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Relationship between maternal and perinatal outcomes in pre gestational and gestational diabetes mellitus

[1]Dr. R. Nivetha, MBBS, MS (OG), Assistant Professor, Department of Obstetrics and Gynaecology, Dhanalakshmi Srinivasan Institute of Medical Sciences and Hospital, Perambalur.

[2]Dr. S. Viswajaa, MBBS, MS (OG), Assistant Professor, Department of Obstetrics and Gynaecology, Dhanalakshmi Srinivasan Institute of Medical Sciences and Hospital, Perambalur.

Corresponding Author: Dr. R. Nivetha, MBBS, MS (OG), Assistant Professor, Department of Obstetrics and Gynaecology, Dhanalakshmi Srinivasan Institute of Medical Sciences and Hospital, Perambalur.

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Abstract

Background: Diabetes mellitus complicating pregnancy, including gestational diabetes mellitus (GDM) and pregestational diabetes mellitus (PGDM), is associated with increased maternal and perinatal morbidity. The increasing prevalence of diabetes in pregnancy underscores the need for early diagnosis and optimal management to improve pregnancy outcomes.

Objective: To compare maternal and perinatal outcomes among women with gestational and pregestational diabetes mellitus and evaluate the prevalence of associated complications.

Methods: This prospective observational study was conducted at a tertiary care centre over a two-year period. A total of 202 pregnant women with diabetes mellitus, including 138 women with GDM and 64 women with PGDM, were enrolled and followed from diagnosis until six weeks postpartum. Maternal complications, mode of delivery, neonatal outcomes, and postpartum glycaemic status were analysed using appropriate statistical methods.

Results: Of the 202 participants, 68.3% had GDM and 31.7% had PGDM. Preeclampsia occurred in 26.0% of pregnancies and was significantly associated with the type of diabetes (p=0.016). Polyhydramnios (17.5%) and urinary tract infection (11.0%) were significantly associated with preterm labour (both p<0.001). Caesarean delivery was significantly more common in the PGDM group than in the GDM group (p<0.0001). Macrosomia was observed in 13.1% of neonates, congenital anomalies in 5.2%, and adverse perinatal outcomes, including intrauterine fetal death, stillbirth, and early neonatal death, in 5.0% of pregnancies. At six weeks postpartum, 22.8% of women had abnormal glucose tolerance, with a significantly higher prevalence among women with PGDM (p<0.001).

Conclusion: Pregnancies complicated by diabetes mellitus are associated with a higher risk of adverse maternal and perinatal outcomes, particularly among women with pregestational diabetes. Universal antenatal screening, strict glycaemic control, timely obstetric intervention, and postpartum glucose surveillance are essential to reduce pregnancy-related complications and identify women at risk of persistent dysglycaemia after delivery.

Keywords: Gestational diabetes mellitus, Pregestational diabetes mellitus, Pregnancy outcomes, Maternal complications, Perinatal outcomes, Postpartum glucose tolerance.

Introduction

Diabetes mellitus is a condition of absolute or relative insulin deficiency. It is of three types a) Type 1 b) Type 2 c) Gestational diabetes mellitus. Gestational diabetes mellitus is defined as the carbohydrate intolerance of variable severity with onset or first recognition during pregnancy1. Prevalence of GDM develops in around 15-17% of all pregnancies. Indian population have more chances of getting Diabetes (16.5%)2, as we people are inherently more prone to get affected because of our ethnicity and genetics. Normal pregnancy is a diabetogenic state because of increased amount and rate of release of insulin and decreased sensitivity to insulin at cellular levels. Gestational diabetes mellitus women have decreased insulin secretion by pancreas and abnormal insulin resistance in pregnancy are mainly due to counter hormones. As pregnancy advances there will be a rise of progesterone, estrogen, human placental lactogen, prolactin and cortisol. Most of these hormones are insulin antagonists, so these hormomes will cause insulin resistance in antenatal mothers. High levels of placental and maternal hormones leads to the development of GDM. In early pregnancy, through facilitated diffusion mechanism maternal glucose crosses the placenta to the fetus which results in decrease in FBS to 50 65mg%. In late first trimester fetus produces it own insulin as maternal insulin 1 does not crosses the placenta. So the fetal insulin plays more role in growth than in glucose haemostasis which leads to macrosomia. Based on a social study,3945 pregnant women screened in tamilnadu based on urban, semi urban and rural respectively. Of which the GDM prevalence was 17.8% in urban AN mothers, 13.8% in semi urban AN mothers, 9.9% in rural AN mothers. Out of this 72% AN mothers were diagnosed early in their first visit. This study was conducted to evaluate the relationship in maternal outcome and fetal outcome in patients with gestational and pre gestational diabetes mellitus in Tertiary care centre for a period of 2 years

