

ORIGINAL ARTICLE

Frequency of Neonatal Hypocalcemia among Diabetic Mothers

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ABSTRACT

Objective: To determine the frequency of neonatal hypocalcemia among mothers presented with glucose impairment.**Subject and Method:** This was a cross-sectional study and was done at department of OBS and Gynaecology of PNS SHIFA Karachi. Study was conducted during six months from December 2010 to June 2011. This study comprised all the known diabetes mothers aged more than 18 years presented at PNS SHIFA Hospital and underwent child birth of either mode of delivery and parity. Females were monitored until they gave birth. A 5ml blood sample was taken from each mother to assess the current value of fasting blood sugar levels. To assess the neonatal calcium level 2cc blood samples were obtained under aseptic conditions after 24 hours of the births and the serum calcium level below 7mg/ dl was considered as hypocalcemia. All the data was collected via self-made study proforma. SPSS version 26 was used the purpose of data analysis.**Results:** Total 150 diabetes mothers were studied. The average maternal age was 30.23±3.55 years and gestational age was 37.11±3.22 weeks. Most of the females were multiparous 54.0% and majority of the cases underwent c-sections 93(62.0%). Neonatal hypocalcemia was 20.7% Frequency of the newborn hypocalcemia was higher in age group of 21-30 years (p=0.082), while it was also insignificant according to gestational age (p=0.172).**Conclusion:** According to the study's findings, the newborn hypocalcemia was observed to be the 20.7% in diabetes mothers. According to maternal age, it was determined to be statistically significant.**Key words:** Pregnancy, diabetes, neonatal calcium level

INTRODUCTION

Diabetes has long been linked to maternal and foetal mortality and morbidity during pregnancy.¹ The primary mechanism accountable for a broad range of prenatal, natal, and postnatal problems is poor metabolic regulation in the mothers and exposure of the foetus to maternal hyperglycemia.¹⁻³ Infants born to diabetes mothers are at risk for a variety of metabolic and hematological problems, including polycythemia and hyperbilirubinemia.⁴ Hypocalcemia is more common in babies who have had a history of hypomagnesemia and birth asphyxia is generally caused by hypocalcemia.¹ Neonatal hypocalcemia has been recorded in approximately 50% of diabetes mothers' newborns (GDM or PGDM). Premature birth, birth asphyxia, reduced placental transfer of calcium due to considerable maternal urine excretion of calcium, decreased neonatal production of PTH, and limited intake & impaired absorption of ingested calcium are all factors that contribute to hypocalcemia.^{4,5} Hypomagnesemia in the mother and newborn due to higher maternal urinary excretion of magnesium during gestation, on the other hand, has been identified as the commonest cause of hypocalcemia in the newborns of diabetes mothers.⁶ In the newborn, hypomagnesemia induces functional hypoparathyroidism and the Higher maternal calcium attributable to mother's hyperparathyroidism passes to the fetus through the placenta, suppressing foetal PTH synthesis and impairing PTH response to post pregnancy hypocalcemia.⁶ Hypocalcemia is a frequent metabolic issue that affects newborns and children. In symptomatic hypocalcemia, there is agreement on treatment, but the calcium level at which treatment should begin and the

therapeutic alternatives are still up for debate in asymptomatic hypocalcemia.⁶ Jitteriness, tachypnea, sweating, convulsions and irritability are signs and symptoms of neonatal hypocalcemia and hypomagnesemia, which are similar to that of hypoglycemia.⁷ At both a case and population level of health, the increased incidences of impaired glucose tolerance during pregnancy, as well as perinatal complications secondary to GDM, and an increasing understanding of the major long-term influences on offspring of female with Gestational diabetes, is of growing importance to obstetric and neonatal clinicians.⁸ Due to limited data particularly at local level, this study has been conducted to assess the frequency of neonatal hypocalcemia among patients with maternal hyperglycemia.

