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Outcome of Neonates Born to Mothers with Diabetes Mellitus in a Tertiary Care Centre in Kolar-A Prospective Cohort Study

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ABSTRACT

INTRODUCTION*:* Gestational Diabetes Mellitus (GDM) is one of the important health concerns, affecting both mothers and neonates. This condition can lead to many complications for newborns, including preterm birth and congenital anomalies. This study was done to determine the outcomes of neonates born to GDM mothers at a tertiary care center in Kolar, providing insights into the morbidity and mortality patterns associated with maternal glycemic control. By comparing neonates delivered to mothers with low versus high glycemic index, this study signifies the importance of effective diabetes management during pregnancy and its effect on the newborn.

OBJECTIVES*:* To determine and compare morbidity and mortality patterns of neonates born to mothers with good or poor glycemic control in diabetic mothers

MATERIALS & METHODS*:* All neonates admitted to the Neonatal Intensive Care Unit (NICU) of R L Jalappa Hospital, Tamaka, Kolar, with maternal history of gestational or pregestational diabetes mellitus were taken into the study, using timeline sampling that meets the inclusion and exclusion criteria. The neonates were divided into Group 1 (poor glycemic control) and Group 2 (good glycemic control). Data was noted and analyzed.

RESULTS*:* Hypoglycemia and hypocalcemia were observed in neonates, but no significant association was found with maternal glycemic control. However, neonatal respiratory distress and neonatal congenital heart disease were significantly higher in newborns delivered to mothers with poorly controlled glycemic index.

CONCLUSION*:* The study signifies the importance of maintaining good glycemic control during pregnancy to improve neonatal health outcomes, highlighting the need for targeted interventions and continuous monitoring of diabetic mothers and newborns delivered to them.

KEYWORDS: ***Gestational Diabetes Mellitus, Glycemic Control, Neonatal Respiratory Distress, Congenital Heart Disease***

INTRODUCTION: Diabetes mellitus is one of the most common medical conditions occurring during pregnancy, affecting between 0.5% to 5% of all pregnancies.[1]

GDM may be diagnosed for the first time during pregnancy or may occur before pregnancy (pre-gestational or overt diabetes). The complications that can be included are impaired fetal growth, stillbirth, miscarriage, respiratory distress, cardiomyopathy, congenital malformations, shoulder dystocia, brachial plexus injury,

clavicular fracture, metabolic issues like hypoglycemia and hypocalcemia asphyxia and increased perinatal mortality. Complications in mothers may involve preterm labor, early rupture of membranes, infections, hypertensive disorders , polyhydramnios, a higher rate of caesarean and surgical vaginal deliveries, and maternal trauma.[2]

Hence the need for this study is to determine the different morbidity pattern occurring in newborns born to gestational diabetes mothers.

MATERIALS AND METHODS:

Study place: Neonatal Intensive Care Unit (NICU) at R L Jalappa Hospital, Tamaka, Kolar

Source of data: All neonates admitted to RL Jalappa Hospital (intramural and extramural) with maternal history of GDM and pregestational diabetes mellitus during the period of study.

Study population: Neonates born to diabetic mothers admitted to RL Jalappa Hospital, Tamaka, Kolar

Study design: A Prospective Cohort Study

Sampling technique: Timeline sampling fitting our inclusion and exclusion criteria was considered in our study.

Babies born to mothers with poor glycemic control were considered as Group 1, and babies born to mothers with good glycemic control were considered as Group 2

Sample size:

$$n = \frac{2(\bar{p})(1-\bar{p})(Z_{\beta} + Z_{\alpha/2})^2}{(p_1 - p_2)^2}$$

n - Sample size in each group (assuming equal-sized groups)

$(\bar{p})(1-\bar{p})$ - measure of variability (similar to standard deviation)

Z_{β} - represent the desired power

$Z_{\alpha/2}$ - represents the desired level of statistical significance (typically 1.96)

$(p_1 - p_2)$ - effective size (the difference in proportions)

Incidence of hypoglycemia among newborn delivered to GDM with HbA1c above 6.5 was 37% as reported by study Saha D et al.[3] Considering the power of 90%, 99% confidence interval effective size of 76%, with P1 being 7 % and P2 being 30%, and according to unpublished institutional data (70 NICU admissions/year – neonates born to diabetic mothers), the estimated sample size of the study was 156.

Study period: September 2022 – March 2024

Method of collection of data:

- **Inclusion criteria:**
  Infants of diabetic mothers (Preterm, term, and post-term) admitted to R L Jalappa Hospital (Intramural and extramural) were included in the study.
- **Exclusion criteria:**
  a) Neonates with meconium stained amniotic fluid (MSAF), during the delivery.

Methodology:

All the neonates with maternal GDM or pregestational diabetes mellitus admitted to RLJH during the study period were included in the study, after taking informed consent from the mother.

