

Maternal and Perinatal Outcome in Gestational Diabetes Mellitus at a Tertiary Care Centre.

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Abstract:

Aim of study: To study Clinically Maternal and Perinatal Outcome in Gestational Diabetes Mellitus at a Tertiary Care Centre.

Material & Methods: A Prospective observational study was conducted in the labour room, Department of Obstetrics and Gynecology at a tertiary care hospital, during 1st October 2019 to 30th September 2021. In this study we enrolled 120 cases during two years. All pregnant women diagnosed as GDM and delivering in our hospital were included.

Observation & Results: 47(39.17%) pregnant women with GDM were from age-group of 21-25 years. Majority of the cases of GDM i.e.34(28.3%) were associated with Diabetes in first degree relatives. Most frequent antepartum maternal complication seen was pre-term found in 32 (26.7%). In intrapartum, 3(2.5%) pregnant women were found to have Cervical Tear and postpartum, Post operative wound infection (Purpural Sepsis) was observed in 3(2.5%) pregnant women and 07(5.8%) had Postpartum hemorrhage. Most frequent maternal complication in pregnant women with GDM which was observed was Preterm labour i.e. 32(26.7%). Among foetal complications, maximum i.e. in 11(9.2%) GDM pregnant women, Intrauterine foetal death was observed and 02(1.7%) were IUGR and 01(0.83) reported Shoulder Dystocia. 14(11.7%) pregnant women reported perinatal mortality.

Conclusion: Screening for GDM should be done at the first antenatal visit. Precise control of blood sugar right from the beginning of pregnancy assures a good maternal and neonatal outcome. Gestational Diabetes Mellitus is a high risk pregnancy and should be delivered at a tertiary care centre or a centre equipped with all the facilities needed.

Keywords: Gestational Diabetes Mellitus, glucose challenge test, medical nutritional therapy.

Introduction:

Gestational Diabetes Mellitus is defined as Carbohydrate intolerance with recognition in or onset first during pregnancy, irrespective of the diet or insulin [1]. It is a group of metabolic disorders characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. It is a heterogeneous syndrome which if unrecognized or untreated is associated with increased foetal and neonatal loss and neonatal and maternal morbidity.

Maternal complications of GDM include polyhydramnios, pre-eclampsia, prolonged labour, obstructed labour, instrumental delivery, caesarean section, uterine atony, postpartum haemorrhage, infection and progression of retinopathy^[2].

Foetal complications include spontaneous abortion, intra-uterine death, stillbirth, congenital malformation, shoulder dystocia, birth injuries, neonatal hypoglycaemia and infant respiratory distress syndrome^[2].

Normal pregnancy is usually associated with altered maternal glucose homeostasis and

metabolism. Pregnancy is considered to be a diabetogenic state, characterized by exaggerated rate and amount of insulin secretion associated with decreased sensitivity to insulin at cellular levels. Many of the changes are a result of the progressive rise in the levels of oestrogen, progesterone, human placental lactogen, cortisol and prolactin. As pregnancy advances, any of these hormones can act as insulin antagonists causing insulin resistance in the mother and also cause abnormal glucose tolerance in some women rendering them prone for gestational diabetes^[4,5].

The prevalence of diabetes mellitus (DM) is increasing worldwide and more in developing countries including India. The increasing prevalence in developing countries is related to increasing urbanization, decreasing levels of physical activity, changes in dietary patterns and increasing prevalence of obesity. As women with gestational diabetes mellitus (GDM) and their children are at increased risk of developing diabetes mellitus in future, special attention should be paid to this population especially in developing countries.

Worldwide, one in 10 pregnancies is associated with diabetes, 90% of which are GDM. In India, one of the most populous countries globally, prevalence of GDM are estimated to be 16.55%, whereas in Maharashtra it is 7.7 %^[6].

