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MATERNAL AND PERINATAL OUTCOMES IN GDM: A STUDY

P. Vijaya Sheela¹, R. Padmaja², Vijayalakshmi³

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ABSTRACT: BACKGROUND: India today is the diabetic capital of the world. A venous blood sugar level more than 140 mg/dl is suggestive of Gestational Diabetes mellitus (GDM) and more than 90% of these people are managed by meal plan alone. GDM tends to occur in older women with higher body mass index, higher parity, and other associated risk factor. **AIMS AND OBJECTIVES:** To assess the hospital prevalence of GDM, maternal and fetal outcomes in pregnancies complicated by GDM compared with non-diabetic pregnancies managed at a tertiary care unit during the study period. **MATERIALS AND METHODS:** A Study was conducted at KING GEORGE HOSPITAL, Visakhapatnam, over a period of 2 years from October 2011 to October 2013. A total of 64 subjects of GDM were recruited and compared with 100 controls selected randomly that matched that matched for age, parity, BMI, who delivered in the hospital during the study period. **RESULTS:** Prevalence of GDM increases as the parity of the woman increases. Incidence of GDM increases as the age of the pregnant woman increases. Obesity and pre pregnancy weight act as high risk factors for the development of GDM. Patients with known risk factors are more likely to have GDM than those with risk factors. There is increased incidence of operative delivery among GDM cases compare to controls. There is increased prevalence of macrosomia, hyperbilirubinemia and hypoglycemia in GDM cases compared to controls. **CONCLUSIONS:** Outcomes of pregnancy in women with GDM in this study showed significantly raised incidence of hypertensive disorders, LGA Neonates, macrosomia and NICU admissions for more than 24hrs compared to non-diabetic mothers who delivered in the hospital.

KEYWORDS: GDM, Risk factors.

INTRODUCTION: India today is recognized as the Diabetic capital of the world. According to Government of India order universal screening at 24-28 weeks with 2 hour 75 gm.

Oral Glucose Tolerance Test (OGTT) and post lunch blood sugar level is mandatory irrespective of her fasting sugar levels.

A venous blood sugar level >140mg/dl is suggestive of GDM and more than 90% of such cases are managed by meal plan alone.

AIM OF THE STUDY: To assess the hospital prevalence of GDM, maternal and fetal outcomes in pregnancies complicated by GDM compared to non-diabetic pregnancies managed at a tertiary care unit during the study period.

Should all pregnant women be screened or only those with risk factors?

- Does GDM pose serious risks to mother and offspring?
- Does reducing hyperglycemia reduce risks? (macrosomia & cesarean delivery).

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MATERIALS & METHODS: This study was conducted at King George Hospital, Andhra Medical College, Visakhapatnam over a period of about 2 years from October 2011 to 2013.

A total of 64 subjects of gestational diabetes were recruited and compared with 100 controls selected randomly that matched for age, parity and BMI, who delivered in the hospital during the study period.

Inclusion Criteria: All antenatal women who were at risk for GDM.

Exclusion Criteria:

- Patients with known diabetes prior to conception.
- Patients with other medical disorders affecting perinatal outcome like renal Disease, chronic hypertension, heart disease.
- Patients who were on drugs affecting carbohydrate metabolism were excluded.

METHODOLOGY: Screening according to American Diabetic Association (ADA) Guidelines: First Prenatal Visit – Measure Fasting Plasma Glucose (FPG) or random (casual) on all antenatal women routinely.

If FPG is <5.1 mmol/L (92 mg/dL), test at 24 to 28 week with 50-g OGCT. If within normal limits, test again at 32-34weeks.

A 50 gm glucose drink was given to the patient regardless of previous meals followed by glucose estimation after 1 hour at 24 to 28 week of gestation. Three ml of Venous blood was collected with complete precautions in a sterile container and the samples were transported to the clinical laboratory at King George hospital within 6 hours. Women with high risk factors were screened at their first visit and if the blood sugar value was within normal limits, the OGCT was repeated at 26-30 week period of gestation.

Confirmatory testing with 100 gm OGTT was done on all subjects with a screening test value more than or equal to 130 mg/dl.