The following data of all the pregnant women with diabetes were obtained: Mother's age, Obstetric score, Antenatal scan, Type of diabetes– pre-gestational/ gestational, Glycemic control (HbA1c levels)

The following neonatal data were noted: mode of delivery, gestational age, birth weight of the baby, and gender of the baby. The weight of the neonate was classified as small for gestational age (SGA), appropriate for gestational age (AGA), and large for gestational age (LGA).

As per Departmental protocol, all neonates of diabetic mothers were admitted to NICU. For all neonates the following investigations were done on Day 1:

Blood glucose levels, Complete blood count, Serum calcium

The following investigations were done as and when needed:

Chest x-ray, arterial blood gas analysis, magnesium levels, neurosonogram, USG Abdomen, 2 D ECHO,

For all neonates, serial blood glucose levels were measured using a glucometer. It was done at birth 2, 6, 12, 24, 48 and 72 hours.

The babies were divided into two groups based on maternal glycemic control as follows:

A) Group 1: consists of neonates born to mothers with poor glycemic control (HbA1c≥ 6.5)

B) Group 2: consists of neonates born to mothers with good glycemic control (HbA1c< 6.5)

RESULTS:

A total of 156 samples were included in the present study.

Table 1: Distribution of cases according to Maternal Glycemic Control (n=156)

Maternal Glycemic Control	Number	Percentage
Group 1(HbA1c ≥ 6.5) Poor glycemic control	70	45
Group 2 (HbA1c < 6.5) Good glycemic control	86	55

Figure 1: Distribution according to maternal glycemic control (n=156)

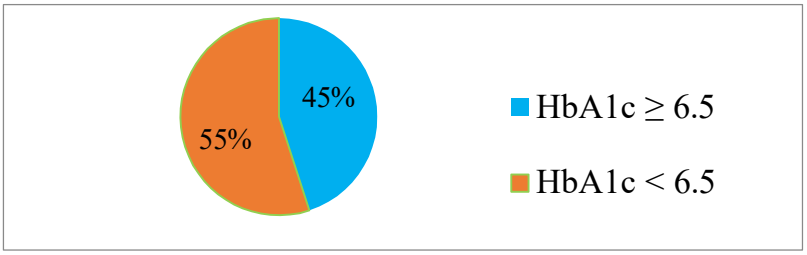
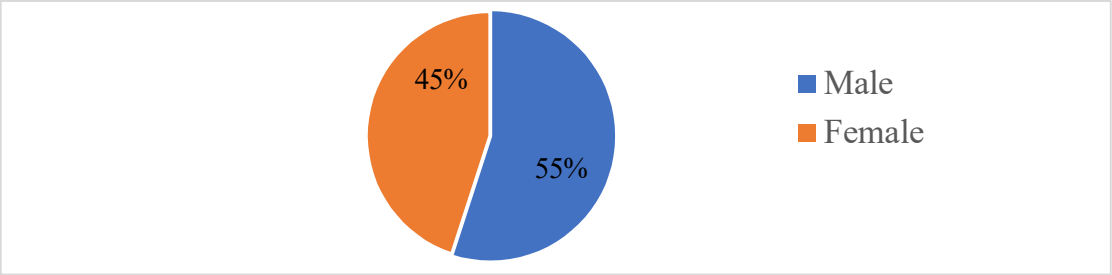


Table 1 and Figure 1 depict the distribution of cases according to maternal glycemic control. There were 70 neonates (45%) born to mothers with poor glycemic control (Group 1) and 86 neonates (55%) were born to mothers with good glycemic control (Group 2).

Table 2: Distribution of cases according to gender

Figure 2: Distribution of cases according to gender (n=156)



Out of 70 infants born to mothers with poor glycemic control, 51.4% were female and 48.6 % were males. Distribution was almost similar.

Among infants born to mothers with good glycemic control majority, 61.6% were males while 38.4% were female. There was a male preponderance with a male-to-female ratio of 1.6:1

Table 3: Distribution of cases according to birth weight

Birth weight (in kgs)Figure 3: Distribution of cases accordin g to birth weight (n=156)	Group1 (n=70)	Group 2 (n=86)
<1.5	3 (4.3)	3 (3.5)
1.5-2.5	19 (27.1)	32 (37.2)
>2.5-3.5	35 (50.0)	43 (50.0)
>3.5	13 (18.6)	8 (9.3)