Aims and Objectives

1. To study the pregnancy outcome in patients with gestational and pregestational diabetes mellitus
2. To study the Fetal outcome in patients with gestational and pre gestationaldiabetes mellitus.
3. To study the Prevalance of both maternal and perinatal complications in patients with gestational and pre gestational diabetes mellitus.

Materials and Methods

Inclusion Criteria

- Patient diagnosed with either Gestational diabetes mellitus and Pre gestational diabetes mellitus. Singleton pregnancy

Exclusion Criteria

- Multiple pregnancy
- Abnormal presentation
- Chronic medical illness
- Patient with abnormal thyroid profile

- Patients is on any medication that alter metabolism of glucose like oral
- Contraceptive pills, steroids, diuretics, antipsychotics. Cushing syndrome.

Purpose of Study

Early diagnosis and appropriate treatment will reduce the risks of maternal and perinatal complications. In developing countries like India, women with GDM had increased risks of developing diabetes mellitus in later life. Therefore, special attention to be given to these populations. All antenatal women attending OPD were offered a 75gms of Glucose challenge test. If the values are more than 140mg/dl, this patient labelled as GDM. And the value is More than or equal to 200mg /dl it is labelled as pre gestational diabetes mellitus. Study involves 138 patients diagnosed as GDM and 64 patients diagnosed as Pre gestational diabetes mellitus irrespective of period of gestation. Patients are followed up from antenatal period till 6 weeks after delivery. Detailed history taking, proper clinical examination, blood investigations, ultrasonagram should be done. During every visit, height weight, blood pressure and urine routine with sugars and acetone should be done. In early trimester HbA1c should also be done. During the study period, maternal and perinatal complications, postpartum follow-up are evaluated.

Results and Analysis

Table 1; Age Distribution

Age	GDM	PGDM	Frequency	Percentage
≤20years	25	0	25	12.4
21-25years	50	3	53	26.3
26-30years	58	8	66	32.7
31-35years	3	40	43	21.1
36-40years	2	13	15	7.5
Total	138	64	202	100

Table 2: Parity

Parity	Frequency	Percentage
Primi	88	43.8
Multi	114	56.2
Total	202	100

Table 3: TYPE OF DM

Type	Frequency	Percentage
GDM	138	68.3
PGDM	64	31.7
Total	202	100

Table 4: Gestational Age

Gestational Age	GDM	PGDM	Frequency	Percentage
<20Weeks	1	7	8	4
20-28Weeks	8	9	17	8.5
28-34Weeks	48	5	53	26.2
34-36Weeks	68	42	110	54.2
>36Weeks	13	1	14	7
Total	138	64	202	100

Table 5: Pre-Eclampsia

Pre-Eclampsia	GDM	PGDM	Frequency	Percentage
Absent	98	52	150	74
Mild	10	8	18	9
Severe	30	4	34	17
Total	138	64	202	100

Table 6: Pre Eclampsia

Pre-Eclampsia	GDM	PGDM	Total	Chi–Square	P Value
Absent	98	52	150	8.20	0.016
Mild	10	8	18		
Severe	30	4	34		
Total	138	64	202		

