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**Research Article**

# Relationship of glycaemic level of mother in last two hours before delivery and occurrence of acute neonatal complications

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## ABSTRACT

**Background:** Diabetes is the most common pre-existing medical disorder seen in pregnancy. Between 2-5% of pregnancies are complicated by diabetes. 87.5% of these women have gestational diabetes, 7.5% have type 1 and 5% have type 2. The study was designed to know the relation of control of diabetes to neonatal outcome in terms of metabolic complications.

**Methods:** Study was conducted in laboring women in government medical college hospital Kottayam. Selection criteria was based on oral GTT. Patients with multiple gestations, other medical disorders were excluded. All the patients were monitored with hourly RBS in active phase of labor. It was compared with cord levels of RBS, calcium, haematocrit and admission to SCNU. For data measured at normal level Chi square test was used to study the significance of difference between the groups. For statistically significant differences odds ratios were computed and 95% confidence limits are calculated. Whenever necessary for quantitative data t- test was used to study the difference in mean values.

**Results:** All normal RBS had live births and all the intrauterine deaths were associated with maternal hyperglycaemia. Among the SCNU admission 87.5% had hyperglycaemia in mother. 33.3 % of abnormal RBS had admission to SCNU whereas only 3.4% of the normal RBS group had admission. The risk of SCNU admission is 14 times more among babies of mothers with abnormal maternal RBS. $X^2 = 16.188$ P = 0.000. The correlation coefficient between maternal RBS and cord RBS is 0.35 indicating a negative relationship between maternal RBS and Cord RBS. The coefficient of determination ($r^2$) is 12 indicates 12% of variation of RBS is explained by maternal RBS. The average RBs cord among mothers with abnormal maternal RBS is 58.4 and among mothers with normal RBS is 72.4 and the observed difference is statistically significant.

**Conclusions:** Heart The study shows that tight regulation of maternal glucose levels during labor can reduce the incidence of neonatal hypoglycaemia and is needed for best neonatal outcome.

**Keywords:** GDM, Hypoglycaemia, RBS, Hypocalcaemia, Oral glucose tolerance test, Neonatal outcome

## INTRODUCTION

Diabetes is the most common pre-existing medical disorder seen in pregnancy. Between 2-5% of pregnancies are complicated by diabetes. 87.5% of these women have gestational diabetes, 7.5% have type 1 and 5% have type 2.

Gestational diabetes is defined by the World Health Organization (WHO) as 'carbohydrate intolerance resulting in hyperglycaemia of variable severity with onset or first recognition during pregnancy'.

For many years there was no consensus on the best method of screening diagnostic criteria, definition, management or treatment of gestational diabetes.

This evidence now suggests that there is a continuum of risk with hyperglycaemia in pregnancy. It remains unclear at what level to define 'gestational diabetes', not helped by differing testing regimens and definitions in the key trials. As such there is significant variation nationally and internationally as to the cut off for diagnosis. NICE recommends a fasting glucose of >6 mmol/l and 2-hour post prandial >7.8 for diagnosis.

International Association of Diabetes in Pregnancy Study Groups (IADPSG) criteria for Gestational Diabetes Mellitus (GDM) The thresholds were fasting: 92 mg/dL (5.1 mmol/L), 1 hour: 180 mg/dL (10.0 mmol/L), and 2-hour postload: 153 mg/dL (8.5 mmol/L).

## METHODS

Study was conducted in laboring women in government medical college hospital, Kottayam. Selection criteria were based on oral GTT. Patients with multiple gestations, other medical disorders were excluded.

All the patients were monitored with hourly RBS in active phase of labor. It was compared with cord levels of RBS, calcium, haematocrit and admission to SCNU.

For data measured at normal level Chi square test was used to study the significance of difference between the groups. For statistically significant differences odds ratios were computed and 95% confidence limits are calculated. Whenever necessary for quantitative data t- test was used to study the difference in mean values.

