Original Article

Frequency of Macrosomia and Hypoglycemia in Neonates of Diabetic Mothers

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ABSTRACT

Objectives: To determine frequency of macrosomia and hypoglycemia in neonates of Diabetic Mothers.
Study Design: Descriptive / Cross-Sectional Study
Place and duration of Study: This study was conducted at the Labor Room and Post Natal Unit of Pediatric Department, Liaquat National Hospital Karachi from October 2013 to March 2014.
Materials and Methods: This study was carried out on 376 cases at labor room where female (Mother) came for delivery, her pregnancy record Checked for control of blood sugar level and brief history taken. Neonatal cord blood taken at the time of delivery for glucose level. Neonatal birth weight taken immediately after birth and plotted on growth chart for the assessment of macrosomia
Results: Mean age of the patients was 35.37 years, male prevalence was found higher, and that is 57.40%. Mean gestational age was 37.22 weeks. Mean duration of diabetes was 3.77 years. Frequency of hypoglycemia was found in 21.50% patients, while macrosomia was found in 36.20% patients.
Conclusion: The frequency of hypoglycemia and macrosomia in infants of diabetic mother was 21.5% and 36.50% respectively.
Key Words: Infant of Diabetic Mother, Hypoglycemia, Hyperglycemia, Macrosomia. Neonates

INTRODUCTION

Today, 3-10% of pregnancies are affected by abnormal glucose regulation and control. Of these cases, 80-88% is related to abnormal glucose control of pregnancy or gestational diabetes mellitus. Of mothers with preexisting diabetes, 35% have been found to have type 1 diabetes mellitus, and 65% have been found to have type 2 diabetes mellitus [1].

The infant of diabetic mother is the premier example of the morbidity that may exist in the neonates due to maternal disease (diabetes) because it may cause hypoglycemia, respiratory distress syndrome and hypocalcemia in newborns.[2]

Closer metabolic control of the pregnant diabetic women results in greater potential for producing a normal neonate. Pregnancy of diabetic mother should be considered as a high risk. Diabetic mothers can control their blood sugar level by walking 3 times a day for 30 minutes after each meal and Medical Nutrition therapy by taking 30 Kcal/kg/day.

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If after 7 days of exercise and Medical Nutrition Therapy, blood sugar level is not controlled than human Regular and NPH Insulin therapy can normalize blood sugar level.[3, 4]

Various studies show that perinatal mortality varied directly with maternal severity of diabetes. At birth the infants of poor controlled diabetes often appears macrosomic (45%) in contrast to the infant born to well control diabetes. If gestational diabetes is well controlled than the outcome can approach that of non-diabetic pregnancies, and because of better understanding of pathophysiology of diabetes, the complications in uncontrolled gestational diabetes cab be recognized and managed.[4,5,8]

A decline in plasma glucose concentration following delivery is characteristic of infant of diabetic mother, especially among neonates who are either macrosomic or whose mothers had poor glycemic control during pregnancy.[6, 7]

The rationale of this study is to determine the frequency of complications such as hypoglycemia and macrosomia in infants of diabetic that will help in determining the hypoglycemia soon after birth 60 and 120 minutes later, by doing this we can enforce for early neonatal blood sugar monitoring to prevent the brain insult.

MATERIALS AND METHODS

It was a Descriptive and Cross- Sectional Study done with Non Probability Consecutive

Technique, conducted at the labor room and post natal unit of Liaquat National Hospital Karachi, from October 2013 to March 2014 over 376 neonates, at labor room where female (Mother) came for delivery, her pregnancy record Checked for control of blood sugar level and brief history taken. Neonatal cord blood taken at the time of delivery for glucose level. Neonatal birth weight taken immediately after birth and plotted on growth chart for the assessment of macrosomia

All this data was collected and recorded by main researcher in predesigned proforma. Informed verbal consent was taken prior to asking questions and the information gathered from mothers were kept confidential

The data entered and analyzed in statistical program SPSS version 16.0. Frequencies and percentages computed for qualitative variables like gender of baby, hypoglycemia (neonatal Glucose level), Macrosomia (weight of baby), Gravida, Para, whether diabetes controlled or uncontrolled, diabetes how controlled (Exercise, diet, Insulin), mode of delivery and duration of maternal diabetes.

The numerical variables such as age of mother (in years), gestational age of baby etc. presented as Mean + Standard deviation. Effect modifiers controlled by stratification of age of mother, duration of diabetes, gender of baby, gestational age of baby, parity and mode of delivery. Outcome compared among controlled and uncontrolled diabetic mothers applying chi square test. All the data calculated on 95% confidence interval. A p- value < 0.5 considered as statistically significant level.

