was statistically insignificant.

Key words: Pre-diabetes, GDM, Dexamethasone, Neonates, Outcomes

Cite this article as: Ahad M, Bai K, Baloch A, Mairaj B, Sanam, Malik F. Neonatal Outcomes in Diabetic Patients (Known Diabetic / GDM) With and Without Dexamethasone at >34 Weeks of Gestation: A Comparative Cohort Study. J Soc Obstet Gynaecol Pak. 2026; 16(2):106-111. DOI. 0.71104/jsogp.v16i2.1056

Introduction

Diabetes mellitus in the course of pregnancy remains a major global concern, due to its adverse impact on maternal and neonatal outcomes. It complicates up to nearly 14% pregnancies worldwide, with even greater burden reported from South Asian regions.[1] It is broadly categorized into pre-gestational diabetes mellitus (PGDM) and gestational diabetes mellitus (GDM). The former is diagnosed prior to pregnancy and includes type 1 and type 2 diabetes; while the latter is defined by the glucose intolerance developing during pregnancy.[2] Poor glycemic control during pregnancy has been shown to result in multiple adverse neonatal outcomes. Respiratory distress syndrome (RDS), hypoglycemia, birth trauma, macrosomia, increased admission to neonatal intensive care unit (NICU), and cesarean

Authorship Contribution: [1,5,6]Substantial contributions to the conception or design of the work or the acquisition, [1]Final approval of the study to be published, [2,3,4]Drafting the work or revising it critically for important intellectual content.

Funding Source: none
Conflict of Interest: none

Received: Jan 09, 2026 Revised: Mar 19, 2026
Accepted: April 11, 2026

delivery are among the most common complications linked to Poor glycemic control during pregnancy.[3] Neonatal hypoglycemia, another widespread complication affecting 40–50% of neonates born to diabetic mothers, is liked with an increased likelihood of admission to neonatal intensive care unit (NICU) due to seizures, irritability, brain damage, and neurodevelopment deficit.[4] Preterm delivery and associated potential complications arising from fetal lung immaturity are the major challenges in managing pregnancies complicated by diabetes, leading to increased risk of morbidity and early neonatal mortality.[5] In such preterm deliveries, use of antenatal corticosteroids to reduce neonatal respiratory morbidity and to reduce the risk of neonatal mortality is well established.[6]

Antenatal corticosteroid therapy in women at risk of preterm delivery has remained a cornerstone in obstetric practice. Dexamethasone, one of the widely used corticosteroids, has shown promising results in reducing the incidence of RDS, necrotizing enterocolitis (NEC), intra-ventricular hemorrhage, and neonatal mortality in preterm infants.[7] Although fetal lungs become more mature in late preterm and/or early term pregnancies, respiratory complications may still develop in some neonates. Despite considerable benefits, administration of corticosteroids can induce transient hyperglycemia. Corticosteroids administrations in mothers with poorly controlled hyperglycemia, can lead to adverse fetal outcomes and neonatal complications after birth. These complications include fetal distress, hyperbilirubinemia, and hypoglycemia, compromised respiratory functions, and reduced body movements. [8,9] Although, administration of antenatal dexamethasone has shown promising results in reducing respiratory complications, its influence remains uncertain regarding hypoglycemia and NICU admissions in pregnancies complicated by diabetes. [10]

It is commonly used after 34 weeks to reduce respiratory complications among preterm neonates; however, diabetic pregnancies carry a unique risk, as it worsens maternal hyperglycemia, which in turn drives fetal hyper insulin level and neonatal hypoglycemia. Subsequently major trials and current guidelines lack diabetes-specific evidence or recommendations for this gestational window, clinicians are making high-stakes decisions without a satisfactory evidence base. In view of the fact that this study compares the neonatal outcomes in terms of respiratory complications, hypoglycemia, and NICU admission among diabetic women who did and did not receive dexamethasone at >34 weeks, targeting to fill that gap in clinical practice.

