The Prevalence, Risk Factors, Maternal and Fetal outcomes in Gestational Diabetes Mellitus

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Abstract

The study is aimed to find out the prevalence, risk factors, maternal and fetal outcome of gestational diabetes mellitus. 222 women diagnosed with Gestational Diabetes Mellitus (GDM) for the period of 8 years from Januarys 2003 to December 2010 were taken into the study. Data on maternal and neonatal outcome, patient history and diabetic management were collected and analyzed. Overall prevalence of GDM was found to be 2.1%. Of the affected women, 16.21% were managed with diet alone and 83.79% were received insulin treatment. Increased BMI, weight, marital period and positive family history for Diabetes Mellitus shows definite influence on GDM. 92.80% of women underwent cesarean delivery only 7.20% were had normal delivery. There was no history of macrosomnia, Intra uterine growth retardation and stillbirth. All babies were born normal in health except for hyperbilirubinemia and hypoglycemia which is the conditions may push them to the risk for Diabetes Mellitus and GDM, hence future monitoring for obesity and Diabetes Mellitus will be advisable. We recommend the early screening before 24th week of gestation, for GDM regardless of any other risk factors and those women with increased BMI, age, weight and positive history of diabetes mellitus has to be considered as high risk group. All GDM diagnosed women should be closely monitored for glycemic control for good maternal and fetal outcome.

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Introduction

The prevalence of diabetes mellitus is increasing globally and India is no exception. The WHO estimates the prevalence of diabetes mellitus which

include gestational diabetes mellitus in India is around 40.9 million in 2006 and is expected to rise to 69.9 million by 2025.

Diabetes mellitus complicates 1-20% of all pregnancies worldwide which include pre gestational diabetes mellitus and gestational diabetes mellitus.**[1]** Gestational diabetes mellitus is a medical condition complicating pregnancy, and in the face of the rising prevalence of diabetes, particularly in women of child bearing age, the problem is growing.[2]

Gestational diabetes mellitus is the development of symptoms and signs of diabetes mellitus during pregnancy and the glucose intolerance revert to normal during puerperium. The prevalence of gestational diabetes mellitus varies from 1-16% according to the diagnosis criteria and population. When compare to Europeans, migrant Indians in Europe have greater predisposition to diabetes m ellitus during pregnancy. The prevalence of Gestational Diabetes Mellitus in Indian women has increased to eleven fold when compared to European women.**[3]**

The prevalence of gestational diabetes mellitus is more in south India when compared to other part of India and Southeast Asia. The prevalence of Gestational Diabetes Mellitus in south India has increased dramatically from 1% in 1998 to 16% in 2004.[4] The risk factors for gestational diabetes mellitus are age >30 years, family history of diabetes mellitus, obesity, history of macrosomia, glycouria, previous unexplained neonatal death, unexplained recurrent abortion, Previous congenital malformations, history of hydramnios, history of stillbirth, history of gestational hypertension and history of pre-eclampsia.**[5]** Teenagers of mother who drank alcohol were less likely to have gestational diabetes mellitus.[6]

Gestational diabetes mellitus is associated with increased risk for mother and fetus during the pregnancy and birth and in later life. Maternal complications are Pre-eclampsia and cesarean delivery. Fetal complications are shoulder dystocia, birth injuries, neonatal hyperbilirubinaemia, hypoglycemia and respiratory distress syndrome.**[7]**

For the mother, Gestational Diabetes Mellitus is a very strong risk factor for the development of type 2 diabetes mellitus,[8] metabolic syndrome and cardiovascular disease later in life Around 35-60% of Gestational diabetes mellitus women develop type 2 diabetes within 10 years.**[9]** Gestational diabetes mellitus women are obese, hypertensive, dyslipidemia as well as subclinical atherosclerotic which were the risk factor for cardiovascular disease. Taken together, these findings suggest that gestational diabetes mellitus identifies a population of young women at increased risk for cardiovascular disease.**[10]**

Specific treatments of gestational diabetes (dietetics, physical exercise, blood glucose self-monitoring, and insulin-therapy if appropriate) reduces severe perinatal complications such as fetal macrosomia and pre-eclampsia compared to women with absence of therapy.[11]

Infants born to untreated Gestational Diabetes Mellitus mother has increased cesarean section rates, prematurity, larger for gestational age and macrosomic but most of the children were healthy but there is increased morbidity.[12]

A study conducted by (Crowther CA et al., 2005) has found that treatment of gestational diabetes reduces serious perinatal morbidity and may also improve the woman's health-related quality of life.