Table 7: Polyhydramnios

Polyhydramnios	GDM	PGDM	Frequency	Percentage
No	122	44	166	82.5
Yes	16	20	36	17.5
Total	138	64	202	100

Table 8: Urinary Tract Infection

Urinary tract infection	GDM	PGDM	Frequency	Percentage
No	126	54	180	89
Yes	12	10	22	11
Total	138	64	202	100

Table 9: Preterm Labour

Preterm Labour	GDM	PGDM	Frequency	Percentage
No	124	60	184	91.2
Yes	14	4	18	8.8
Total	138	64	202	100

Table 10: Polyhydramnios Vs Preterm

Polyhydramnios Vs Preterm	No	Yes	Total	Chi–Square	P Value	OR
No	162	4	166	94.28	0.000	0.092
Yes	22	14	36			
Total	184	18	202			

Out of 18 women who delivered preterm 14 of them had associated Polyhydramnios. In this study, Polyhydramnios could be the main reason for pretem labour and the results were statistically significant (p value=0.000 chi sq=94.28).

Table 11: UTI Vs Preterm

UTI Vs Preterm	No	Yes	Total	Chi–Square	P Value
No	178	2	180	123.87	0.000
Yes	6	16	22		

Total	184	18	202		

Out of 18 women who had preterm labour, 16 of them had urinary tract infections and the results are statistically significant (p value=0.000 chi sq=123.87)

Table 12: Mode of Delivery

Mode of Delivery	GDM	PGDM	Frequency	Percentage
Labour Natural	83	10	93	46
Emergency LSCS	30	26	56	27.8
Elective LSCS	20	23	43	21.2
Instrumental	5	5	10	5
Total	138	64	202	100

Table 13: Mode of Delivery

Mode of Delivery	GDM	PGDM	Total	Chi–Square	P Value
Labour Natural	83	10	93	35.44	<0.0001
Emergency LSCS	30	26	56		
Elective LSCS	20	23	43		
Instruments	5	5	10		
Total	138	64	202		

In this study population, normal vaginal delivery (93) was higher in GDM group (83) when compared to PGDM group (10) which was statistically significant (p value=<0.0001)

Out of 56 women who delivered via emergencyLSCS,30of them in GDM group and 26 of them in PGDM group .43 women who delivered via elective LSCS, 20 of them in GDM group and 23 of them in PGDM group. Instrumental delivery proportion was equal in both group(n=10).

Table 14: Postpartum Hemorrhage

PPH	Frequency	Percentage
No	197	97.6
Yes	5	2.4
Total	202	100

Table 15: Birth Trauma

Shoulder Dystocia/Birth Trauma	GDM	PGDM	Total	Percentage
No	137	61	198	98.2
Yes	1	3	4	1.8
Total	138	64	202	100

Table 16: Birth Weight

Birth Weight	Frequency	Percentage
<2.5	24	11.6
2.6-3.5	94	46.5
3.6-4	58	28.8
>4	26	13.1
Total	202	100

Table 17: MACROSOMIA

Macrosomia	GDM	PGDM	Total
No	134	42	176
Yes	4	22	26
Total	138	64	202

Table 18: ANAMOLIES

Anamolies	GDM	PGDM	Total	Percentage
No	136	55	191	94.8
Yes	2	9	11	5.2
Total	138	64	202	100

Table 19: Fetal Outcome

Fetal Outcome	Frequency	Percentage
IUD	4	2
Still Born	1	0.5
Live Birth	192	95
Early Neonatal Death	5	2.5
Total	202	100

Table 20: Postpartum Follow-up

Postpartum Followup	Frequency	Percentage
Normal	145	71.8
Elevated	46	22.8
Loss to followup	11	5.5
Total	202	100

