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Original Article

Neonatology Section

Can We Predict the Sex of Babies and their Outcome in Relation to Gravida of Mother with Trimesteral Glucose in GDM & NGDM Persistently Elevated Cases?

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ABSTRACT

Introduction: Gestational diabetes mellitus is defined as diabetes diagnosed for the first time during pregnancy and its incidence is 3-7% of pregnancies. There are many risk factors like sex, birth weight of babies. Fetal sex potentially may influence maternal glucose metabolism in pregnancy. Some studies found that higher maternal fasting glucose during 4-12 weeks gestation of pregnancy was associated with more birth weight and birth height. So, despite of tremendous research there is no consensus about universal screening and selective screening for GDM. Treatment of GDM reduces serious perinatal morbidity, improves neonatal outcome.

Aim: To find out the correlation between sex and birth weight of babies, time and mode of delivery by gestational age and outcome in relation to gravid of mothers with trimesteral glucose in persistently elevated and confirmed GDM cases.

Materials and Methods: A prospective randomised study was done in KIMS Medical College and Hospital, Amlapuram from January 2014 to January 2016, with patients consent and ethical committe approval. It included 150 cases attending in the antenatal clinic of Obstetrics and Gynaecology Department and Hospital delivery in KIMS Medical College. After detailed history and clinical examination, investigation OGTT (Oral Glucose Tolerance Test) in the first trimester of pregnancy was done. Babies delivered from NGDM persistently elevated (PGBS >100mg/dl) and confirmed GDM (Gestational Diabetes mellitus) (PGBS >140mg/dl) cases were admitted with complication in NICU.

Results: Most GDM cases (76%) were in the age >30 years in compared to NGDM cases (57.77%). In 20 -25 years of age, majority GDM (80%) were in multi and 64.44% of NGDM persistently elevated in primi cases. Most of cases (50%) delivered after 37 weeks of gestation. The commonest mode of delivery was LSCS in all groups of blood sugar level of 100-120mg/dl,120-140mg/dl and >140mg/dl. In the present study, male babies were predominantly delivered from primi mothers not from multigravida as in other study. Whereas, in NGDM persistently elevated level, babies predominantly delivered from multigravida mothers were male babies. Those mothers who were diagnosed early and undergone treatment delivered term babies, whereas those who were late diagnosed had preterm deliveries.

Conclusion: Though, the neonatal complications are poorly predictable by maternal history and risk factors like sex, birth weight of babies especially in nullipara. From this study, it was observed that sex of babies had important effect on mother's glucose status and early treatment of GDM cases reduces perinatal outcome.

Keywords: Foetal growth restriction (FGR), Neonatal complications, Post Glucose blood sugar (PGBS).

INTRODUCTION

Gestational diabetes mellitus is defined as diabetes diagnosed for the first time during pregnancy and its incidence is 3-7% of pregnancies. There are many risk factors of pregnancy and babies born to untreated gestational diabetes mother are typically at increased risk of glucose-mediated growth disturbances as macrosomia and IUGR, hypertension, birth trauma, respiratory distress, hypoglycaemia, hypocalcaemia, hyperbilirubinemia with increased Neonatal Intensive Care Unit (NICU) admissions. Specifically, it has long been recognized that the presence of a male fetus is associated with poorer ß-cell function, higher postprandial glycaemia, and an increased risk of GDM in the mother

[1] and more associated with neonatal complications [2]. Thus, fetal sex potentially may influence maternal glucose metabolism in pregnancy. Some studies found that higher maternal fasting glucose during 4 -12 weeks gestation of pregnancy was associated with larger birth weight and birth length.

Despite tremendous research there is no consensus about universal screening and selective screening for GDM. Treatment of GDM reduces serious perinatal morbidity, improves neonatal outcome.

MATERIALS AND METHODS

A prospective randomised study was done to know the gender, birth weight, time of delivery by gestational age and outcome in relation to gravida of mother with trimesteral glucose in persistently elevated and confirmed GDM cases in KIMS Medical College and Hospital, Amlapuram, India from January 2014 to January 2016. Patients consent and ethical committee approval was obtained prior to the study. In this study 100 cases were taken, those who had attended the antenatal clinic early in first trimester of pregnancy with PGBS > 90mg/dl, regular antenatal check-up during antenatal period in Obstetrics & Gynaecology Department and Hospital delivery in Konaseema Medical College, Amalapuram. A detailed clinical assessment of the patient, general physical examination and obstetrical examination and routine investigation with Oral Glucose Tolerance Test (OGTT) in the first trimester of pregnancy (a single test procedure i.e. 75g oral glucose load and at 2 hours a venous blood sample is collected for estimating plasma glucose-PGBS as per the Diabetes in pregnancy study group in India DIPSI guidelines) were done during antenatal visit.

Out of 100, 70 babies were delivered from persistently elevated blood sugar (>100mg/dl) in all trimester throughout pregnancy but NGDM and confirmed GDM (PGBS >140mg/dl) cases, and were admitted with complication in the NICU. Their mode of delivery, sex, birth weight and gestational age were recorded.