Treatment of Gestational Diabetes Mellitus involves educating the patient about diet, exercise, blood glucose self-monitoring, and insulin self-administration. A successful pharmacist can counsel a gestational diabetes patient.**[13]**

Rationale behind the Study

India has the largest number of diabetes patient in the world with an estimated number of 46 million in 2006 and it is estimated that around 2.5 million

women in India are in reproductive age are affected by diabetes. However there has only little study conducted in India on gestational diabetes mellitus. In order for the better understanding about the disease and to find out the prevalence, risk factors and to find out the outcomes in gestational diabetes mellitus this study is conducted.

Study Design

Retro- Prospective observational study

Study Period

Nine months from April 2010 to December 2010.

Objective

The main objective of the study is to identify the prevalence, risk factors and to compare the maternal and fetal outcomes of gestational diabetes mellitus.

Inclusion Criteria

Women diagnosed with gestational diabetes mellitus and whose expected date of delivery date has to be before the end of the month of December 2010.

Exclusion Criteria

Women with pre-existing diabetes mellitus, hypertension, renal diseases and autoimmune diseases.

Data Entry Form

A separate data entry form was prepared and which consist of drug chart, laboratory investigations, family history and maternal and neonatal details.

Data Collection

Data was collected for the period of January 2003 to December 2010. The data were collected directly from patients, family members, inpatient files and outpatient medical records, maternal data include age, weight, height, blood group, marital period, family history, husband details, ultrasound report, obstetric history, past medical history, treatment,

laboratory investigation and current diagnosis details were collected. Neonatal data include sex, weight, length, Apgar score, neonatal complications, Abdominal and head Circumference and blood sugar values were collected.

The maternal and fetal outcomes were analyzed by grouping the patients as follows.

1. Patients who were treated with diet alone and along with insulin.
2. Patients who were nullparous and multiparous.
3. Patient who had a normal and abnormal level of Hemoglobin. [Abnormal hemoglobin level is consider as level less than 12mg/dl and hemoglobin level between 12-15mg/dl is consider as normal level]
4. Patients who were diagnosed gestational diabetes mellitus at the early and late stage of gestation. [The week of gestation less than 28 is considered as early diagnosed and greater than 28th week is considered as late diagnosed gestational diabetes mellitus].
5. Patients who had a positive and negative family history of Diabetes Mellitus.

Analysis of maternal and fetal parameters

1. The cut of value of fasting blood glucose level for gestational diabetes mellitus women 95mg/dl and155mg/dl for 2-hours post prandial blood sugar according to ADA
2. Preterm delivery - the delivery before 37th week of gestation.
3. Macrosomia - the birth weight of 4000grams or greater.
4. Hyperbilirubenemia - the increase in total bilirubin level more than 12mg/dl.
5. Neonatal hypoglycemia - capillary heel blood glucose levels of 40mg/dl or less.
6. Maternal weight gain is the amount of weight gained by the mother during the pregnancy period. According to Institute of medicine and

nutrition the normal maternal weight gain during pregnancy is 11.5 – 16kg.

7. Large for gestational age (LGA) is those whose birth weight lies above the 90th percentile of weight for that gestational age.

8. Appropriate for gestational age (AGA) is those whose birth weight lies above the 10th percentile for that gestational age and below the 90th percentile of weight for that gestational age.

9. Small for gestational age (SGA) is those whose birth weight, length or head circumference lies below the 10th percentile of weight for that gestational age.

10. The universal screening for gestational diabetes mellitus is between 24 – 28 week. The gestational diabetes mellitus diagnosed between 24 -28 week or before 28th week were consider as early gestational diabetes mellitus and which is after 28 is consider as late GDM.

Statistical Analysis

Statistical analysis was performed by using the SPSS statistical package version 16.0. To assess the maternal and fetal outcomes in different group of patient's chi square test was used and P value lessthan0.05 was considered as statistically significant.

Results

Prevalence

Total of 10333 women were given birth for the period of 8 years from January 2003 to December 2010. Out of which 222 women were diagnosed as GDM which is account for 2.1% of whole delivery. Detailed result has given in Table No 1.