MATERIAL AND METHODS

This was a cross-sectional (retrospective) study and was done at department of OBS and Gynaecology of PNS SHIFA Karachi. Study was conducted during six months from December 2010 to June 2011. This study comprised all the known diabetes mothers aged more than 18 years presented at PNS SHIFA Hospital's and underwent child birth of either mode of delivery. Women under the age of 18 years, pregnant women with additional conditions such as hypertension, autoimmune disease, repeated pregnancies, and women who refused to partake in the study were excluded. Verbal consent was obtained from all the study subjects, and the goal of the study was described. Females were monitored until they gave birth, and the above-mentioned results were recorded. A 5ml blood sample was taken from each mother to assess the

current value of fasting blood sugar levels. The researcher performed the mother's glucose test themselves, using the glucose oxide approach. Women who were critical ill and shifted to the ICU were also excluded. To assess the neonatal calcium level 2cc blood samples were obtained under aseptic conditions after 24 hours of the births and the serum calcium level below 7mg/ dl was considered as hypocalcemia. All the data was collected via self-made study proforma. SPSS version 26 was used the purpose of data analysis.

RESULTS

In this study total 150 diabetes mothers were studied to assess the incidence of neonatal hypocalcemia. The average maternal age was 30.23 ± 3.55 years and gestational age was 37.11 ± 3.22 weeks. Most of the females were multiparous 54.0% and majority of the cases underwent c-sections 93(62.0%). Females were in majority 86(57.3%) as per neonatal gender. Table.1

Neonatal hypocalcemia was found 20.7% among all pregnant mothers. Fig:1

Median Apgar score of the babies at one minute was 7(IQR=1) while at five minute was 9(IQR= 2). Fig:2

Frequency of the newborn hypocalcemia was higher in age group of 21-30 years, while findings were statistically insignificant ($p=0.082$), it was also insignificant according to gestational age ($p=0.172$). Table.2

Table 1. Demographic characteristics of the patients n=150

Variables		Statistics
Age		30.23 ± 3.55 years
Gestational Age (Weeks)		37.11 ± 3.22 weeks
Fasting Blood Glucose mmol/L		109.65 ± 10.33 mg/dl
Parity	Primiparous	69(46.0%)
	Multiparous	81(54.0%)
MOD	Normal vaginal delivery	57(38.0%)
	C-section	93(62.0%)
Neonatal gender	Male	64(42.7%)
	Female	86(57.3%)