Females who were diagnosed as GDM were subjected to Medical Nutrition Therapy for two weeks. If it failed to achieve control blood sugar then insulin was initiated. While all the cases of NGDM were subjected to proper diet and regular exercise.

Inclusion Criteria

1. Pregnant women attending antenatal clinic of Obstetrics and Gynaecology Department in first trimester of pregnancy and regularly, 2. Pregnant women of any parity. 3. Singleton Pregnancy.

Exclusion Criteria

1. Pregnant women those not attending antenatal clinic regularly and those attended after first trimester, 2. Pregnant women with complication other than GDM, 3. Twin pregnancy.

STATISTICAL ANALYSIS

The data was collected using MS excel sheet and analysed. Summarisation of the data was presented using basic tables. Categorical variables were presented as frequency and percentage.

RESULTS

Out of 100 mothers, 25(25%) were diagnosed as GDM (>140mg/dl), 45(45%) NGDM but persistently elevated (>110mg/dl) in all trimester throughout pregnancy and remaining 30(30%) were normal >90mg/dl [Table/Fig-1].

Most of the mother came for antenatal visit with elevated blood sugar >100mg/dl at 21-25 years of age were 28(40%). Most GDM 19(76%) were in the above the age of 30 years and 6(24%) below 30 years. Whereas, 26(57.77%) NGDM persistently elevated were in 20-25 years age group. In the present study, according to gravida, majority of GDM, 20(80%) cases were in multi and 29 (64.44%) NGDM persistently elevated in primi cases [Table/Fig-1].

In this study, 35 babies were delivered after 37 weeks, out of which 16 (45.71%) babies, whose mother detected first time having blood sugar > 100mg/dl before 8 weeks gestation of pregnancy and 11(31.42%) at 8-10 weeks of pregnancy. Whereas, 22(68.75%) babies out of 32 delivered by 36-37weeks gestation, whose mother detected first time at 8-10 weeks gestation of pregnancy [Table/Fig-2].

Maternal		GDM (n=25)		NGDM Persistently Elevated (n=45)		No. of Pt (n=70)	Percentage (%)
		n	%	n	%		
Age	< 20 yrs	01	4%	02	4.44%	03	4.28 %
	20 – 25 yrs	02	8%	26	57.77%	28	40%
	26 – 30 yrs	03	12%	17	37.77%	20	28.57%
	>30 yrs	19	76%	00	00%	19	27.14%
Parity	Primi	05	20%	29	64.44%	34	48.57%
	Multi	20	80%	16	35.55%	36	51.42%

[Table/Fig-1]: Distribution of GDM and NGDM persistently elevated cases according to age & parity.

1st Screening for GDM at Gestation with PGBS > 100 mg/dl (n = 70)%	Time of Delivery by GA		
	< 36 weeks	36 – 37 weeks	>37 weeks
< 8 weeks (n=25) (35.71%)	01	08	16
8 – 10 weeks (n=33) (47.14%)	00	22	11
>10 weeks (n =12) (17.14%)	02	02	08
Percentage (%)	03 (4.28%)	32(45.71%)	35(50%)

[Table/Fig-2]: Distribution of babies according to time of delivery vs maternal blood sugar.

In majority, 32 (71.11%) out of 45 mother of NGDM persistently elevated case, the blood sugar level were 100-120 mg/dl. In confirmed GDM cases, where maximum cases were in 2nd trimester followed by 3rd and 1st. Out of 32, 14(43.75) babies were having birth weight 2.6 -3 kg, 8(25%) with >3 kg; and 10(31.25%) with 2–2.5 kg. In 13(28.88%) cases having blood sugar 120-140mg/dl, the babies 9(69.23%) were 2–2.5kg weight followed by 4(30.76%) with <2kg. In GDM cases, 17(68%) babies were >3kg with 2 macrosomic and 4 (16%) with <2kg. 43 (61.42%) babies delivered by LSCS, 21(30%) by NVD and 6 (8.57%) by assisted delivery [Table/Fig-3].

Out of 25 babies delivered to GDM cases, 3 male and one female baby delivered from multigravida mother diagnosed in 1st trimester of pregnancy. Seven female and four male babies were delivered from multigravida and two male, one female from primigravida diagnosed in 2nd trimester of pregnancy. Two female and three male babies delivered from multigravida and two male from primigravida diagnosed in 3rd trimester of pregmnancy . Whereas, in NGDM persistently elevated cases, 10 male babies were delivered from multigravida and 17 female from primigravida mother [Table/Fig-4].

Mostly 50% of babies delivered at 36-37 weeks gestation were from multigravida mother diagnosed as GDM at 1st trimester, with 25% in < 36 weeks and 37-38 weeks gestation. Four (36.36%) babies before 37 weeks were from multigravida, and 100% babies delivered at before 36 weeks gestation were from primigravida , diagnosed as GDM in 2nd trimester of pregnancy. whereas, 100% babies delivered at after 38 weeks gestation were from primigravida and 40% at 36-37 weeks gestation were from multigravida, diagnosed as GDM in 3rd trimester of pregnancy. In NGDM persistently elevated cases, 16(55.17%) babies at after 38 weeks and 8(27.58%) babies at before 36 weeks gestation were from primigravida and almost 5(31.25%) babies delivered at 36-37 weeks and 5 (31.25%) at 37-38 weeks gestation were from multigravida .