FACTORS	2003(n=22)	2004(n=29)	2005(n=25)	2006(n=29)	2007(=n=28)	2008(n=28)	2009(n=25)	2010(n=36)
Maternal Age (yrs)	26.09 ± 3.1	27.41 ± 3.87	28.72±4.703	27.724±4.00	26.54±3.626	27.85±4.28	27.84±3.7	28.47±3.29
Gravidity	1.863 ± 1.66	1.655 ± 1.11	2.04±1.059	1.724±0.92	1.607±0.956	1.928±1.11	2.04±0.97	2.194±1.11
Parity	0.5 ± 0.91	0.241±0.510	0.44±0.50	0.206±0.41	0.357±0.487	0.535±0.63	0.56±0.65	0.611±0.494
Height (cm)	157.45± 3.88	156.51±4.76	155.03±5.36	156.39±5.48	155.5±5.35	156.25±5.30	158.9±5.2	156.84±6.181
Weight (kg)	69.95 ± 7.34	68.31 ± 9.32	69.98±9.79	68.28±8.28	70.34±7.986	68.875±7.20	60.7±10.9	69.63±9.067
BMI (kg/m²)	28.1± 2.1	27.73 ± 3.18	29.18±2.93	28.7±2.93	29.01±3.065	28.28±3.44	23.9±2.1	28.65±3.78
Week of GDM Diagnosed	28.90 ± 8.27	26.37 ± 7.52	28.35±8.15	27.79±6.88	28.63±8.207	25.657±8.86	25.85±8.4	24.45±11.201
Marital Status	3.15 ± 2.10	3.65 ± 2.70	4.88±4.14	3.862±2.70	3.53±3.211	4.075±3.70	3.62±2.86	4.82±3.44
Week of Delivery	35.90 ± 1.94	35.15 ± 2.71	35.44±2.05	36.46±1.53	35.62±2.053	34.76±1.84	35.26±7.6	36.27±1.884
Insulin Used NPH Regular Both Diet	9 5 4 4	13 9 2 5	12 7 2 4	12 6 7 4	12 9 2 5	11 8 3 6	12 7 2 4	21 9 2 4
FBS Baseline level Prior to Delivery-	101.3 97.3	96.03 94.75	106.76 100.52	96.92 92.03	98.18 94.37	99.04 95.29	100.5 89.85	100.25 94.65
PPBS Baseline level Prior to Delivery	156.75 141.56	149.56 145	151.21 149.03	155.95 137.75	152 139	157.78 129.28	144.26 126.94	166.31 145.30
Prevalence	3.0	3.8	2.8	2.6	2.1	1.7	1.31	1.64
Family history of DM F/M/B None	9/5/3 5	10/5/2 12	10/5/4 6	8/4/3 14	9/5/2 12	8/5/4 11	7/5/3 10	9/8/4 15

Table 1: Characteristics Of The Study Subjects From 2003 -2010

FACTORS	2003	2004	2005	2006	2007	2008	2009	2010
Neonatal Weight	22.78±0.703	2.48 ± 0.895	2.50±0.70	2.69±0.389	2.61±0.389	2.29±0.688	2.79±0.8632	2.85±0.585
Sex	M=5 F=20	M=14F=15	M=15F=11	M=21 F=8	M=18F=12	M=18F=11	M=12F=13	M=26F=13
Apgar score at 1st minute	7.65 ± 0.587	7.68 ± 0.470	7.66±0.761	7.689±0.6037	7.71±0.599	7.92±0.744	7.24±1.640	7.72±0.513
Apgar score at 5th minute	8.57 ± 0.50	8.51 ± 0.50	8.65±0.575	8.44±0.57	8.57±0.5039	8.68±0.4676	8.125±1.825	8.80±0.401
Delivery Term	PT= 9 T= 19	PT= 22 T= 10	PT= 10 T= 15	PT= 14 T= 15	PT= 10 T= 18	PT= 20 T= 10	PT= 11 T= 14	PT= 15 T= 23

Table 1a: CHARACTERISTICS OF THE FETAL SUBJECTS FROM 2003 – 2010

Maternal

Risk Factors

The average age of GDM women was 27.62 ± 3.864 years. Out of 222 women 103(46.39%) had an age limit of 25-29, 60 (27.02%) had an age limit of 20-24 and 50 (22.25%) had an age limit of 30-34 years. Regarding BMI the average value was 27.89 ± 3.48kg/m² and 119 (53.60%) women were falls between the range of 25-29, 60 (27.02%) had a BMI above 30 and 43 (19.46%) had a normal BMI.