Post Partum Followup	GDM	PGDM	Total	OR	P Value
Normal	136	9	145	0.062	0.000
Elevated	1	45	46		
Total	137	54	191		

Discussion

Many studies have proved that abnormal glucose intolerance in pregnancy was associated with increased incidence of maternal morbidity and perinatal morbidity. The main aim of this study is to reduce maternal and perinatal complications by early screening, diagnosis, management of diabetes mellitus complicating pregnancy. The maximum incidence of PGDM occurred between the age group of 31 40years. Ismail NA et al studied that maximum incidence of GDM reported in mean age group of 27.9years. In this study, maximum incidence of GDM (32.7%) reported between the age group of 26-30years. In this study, maximum incidence of diabetes mellitus was seen in multigravida (56.2%). Farook et al stated that diabetes mellitus incidence was increased with increase in parity.

Peradi et al reported that the maximum insulin resistance occurs in late trimester of pregnancy. This was proved in this study as maximum incidence of diabetes mellitus occurred between the gestational age group of 34-

36weeks (54.2%). In this study,26% of the study population had pre eclampsia.

Ameya et al52 demonstrated in their study that pre eclampsia was present in 26% of GDM women. 72 In this study, 17.5% of the DM women had polyhydramnios.

Lakshmi sunar et al reported that in GDM women, polyhydramnios had incidence of 27.17% in their study. The maximum incidence of Preterm labour was seen in 8.8% of the study population. In Lakshmi sunar53 et al study, incidence of preterm labour was 14.13%.

Krishnamoorthy et al stated that the incidence of preterm labour was 9%. According to Dutta's review, polyhydramnios leads to preterm delivery. In this study, Urinary tract infection incidence was 11%. Al-Bash MR et al reported that prevalence of UTI in diabetic antenatal women was 6.7%. The incidence of caesarean section was higher in diabetic women (49%) when compared to normal vaginal delivery (46%).

This was also proved by the study that GDM women had increased incidence (52%)of caesarean section by Mutummatouleidi et al54. The maximum incidence of postpartum haemorrhage in diabetic pregnancies was 4.8% reported by AA Muche et al. In this study, 2.4% of the study population had postpartum haemorrhage. In this study, 1.8% of the antenatal women had deliveries which was complicated by shoulder dystocia/birth injuries. Macrosomia incidence in this study was 13.2%. Other studies showed that there was higher incidence of macrosomia such as 21.73% in Lakshmi sunar et al, 23 % in Mutummatouleidi et al and 40% in Ameya et al.

Ameya et al reported that 8% of the GDM mothers had congenital anamoly babies. In this study, 5.2% of the study population had congenital anamolies. In this study, 5% of the study population had adverse perinatal outcome. 2.5% had early neonatal death, 0.5% had stillborn and 2% had intrauterine fetal death in this study population

. In this study, during followup in the postpartum period, 22.8% of the study population had elevated OGTT values

Ameya et al documented that 16.9% of the population had abnormal glucose intolerance.

In Kjos et al44 study, 19% of GDM women had abnormal OGTT values in postpartum period, 9% had T2DM and 10% had impaired glucose intolerance.

Conclusion

Based on the results of this study, we concluded that diabetes mellitus is associated with both perinatal and maternal complications. Most of the gestational diabetic women are more prone to develop overt diabetes in later life. Therefore, we should do screening test for GDM to all the women attending AN clinic by oral glucose challenge test. And it should be repeated every trimester, even if it is normal. Early diagnosis and appropriate treatment for GDM can decreases the risks of maternal and perinatal complications. So, Appropriate counselling should be given to women in postpartum period to undergo the oral glucose tolerance test after 6 weeks of delivery.

Limitations

1. As some of the women did not turn up for the follow up in postpartum period, follow up could not be fulfilled in 100% of the study population.
2. Long term follows up in pregnant women complicating by diabetes mellitus could not be done in this study period as DM women should be followed up to six weeks of postpartum only.

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