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Obstetrical Outcome of False Positive One Hour OGCT in Tertiary Care Hospital

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Abstract: ***Objective: To evaluate the maternal and perinatal outcome of pregnancies with abnormal OGCT (oral glucose challenge test) and subsequent normal OGTT. Methods: We performed a prospective observational study of 100 eligible pregnant women , over a period of 2yrs, between 1st January 2017 to 31st December 2018. Patients were screened for gestational diabetes mellitus (GDM) with the 1-hour 50-g OGCT at 24-28 gestational weeks. An isolated abnormal OGCT was defined as a result greater than or equal to 130 mg/dL followed by a normal 3-hour oral glucose tolerance test (OGTT).Clinical outcomes of pregnancies were studied in the selected population. Results: The isolated abnormal OGCT cohort on average was younger, of higher parity, had a relatively higher body mass index and no associated risk factor. Pre-eclampsia19 % (19 cases) was the most common maternal complication. Caesarean section 25% and difficult delivery 11% rate were increased. Incidence of macrosomia was 3.7%, overall perinatal morbidity was increased and 29% needed NICU admission. Conclusion: An isolated abnormal OGCT is an independent risk factor for adverse perinatal outcomes. These suggest that minimal alterations in maternal carbohydrate metabolism may have a significant impact on the fetus and the patients with minimal alterations also require strict glycemic control to decrease the frequency of abnormal outcomes.***

Keywords: Pregnancy, GDM (Gestational diabetes mellitus), OGCT (oral glucose challenge test), OGTT(oral glucose tolerance test), Maternal outcome, Perinatal outcome

1. Introduction

India today is being recognized as diabetic capital of world. Incidence varying from 9.9% in rural population to 17.8% in urban areas.(1).The frequency of gestational diabetes mellitus is 0.6% -15% of pregnant woman depending on ethnic, clinical characteristic and diagnostic test employed in the population(2). The adverse maternal effect associated with GDM is, pre-eclampsia, macrosomia, polyhydramnios, shoulder dystocia, increased rate of caesarean section (30-40%) and sudden intra-uterine death. It has been reported that 50% of these patients will become diabetic in the 15 years following pregnancy(3).Since, this condition is associated with the adverse effect on mother and neonate, so it is important to find out the GDM by screening of all the pregnant women.(4)

Recently, it has emerged that even women with mildly elevated glucose i.e., isolated abnormal GCT levels on antepartum GDM screening are still at risk of pre-eclampsia and macrosomia 6.6% & 3.4% respectively(5). Similarly, Retnakaran R et al have reported that women with mild glucose intolerance in pregnancy (i.e., less severe than GDM) are also at increased risk of developing pre-diabetes or diabetes at 3-months postpartum (6).

Thus, taken together, these data suggest that the obstetrical and postpartum metabolic risks of GDM extend to much lower levels of maternal glycemia than currently recognized, a possibility that may have important implications for a large number of women with mild abnormalities on GDM screening(6).

Although NGT on the OGTT following an abnormal OGCT is generally considered a reassuring result (one that does not require any clinical intervention), it should be noted that there has been limited study to date of the obstetrical and postpartum metabolic implications of this presentation. Thus, in light of the aforementioned observations regarding the significance of mild dysglycemia in pregnancy, our objective in the current study was to systematically evaluate obstetrical and neonatal outcomes and postpartum metabolic function in women with an abnormal OGCT followed by NGT on antepartum OGTT.

2. Material & Methods

This was a prospective study conducted at the antenatal clinic, at Hitech medical college and hospital Bhubaneswar. over a duration of 2 years between 1st January 2017 to 31st December 2018. About 100pregnant women seeking antenatal care between the gestational age group of 24-28 weeks were evaluated for isolated abnormal OGCT and its impact on maternal and fetal outcome. Universal screening was opted. Pregnant mothers having preexisting Diabetes Mellitus, previously diagnosed with GDM, H/o intake of corticosteroids were excluded from study.