About parity total of 143 (64.4%) women were nulliparous, 73 (36.03%) were primiparous and 6 (2.80%) women were more than one. Regarding gravidity 106 (47.74%) women were primigravida and 116 women (50.36%) were multigravida. Regarding past obstetric history 20 (9.0%) women had previous GDM and 14 women (6.31%) had previous PIH.

31.43% of women have the paternal history of diabetes mellitus and 18.9% (42) have the maternal history of diabetes mellitus, 11.26% of women (25) have both and 38.20% of women (85) have none. 128 women (57.65%) gained the weight of 11 to 20kg and 87 (39.18%) women gained the weight of <10kg where as 7 (3.15%) had maternal weight gain more than 20kg. 118 (53.15%) subjects had hemoglobin level between 10 to 20mg/dl, 9 (8.58%) had less than 10mg/dl and 88 (39.63%) subjects had normal hemoglobin level of 13-17mg/dl.

Complications

The co-morbidity complications like PIH were also reported. 32 women (14.4%) were found with PIH, 8 women (3.6%) with oligohydrominos, 6 (2.7%) women with polyhydraminos and 5 (2.25%) women with hypothyroidism.

Out of 222women 186 (83.78%) were treated with insulin and 36 (16.2%) women were treated with diet alone and no women were treated with oral hypoglycemic drugs. The insulin treated women were received short acting [regular insulin] 102 (54.83%) and intermediate acting insulin [NPH] 60 (32.25%) and 24 women (12.0%) were received both NPH and regular insulin.

At the diagnosis of gestational diabetes mellitus the mean average value of fasting blood sugar was 99.18mg/dl and 2-hours post prandial blood sugar value was 148.56mg/dl, which were controlled to 93.88mg/dl and 137.64mg/dl fasting blood sugar and 2- hours post prandial sugar values respectively. The diet and insulin treated patient fasting blood sugar and 2- hours post prandial blood sugar values were 101.5mg/dl and 151.6mg/dl respectively and it were controlled to 97.8mg/dl and 145.3mg/dl fasting blood sugar and 2-hour post prandial blood sugar values respectively. 86(38.73%) of women were diagnosed between the week of 30-34, 43(19.36%) women were diagnosed week between 25-29 gestation, 32(14.41%) were diagnosed before 16th week, 27(12.16%) were diagnosed between 35-39 week of gestation, 8.35% (19) were diagnosed between 21-24th week and 15(6.75%0 were diagnosed between 16-20th week of gestation.

Out of 222 deliveries 16 (7.20%) were normal vaginal delivery and 206 (92.40%) were cesarean delivery in which 103(46.40%) were EL-LSCS and 103 (46.40%)

were EM-LSCS.51.80% of women (115) had given delivery after 37th week of gestation and 11.26% (25) of women were in between 34-36 week of gestation whereas 35.58% of women (79) had given deliveries between 31st-33rd weeks of gestation and 3 had delivered before 30th week of gestation.

Neonatal

All women had given live birth and of which 10(4.5%) women were twin pregnancy, totally 232 babies were delivered, of which124 (53.44%) were male babies and 103(46.29%) were female babies. Out of 232 babies 125(53.87%) were born as term and 107 (46.12%) were born as preterm delivery. 19 (8.1%) babies were Large for gestational age, 181 (78.01%) were Appropriate for gestational age and 32 (13.79%) babies were Small for gestational age.

Regarding the baby weight the mean weight is 2.64 ± 0.076 kg and the weight of 70(30.17%) babies was in between 2-2.5kg, 63 (27.15%) had birth weight in between 2.5-3 kg, 20 (8.62%) had birth weight between 3-3.5kg, 22(9.48%) had birth weight 3.5-4, 18(7.75%) had a birth weight between 1.5-2, 5(2.15%) had birth weight less than 1kg and 19 (8.18%) had more than 4000kg.

204(87.93%) babies Apgar score was less than or equal to 7 at the 1st minute and 93(40.08%) babies had Apgar score and 135 (58.15%) babies had 9 at the 5th minute. 124 (53.44%) babies Random Blood Sugar value were less than the normal level and 108 (46.55%) has normal level and 134 (57.75%) has hyperbilirubenemia and 98 (42.24%) has normal level of bilirubin and 69 (29.74%) had both hyperbilirubinemia and hypoglycemia.