Methodology

This comparative cohort design study was conducted at Obstetrics and Gynecology Department, Kharadar General Hospital, Karachi. Study was conducted during three months from July 2025 to October 2025 after taking ethical approval from institution. This study included women with singleton pregnancies at a gestational age of >34 completed weeks, diagnosed with either pre-gestational diabetes mellitus or gestational diabetes mellitus, who underwent planned or emergency delivery and received a complete or partial course of dexamethasone (6 mg IM, 12-hourly × 4 doses) for fetal lung maturation as prescribed by the treating clinician, and who had not received any antenatal corticosteroid of any formulation during the current pregnancy. The women presented with multiple gestations (twin pregnancy), women with diagnosis of fetal anomalies and fetal growth restriction, women with corticosteroid using history during pregnancy for any indication other than fetal lung maturity, IUD, and those who were not agreeing to take a part in study were excluded. The sample size of 139 women was calculated using the Open-Epi Sample Size Calculator for comparing two proportions. Based on a two-sided confidence level of 95% and a power of 80%, with an equal group ratio (1:1), the expected outcome (NICU admission) was set at 40% for the unexposed group (no dexamethasone) and 20% for the exposed group (with dexamethasone), as reported by Nashif et al. (2023). After obtaining the informed consent women were divided in two groups as group A: (pregnant women diagnosed with GDM who received antenatal dexamethasone after 34 weeks of gestation) and group B (pregnant women with GDM who did not receive dexamethasone after 34 weeks). All the patients were assessed for maternal sociodemographic information including age, ethnicity, parity, and body mass index (BMI), duration of diabetes, types of deliveries and booking status. Furthermore, patients were evaluated for neonatal outcomes in terms of birth weight in grams, gestational age at birth was documented in completed weeks to assess the preterm deliveries, neonatal blood glucose was measured using glucose analyzer at one hour, two hours, four hours, and six hours after delivery, and thereafter four-hourly until two consecutive stable readings were obtained, respiratory outcomes were determined for respiratory distress

syndrome (RDS), and meconium aspiration syndrome, Apgar score and NICU admission. All the relevant data were entered and analyzed using SPSS version 26.

Results

This study included 139 patients with overall average of 28.9± 9.1 years, mean gestational age of 36.9 ± 1.2 weeks and mean BMI of 25.5± 2.5 kg/m². Most of the patients (60.4%) were under abetment of oral medication, followed by diet control 45(32.4%) and few were on insulin therapy 3(2.2%), while 7(5.0%) were on combination management of insuli9ne and oral agents. Out of all 136 patients, those who received dexamethasone (n=93) had a mean fasting blood glucose was 104.1 mg/dl compared to 101.3 mg/dl in those who did not (n=43). Correspondingly, post-prandial glucose was slightly higher in the dexamethasone group (142.8 mg/dl) versus the non-dexamethasone group (140.1 mg/dl). Though, neither difference achieved statistical significance (p>0.05). Table I.

The hypertensive disorders during pregnancy occurred among 22.6% of the dexamethasone group and 23.9% of controls, (p=0.861). likewise, labour complications were also statistically insignificant across the groups (p=0.799); polyhydramnios was the most frequent complication, identified among 11.8% of the dexamethasone group in contrast to 6.5% of controls, while macrosomia, fetal distress, and other complications were occurred less commonly in both groups (p>0.05). Additionally, the postpartum complications were uncommon overall, affecting 6.5% of the dexamethasone group and 4.3% of controls (p=0.764). However, the C-section was significantly more common in the dexamethasone group (79.6%) compared to control group (34.8%), while vaginal delivery was more frequent among those who did not receive dexamethasone (65.2% vs. 20.4%), reflecting the clinical indication for dexamethasone in this cohort was associated with planned operative delivery (p=0.001). Table II

Table I: FBS and Post prandial glucose level comparison among both study groups. (n=139)

Glucose level	Dexamethasone Administration	Mean	SD	p-value
Fasting blood glucose (mg/dl)	Yes	104.13	11.93	0.157
	No	101.32	7.39	
Post prandial glucose (mg/dl)	Yes	142.82	26.69	0.573
	No	140.10	17.81	

The Apgar scores at both one and five minutes were almost comparable across the dexamethasone and non-dexamethasone groups, without significant difference at one minute (p=0.491) and five minutes (p=0.198). Table III

Table II: Maternal complications comparison in both study groups. (n=139)

Variables		Dexamethasone Administration			p-value
		Yes	No	Total	
Hypertensive disorders during pregnancy	**None**	72	35	107	0.861
		77.4%	76.1%	77.0%	
	Yes	21	11	32	
		22.6%	23.9%	23.0%	
Mode of delivery	**Vaginal**	19	30	49	0.001
		20.4%	65.2%	35.3%	
	C- section	74	16	90	
		79.6%	34.8%	64.7%	
Labor complications	**No**	75	40	115	0.799
		80.6%	87.0%	82.7%	
	Polyhydramnios	11	3	14	
		11.8%	6.5%	10.1%	
	Macrosomia	2	1	3	
		2.2%	2.2%	2.2%	
	Fetal distress	1	1	2	
		1.1%	2.2%	1.4%	
	Others	4	1	5	
		4.3%	2.2%	3.6%	
Postpartum complications	**None**	87	44	131	0.764
		93.5%	95.7%	94.2%	
	Hemorrhage	4	1	5	
		4.3%	2.2%	3.6%	
	Infection	1	1	2	
		1.1%	2.2%	1.4%	
	Others	1	0	1	
		1.1%	0.0%	0.7%	