The threshold value of 130 mg/dl was taken as it increases the diagnostic yield and the sensitivity of the test to 100%.

The diagnosis of GDM was done by 100gm oral glucose tolerance test. In OGTT, the patient was asked to take exclusive carbohydrate diet for 3 days before the test. After an overnight fasting for at least 8 hours, venous plasma glucose was measured on 3 occasions i.e., fasting, 1 hour, and 2 hour post prandial after giving a 100gm glucose drink. The subject was remain seated and not to smoke throughout the test. All women diagnosed with GDM or overt DM were advised to have postpartum glucose testing at 6wks, annually and 3 year thereafter.

	National Diabetes data group (100 gm OGTT)	American Diabetes association (100 gm OGTT)	Carpenter and Coustan (100 gm OGTT)	WHO (75 gm OGTT)
Fasting	105mg/dl	95mg/dl	95mg/dl	> _126mg/dl

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1 hour	190mg/dl	180mg/dl	180mg/dl	
2 hours	165mg/dl	155mg/dl	155mg/dl	>_140mg/dl
3 hours	145mg/dl	140mg/dl	140mg/dl	

Table 1: GDM Criteria

*Two or more criteria met = positive diagnosis (cut off points in mg/dl) † 1 or more criteria met = positive diagnosis. All patients who were found to have GDM were referred to an Endocrinologist and jointly managed by Dietician. Women whose sugar levels were well controlled by diet alone were allowed to progress to spontaneous labor but not beyond expected date of delivery. Women who required insulin therapy pregnancy was terminated at 37 completed week once the fetal lung maturity was attained. Women who had vasculopathy in pregnancy were terminated at 35-36 completed week.

The outcome was assessed by studying the influence of age factor and body mass index, Gestational age at delivery and mode of delivery, maternal complications, operative interference and neonatal outcome in terms of birth weight, Apgar scores, congenital abnormalities, hyperbilirubinemia, hypoglycemia and respiratory distress.

Statistical analysis was performed manually using chi-square test. 'p' value was obtained. A 'p' value of less than 0.05 was considered to be statistically significant.

STUDY POPULATION: This study was conducted at King George Hospital, Andhra Medical College, Visakhapatnam over a period of about 2 years from October 2011 to 2013. A total of 64 subjects of gestational diabetes were recruited and compared with 100 controls selected randomly that matched for age, parity and Body Mass Index (BMI), who delivered in the hospital during the study period.

Total Hospital admissions during the study period from 2011 to 2013 were 10, 690 cases. Of these total cases, those identified as having gestational diabetes were 64. The percentage of GDM cases was 5.9 per 1000.

STUDY RESULTS: Among the GDM cases 18 were primi gravida and 46 were multi gravida. Among the controls 49 were primi gravida, and 51 were multi gravida.

PARITY	GDM	CONTROL
PRIMI	18	49
MULTI	46	51

TABLE 2

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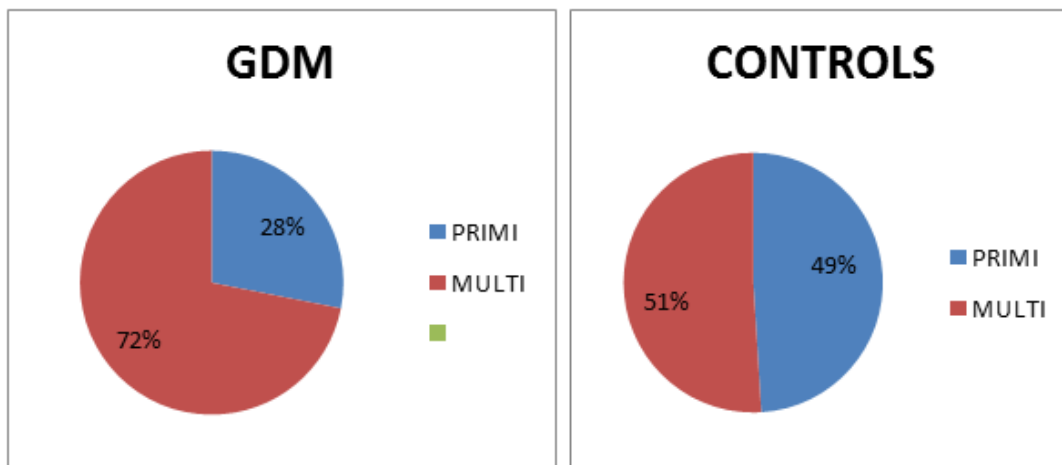


Fig. 1

Fig. 2

Hence prevalence of GDM increases as the parity of the pregnant woman increases.