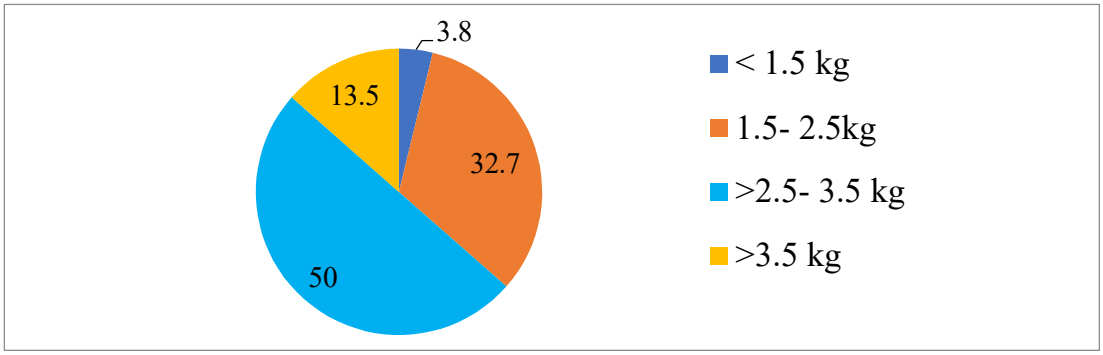


Table 3 and Figure 3 depict the distribution of cases according to birth weight. Out of 70 neonates in group 1,50% were in the birth weight category of >2.5 to 3.5kg. Similarly in group 2 out of 86 neonates,50% were in similar birth weight category of >2.5-3.5kg. In the birth weight category of >3.5 kg, 18.6% and 9.3% of neonates were in Group 1 and Group 2 respectively.

Table 4: Distribution of cases according to gestational age

Gestational age	Group 1 (n=70)	Group 2(n=86)
Early Preterm (< 32 weeks)	4 (5.7)	2 (2.3)
Late Preterm (32weeks-<37 weeks)	23 (32.9)	22 (25.6)
Term (37-41 weeks)	43 (61.4)	60 (69.8)
Post-term (≥ 42 weeks)	0(0)	2 (2.3)

Figure 4: Distribution of cases according to gestational age (n=156)

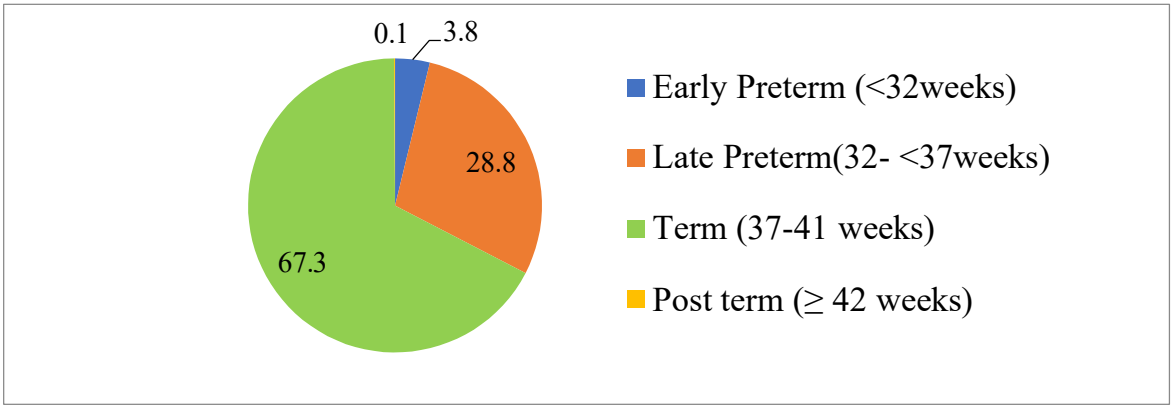


Table 4 and Figure 4 shows the distribution of cases according to gestational age.

In Group 1, the majority (61.4%) were term neonates. Twenty-three (32.9%) of neonates were late preterm while 5.7% were early preterm neonates. None of the neonates were post-term in group 1.

In Group 2, the majority (69.8%) were term neonates. Late preterm neonates constituted 25.6%. Early preterm neonates and post-term neonates were 2.3% each.

Table 5: Distribution of cases according to mode of delivery

Mode of Delivery	Group 1 (n=70)	Group 2 (n=86)
LSCS	42 (60.0)	59 (68.6)
Forceps-assisted vaginal delivery	3 (4.3)	0 (0.0)
Vacuum-assisted vaginal delivery	4 (5.7)	2 (2.4)
Normal vaginal delivery	21 (30.0)	25 (29.0)

Figure 5: Distribution of cases according to mode of delivery (n=156)