Inclusion Criteria: All alive babies born to Type 2 Diabetic Mothers (whether controlled or uncontrolled diabetes) above 28 weeks of gestation (Assessed on Last Menstrual Period), Duration of Maternal Type 2 Diabetes of more than 1 year

Exclusion Criteria: Babies born before 28 weeks of gestation (Assessed on Last Menstrual Period), Babies born to Nondiabetic mothers

Operational Definitions: Diabetes**:** Diabetes may be defined as, that meeting the WHO criteria for diabetes that is Fasting plasma glucose level >126 mg/dl at 2m different occasions (24 hours apart)

Hypoglycemia: Any blood glucose levels of <45mg/dl (2.2mmol/l). Macrosomia: Birth weight >90% for gestational age

RESULTS

Table No.1: Age Parameters

	Mean	S.D	Min.	Max.
Age of Mothers (Years)	35.37	1.49	34	37
Gestational age of Baby (Weeks)	37.22	1.13	37	43
Duration of Diabetes (Years)	3.77	1.47	2	5

Table No. 2: Comparison of Outcome and Diabetes Status   n=376

Outcome		Total	P-Value
Hypoglycemia	Yes	81 (100)	
	No	295 (100)	
	Total	376 (100)	0.001
Macrosomia	Yes	136 (100)	
	No	240 (100)	
	Total	376 (100)	0.001

Table No.3: Comparison of Hypoglycemia and Diabetes Status with gender of the baby

Gender	Hypoglycemia	Total	P- Value
Male	Yes	39 (100)	0.001
	No	177 (100)	
	Total	216 (100)	
Female	Yes	42 (100)	0.452
	No	118 (100)	
	Total	160 (100)	

Table No.4: Comparison of Macrosomia and Diabetes Status with gender of the baby

Gender	Macrosomia	Total	P-Value
Male	Yes	56 (100)	0.001
	No	160 (100)	
	Total	216 (100)	
Female	Yes	80 (100)	0.132
	No	80 (100)	
	Total	160 (100)	

Table No.5: Comparison of Hypoglycemia and Diabetes status with age, diabetes duration and Parity   N=376

Age Group (Years)	Hypoglycemia	Total	P-Value
≤ 35	Yes	37 (100)	0.001
	No	167 (100)	
	Total	204 (100)	
>35	Yes	44 (100)	0.001
	No	128 (100)	
	Total	172 (100)	
≤ 40	Yes	76 (100)	0.001
	No	286 (100)	
	Total	362 (100)	
>40	Yes	5 (100)	0.001
	No	9 (100)	
	Total	14 (100)	
Diabetes Duration ≤ 3 Years	Yes	20 (100)	0.001
	No	133 (100)	
	Total	153 (100)	
Diabetes Duration > 3 Years	Yes	61 (100)	0.001
	No	162 (100)	
	Total	223 (100)	
Primiparous	Yes	36 (100)	0.001
	No	48 (100)	
	Total	84 (100)	
Multiparous	Yes	45 (100)	0.001
	No	247 (100)	
	Total	292 (100)	

Table No.6: Comparison of Macrosomia and Diabetes Status with age, diabetes duration and Parity   n=376

Age Group (Years)	Macrosomia	Total	P-Value
≤ 35	Yes	69 (100)	0.001
	No	135 (100)	
	Total	204 (100)	
>35	Yes	67 (100)	0.001
	No	105 (100)	
	Total	172 (100)	
≤ 40	Yes	131 (100)	0.001
	No	231 (100)	
	Total	362 (100)	
>40	Yes	5 (100)	0.001
	No	9 (100)	
	Total	14 (100)	
Diabetes Duration ≤ 3 Years	Yes	45 (100)	0.001
	No	108 (100)	
	Total	153 (100)	
Diabetes Duration > 3 Years	Yes	91 (100)	0.001
	No	132 (100)	
	Total	223 (100)	
Primiparous	Yes	53 (100)	0.001
	No	31 (100)	
	Total	84 (100)	
Multiparous	Yes	83 (100)	0.001
	No	209 (100)	
	Total	292 (100)	

Mean age of patients was 35.37 years (Table 1). Most of the patient lies in age <35 years, i.e. 54.30% (Table 1).