AGE in years	GDM	CONTROLS
<25	15	71
26-30	35	24
>30	14	5

Table 3: Age factor of pregnant women in relation to GDM

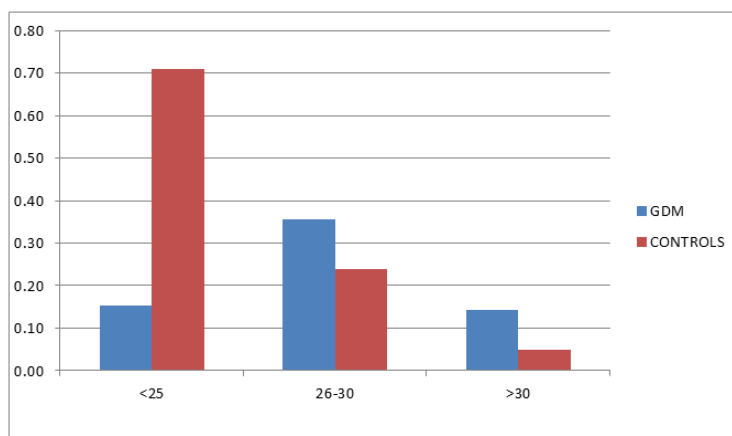


Fig. 3

GDM is seen in 21% of >30 years compared to 5% of controls, 54% of 26-30 years compared to 24% of controls. Chi square value is 36.64 degree of freedom is 2 P value is <0.001 which is highly significant. Hence incidence of GDM increases as the age of the pregnant woman increases.

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BMI	GDM	CONTROL
<20	0	20
20-30	46	80
>30	18	

Table 4: EFFECT OF BMI OF PREGNANT WOMEN ON GDM

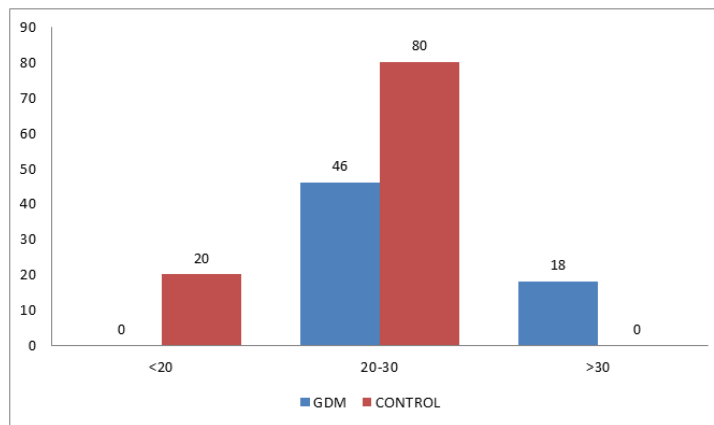


Fig. 4

Increased BMI >30 seen in 28% GDM compared to controls Chi square value is 41.41. Degree of freedom is 2. P value is <0.001 which is highly significant.

<u>MATERNAL COMPLICATIONS IN GDM CASES</u>			
INDICATION ALPHABET	HIGH RISK FACTORS	GDM	CONTROLS
A	Preeclampsia	14	8
B	POLYHYDRAMNIOS	7	4
C	PROM	10	10
D	SEVERE ANEMIA	6	10
E	PCOD	4	0
F	LOW LYING PLACENTA	6	1
G	Bad obs history	8	2
H	PAST H/O ABORTIONS	25	9
I	PAST H/O UTI	5	0
J	HYPOTHYROIDISM	4	1
K	OLIGOHYDRAMNIOS	3	1
L	RH NEGATIVE	3	3