Method of Performing OGCT

Fasting was not a prerequisite. 50gms of glucose was dissolved in 200ml of water and the mother was asked to drink it within 5 minutes. Exactly after 1 hour, blood was obtained for the study. Plasma glucose was estimated with glucose oxidase reagent test. If the result was ≥130mg/dl[1]then the mother underwent three hour OGTT with 100 grams of glucose.

Method of performing OGTT

After an overnight fasting for at least 8 hours, but not more than 14 hours and 3 days of unrestricted diet and physical activity, the mother was asked to come to the hospital.[12]Fasting blood sample was obtained for the study. First hour, Second hour and Third hour samples were collected.

Plasma glucose of all the four samples were estimated with glucose oxidase reagent test and compared with values done for 100gms OGTT of Carpenter and Coustan criteria. If no values were greater than the values of Carpenter and Coustan criteria, then the mother was selected for the study.

Variables Studied

Prepregnancy: age, gravida, BMI, risk factors. Maternal complications: Preclampsia, oligohydraminos, polyhydramnios, IUGR, preterm labour, fetal distress, mode of delivery, PPH.

Neonatal complications: macrosomia, APGAR score, hypoglycemia, hyperbilirubinemia, respiratory distress, NICU admission, neonatal death.

Statistical tools

The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was done with the help of computer using **Epidemiological Information Package (EPI 2010).** Kruskul Wallis Chi-Square test was used to test the significance of difference between quantitative variables and Yate's Chi-Square test for qualitative variables. A 'p' value less than 0.05 is taken to denote significant relationship.

3. Results & Analysis

Prospective observational study was conducted to evaluate the results of 100 pregnant mothers who satisfied the inclusion criteria listed in materials and methods and their results were analyzed.

The mean age of patients was 28.20yr ranging from 18-40 yrs, majority of patients i.e. 40% were between 25-29 age group, 63%were multigravida, mean BMI was 26 which comes under slightly overweight group. Most of the cases were without any risk factors 76% (Table A).

Table A: High Risk Factors

High risk factors	Cases	
	No	%
Previous H/O unexplained neonatal death	3	3
Previous H/O IUD > 28wks	3	3
Previous H/O congenital anomalies	4	4
Previous H/O preeclampsia	6	6
Previous H/O big baby	3	3
PCOS	5	5
Total cases with risk factors	24	24
Cases without high risk	76	76

Pre-eclampsia was most significant antenatal complication which was present in 19 cases (out of which 8 cases were primigravida and 11 cases were multigravida). 11patients had difficult delivery, either because of shoulder dystocia or prolonged labour. Postnatal 11patients had PPH among which 9 cases had atonic PPH. None of the cases had chorioamnionitis. (Table B)

Table B: Maternal Complications

Maternal complication	Cases	
	No	%
Antenatal		
Asymptomatic bacteria	6	6
Recurrent UTI	9	9
Pre eclampsia	19	19
< 8 AmnioticFluidIndex	5	5
> 15 AmnioticFluidIndex	10	10
IUGR	5	5
PTL	9	9
PROM + PPROM	5	5
Non Reactive NST + Abnormal Doppler	9	9
Intra partum		
Fetal Distress	7	7
Difficult Delivery	11	11
Post natal		
PPH	9	9
a) Atonic	2	2
b) Traumatic	11	11
Total		

The caesarean section rate in our study was 25%, out of which 15% had elective and 10% had emergency LSCS. Most of the patients i.e.,68% delivered normally among which 4 had shoulder dystocia. Only 7 required operative vaginal delivery 2 among them were due to maternal exhaustion and 4 were due to fetal causes. (Table C)

Table C: Mode of Delivery

Delivery mode	Cases	
	No	%
1. Labour natural	68	68
2. Operative vaginal delivery (outlet forceps)	7	7
3. LSCS		
a) Emergency LSCS	10	10
b) Elective LSCS	15	15
Total LSCS	25	25
Total	100	100

Most important causes among Emergency LSCS were PPROM and PROM more than 12 hours (3cases) and second stage cesarean section due to obstructed labour (2cases).