S. NO	CO-MORBIDITY	NUMBER OF SAMPLE	PERCENTAGE (%)
1	PIH	32	14.41
2	OLIGOHYDRAMINOS	8	3.60
3	POLYHYDRAMINOS	6	2.70
4	HYPOTHYROID	5	2.25

Table 2: Distribution of the sample according to the Co-Morbidities

S. NO	APGAR SCORE	NUMBER OF SAMPLE	PERCENTAGE (%)
1	6	78	33.62
2	7	126	54.31
3	8	26	11.20
4	9	2	0.86

TABLE 3: Distribution of the sample according to the Apgar score At 1 Minute

S.NO	APGAR SCORE AT 5TH MINUTE	NUMBER OF SAMPLE	PERCENTAGE (%)
1	8	93	40.08
2	9	135	58.18

TABLE 4: Distribution of the sample According to the Apgar score at 5th Minute

S. NO	OUTCOME	DIET ALONE (n=36) (%)	INSULIN ALONE (n=186) (%)	CHI-SQUARE VALUE	P-Value
1	percentage	16.21%	83.78%		
2	cesarean section	30 (83.3%)	176 (94.6%)	6.043	0.013*
3	preterm delivery	14 (38.8%)	93 (50%)	2.49	0.114
4	pih	6 (16.6%)	26 (13.9%)	0.175	0.675
5	hypoglycemia	21 (58.3%)	106 (56.9%)	0.015	0.902
6	hyperbilirubinemia	20 (55.5%)	113 (60.7%)	0.239	0.472
7	apgar score at 1st minute < 8	23 (63.8%)	47 (25.2%)	5.066	0.244
8	maternal weigth gain	17(47.22%)	81(43.54%)	1.038	0.3083
9	SGA	2(5.55%)	30(21.7%)	2.733	0.0983
10	AGA	30(83.33%)	141(75.8%)	47.16	0.0001***
11	LGA	4(11.11%)	15(10.6%)	0.357	0.5498

*= Significance

TABLE 5: Maternal and Fetal Outcomes among women with GDM treated by diet alone and with Insulin.

S. NO	OUTCOMES	NULL (n=134) (%)	MULTI (n=88) (%)	CHI-SQUARE VALUE	P-Value
1	PERCENTAGE	60.36%	39.63%		
2	CESAREAN SECTION	124 (92.5%)	82 (93.1%)	0.031	0.860
3	PRETERM DELIVERY	62 (50%)	44 (50%)	0.061	0.804
4	APGAR SCORE AT 1ST MINUTE < 8	40 (32.2%)	27 (30.6%)	0.045	0.832
5	HYPOGLYCEMIA	80 (59.7%)	47 (53.4%)	0.382	0.536
6	HYPERBILIRUBINEMIA	77 (57.4%)	56 (63.3%)	0.843	0.358
7	PIH	18 (13.4%)	14 (15.9%)	0.369	0.543
8	WEIGHT< 2.5	46(34.32%)	30(34.09%)	0.00130	0.9709
9	Week of GDM Diagnosed	28 (20.89%)	29 (32.95%)	4.048	0.0442*

*= Significance

TABLE 6: Maternal and Fetal According to the Nulliparous or Multiparous

S.NO	OUTCOME	HEMOGLOBIN <12 (n=134) (%)	NORMAL (12-15) (n=88) (%)	CHI-SQUARE VALUE	P-Value
1	PERCENTAGE	60.36%	37.93%		
2	CESAREAN SECTION	121 (90.2%)	85 (96.5%)	7.620	0.005*
3	PRETERM DELIVERY	67 (50%)	39 (44.31%)	0.734	0.391
4	APGAR SCORE AT 1ST MINUTE < 8	37 (27.6%)	30 (34.09%)	1.058	0.303
5	HYPOGLYCEMIA	75 (55.9%)	51 (57.9%)	0.085	0.770
6	HYPERBILIRUBINEMIA	83 (61.9%)	50 (56.81%)	0.580	0.446
7	PIH	20 (14.9%)	12 (13.6%)	0.071	0.789
8	Week of GDM Diagnosed	40 (29.85%)	17 (19.31%)	3.088	0.0789
9	NEONATAL WEIGHT	50(37.31%)	33(37.5%)	2.895	0.8895

*= Significance

TABLE 7: Maternal and Fetal Outcomes according to the Hemoglobin Level.