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PATIENTS WITH KNOWN RISK FACTORS ARE MORE LIKELY TO HAVE GDM THAN THOSE WITHOUT RISK FACTORS

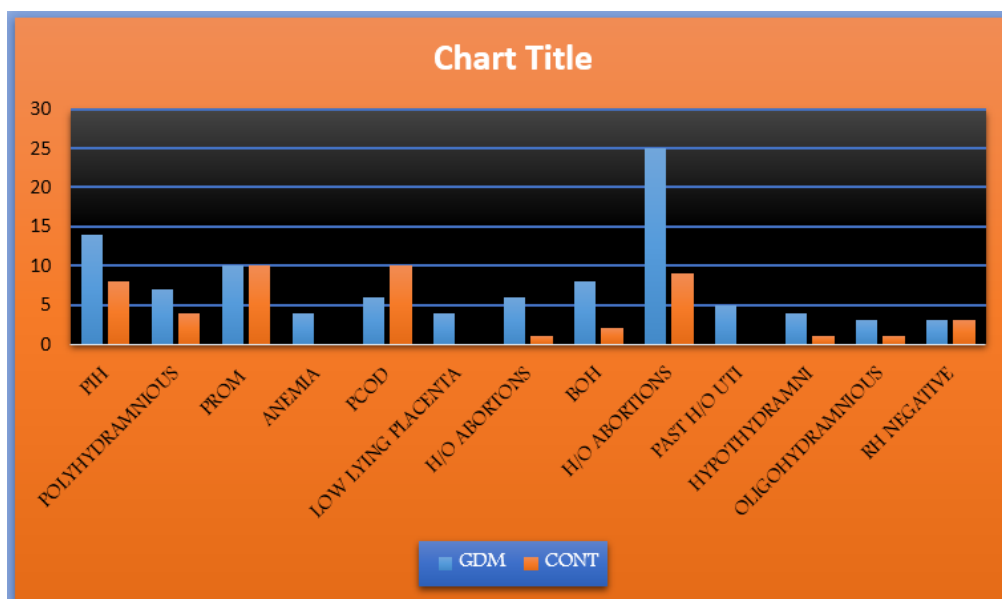


Fig. 5

- Increased prevalence of preeclampsia about 21% in GDM and 8% of controls.
- Increased prevalence of Polyhydramnios of 10% in GDM and 4% in controls.
- Increased prevalence of hypothyroidism of 4 cases. BOH of 12% at H/O abortions in 40% compared to 9% in controls, 4 case of PCOD is seen in GDM cases.
- Increased incidence of Malpresentations of 22%.

MODE OF DELIVERY	GDM	CONTROL
NVD SPONTANEOUS	3(4.6%)	37(37%)
NVD INDUCED	8(12.5%)	10(10%)
PRIMARY LSCS	29(45%)	33(33%)
REPEAT LSCS	22(34.3%)	14(14%)
Mode of delivery		

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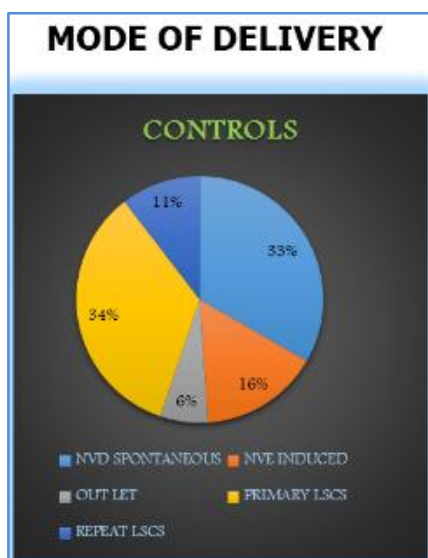