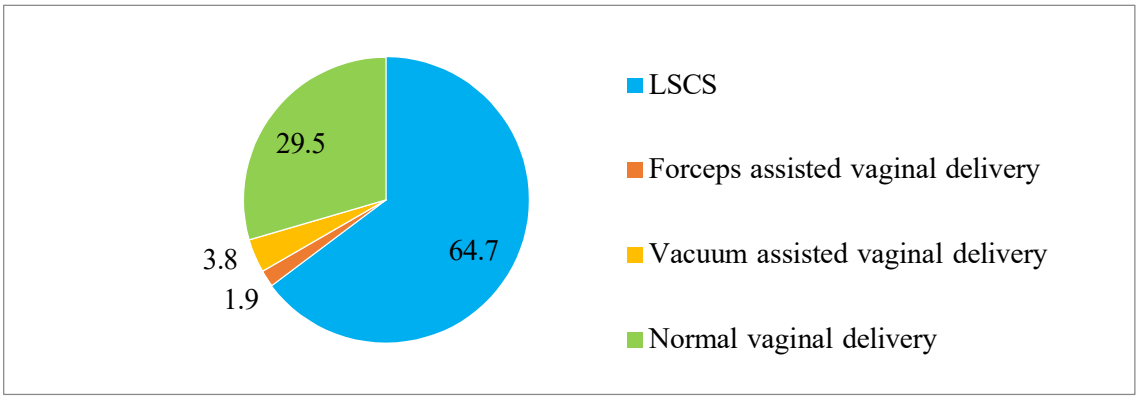


Table 5 and Figure 5 depict the distribution of cases according to the mode of delivery. Majority (60%) of neonates in Group 1 were delivered by LSCS and 45.7% were delivered through normal vaginal route. Forceps-assisted vaginal delivery + vacuum-assisted vaginal delivery was present in 4.3 % + 5.7% respectively. In Group 2, majority (68.6%) of neonates were delivered by LSCS, and 30% were delivered through normal vaginal route. Vacuum-assisted vaginal delivery in Group 2 was present in 2.4% whereas there were no forceps-assisted vaginal delivery present in Group 2.

Table 6: Distribution of cases according to weight for gestational age

Weight for gestational age	Group 1 (n=70)	Group 2 (n=86)
AGA	56 (80.0)	61 (70.9)
SGA	10 (14.3)	23 (26.7)
LGA	4 (5.7)	2 (2.3)

Figure 6: Distribution of the cases according to weight for gestational age (n=156)

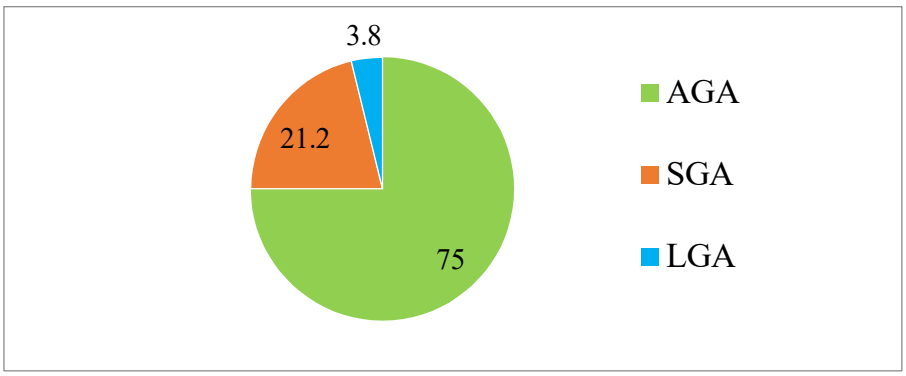


Table 6 and Figure 6 depict the distribution of cases according to weight for gestational age. Majority (80%) of neonates in Group 1 were appropriate for gestational age, 14.3% and 5.7% were small and large for gestational age respectively. In Group 2, majority of neonates (70.9%) were appropriate for gestational age, whereas 26.7% and 2.3% neonates were small and large for gestational age. Overall only 3.8% of neonates were large for gestational age.

Table 7: Distribution of cases according to type of maternal diabetes

Type of diabetes	Group 1 (n=70)	Group 2 (n=86)
Gestational	51 (72.9)	73 (84.9)
Pregestational	19 (27.1)	13 (15.1)

Figure 7: Distribution of cases according to type of maternal diabetes (n=156)

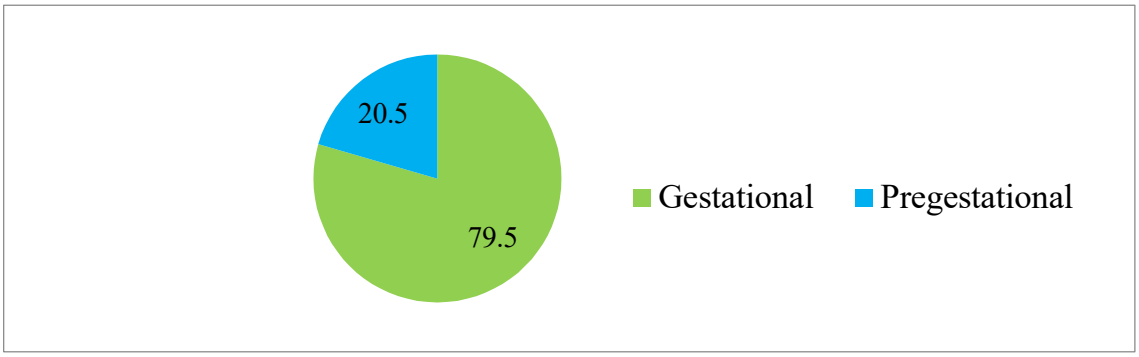


Table 7 and Figure 7 depict the distribution of cases according to type of maternal diabetes. In Group 1, majority (72.9%) of neonates were born to mothers with gestational diabetes, and 27.1% were born to mothers with pregestational diabetes.