## RESULTS

All normal RBS had live births and all the intrauterine deaths were associated with maternal hyperglycaemia. Among the SCNU admission 87.5% had hyperglycaemia in mother. 33.3 % of abnormal RBS had admission to SCNU whereas only 3.4% of the normal RBS group had admission. The risk of SCNU admission is 14 times more among babies of mothers with abnormal maternal RBS. $X^2 = 16.188$ P = 0.000.

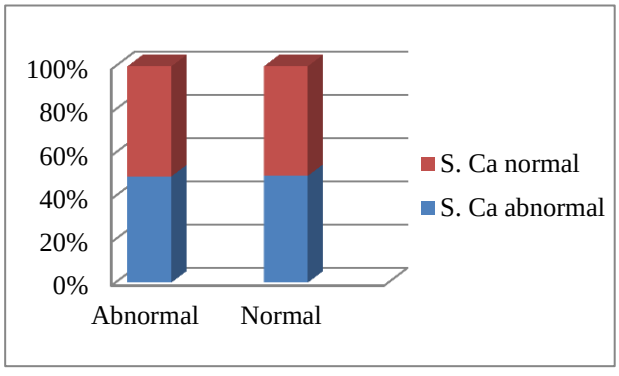


**Figure 1: Distribution of serum calcium of babies among abnormal and normal maternal RBS.**

Among mothers with abnormal RBS 57.1% had neonatal hypocalcaemia. The corresponding percentage is only 41.4% among mothers with normal maternal RBS. $X^2 = 2.425$ P = 0.119, the observed difference is not statistically significant. 14.3% of hyperglycaemic mothers had neonatal hyperbilirubinaemia. All the neonatal hyperbilirubinemia was associated with hyperglycaemia in mother. There is significant relationship between maternal RBS and neonatal hyperbilirubinaemia. $X^2 = 8.815$ P = 0.003.