Fig. 6

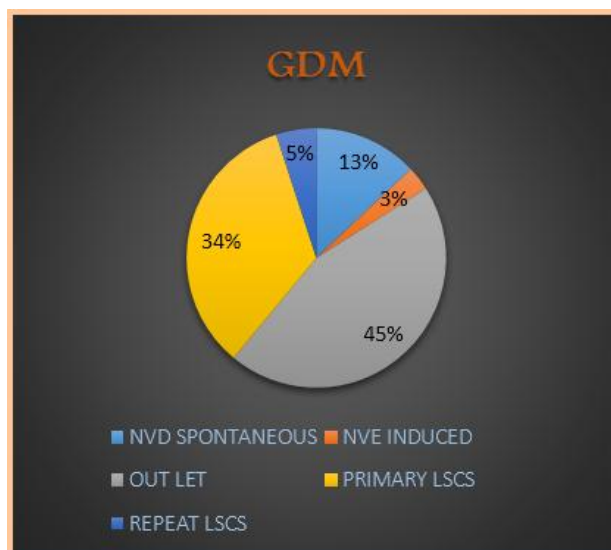


Fig. 7

- Increased rate of caesarean section of 7% is seen in GDM cases compared to 47% in controls. Increased rate of labour induction necessary in GDM compared to controls.
- Chi square value is 17.38
- Degree of freedom is 2.
- P value is <0.001 which is highly significant.

THERE IS INCREASED INCIDENCE OF OPERATIVE DELIVERY AMONG GDM CASES COMPARED TO CONTROL.

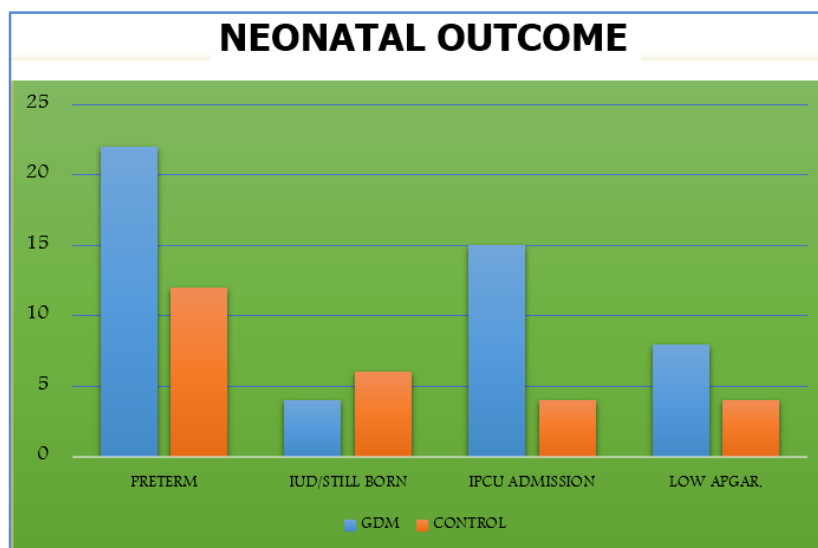


Fig. 8

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34% increase of preterm deliveries compared to 12% in controls which in due to associated complications. There is increased prevalence of low apgar in GDM compared to cotrols.

Percentage of IUD/Still born comparatively low in GDM cases compared to controls which may be due to good glycaemic control, timely delivery,

IPCU admissions are more in GDM cases 23% compared to controls 4% as it is routine policy of the hospital to admit and observe all babies of GDM complicating pregnancy.

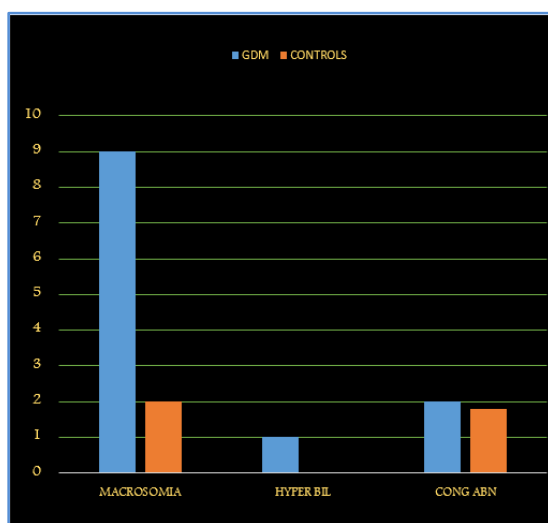


Fig. 9

There in increased prevalence of macrosomia. Hyperbilirubinemia. And hypoglycaemia in GDM cases compared to controls