S. NO	OUTCOME	POSITIVE HISTORY (early) (n=137) (%)	NO HISTORY (n=85) (%) (late)	CHI-SQUARE VALUE	P-Value
1	PERCENTAGE	61.71%	38.28%		
2	CESAREAN SECTION	126 (91.9%)	78 (91.7%)	0.203	0.652
3	PRETERM DELIVERY	66 (48.17%)	40 (47.05%)	0.026	0.871
4	APGAR SCORE AT 1ST MINUTE < 8	53 (38.6%)	14 (16.4%)	2.288	0.130
5	HYPOGLYCEMIA	75 (54.7%)	44 (51.76%)	2.276	0.313
6	HYPERBILIRUBINEMIA	106 (77.37%)	54 (63.52%)	4.994	0.025*
7	PIH	25 (18.24%)	7 (8.23%)	4.262	0.03*

*= Significance

TABLE 8: Maternal and Fetal Outcomes according to the Family History of Diabetes Mellitus

S. NO	OUTCOME	BEFORE 28TH WEEK (n=97) (%)	AFTER 28TH WEEK (n=125) (%)	CHI-SQUARE VALUE	P-Value
1	PERCENTAGE	43.69%	56.30%		
2	CESAREAN SECTION	87 (89.69%)	119 (95.2%)	6.070	0.013*
3	PRETERM DELIVERY	48 (49.48%)	58 (46.4%)		0.503
4	APGAR SCORE AT 1ST MINUTE < 8	27 (27.83%)	40 (32%)	0.448	0.502
5	HYPOGLYCEMIA	40 (41.23%)	77 (61.6%)	9.084	0.002**
6	HYPERBILIRUBINEMIA	60 (61.85%)	73 (58.4%)	0.271	0.602
7	PIH	16 (16.4%)	16 (12.8%)	0.604	0.437
8	SGA	14 (14.43%)	18 (14.4%)	0.0004	0.995
9	LGA	9 (9.27%)	10 (8%)	0.1440	0.7356
10	AGA	74 (76.28%)	97 (77.6%)	0.0530	0.8178

*= Significance

TABLE 9: Maternal and Fetal according to the Diagnosis Week of Gestational Diabetes Mellitus

Results of Comparison

Comparison Between Diet Alone and Insulin Treated Group

Related to cesarean delivery (83.3%) (P=0.013*) and AGA (83.3%) (P=0.0001***) there was a significant difference between the diet treated and insulin treated group and the rest of the parameters were found to be non-significant.

Comparison Between Regular and Irregular Menstrual Cycle

The Apgar score less than 8 at the 1st minute is highly significant (21.05%) (P = 0.0002***) and week of gestational diabetes mellitus diagnosed was also found to be significant (19.54%) (P = 0.0106**) where other parameters found to be non-significant.

Comparison Between Nulliparious and Multiparious

The week of diagnosis of gestational diabetes mellitus shows significant difference (20.89%) (P = 0.0442*) and other parameters were non significant.

Comparison Between Normal and Abnormal Hemoglobin Level

The P value of the cesarean section was found to be significant (90.2%) (P = 0.005**) and the other parameters were found to be non-significant.

Comparison Between Positive and Negative Family History of Diabetes Mellitus

We had found that PIH (18.24%) (P = 0.03**) and hyperbilirubenemia were shown significant difference (77.37%) (P = 0.025*) and other parameters were shown non-significant.

Comparison Between Early and Late Diagnosis of GDM Periods

There was a significant difference in cesarean section (86.69%) (P = 0.013**) hypoglycemia (41.23%) (P = 0.002**) and SGA were found to be highly significant (14.43%) (P = 0.0001***) where as other parameters were found to be non significant.

Disscusion

Prevalence

For the period of 8 years from January 2003 to December 2010 the prevalence of gestational diabetes mellitus was 2.1%. Approximately 1-14% of all pregnancies are diagnosed with gestational diabetes mellitus and the prevalence also keep on increasing from year to year. In South India, the prevalence of gestational diabetes mellitus has increased from 1% in 1998 to 16.55% in 2004 Bhat M et al., 2010.[14] In Chennai, India, it was recorded as 18.9% in 2004 Seshiah V et al., 2004.[15] In our study the prevalence rate was decreasing from the year 2003 to 2010, in 2003 the prevalence was recorded as 3.0% and in 2004 recorded as 3.8% same was recorded as 1.64% in 2010. Detailed result has given in Table No 1.