The prevalence of diabetes mellitus is increasing at a tremendously rapid rate not only in India but in the entire world. India is fast becoming the diabetic capital of the world. In Indian context, Universal screening for all pregnant women is essential as the Indian women have eleven fold increased risk of developing glucose intolerance during pregnancy compared to Caucasians^[7].

Our health setup is a tertiary care centre, with around 20,000 deliveries occurring annually with numerous high risk cases being referred from surrounding areas, GDM being an important one of them. It is important to identify the women with gestational diabetes mellitus as it is associated with significant metabolic alterations, increased perinatal mortality as well as morbidity among the mothers and their off springs. So this study has been taken up for early diagnosing and hence improving the maternal and foetal outcome in GDM.

Objectives:

- To study sociodemographic factors associated with Gestational Diabetes Mellitus.
- To study maternal outcome in Gestational Diabetes Mellitus.
- To study perinatal outcome in Gestational Diabetes Mellitus.

Material & Methods:

This study was a prospective observation study conducted in Labour room , Department of Obstetrics and Gynecology at a tertiary care hospital during 1st October 2019 to 30th September 2021.

Inclusion criteria:

- All pregnant women diagnosed as GDM (either at our hospital or outside) and delivering in our hospital.
- Women willing to participate in study.

Exclusion criteria:

- Pregnant women who were known cases of Overt Diabetes mellitus (pregestational diabetes mellitus).
- Women who were lost to follow-up.

Sample size :

For calculation of sample size, Prevalence of Gestational Diabetics Mellitus was considered to be overall 7.0%.

The sample size was calculated using the formula

$$n = \left(\frac{Z_1}{d} \right)^2 \cdot \frac{P(1-P)}{d^2}$$

P	Your guess of Population P (any value<1)	0.07
1- α	Confidence level set by you	0.99
Z	Z value associated with confidence	2.576
D	Absolute precision (Value less than P)	0.06
N	Minimum sample size	120

In present study we have enrolled 120 cases during two years.

Methodology:

Every pregnant woman coming to the ANC OPD is screened using the 75 gm glucose, at her first ANC visit. It is a Single step test done using 75 gm anhydrous oral glucose & measuring blood sugar 2 hours after ingestion is done. 75 gm glucose is to be given orally after dissolving in approximately 300 ml water whether the pregnant women comes in fasting or non-fasting state, irrespective of the last meal. Detailed clinical examination and biochemical investigations are done like Complete blood count, Blood grouping, Urine routine, obstetric scan reports, Blood sugar levels, FBS, PPBS.

Statistical Analysis:

The data was compiled in master chart i.e. in MS-EXCEL Sheet and for analysis of this data; SPSS (Statistical package for social sciences) Version 20th was be used. Frequencies and percentages were calculated to show the distribution.

Observation & Results:

In present study 120 pregnant women with GDM were studied. Maximum pregnant women i.e. 47(39.17%) were from age-group of 21-25 years and minimum i.e 08(6.7%) were from more than 35 years of age. The mean age of pregnant women was 26.37 \pm 4.39 years. 97(80.8%) of pregnant women were booked cases. Majority of the pregnant women 68(56.7%) belonged to upper lower class where as 37(30.8%) pregnant women belonged to lower class. Majority of 77(64.2%) pregnant women were from urban areas.

Table 1: High Risk Factors associated with GDM [n=120]

Risk Factor	No. of Pregnant women [n=120]	Percentage
GDM in previous pregnancy	31	25.8%
Diabetes in first degree relative	34	28.3%
Recurrent abortion	3	2.5%
Previous IUD or neonatal Death	16	13.3%
Obesity	22	18.4%
Hypothyroidism	11	9.2%
Severe Preeclampsia	9	7.5%

*One patient may have more than one risk factor.

In present study majority of the pregnant women with GDM i.e. 34(28.3%) had diabetes in first degree relative whereas 31(25.8%) pregnant women were having GDM in previous pregnancy and 03(2.5%) pregnant women reported history of recurrent abortion.