Majority (84.9%) of neonates in Group 2 were born to mothers with getional diabetes whereas 15.1% were born to mothers with pregestational diabete

Table 8: Distribution of cases according to Morbidity Pattern

MORBIDITY PATTERN	Number	Percentage
Neonatal hypoglycemia	23	14.7
Neonatal hypocalcemia	31	19.9
Neonatal respiratory distress	45	28.8
Congenital heart disease	47	30.1

Figure 8: Distribution of cases according to morbidity pattern

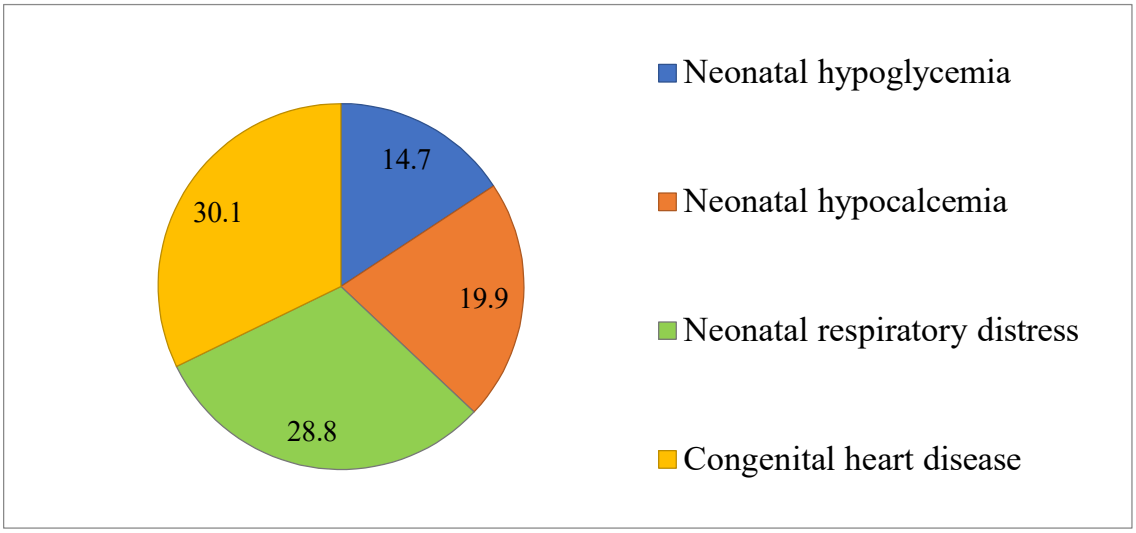


Table 8 and Figure 8 depict the overall morbidity pattern. Congenital heart disease was present in 30.1 % of cases, followed by respiratory distress in 28.8%, hypocalcemia in 19.9%, and hypoglycemia in 14.7%.

ANALYSIS

Table 9: Comparison of neonatal hypoglycemia between two groups

NEONATAL HYPOGLYCEMIA	Group 1	Group 2	TOTAL	P VALUE	ODDS RATIO
Present	13 (56)	10 (44)	23(100)	1.48 (0.22)	1.73
Absent	57 (42.8)	76 (57.2)	133(100)		

- Table 9 depicts the comparison of neonatal hypoglycemia in two groups. In the present study, 23 neonates had episodes of hypoglycemia. Amongst these neonates, 56% were born to mothers with poor glycemic control, whereas 44% of neonates were born to mothers with good glycemic control. In Group 1, 18.6% of neonates had episode of hypoglycemia whereas in Group 2 only 11.6% of neonates had episode of hypoglycemia.
- The P value between the maternal glycemic control and neonatal hypoglycemia was 0.22(not significant). Hence the study found no statistically significant association between them.

Table 10: Comparison of neonatal hypocalcemia between the two groups

NEONATAL HYPOCALCEMIA	Group 1	Group 2	TOTAL	P VALUE	ODDS RATIO
Present	17 (54.8)	14 (45.2)	31(100)	1.554 (0.2)	1.65

Absent	53 (42.4)	72 (57.6)	125(100)		

- Table 10 depicts the comparison of neonatal hypocalcemia according to maternal glycemic control. In the present study, neonatal hypocalcemia was present in 31 neonates. Amongst these neonates, 54.8% born to mothers with poor glycemic control had hypocalcemia. Whereas only 45.2% of neonates born to mothers with good glycemic control had hypocalcemia.
- The P value between the maternal glycemic control and neonatal hypocalcemia was 0.21 (not significant). Hence the study found no significant association between them.