Risk Factors

Women of age more than 25 is being considered as risk factor. Our mean average age was 27.62±3.864 years. Which is the same statement of many studies Seshiah V et al., 2004[15], Boriboonhirunsan D et al., 2006[16] The study by Getahun D et al., 2008[17] reported that the prevalence of gestational diabetes mellitus largely driven by the increase in 25-35 years age group. In our study population 68% of women were between the age group of 25-34 years.

The increase in BMI is also a risk factor for gestational diabetes mellitus Bhat M et al 2010[18], Keshavarz M et al., 2005[19]. In our population the overall BMI value was 27.89±3.48kg/m² and 27% of women were above the BMI of 30.

Parity and Gravidity were also shows influence on gestational diabetes mellitus. Lesser parity Kevin J et al., 2006[20] and primigravida Tayol R et al., 2002[21] have more risk for gestational diabetes mellitus. In our study also the parity was less 68.4% and primigravida women were more 47.74% in number.

Family history of Diabetes Mellitus has a strong correlation with occurrence of gestational diabetes mellitus. Paternal only history of diabetes or parental history of Diabetes Mellitus have significant risk

Jawad et al., 1996[22],and Hadaegh et al., 2005[23]. In our study 67% of the women had positive family history of Diabetes Mellitus of which 31% of women had paternal only history of diabetes.

Complications

Maternal weight gain has correlation with birth weight of babies Niswanda et al., 1969[24], Jensen D et al., 2005[11]. In our study most of the women 26.12% had a maternal weight gain more than 17 kg and 17.56% of babies had a birth weight more than 3.5kg.

PIH, polyhydraminos, oligohydraminos and hypothyroid also has correlation with gestational diabetes mellitus Boriboonhirunsaran et al., 2006[16]. In our study 14.41% of women were complicated with PIH, 3.60% of the women were complicated with oligohydraminos and 2.70% were complicated with polyhydraminos.

The rate of cesarean delivery was increased significantly with gestational diabetes mellitus Casey MB et al., 1997[25] the other co-morbidity conditions like PIH also trigger the cesarean delivery in gestational diabetes mellitus Beucher G et al., 2010.[26] In our study the rate of cesarean delivery was high with 93% of whole delivery, 14.4% of gestational diabetes women found with PIH of which whole was cesarean delivery.

Comparison

The study done with 20512 women stated that, there was no significant difference in outcome of gestational diabetes mellitus women treated with diet alone and along with insulin except apgar score. The study by Zan TT et al., 2006[27] stated that 1% babies delivered to insulin treated women had apgar score less than 7 at 1st minute but 3% were reported with diet alone treated women. In our study the cesarean delivery was more with insulin treated 94% where as 83% reported with diet alone group. There was no significant difference in apgar score but there was

significant difference in AGA, 83% of diet alone treated women were delivered baby for AGA but 75% with insulin treated group.

A study done with 191 patients were stated that there was no significant difference in cesarean delivery, maternal weight gain and preterm delivery in between the group of early and lately diagnosed women but there was increased macrosomnia in late gestational diabetes mellitus diagnosed women group Barahona.M.J et al., 2005[28] in their study in Barcelona, Spain, has compared the maternal and fetal outcomes according to the week of gestational diabetes mellitus diagnosed and found out that cesarean section, 5 minute Apgar score < 7, insulin treatment, preterm birth, hyperbilirubinemia and respiratory distress were found to be significant. In our study we had found out that cesarean delivery, hypoglycemia were significant where as preterm delivery, LGA and AGA, were shown no significant difference between the groups.

Lao.T.T et al., 2002[29] in China has classified the patient according to the hemoglobin level, the study shown that there was no significant difference in birth weight. In our study we had found the same that there was no significant difference in neonatal birth weight but there was significant difference in cesarean delivery. The level of hemoglobin does not have influence on mode of deliveries.

A study by Levy A et al., 2010[30] on 181,479 deliveries has compared the maternal and fetal outcomes according to the family history of diabetes. Patients with familial history of diabetes mellitus had higher rates of macrosomia and also, a 1.3-fold increase in the risk for cesarean delivery (CD). In our study there was no significant difference in cesarean delivery but there was a significant difference in the PIH and hyperbilirubinemia. 77.37% of babies, delivered by positive family history of Diabetes Mellitus women, were affected with hyperbilirubinemia, which was recorded as 63.5% with negative family history of Diabetes Mellitus. 18.24% women with positive

family history Diabetes Mellitus were affected with PIH and 8.23% with negative family history of diabetes mellitus.