Neonatal complication like IUGR, LBW, Macrosomia, Meconium-stained amniotic fluid. Hypoglycemia were in proportionate in GDM than NGDM persistently elevated cases. RD cases were more as compared to other complication in both cases. Macrosomia and IUGR cases were more in persistently elevated than GDM case [Table/Fig-5].

PGBS (mg/dl)	Trimester of Pregnancy			Birth Weight (kg)				Mode of Delivery		
	1st	2nd	3rd	<2	2.1- 2.5	2.6- 3	>3	LSCS	NVD	Assisted
100- 120(n=32)	08	10	14	00	10	14	08	18	10	04
121-140 (n=13)	07	05	01	04	00	09	00	10	03	00
>140 (n=25)	04	14	07	04	01	03	17	15	08	02
Percentage (%)	19 (27.14%)	29 (41.42%)	22 (31.42%)	8 (11.42%)	11 (15.71%)	26 (37.14%)	25 (35.71%)	43 (61.42%)	21 (30%)	6 (8.57%)

[Table/Fig-3]: Distribution of babies by birth weight and mode of delivery.

No. of Cases	Trimester (No. of Case)	Primi (P) Multi (M)	Male (M)	Female (F)	Time of Delivery by GA (Weeks)			
					<36	36 - 37	37 - 38	>38
GDM (n=25)	1st (4)	P (0)	00	00	00	00	00	00
		M (4)	03	01	01	02	01	00
	2nd (14)	P (3)	02	01	03	00	00	00
		M (11)	04	07	02	02	05	02
	3rd (7)	P (2)	02	00	00	00	00	02
		M (5)	03	02	00	02	00	03
NGDM (n=45)	Persistently Elevated (>110mg/dl)	P (29)	12	17	08	02	03	16
		M (16)	10	06	02	05	05	04

[Table/Fig-4]: Distribution of babies by sex in relation to gravida and trimester glucose level.

Neonatal Complications	GDM (n=25)		Persistently Elevated (n= 45)		Total (n = 70)	
	n	%	n	%	n	%
IUFD	00	00	00	00	00	00
IUGR	05	20%	11	24.44	16	22.85%
LBW	04	16%	06	13.33	10	14.28%
Macrosomia	02	08%	06	13.33	08	11.42%
MSAF	02	08%	03	6.66	05	7.14%
RD	09	36%	15	33.33	24	34.28%
Hypoglycemia	03	12%	04	8.88	07	10%

[Table/Fig-5]: Distribution of babies according to their complication.

DISCUSSION

In the present study, confirmed GDM cases were found in multigravida mother and the age of presentation mostly above 30 years, whereas in NGDM persistently elevated cases, the age of presentation was at 20 to 25 years which was similar to that of Kalra P et al., [3] and Neelakandan R et al., [4]. Most (50%) of babies delivered after 37 weeks from either diagnosed or elevated levels of blood sugar at early (< 8 weeks) gestation [Table/Fig-2], which was against the study of Bener A et al., [5]. The commonest mode of delivery was LSCS in all groups and weight of babies as the blood sugar level increased [Table/Fig-3], which was similar to that of Dong L et al., [6]. Male babies were predominantly delivered from primi mother in GDM cases not from multigravida as in other study. Whereas, in NGDM persistently elevated level, babies predominantly delivered from multigravida mother were male babies [Table/Fig-4], which was similar to the study of Retnakaran R et al., [1] and Di RGC et al., [7]. It might be due to association of male foetus with poorer ß-cell function, higher postprandial glycaemia, and an increased risk of GDM in the mother. Neonatal complication like Foetal growth restriction (FGR), Low birth weight (LBW), macrosomia, Meconium-stained amniotic fluid (MSAF), hypoglycaemia were in proportionate, in persistently elevated cases. Respiratory distress cases were more as compared to other complication in both cases [Table/Fig-5], which was almost similar with the study of Saxena P et al., [8].

In previous studies it was found that, male babies were associated with GDM multigravida cases. The presence of a male fetus is associated with poorer β-cell function, higher postprandial glycaemia, and an increased risk of GDM in the mother. Thus, fetal sex potentially may influence maternal glucose metabolism in pregnancy. In this study, though male babies were predominant compared to female babies in GDM cases, the sex distribution of babies became almost equal in NGDM persistently elevated cases. So in this study, there was no association between foetal sex and GDM in the mother.

LIMITATIONS

The limitation of this study was the short duration and small sample size to remove beta error in GDM case and needs studies of long duration with large sample size.

CONCLUSION

Neonatal complications are poorly predictable by risk factor alone, especially in nullipara. From this study, it was seen that sex of babies had important effect on mother glucose status. So, we can predict the sex of babies early, from the trimesteral glucose in relation to gravid of mother retrospectively and by treatment of these cases, can reduces and prevents some perinatal complication.

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