Table 11: Comparison of neonatal respiratory distress between the two groups

RESPIRATORY DISTRESS	Group 1	Group 2	TOTAL	P VALUE	ODDS RATIO
Present	27 (60)	18 (40)	45(100)	5.85 **(0.016*)**	2.37
Absent	43 (38.7)	68 (61.3)	111(100)		

- Table 11 depicts the comparison of neonatal respiratory distress between the two groups. In our study, neonatal respiratory distress was present in 45 neonates. Amongst these cases, 60% were born to mothers with poor glycemic control, while 40% were born to mothers with good glycemic control.
- The P value between maternal glycemic control and neonatal respiratory distress was **0.016 (significant).** Hence the study found a significant association between neonatal respiratory distress and poor maternal glycemic control.
- Outcomes of neonates born to mothers with poor glycemic control, having respiratory distress is **2.37 times** more than those born to mothers with good glycemic control.

Table 12: Comparison of congenital heart disease between the two groups

CONGENITAL HEART DISEASE	Group 1	Group 2	TOTAL	P VALUE	ODDS RATIO
Present	27 (57.4)	20 (42.6)	47(100)	4.30 **(0.038*)**	2.072
Absent	43 (39.5)	66 (60.5)	109(100)		

- Table 12 depicts the comparison of congenital heart disease between the two groups. In our study, it was observed that congenital heart disease was present in 47 neonates. Amongst these neonates, 57.4% were born to mothers with poor glycemic control, while 42.6% of neonates with congenital heart disease were born to mothers with poor glycemic control.
- The P value between the maternal glycemic control and congenital heart disease was **0.038 (significant).** Hence our study found a significant association between congenital heart disease and poor maternal glycemic control.

- Odds of a neonate born to a mother with poor glycemic control, having congenital heart disease is **2.07 times** more than those born to mother with good glycemic control.
- Amongst 47 neonates with congenital heart disease, it was observed that some neonates presented with more than one 2D echo findings. There were 44 neonates with atrial septal defect (ASD), 8 neonates with ventral septal defect (VSD), and 8 neonates with significant patent ductus arteriosus (PDA).

Table 13: Comparison of congenital heart disease (ASD) between the two groups

ASD	Group 1	Group 2	Total	P value	Odds ratio
Present	25(56.8)	19(43.2)	44(100)	3.536 (0.06)	1.959
Absent	45(40.2)	67(59.8)	112(100)		

Table 13 compares the occurrence of atrial septal defect between the two groups. It was observed that out of 44 neonates with atrial septal defect, 56.8% were born to mothers with poor glycemic control, while 43.2% of neonates were born to mothers with good glycemic control.

The p-value between the maternal glycemic control and atrial septal defect was **0.06 (not significant).** Hence our study found no significant statistical association between atrial septal defect and maternal glycemic control.

Table 14: Comparison of congenital heart disease (VSD) between two groups.

VSD	Group 1	Group 2	Total	P value	Odds ratio
Present	4(50)	4(50)	8(100)	0.090	1.242
Absent	66(44.6)	82(55.4)	148(100)		

Table 14 compares the occurrence of ventral septal defect between the two groups. It was observed that out of 8 neonates with ventral septal defect, 50% of neonates were born to mothers with poor glycemic control, and 50% of neonates were born to mothers with good glycemic control.

P value between the maternal glycemic control and atrial septal defect was **0.09 (not significant).** Hence our study found no significant statistical association between ventral septal defect and maternal glycemic control.

Table 15: Comparison of congenital heart disease (PDA) between the two groups

PDA	Group 1	Group 2	Total	P value	Odds ratio
Present	3(37.5)	5(62.5)	8(100)	0.185 (0.667)	0.725
Absent	67(45.2)	81(54.8)	148(100)		

Table 15 compares the occurrence of patent ductus arteriosus between the two groups. It was observed out of 8 neonates with patent ductus arteriosus, 37.5% of neonates were born to mother with poor glycemic control, and 62.5% of neonates were born to mothers with good glycemic control.

P value between the maternal glycemic control and patent ductus arteriosus was **0.185 (not significant).** Hence our study found no significant statistical association between patent ductus arteriosus and maternal glycemic control.

Table 16: Comparison of congenital anomalies between the two groups excluding congenital heart diseases

Congenital Anomaly	Group 1	Group 2	Total	P value	Odds ratio
Present	1(50)	1(50)	2 (100)	0.883	1.23
Absent	69(45)	85(55)	154 (100)		

Table 16 compares the occurrence of congenital anomalies between the two groups excluding congenital heart disease. In our study, out of 2 neonates with congenital anomalies, one neonate was born to mother with poor glycemic control and the other was born to mother with good glycemic control.

Mortality

1 out of 156 neonates had the outcome of death.