A study done by Al-Rowaily.M.A et al., 2010[31] in Saudi Arabia has compared the gestational diabetes mellitus patients according to the parity and they had found the prevalence of gestational diabetes mellitus and 2-hours of plasma glucose were found to be significant. In our study we had found that week of gestational diabetes mellitus diagnosed was significant. 32.95% of multiparous women were diagnosed with gestational diabetes mellitus before 24th week of gestation and only 20.89% of nulliparous women were diagnosed with gestational diabetes mellitus. Which shows that multiparity can be a driving force for the development of gestational diabetes mellitus.

Conclusion

Overall prevalence rate of gestational diabetes mellitus was 2.1%. The prevalence rate was gradually reduced from 3.0% in 2003 to 1.64% in 2010. Total number of deliveries was gradually increased from 730 in 2003 to 2187 in 2010.

Increasing age, BMI, weight and marital period shows definite influence on developing gestational diabetes mellitus.

Average age was 27.62 years, BMI was 27.89 Kg/m2 and weight was 68.32kg.

The average age was gradually increased from 26.09 years in 2003 to 28.47 years in 2010.

79.71% of women were more than 60kg of body weight at the time of confirmation of pregnancy.

Based on BMI 80.62% of women were above the ideal body weight

Overall average marital period was 3.81 years which was gradually increasing from 3.15years in 2003 to 4.81years in 2010.

Family history is also an important risk factor for the development of gestational diabetes mellitus.

61.8% of women had family history of diabetes mellitus, of which 51.09% of women had paternal history of diabetes [overall-31.53%]

Occurrence of gestational diabetes mellitus was early in stage of gestation, average week of diagnosis of gestation diabetes mellitus was 24.78 weeks.

The average week of diagnosis of gestation diabetes mellitus was gradually increased from 28.90 in 2003 to 24.45 in 2010

Regarding mode of delivery cesarean delivery was more.

92.78% of deliveries were cesarean delivery.

Gravidity does not have influence on development of gestational diabetes mellitus.

47.74% of women were pimigravida and 50.36% were multigravida.

There was no significant difference in term and preterm deliveries.

Overall preterm delivery was 46.12% and term delivery was 53.87%.

Neonatal weight was found to be normal and there was no history of macrosomic baby.

Overall average weight of the baby was 2.64kg which was gradually increased from 2.27kg in 2003 to 2.85kg in 2010

Nearly half of the babies were affected with hypoglycemia and hyperbilirubinemia.

57.75% of babies were affected with hyperbilirubinemia, 53.44% of babies were affected with hypoglycemia and 29.74% babies with both hperbilirubinemia and hypoglycemia.

GDM is a condition that should be treated aggressivelyand it is a problem that affects a significant number of women during pregnancy.

Regardless of risk factors, early screening before 24th week of gestation, for gestational diabetes mellitus is strictly recommended.

Increasing age, BMI, weight, martial period and positive family history for diabetes are highly prone to gestational diabetes mellitus and those women has to be considered as high risk group. Strictly controlling of blood sugar level definitely gives good outcomes of gestational diabetes pregnancy.

It should be given equal importance to primigravida and multigravida women for the screening of gestational diabetes mellitus.

Fetal exposure to hyperinsulinemia may push them to high risk group of diabetes mellitus and also for gestational diabetes mellitus. Hencefuture risk for obesity and diabetes mellitus to offspring of gestational diabetes mellitus women should be monitored.

Increased awareness of the magnitude and timing of the risk of type 2 diabetes after gestational diabetes among patients and clinicians could provide an opportunity to test and use dietary, lifestyle, and pharmacological interventions that might prevent or delay the onset of type 2 diabetes in affected women.

A major part of GDM involves educating the patient about diet, exercise, blood glucose self-monitoring, and insulin self-administration.Pharmacists can optimize overall care of a gestational diabetes patient by educating, monitoring, and intervening or assisting the patient in the management of gestational diabetes. There is a need for pharmacist intervention in the prevention and management of GDM and to train nurses about the safety precautions required for the safe handling, administration of insulin and provide guidance to the patients of GDM regarding diet plan and exercise to prevent it.

In order to circumscribe and minimize potential complications to mother and child, screening, diagnosis, and management of hyperglycemia are critical. There is still work to be done to gain a better sense of what screening protocols are most efficacious and when they should be administered. Future studies will provide guidance as to what the optimal management choices are.

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