Table 2 : Maternal Complications according to Antepartum, Intrapartum and Postpartum in GDM[n=120]

	Complications	No. of Pregnant women	Percentage
Antepartum	Ketoacidosis	3	2.5
	Pre-eclampsia	14	11.7
	Polyhydramnios	11	9.2
	Preterm	32	26.7
	Candidial Vaginitis	12	10.0
	UTI	21	17.5
Intrapartum	Cervical Tear	3	2.5
	Abruptio Placenta	1	0.83
Postpartum	Post operative wound infection (Purpural Sepsis)	3	2.5
	Postpartum Hemorrhage	7	5.8

Most frequent antepartum maternal complication seen was pre-term found in 32 (26.7%) followed by UTI, which was seen in 21(18.05 %) pregnant women and Candidial Vaginitis found in 12(10.0%). In intrapartum, 3(2.5%) pregnant women hadcervical tearand 01(0.83%) hadAbruptio Placenta. In the postpartum period, post operative wound infection (Purpural Sepsis) was observed in 3(2.5%) pregnant women and 07(5.8%) had postpartum hemorrhage.

Table 3: Maternal & Foetal complications in GDM

Complications	No.	Percentage	
Maternal Complications	Gestational hypertension	28	23.3
	Pre-Eclampsia	14	11.7
	Polyhydramnios	11	9.2
	Preterm labour	32	26.7
	PPH	7	5.8
Foetal Complications	IUD	11	9.2
	IUGR	2	1.7
	Shoulder Dystocia	1	0.83

Most frequentmaternal complications in pregnant women with GDM observed was Preterm labour i.e. 32(26.7%) pregnant women and 28(23.3%) were having Gestational hypertension and 14(11.7%) pregnant women reported polyhydramnios.

Among foetal complications, maximumi.e.in 11(9,2%) GDM pregnant women, Intrauterine death(IUD) was observed and 02(1.7%) were IUGR and 01(0.83) reported Shoulder Dystocia.

Table 4: Mode of Therapy[n=120]

Therapy	No. of Pregnant women	Percentage
MNT	27	22.5
MNT+Insulin	49	40.8
MNT +OHA	33	27.5

MNT + OHA + Insulin	11	9.2
TOTAL	120	100

Out of 120 pregnant women of GDM, maximum pregnant women were treated with MNT(medical nutritional therapy)+Insulin,49 (40.8%), 33(27.5%) pregnant women were treated with MNT +OHA(oral hypoglycaemic agents), 27(22.5%) of pregnant women required MNT alone and 11(9.2%)pregnant women were treated by MNT + OHA + Insulin.

Table 5: Mode of delivery [n=120]

Mode of delivery		No of pregnant women	Percentage
Vaginal	Pre-term	05	4.2
	Full Term	44	36.7
LSCS	Pre-term	27	22.5
	Full Term	42	35.0
Operative Delivery	Vaginal	02	1.7
Total		120	100

Out of 120, 49(40.9 %) pregnant women had vaginal delivery in this 05(4.2%) were pre-term and 44(36.7%) were full term delivery and 69(57.5%) pregnant women had caesarean section, in this 27(22.5%) were pre-term and 42(35.0%) were full term. 2(1.7%) required Operative vaginal delivery.

Table 6: Indications for caesarean section [n=69]

Indication	No. of Pregnant women	Percentage
Foetal distress	15	12.5
CPD in Labour	09	7.5
PROM with unfavourable cervix	2	1.7
Previous 1 LSCS with Impending scar dehiscence	29	24.2
Previous 2 LSCS at term	3	2.5
Previous 3 LSCS at term	3	2.5
Non progress of labour	2	1.7
Placenta praevia in bleeding phase	1	0.83
Severe preeclampsia with abruption with unfavourable cervix	2	1.7
Primi breech in labour	3	2.5
Total	69	57.5

In this study, 29(24.2%) of pregnant women underwent caesarean section with , previous 1 LSCS with impending scar dehiscence, being the most common indication for caesarean section followed by foetal distress, which was reported in 15(12.5%)pregnant women with GDM.