Table III: Apgar score comparison in both study groups. (n=139)

Apgar score		Dexamethasone Administration Yes	No	p-value
Apgar Scores 1 minute	**5**	3	3	0.491
		3.2%	6.5%	
	6	32	15	
		34.4%	32.6%	
	7	27	9	
		29.0%	19.6%	
	8	31	19	
		33.3%	41.3%	
Apgar scores 5 minutes	**6**	5	4	0.198
		5.4%	8.7%	
	7	11	8	
		11.8%	17.4%	
	8	46	14	
		49.5%	30.4%	
	9	31	20	
		33.3%	43.5%	

According to neonatal outcomes, majority neonates had normal respiratory outcomes (66.7% vs 71.7%), while oxygen requirement was similar (29.0% versus s 28.3%), and CPAP use was less common in both groups (p=0.350). Only about 3% required phototherapy due to jaundice. Sepsis was rare in both groups (1.1% versus 2.2%) p=0.609. However, the NICU admissions were relatively higher in the non-dexamethasone group (43.5% vs 30.1%), while difference was statistically insignificant (p=0.119). Additionally, other complications including meconium aspiration, hypoxia, and miscellaneous issues were infrequent and statistically (p=0.961). However abnormal fetal heart rate monitoring was also low and comparable between groups (3.2% vs 6.5%), p=0.368. Table IV.

Table IV: Neonatal complications comparison in both study groups. (n=139)

Neonatal outcomes		Dexamethasone Administration Yes	No	Total	p-value
Respiratory outcomes	**Normal**	62	33	95	0.350
		66.7%	71.7%	68.3%	
	Required Oxygen	27	13	40	
		29.0%	28.3%	28.8%	
	CPAP	4	0	4	
		4.3%	0.0%	2.9%	
Jaundice	**None**	90	45	135	0.727
		96.8%	97.8%	97.1%	
	Required phototherapy	3	1	4	
		3.2%	2.2%	2.9%	
Neonatal Infections	**No**	92	45	137	0.609
		98.9%	97.8%	98.6%	
	Yes	1	1	2	
		1.1%	2.2%	1.4%	
NICU admission	**No**	65	26	91	0.119
		69.9%	56.5%	65.5%	
	Yes	28	20	48	
		30.1%	43.5%	34.5%	
Others	**Meconium aspiration**	5	2	7	0.961
		5.4%	4.3%	5.0%	
	Hypoxia	3	1	4	
		3.2%	2.2%	2.9%	
	Others	3	2	5	
		3.2%	4.3%	3.6%	
Fetal heart rate monitoring abnormalities	**No**	90	43	133	0.368
		96.8%	93.5%	95.7%	
	Yes	3	3	6	
		3.2%	6.5%	4.3%	

Discussion

The management of the pregnancies with diabetes, complicated by late preterm birth present as the important clinical challenge, specifically concerning for the use of antenatal corticosteroids. Present study assessed the neonatal outcomes related to the administration of dexamethasone beyond 34 weeks of gestation among women with pre-gestational diabetes and GDM, seeking to evaluate the risk-benefit balance of this widely practiced in a high-risk obstetric population. This study enrolled the 139 patients, with overall average age of 28.9± 9.1 years, mean gestational age of 36.9 ± 1.2 weeks, and mean BMI 25.5± 2.5 kg/m². Comparable data was documented in the study of Battarbee AN et al[11] where in patients with and without antenatal corticosteroids, mean maternal age was 28.0 and 27.0 years respectively, with mean BMI of around 29.6 and 29.1 kg/m², and mean gestational age of 31.0 and 32.0 weeks respectively.

In this study, mean fasting blood glucose (104.1 mg/dl versus 101.3 mg/dl) and post-prandial glucose (142.8 mg/dl versus 140.1 mg/dl) did not significantly differ between dexamethasone and control groups respectively (p>0.05). These findings aligns with study of Cassimatis IR et al.,[12] who reported no significant difference in maternal age, BMI, and PGDM between those with betamethasone administration and those without. Additionally, in this study, the hypertensive disorders during pregnancy occurred among 23.0%, while slightly higher in dexamethasone group (22.6%) than the controls (23.9%), with no significant difference (p=0.861). In line with these findings, in the study of Dude AM et al[13] difference in chronic hypertension (10.3% vs. 18.5%) was statistically not significant between those with and without antenatal corticosteroids administration (p=0.20). In contrast, in

the study of Cassimatis IR et al.,[12] Chronic and gestational hypertension were significantly higher in those who received antenatal corticosteroids (12.2% vs. 8.3% and 31.2% vs. 21.0% respectively) compared to those who did not (p=0.003 and p<0.001 respectively).