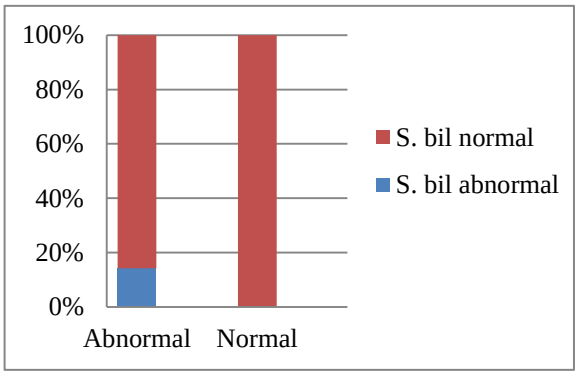


**Figure 2: Distribution of serum bilirubin of babies among abnormal and normal maternal RBS.**

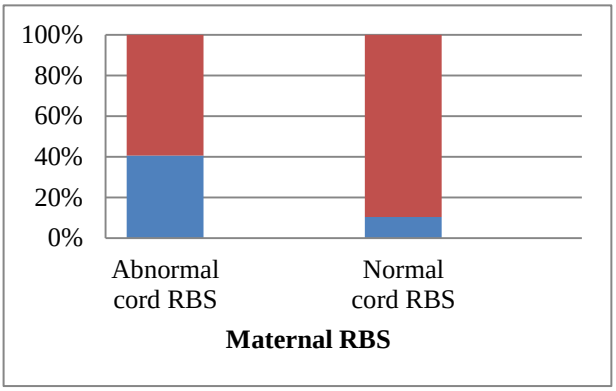


**Figure 3: Distribution of RBS cord among abnormal and normal maternal RBS.**

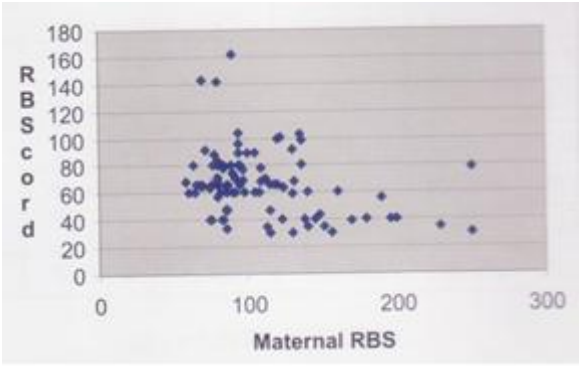


**Figure 4: Correlation between maternal RBS and RBS cord.**

The odds ratio is 5.8 and 95%confidence limits for the odds ratio are 2 and 16.7.the risk of having abnormal cord RBS is 5.8 times among mothers with abnormal maternal RBS. $X^2$ =12.488 P = 0.000.

The correlation coefficient between maternal RBS and cord RBS is 0.35 indicating a negative relationship between maternal RBS and cord RBS. The coefficient of determination ($r^2$) is 12 indicates 12% of variation of RBS is explained by maternal RBS.

The average RBS cord among mothers with abnormal maternal RBS is 58.4 and among mothers with normal RBS is 72.4 and the observed difference is statistically significant (Table 1).

**Table 1: Average RBS cord among mothers with abnormal maternal RBS.**

| | Mean ± SD | T | Significance |
|---|---|---|---|
| Abnormal | 58.4 ± 22.93901 | 2.96 | 0.003 |
| Normal | 72.4 ± 23.49893 | | |

## DISCUSSION

Nearly third of mothers belonged to 25-29 years of age. The groups were comparable with respect to age.

All euglycaemic mothers had live births and all intrauterine deaths were associated with maternal hyperglycaemia.

Among the NICU admission 87.5% had hyperglycaemia in mother 33.3% of abnormal RBS had admission to SCNU whereas only 3.4% of normal RBS group had admission. Risk of SCNU admission is 14 times more among babies of mothers with abnormal maternal RBS.

Among mothers with abnormal RBS 57.1% had neonatal hypocalcaemia. 14.3% of hyperglycaemic mothers had neonatal hyperbilirubinaemia.

The odds ratio is 5.8 and 95% confidence limits for odds ratio are 2 and 16.7. The risk of having abnormal cord RBS is 5.8 times among mothers with abnormal maternal RBS. The correlation coefficient between maternal RBS and cord RBS is -0.35 indicating a negative relationship between maternal RBS and RBS cord. The coefficient of determination is 12 indicating 12% of variation is explained by maternal RBS.

Lowering glucose is of pivotal importance in the treatment of diabetes in pregnancy.[1] A spectrum of different glucose thresholds can be established and used appropriately to prevent each complication. This article outlines the concept of normality and what definition of normality should be used to evaluate the relationship between the level of glycaemia and perinatal outcome.

In GDM, it has been established that there is a positive relationship between levels of maternal glycaemia and perinatal morbidity and mortality.[2] Although the terms normal and abnormal seem to be self-explanatory, the range suggested for the measurement of a specific medical condition is often incompatible for the stated goals. As a result, there is a need to establish thresholds or boundaries for targeted glycaemic levels appropriate to a specific diabetic complication.[4]

Perinatal mortality in pre-existing diabetes was higher than in the GDM patients but with similar rates between type 1 (stillbirth: 12/1000; neonatal death: 8/1000) and type 2 diabetes (stillbirth: 13/1000; neonatal death: 5/1000).[5] The higher rate of perinatal mortality in the pre-existing diabetic patients is attributable in part to the lower rate of those achieving targeted levels of glycaemic control and to the higher incidence of congenital malformations and vascular complications.[6]

The abnormal maternal glucose level causes cellular hyperplasia and hypertrophy of most foetal tissues resulting in foetal hyperinsulinaemia. The consequence of this abnormality is macrosomia, metabolic and respiratory complications, and others. As the common denominator is maternal hyperglycaemia and foetal hyperinsulinaemia, it is reasonable to speculate that glycaemic control on the maternal side will positively influence the foetal side.[7]

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