Table 7 : Perinatal Complications & Outcome

	No. of babies	Percentage
Low Birth Weight	33	27.5
APGAR Score <7	13	11.9
NICU Admissions	39	32.5
Hypoglycemia	18	15.0
Septicemia	0	00
Birth Asphyxia	5	4.2
Hyperbilirubinemia	3	2.5
Respiratory Distress Syndrome	10	8.3
Congenital Anomalies	3	2.5
Perinatal Mortality Rate	14	11.7

13(11.9%) were having Apgar score less than 7. 39(32.5%) babies required NICU Admission, majority of the babies admitted to NICU i.e. 18(15.0%) reported Hypoglycemia followed by 10(8.3%) babies, who were reported to have respiratory distress syndrome. 14(11.7%) reported perinatal mortality, among which 11(9.2%) were intrauterine deaths and 3(2.5%) were Early Neonatal deaths. Out of 3 early neonatal deaths, 2 were due to birth asphyxia and 1 was due to congenital anomaly (Tracheoesophageal Fistula).

Discussion:

Gestational diabetes mellitus forms the most common medical complication of pregnancy. The women with GDM are at a higher risk for numerous maternal complications and their infants are at a higher risk for morbidity and mortality. There is general consensus that the prevalence of GDM is increasing globally.

In the present study 120 pregnant women with GDM were studied. Maximum pregnant women i.e. 47(39.17%) were from age-group of 21-25 years and minimum i.e. 08(6.7%) were from, more than 35 years of age group. The mean age of pregnant women was 26.37 ± 4.39 years. Prakash G^[8] reported that the majority of pregnant women were in the age group of 26–30 years (59.3%). The mean age of the GDM pregnant woman was 27.2 years. Rajput R et al.^[9] found that the mean age of participants was 23.62 ± 3.42 yr (range 18-38). The prevalence rate was higher in women aged 26-30 and >30 years (41.57 and 34.8%, respectively). Also similar findings age were noted by Madi et al.^[10]. In the present study majority of the pregnant women, 77(64.2%) belonged to urban population and 43(35.8%) of pregnant women belonged to rural population. Similar findings were noted by Sonal Jain et al^[11], 20% belong to the rural and 80% belong to urban population. Whereas D. Lakshmi et al^[12] found that 72.8% of pregnant women were living in rural areas. In this study majority i.e. 56.7% of the pregnant women were multigravidas, Whereas Shridevi A. S. et al^[13] found that majority 59.5% were multigravidas. Wagan N, et al^[14] reported, 97 (52.43%) were multiparous.

In the present study majority of the cases of GDM i.e. 34(28.3%) were associated with diabetes in first degree relatives whereas 31(25.8%) pregnant women were having GDM in previous pregnancy and 03(2.5%) pregnant women reported history of recurrent abortion. Shridevi A. S. et al^[13] reported 43.47% with GDM in previous pregnancy, 60.9% pregnant women with diabetes in first degree relatives, 39.13% with previous neonatal death and 73.91% of

pregnant women were having obesity. Also Wagan N, et al^[14] [2021] reported 66.7% pregnant women with GDM in previous pregnancy and 50% pregnant women were having obesity.

Table 8 : Comparison of Maternal and Foetal Complications in GDM in different studies

Complications		Krishna Dahiya et al ^[15] [2014]	Sathiamma P. K. ^[16] [2017]	Sonal Jain et al ^[11] [2018]	Kumari, et al ^[17] [2018]	Present Study
Maternal Complications	Gestational hypertension	14.3	11.9	37.0	13.5	23.3
	Pre-Eclampsia		4.88	10.0		11.7
	Polyhydramnios	17.1	9.7	12.5	1.2	9.2
	Preterm labour	8.6	24.6	27.0	10.6	26.7
	PPH			15.0	-	5.8
Foetal Complications	IUD	5.7	1.6	-	-	9.2
	IUGR	5.7	1.6	-	-	1.7
	Shoulder Dystocia	-	-	-	-	0.83