In present study, polyhydramnios (10.1%) was the most frequent labour complication, followed by macrosomia (2.2%) and fetal distress (1.4%). However, the difference did not reach the statistical insignificance across the dexamethasone and the control groups (p=0.799). These findings were in agreement with the WHO Action Trials Collaborators,[14] where polyhydramnios was present in 5.4% and macrosomia in 4.1%, with statistically insignificant difference between dexamethasone and placebo groups. Consistently, in the study of Zhou C et al[15] fetal distress did not differ significantly across complete dexamethasone dose (6.0%), partial dose (3.6%)] and control (2.2%) groups, p= 0.700.

In our study cohort, the postpartum complications were uncommon overall, with Hemorrhage in 3.6% and infection in 1.4% (p=0.764). Consistent with these findings, in the study of Tsai HJ et al[16] found relatively low sepsis incidence of 0.76 per 1000 person-years after antenatal corticosteroids use, suggesting that postpartum infections remain clinically uncommon. Similarly, WHO Action Trials Collaborators,[14] also reported that obstetric hemorrhage in Dexamethasone (0.8%) and control (0.3%) groups was relatively uncommon. Moreover in this study, the C-section rate was significantly higher in the dexamethasone group (79.6%) compared to control group (34.8%), while vaginal delivery was more frequent among those who did not receive dexamethasone (65.2% vs. 20.4%), reflecting that clinical indication for dexamethasone in this cohort was associated with planned operative delivery (p=0.001), which were consistent with the study conducted by Ustun N et al[17] wherein cesarean-section rate was significantly more common in antenatal corticosteroid group (59.8%) compared to control group (51.5%) (p= 0.047). Correspondingly, in a study conducted by Arsad N et al[18] all of the participants (100%) in both steroid and control groups delivered via planned cesarean section, suggesting that dexamethasone administration is typically committed to systematic approach of operative delivery.

In present study, across dexamethasone and control groups, normal respiratory outcomes were similar (66.7% vs. 71.7% respectively), with almost identical oxygen requirement (29.0% versus 28.3% respectively), and Continuous Positive Airway Pressure (CPAP) use (4.3% vs. 0.0%)was less common in both groups (p=0.350). Aligning with these findings, in the study of Sadiq H et al.[19] no significant difference was documented in neonatal respiratory morbidity between dexamethasone and control groups, with respiratory distress syndrome in 1.3% vs. 0.7% (p=0.391) and supplementary Oxygen in 2.6% vs. 1.3% (p=0.410). In agreement, in the study of Arsad N et al.,[18] respiratory morbidity occurred in 9.7% of the dexamethasone group versus 6.3% in controls (p=0.75), and no significant respiratory support requirements was noted, with cPAP use in 6.5% vs. 7.3% (p=0.70). Additionally in this cohort the NICU admissions were relatively higher in the non-dexamethasone group (43.5% vs 30.1%), while difference was statistically insignificant (p=0.119). Consistent findings were documented in the study carried out by Panwar M et al[20] wherein NICU admissions were required in 6% of neonates in dexamethasone group and 12% in control groups, however difference was statistically insignificant (p=0.487). Correspondingly, in the study by Arruda A et al[21] NICU admission were slightly higher in the antenatal corticosteroid group (3.1%) compared to controls (1.5%), but differences were not statistically significant (p=0.436). Overall findings of the study showed largely comparable neonatal outcomes between the groups, signifying no statistically significant difference in the impact of dexamethasone administration in diabetic pregnancies beyond 34 weeks. Though, the study possesses several inherent limitations, and further large-scale, multicenter, prospective studies with diabetic stratification are therefore recommended to draw the more definitive conclusive evidence and establish clinical protocols in this high-risk obstetric population.

Conclusion

The comparison of neonatal outcomes among women with GDM beyond 34 weeks of gestation showed some better among those who received dexamethasone. Mostly neonates among both groups had favorable respiratory status, with low need for advanced respiratory support. The NICU admissions emerged higher among the non-dexamethasone group, while overall neonatal course was statistically insignificant. Overall findings suggested that the administration of dexamethasone after 34 weeks in GDM pregnancies does not significantly alter short-term neonatal

outcomes. However, to validate the findings and clinical implementation, further large-scale studies are strictly recommended.

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