Table 17: Comparison of mortality between the two groups

Mortality	Group 1	Group 2	Total	P value	Odds ratio
Present	1	0	1 (100)	-	-
Absent	69 (44.5)	86 (55.5)	155 (100)		

Table 17 compares the occurrence of mortality between the two groups. In our study, only one neonatal death was noted, which was born to mother with poor glycemic control. There was no association between neonatal mortality and maternal glycemic control in our study.

DISCUSSION:

The most prevalent endocrine condition during pregnancy is diabetes mellitus. The prognosis of the offspring is determined by the duration, severity, and glycemic control of the mother's diabetes throughout the pregnancy.[4] This current study is a prospective cohort study to determine the morbidity, mortality pattern and compare the various parameters among neonates born to mothers with GDM with poor (group 1) and good glycemic control (group 2). A total number of 156 subjects satisfying the inclusion criteria were included in the analysis. A slight female predominance (51.4%) was seen in Group 1 while in case of the Group 2, males (61.6%) were predominant. Study done by **Satishkumar and colleagues**[5] observed male predominance (54.5%) while female were 35.5%.

Most of the individuals (50% each) in both groups belong to the birth weight category >2.5- 3.5 kg followed by 1.5- 2.5 kg. **Satishkumar and colleagues**[5] observed 54.8% of the cases to have a birth weight of 2.5 - 4 kg.

The data from the current study did not reveal any significant difference in the birth weight of the neonates born to either of the groups. No difference in birth anthropometric measurements seen between neonates born to GDM and those who were not.[6,7] Conversely, **Baptiste-Roberts K. et al**.[8] found that even after adjusting other factors like maternal BMI, and pregnancy weight gain, mothers with GDM gave birth to children with higher birth weights than their non-diabetic counterparts. Furthermore, compared to newborns of non-GDM mothers,**Sletner L et al.**[9] discovered that fetus of mothers with GDM had growth retardation in 2nd trimester of pregnancy but grew faster later on till delivery.

Most of the mothers belonging to Group 1 (64.3%) as well as Group 2 (54.7%) were multigravid. However, in a study by **Satishkumar and colleagues**[5], it was observed that most of the GDM mothers were primigravida. **Salima et al**[10] observed 90% of participants with GDM to be multigravida. It was observed rise in parity is a risk factor for GDM. This is consistent with research conducted in by **Qadir et al.**[11], who found that 76% of patients with GDM were multigravida, and **Randhawa and colleagues**[12] also reported that 80% of patients with GDM were multiparous. However, **Kheir et al**.[13] discovered that 40.7% of women with GDM were primiparous and 59.7% were multiparous.

Majority of the participants in Group 1(61.4%) as well as Group 2 (72.1%) were term babies (≥ 37 weeks). Similar results were also obtained in a study by **Mohanapriya and Srivastava.**[14] Majority of the participants (72.9%) Group 1 and 84.9% of Group 2) had gestational diabetes. Group 1 had diabetes for a median duration of 6.5 months while in case of the Group 2, it was 7 months.

Most of the babies in both the groups were delivered by LSCS (60% of Group 1 and 68.6% of Group 2) followed by vaginal delivery in 45.7% of the Group 1 cases and 54.3% of the Group 2 cases. **Mohanapriya and Srivastava** [14] who observed majority of their participants having a vaginal delivery, however, more females with GDM delivered via LSCS. It is plausible that the evolving patterns in the handling of GDM pregnancies may be obscured by the increasing incidence of caesarean sections in emerging nations, which bear similarities to the group under study [15]. Pregnancies with diabetes are frequently considered to be at higher risk because of the possibility of problems such as fetal macrosomia or more difficulties achieving vaginal birth. As a result, medical professionals may decide to perform a caesarean section as a safety precaution for the mother and the child.

Majority of the neonates in both the groups were AGA (80.0% of Group 1 and 70.9% of Group 2) followed by SGA (14.3% of Group 1 and 26.7% of Group 2). Similar results were seen in a study by **Satishkumar and colleagues**[5] A Swedish study examined the features of 1547 newborns born to mothers with GDM between 1998 and 2007, comparing them to over 83,000 infants delivered to mothers without GDM. The above study found that the incidence of LGA was 26% among neonates born to GDM mothers.[16]
Hypoglycemia was noted in 54% while hypocalcemia was observed in 43% of newborns in a study by **Anjum and Yashodha**.[17] According to data from the literature, neonates born to women with GDM (25.1%) and type 1 DM (58.3%) are more prone to develop hypoglycemia compared to normal newborn.[18] **Mahmood and Kayes**[19], **Ranade et al**[20], and **Mountain**[21] reported the incidence of hypoglycemia to be 23%, 50%, and 55.2% in their respective studies. According to **Mannan et al**.[22], only 8% of newborns had hypoglycemia. Consequently, it is understood that if a newborn has hypoglycemia, it is often suggestive that the mother's blood sugar levels might not have been properly regulated.[11] However, in our study, there was no statistically significant association noted between neonatal hypoglycemia and neonatal hypocalcemia with maternal glycemic control.