Most frequent maternal complication observed was pre-term labour, found in 32 (26.7%) pregnant women and 28 (23.3%) were having Gestational hypertension and 14 (11.7%) pregnant women reported polyhydramnios. Similarly, most significant maternal complication i.e. preterm labour was 24.6%, as reported by Sathiamma P. K. et al^[16] and 27.0% by Sonal Jain et al^[11]. Whereas Krishna Dahiya et al^[15] found that majority of the pregnant women reported polyhydramnios i.e. in 17.1%. Prakash GT^[8] reported 31% pregnant women had HTN of which 79.54% women had gestational HTN, and 20.45% women had chronic HTN.

Among foetal complications, maximum i.e. in 11 (9.2%) GDM pregnant women, Intrauterine foetal death was observed and 02 (1.7%) were IUGR and 01 (0.83) reported Shoulder Dystocia. Whereas Krishna Dahiya et al^[15] reported IUD & IUGR in 5.7% of cases. Similar findings were reported by Sathiamma P. K. et al^[16] in 1.6% of cases.

In the present study, 42.5% pregnant women had vaginal delivery and 57.5% pregnant women had caesarean section; similar findings were noted by Sathiamma P. K et al^[16] [2017] i.e. 41.04% had vaginal delivery and 58.96% had caesarean section. Also Kumari, et al^[17] [2018] reported 50% vaginal delivery & caesarean section. Krishna Dahiya et al^[15] [2014] noted less percentage of caesarean section i.e. 40.0%. In present study out of 120 pregnant women with GDM, maximum pregnant women were treated on MNT+Insulin 49 (40.8%), 33 (27.5%) of pregnant women treated with MNT +OHA, 27 (22.5%) of pregnant women required MNT alone and 11 (9.2%) of pregnant women were treated by MNT + OHA + Insulin. Whereas Kumari, et al^[17] [2018] reported 79.41% pregnant women with GDM were treated on diet (MNT), 12.35% required insulin and 8.23% were treated with oral hypoglycaemic agent (metformin).

In present study majority of the babies i.e. 47.5% had weight 2.5 to 3.5 kg and 35.0% of babies were having weight less than 2.5kg. Similarly Sathiamma P. K. et al^[16] found that 41.04% had weight between 2.5 to 3.0 kg.

Table 9 : Comparison of reasons for NICU admissions in different studies

Complications	Krishna Dahiya et al ^[15] [2014]	Sathiamma P. K. et al ^[16] [2017]	Kumari, et al ^[17] [2018]	Present Study
Hypoglycemia	-	32.5	20.6	15.0
Septicemia	-	22.9	-	00
Birth Asphyxia	-	-	-	4.2
Hyperbilirubinemia	11.4	12.5	2.9	2.5
Respiratory Distress Syndrome	5.7	12.5	4.7	8.3
Congenital Anomalies	-	5.97	4.7	2.5

In the present study, 39(32.5%) babies required NICU admission. Among these, majority of babies 18(15.0%) were reported to have hypoglycaemia followed by 10(8.3%) babies with respiratory distress syndrome. Similarly Sathiamma P. K. et al^[16] reported hypoglycaemia in 32.5%, Kumari, et al^[17] reported hypoglycaemia in 20.6%. Krishna Dahiya et al^[15] reported hyperbilirubinemia in 11.4% and 5.7% had respiratory distress syndrome.

In this present study, perinatal mortality was found in 14(11.7%), out of which 11(9.2%) were intrauterine deaths and 3(2.5%) were Early Neonatal deaths. Sathiamma P. K et al^[16] reported 2.9% perinatal mortality.

Conclusion:

Screening for GDM should be done at the first antenatal visit. Precise control of blood sugar right from the beginning of pregnancy assures a good maternal and neonatal outcome. Gestational Diabetes Mellitus is a high risk pregnancy and should be delivered at a tertiary care centre or a centre equipped with all the facilities needed.

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