Out of 15 patients who underwent Elective LSCS, the main indication was CPD 6cases (40%) followed by malpresentation and malposition 4 cases (26.7%) respectively.

Total number of term deliveries were 81 out of which 20 babies (24.7%) were >3.5kg and 3 babies (3.7%) were macrosomic i.e. >4kg. Even in preterm group, 1 baby at 36 wks was 3.56 kg which was large for that gestational age. Mean weight in term group was 3.15kg as compared to 2.2kg in preterm babies. Of the total 19 preterm babies 6 were due to maternal causes. (Table D).

Table D: Birth Weight

Birth weight	Term babies		Preterm babies		Total	
	No	%	No	%	No	%
≤2.5 kgs	5	6.2	11	57.9	16	16
2.6-3 kgs	32	39.5	6	31.6	38	38
3.1-3.5 kgs	21	25.9	1	5.3	22	22
3.6-3.9 kgs	20	24.7	1	5.3	21	21
>4 kgs	03	3.7	-	-	3	3
Total	81	100	19	5.3	100	100
Range	1.5 – 4.3		1 – 3.6		1 – 4.3	
Mean	3.15		2.26		2.98	
S.D.	0.57		0.75		0.7	
p	0.0001 (significant)					

Although 'p' value has been shown to be statistically significant, clinically comparison between term and pre-term group has no relevance.

Neonatal complications were overlapping and babies had more than one neonatal complication. Out of 63 babies having various complications, only 2 babies (3.1%) had isolated single umbilical artery with no other gross congenital anomalies. 9 cases(14.2%) had hypoglycemia <40mg/dl, but none had severe hypoglycemic episode. 29 babies(46.03%) were admitted in NICU for various reasons. (TABLE E)

Table E: Neonatal Complications

Neonatal Complications	Cases	
	No	%
Apgar at 1 minute ≤7	23	36.5
Congenital anomalies	2	3.1
Hypoglycemia	9	14.2
NICU Admission	29	46.03
Total	63	100

77% of babies had normal one minute APGAR at birth. 1 minute APGAR was ≤ 7 for 23 babies which is a significant number. Subsequently 5 minute APGAR normalized for 16 babies i.e.,≥ 7 and detoriated or remained same for 7 babies. Out of these low 5minute APGAR i.e., 7 babies subsequently one died of birth asphyxia and 2 died of sepsis, rest of the 4were take home babies.

Among 29 cases admitted in NICU majority 13 cases (44%) had hyperbilirubinemia followed by respiratory distress in 11cases (37.9%) of cases.

Among the 13babies having hyperbilirubinemia, 10 were term (out of total 81 term babies) and 3 were preterm (out of total 19 preterm babies). Likewise among babies who developed respiratory distress 6 were term and 5were preterm babies. Among the babies having both hyperbilirubinemia and RDS, two of them were term and two were preterm babies.

4. Discussion

Results analyzed in our study were found to be consistent with previous reports, that minimal carbohydrate intolerance without GDM is also significant a risk factor for maternal and fetal morbidities.

Demographic characteristics:

According to our study analysis the mean age of patients is 28.2yrs in which 40% were in the age group of 25 to 29yrs. As the gravidity increases, the probability of developing metabolic derangements also increases and in our study 63% of the patients were multigravida.

Mean body mass index in our study was 26 kg/m^2. Majority of patients (43%) had normal body mass index (19-24.9 kg/m^2). 33% of the patients are overweight (body mass index 25-29.9 kg/m^2.).

Retnakaran, Qi, Sremer et al (6) conducted a prospective study in 2009 on 259 patients. The mean age in the study population was 33.9yrs. Most of the patients were primigravida (45.3%) and the mean pre-pregnancy BMI was 23.8 kg/m^2.

Shrestha, Chawla et al (7) conducted a prospective study in 2011 on 198 patients. Majority (43.9%) of the patients were between 20-25yrs of age. Majority of patients (60.1%) were overweight (26-30 kg/m^2).