Male prevalence was found higher, that is 57.40% (Table 3). Mean gestational age was 37.22 weeks Table 1). Most of the patient was present in <40 weeks of gestation that is 96.30% (Table 1).

Mean duration of diabetes was 3.77 years (table 4). Most of the patients were present with duration of diabetes > 3 years that is 59.30% (Table 5). The majority of the patients were present with multi gravida status that is 74.50%, where as 77.70% patients were multiparous (Table 5 and 6).

Frequency of hypoglycemia was found in 21.50% patients, while macrosomia was found in 36.20% patients (Table 2). Stratification was done to see the effect of diabetes status on the outcome. Chi square test was applied and significant effect was observed as P-Value was found 0.001 in hypoglycemia and macrosomia (Table 5). Effect modifiers were controlled by stratification of age, gestational age, duration of diabetes, gender of the baby and parity.

DISCUSSION

A study by Robert Schwartz reported that macrosomia was present in 10-27% newborn of well controlled diabetic mothers [5]. This study is not similar to our study because 42.3% babies were macrosomic in controlled diabetic mothers in our study.

Another study by C. Andrew Combs showed that neonatal macrosomia occurred in 32 (29%) cases whose mothers had high postprandial glucose level between 29 and 32 weeks of gestation [6]. This study is also different from our study because 57.7% babies were macrosomic in uncontrolled diabetic mothers in our study.

A similar local study to our study was done by Hussain M et al who found the complications in infants of diabetic mothers i.e. Macrosomia 40.4% and Hypoglycemia 23.8% in his study.[7] while in our study macrosomia was present in 36.20% babies and Hypoglycemia was present in 21.50% babies.

Similarly, the study of Alam M et al. showed 45% babies were macrosomic and hypoglycemia was noted in 35%, the mean GA of IDMs was 37.84 weeks ± 1.88. 29. The commonest morbidities were Hypoglycemia (significantly higher in IDMs than non-IDMs) and hyperbilirubinaemia in 30 (63.8%) and 26 (57.4%) respectively.[8] Mean gestational age in our study was 37.22 and there was no comparison of morbidities with non IDM Mothers.

Another different study of Mahjabeen K who reported that overall incidence of macrosomia was 72(31.4%). In her study there were significantly more macrosomic newborns in diabetic women; (52.8%) compared to non-diabetic women (47.2%). Fetal macrosomia in her study was 31.4% in both diabetic and non-diabetic mothers. [9] While in our study macrosomia was 42.55% and we did not have any comparison with non-diabetic mothers.

In one non-similar study conducted by Anwar TA et al. on 165 cases who found significant difference of neonatal outcome of all macrosomic neonates of controlled and uncontrolled diabetic mothers' babies, hypoglycemia 62.5% in non-diabetic mothers, 43.3% in diabetic mothers (p value < 0.05). Of the165 macrosomic infants, 112(67.9%) born to controlled diabetic mothers, while 53(32.1%) born to Uncontrolled mothers, whereas Mothers with a uncontrolled diabetic history of fetal macrosomia in the study group accounted for 39.5% compared with 12.5% in the control [10]. While in our study macrosomia was present in 66.2% case whose mothers had uncontrolled diabetes, while 54% cases had macrosomia whose mothers had controlled diabetes. Another study conducted by Saleh A et al. there were significantly more macrosomic newborns in non-diabetic women; 73% versus 2 in diabetic women, p=0.0001 [11].

Another different study by Agrawal RK et al. reported 47% infants developed hypoglycaemia in well controlled diabetic mothers during the first 2 h of life. There was no difference in the cord blood glucose levels between infants with or without hypoglycaemia (3.7 +/- 1.1 vs 4.5 +/- 1.1 mmol/L, respectively) [3]. While in our study hypoglycemia was present in 28.1%

cases of uncontrolled diabetic mothers and 14.3% cases had hypoglycemia in controlled diabetic mothers

In another by Jaja T et al. showed the commonest morbidity was Hypoglycemia (significantly higher in IDMs than non-IDMs) and hyperbilirubinaemia in 30 (63.8%) within the first 24 hours. and 26 (57.4%) respectively[12]. While S Banerjee reported the incidence of neonatal hypoglycemia 12.5% in tight glycemic control diabetic mothers, 18.2% in appropriate glycemic control glycemic mothers and 22.2% in uncontrolled glycemic control diabetic mothers[13.]

Conclusion:

CONCLUSION

The frequency of hypoglycemia and macrosomia in infants of diabetic mother was 21.5% and 36.50% respectively.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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