All newborn with blood glucose levels lesser than 40 mg/dl, irrespective of gestational age or symptoms, is considered to have hypoglycemia. In the fetal period there is hyperplasia of the islets of Langerhans leading to hyperinsulinism. After delivery when the maternal supply of glucose is cut off by clamping the cord, the extra insulin in the baby causes neonatal hypoglycemia.[17]

Neonatal RDS and CHD were significantly higher in Group 1 as compared to Group 2 in the current study. A significant association was noticed in the current study between Neonatal RDS and CHD with poor maternal glycemic control. The odds of a baby delivered to a mothers with poor glycemic control, having RDS is 2.37 times more than those delivered to mothers with good glycemic control. Similarly, the odds of a baby born to a mother with poor glycemic control, having CHD is 2.07 times more than those born to a mother with good

glycemic control. Respiratory distress was seen in 19.3% of cases in a study by **Satishkumar and colleagues**[5]. In research by **Prakash et al.,**[23] respiratory distress syndrome was the most common consequence (11%) that was identified. In **Crowther et al**.'s [24] experiment, respiratory distress syndrome was noted more frequently in the intervention arm.

An extensive analysis conducted by Piper in 2002 underscored the importance of managing glucose levels, demonstrating that infants born to diabetic mothers who maintained adequate glycemic control showed lung maturation comparable to that of the general population.[25] Saturated phosphatidylcholine shortage in the lungs and amniotic fluid is the result of elevated insulin levels, which hinder the absorption of choline into lecithin and cause RDS.[17]

Despite good maternal glycemic control, prenatal hyperglycemia and hyperinsulinism results in an increased risk of cardiac hypertrophy in this newborn. The interventricular septum is caused due to fluctuations in these values, and in extreme situations, a varying degree of left ventricular outflow blockage has been reported. The finding from various studies were inconsistent, but significant changes were noted with poor glycemic control, indicated by HbA1c levels exceeding 6.5%.[26]

Overall incidence of CHD in the current study was 30.1%.**Øyen et al**.[27] discovered that mothers with pre-gestational diabetes mellitus had a four-fold increase in the offspring developing CHDs over a cohort study involving two million births spanning 34 year. The risk of gestational diabetes mellitus was only marginally elevated. Improper diabetes management and insufficient prenatal care were significant confounding factors that raised the risk. Pregnancies with inadequate glycaemic management in the first trimester were reported to be more likely to have fetal cardiac disease by **Todorova et al**.[28] Research has shown that women with adequate glycemic control at the time of conception and during the early stages of pregnancy, have a significantly lower chances of having a newborn with cardiac malformations than women with inadequate glycemic control.[29]

Two cases out of 156 had a congenital anomaly. One case (neonate of a mother with good glycemic control) had an abnormal swelling over the lumbar region which was later diagnosed as left lumbar hernia while another case (neonate of a mother with poor glycemic control) was diagnosed with bilateral paramedian cleft lip. One neonate from the cases group expired due to cardiorespiratory failure with pneumopericardium /severe RDS/ extreme preterm/ probable sepsis. **Satishkumar and colleagues**[5] in their research observed two neonatal deaths. They did not report any neonates with congenital anomalies in their study.

The relatively high rates of unfavourable outcomes for mothers and newborns make GDM a serious issue even with the advancements in diagnosis, monitoring, and treatment that have occurred recently. The results seen in our study highlight the value of a collaborative approach between neonatology and feto-maternal medicine. This balance is crucial in determining the optimal timing for delivery, especially in complicated pregnancies where the risks of preterm birth must be considered alongside the risks of continuing the pregnancy. Such coordination can help in making informed decisions that aim to maximize the better health outcomes for both the mother and the child.

Universal screening for GDM is indeed a critical step in ensuring early diagnosis and management of the condition. The survey by **Mahalakshmi et al**.[30] reflects a positive shift towards widespread adoption of universal screening practices. Early diagnosis through universal screening can lead to timely interventions, which may include medical nutrition therapy and insulin therapy if needed, thereby potentially reducing the complications associated with GDM among the mother and the neonate.

CONCLUSION:

In this hospital-based prospective cohort study of 156 neonates born to diabetic mothers at RLJH, Tamaka, revealed that neonates born to diabetic mothers are prone to morbidities like hypoglycemia, hypocalcemia, respiratory distress and congenital heart disease including ASD, VSD, and PDA. Maternal glycemic control significantly impacts these neonatal outcomes. While there was no statistically significant association found between maternal glycemic control and neonatal hypoglycemia or hypocalcemia, there was a notable correlation with neonatal respiratory distress and congenital heart disease, both of which were more prevalent in neonates born to mothers with poor glycemic control.

Hence this study emphasizes the importance of maintaining good glycemic control during pregnancy to improve neonatal health outcomes.

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