Grotegut, Tatenent et al (8) conducted a study in 2008 on 165patients. Mean age in the study was 27.4yrs. Most of the patients were multiparous (71.5%), and mean BMI in the study population was 26.7kg/m^2.

Risk factors in study population

In our study, 76% of the cases had no risk factors, 6% had a previous history of pre-eclampsia, 5% had PCOS and 3% has a previous history of macrosomia. 82% of cases has no contributory family history.

In the study conducted by Shrestha, Chawla et al, (7) 80.8% of cases did not had any risk factor, 0.5% cases had previous history of macrosomic baby. Family history of diabetes mellitus was contributory for 2% of cases.

In the study conducted by Retnakaran et al,(6) 4.7% of patients had previous history of macrosomic baby and 48% of patients had strong family history of diabetes mellitus.

Maternal outcome:

In our study, pre-eclampsia was a significant complication 19% (total 19 cases, in which 8 were primigravida and 11were multigravida), in antenatal period. 15% had asymptomatic bacteriuria and UTI. 9% of patients have preterm labour. Fetal distress was noted in 7% and post partum hemorrhage in 11% of patients.

The overall Caesarean section rate was overall is 25%, among which 15% underwent Elective LSCS and 10% underwent Emergency LSCS. Among the 15 patients who underwent Elective LSCS, main indication was Cephalopelvic disproportion (6 cases) followed by Malpresentation and Malposition (4 cases).

In other studies;

Bhat et al (9) on 2006,an observational 2 yrs study conducted on 148 patients 6.1%patients had pre-eclampsia. Preterm delivery rate was significant 17.5%.Caesarean section rate was only 5.4%.

In Retnakaran et al study caesarean section rate was very significant 34.5%.

In Akhtar et al(10) study conducted on 100 patients in 2004, candidiasis and recurrent urinary tract infection was 17%. Rate of elective LSCS was 7% mainly due to macrosomia and abnormal lie. Postpartum hemorrhage complication was 4%.

In Shrestha, Chawla et al study pre-eclampsia rate was 13.6% and premature birth rate was14.6%. . In Kim et al(11)study fetal distress rate was 15.8% .

Perinatal outcome

In our study, the mean birth weight for term babies was 3.15kg compared to 2.26 kg in preterm babies. 3.7% (3 babies out of total 81) in term group were macrosomic. 63 babies developed overall neonatal complications and among them 9 babies (14.2%) had hypoglycemia but none had any serious hypoglycemic episode. No major congenital anomaly was observed, except only 2 babies (3%) babies who had isolated single umbilical artery. For 23 babies (36.5%) APGAR score at 1 minute was less than 7 but subsequently the 5 minute APGAR normalized i.e., ≥7 for 16 babies. The most common cause of NICU admission among the 29 babies (46.03%) was hyperbilirubinemia (13 babies), followed by respiratory distress (11 babies). Neonatal death was reported in 5 cases and main cause being sepsis.

In other studies,

Bhat et al study (9), mean birth weight was 2.9kg. 4.1% of babies were macrosomic. Overall perinatal mortality in contrast to my study was 4.1%. None of the patients had respiratory distress syndrome or hypoglycemia.

Retnakaran et al study (6) mean birth weight was 3.47kg. 14.1% of babies had macrosomia, 5.1% of babies had 1'min APGAR less than 7.

In Shrestha chawla et al study (7) mean birth weight overall was 3.7kg, 4.04% of babies were macrosomic.

5. Conclusion

Based on above study we conclude that false positive OGCT i.e., abnormal OGCT and normal OGTT, which also signifies minimal alterations in carbohydrate metabolism also have a significant metabolic impact on maternal and perinatal outcome. A Prepregnancy and antepartum counseling and general awareness regarding lifestyle modification and importance of glucose screening test is really required in present era considering the increasing trend of diabetes. Also in these group awareness should be created for postpartum follow up keeping in mind the fact that they also have a risk of developing DM in future.

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