MOD: Mode of delivery

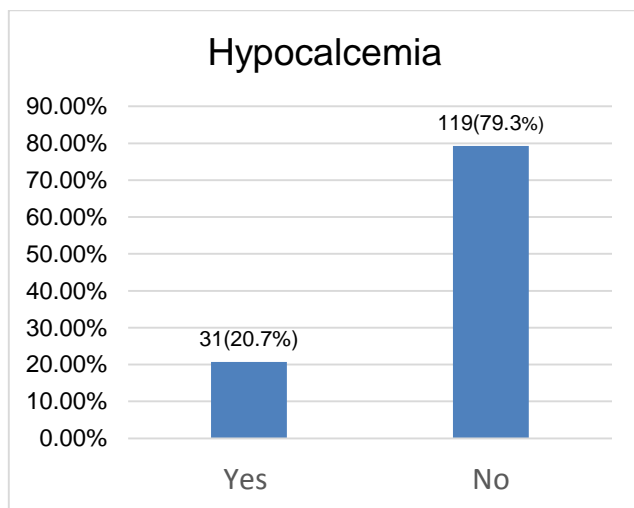


Fig:1. Frequency of hypocalcemia n=150

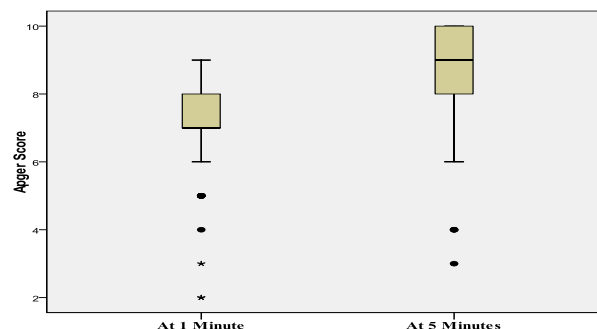


Fig:2 Apgar score of the newborns n=150

Table:2 Neonatal hypocalcemia as per maternal age and gestational age n=150

Variables		Neonatal Hypocalcemia		p-value
		Yes	No	
Maternal age	< 20 years	03	19	0.082
	21-30 years	20	50	
	>30 years	08	50	
Gestational age	<36 weeks	07	12	0.172
	37-40 weeks	15	71	
	>40 weeks	10	35	

DISCUSSION

GDM (gestational diabetes mellitus) is a type of glucose intolerance that develops or is first noticed during pregnancy. In this study total 150 diabetes mothers were studied to assess the incidence of neonatal hypocalcemia. The average maternal age was 30.23 ± 3.55 years and gestational age was 37.11 ± 3.22 weeks. Consistently Toor KM et al⁹ reported that the most of the deliveries 65 (81.25%) were done between gestational age of 37 to 39 weeks and average gestational age was 37.58 ± 1.35 weeks. On other hand Ostlund I et al¹⁰ reported comparable findings regarding age as the mean age of the diabetic mothers was 32.5 ± 5.0 years in the untreated IGT group. Haider G et al¹¹ also demonstrated that the most of the diabetic mothers (52.7 %) were between age group of 31-35 years. In this study most of the females were multiparous 54.0%, majority of the cases underwent c-sections 93(62.0%) and females were in majority 86(57.3%) as per neonatal gender. Haider G et al¹¹ stated that the 33.6% were delivered via emergency caesarean section, 30% via elective caesarean section, 24.5% via spontaneous delivery, vacuum extraction was done in 6.3% and 06 5.4% with outlet forceps and 35.4% females were multiparous. On other hand Toor KM et al⁹ reported that out of infants of diabetic mothers' males were 52.5% and females were 47.5%. Inconsistently Bhavya SO et al¹² also demonstrated that the out of all neonates 64% were males and 36% were females.

In this study neonatal hypocalcemia was found 20.7% among all diabetic mothers. In the comparison of this study Haider G et al¹¹ found almost similar findings of neonatal hypocalcemia as 20% among diabetic mothers. In another study of Toor KM et al⁹ reported that the neonatal Hypocalcemia was among 10(12.5%) of the cases. In a recent randomized trial reported that the hypocalcemia was (16.3%) treated group and (15.4%) was in non-treated

group. In this study the frequency of the newborn hypocalcemia was statically insignificant according to maternal age and gestation age. On other hand Sonia SF et al¹³ found higher frequency of Hypocalcemia as 47.6% in neonates of gestational diabetes mothers 69.2% in neonates of pre- gestational diabetes mothers. Although there are still controversial findings regarding proper incidence of hypocalcemia as mentioned above. In this study also used the data of previous years and there is also difference in the studies may because of study sample sizes and selection criteria. Transient newborn hypocalcemia has been described primarily in newborns of pre- gestational insulin-dependent diabetic women, and it may be linked to maternal hypomagnesemia and foetal hypomagnesemia.^{14,15} Because calcium concentration in newborns was adversely associated to maternal HbA1c concentrations, the hypocalcemia severity appeared observed to be linked to the maternal diabetes severity.^{14,15} As per are several limitations of this study the further large scale recent studies should be done on this subject.

CONCLUSION

According to the study's findings, the newborn hypocalcemia was observed to be the 20.7% in diabetes mothers. According to maternal age, it was determined to be statistically significant. In order to achieve a clear conclusion, further large-scale studies are recommended based on the several strengths and limitations of our study.

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