Incidence of GDM in various studies:

Bhattacharya et al, Calcutta	-3%
Ganguli et al. Pondicherry	-0.25%
Maheswari et al. Mumbai	-4.9%
Kumar et al. New Delhi	-5.5%
Priyanka karla et al western Rajasthan	-6.6%
Present study	-0.59%

Study	Prevalence	Avg age in GDM	BMI	Multi parity	Oper delivery	Gest hyper tension	Macro-somia	Preterm delivery	Neonatal hypoglycaemia hyperbiliru-bnemia	NICU admi-ssions
HAPO		29	27.7	52%	16%	5.9%	9.6%	6.9%	2.1%, 8.3%	8%
TN (RItu Joy et al)	1.5%	28.72	27.52	60%	83.7%	27%	2.7%	62%	40.54%, 35.13%	60%
TN (robin et al)	2.1%	27.62	27.89	50.36%	92.7%		Normal wt	46.12%	50%, 50%	50%
Rajasthan	6.6%	25	25 (67%)	62%	79%	27%	18%	18%	9.09%, 12.12%	27.2%

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New Delhi	6.51%	27	28	54%		22.5%	10%	50%	increased	Increased
Present study	0.59%	28	25	72%	79%	21%	14%	34%	1%, 1%	23%

STATISTICAL ANALYSIS

INCIDENCE OF GDM CASES IN OUR STUDY 5.9 PER 1000.

- Incidence of GDM is seen more in multi gravida than in primi gravid with P value of 0.005 which is highly significant.
- Incidence of GDM increases as the age of the pregnant women increase with P-value of <0.001 which is highly significant.
- Obesity and pre pregnancy weight acts as a high risk factor for the development of GDM with P value is <0.001 which is highly significant.
- There is increased incidence of operative delivery among GDM cases compared to controls with P value of <0.001 which is highly significant.
- Patients with known risk factors are more likely to have GDM than those without risk factors.
- GDM is also associated with risk factors with significant p value
- The incidence of macrosomia is more in GDM cases compared to controls with P value of <0.01 which is highly significant.

DISCUSSION: GDM is defined as carbohydrate intolerance of variable severity with onset or first recognition during the present pregnancy.^(1,2,3,4,5,6,7,8,)

Screening is universal between 24 -28 week POG with a 50 g oral GTT. Confirmation is with a 100 gm oral GTT. WHO criteria, ADA criteria can be used Risk factors can be further divided into high risk, low risk and average risk. Some of them are BMI of 30 or above, Previous macrosomic infant, Previous pregnancy complicated by GDM, Family history of Diabetes in 1st degree relatives, Ethnic origin with known high prevalence of Diabetes.^(1,2,3,4,5)

More than half of women with gestational Diabetes ultimately develop overt Diabetes in the ensuing 20 years.^(1,2,3,4,7)

Maternal complications are Polyhydramnios, Recurrent UTI and Vulvovaginal Candidiasis, Increased incidence of Pre eclampsia, Preterm labour and excessive weight gain during pregnancy.^(1,2,3,4,5)

Fetal complications are macrosomia, stillbirth especially in 3rd trimester, intrapartum asphyxia, shoulder dystocia, clavicular fracture and other injuries.^(1,2,3,4,5,7)

Neonatal complications are Polycythemia, hypoglycaemia, hyperbilirubinemia, hypocalcemia, electrolyte imbalance, and increased perinatal morbidity and mortality.^(1,2,3,4,5,7)

The salient features of management are To maintain a fasting level of < 95 mg/ dl and post prandial levels of < 140 mg/ dl and <120 mg/dl at 1 and 2 hrs respectively.^(1,2,3,4,5,8) if not achieved with diet, insulin can be started.

Recommendation of 5th international workshop on Gestational Diabetes – maternal capillary glucose levels be kept <or = 95 mg /dl in the fasting state.

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Antepartum surveillance and a combination of diet and exercise with or without Insulin.^(1,2,3,4,8)

Majority of carbohydrates in diet should be in the form of unrefined, high fibre foods.^(1,2,3)

Glyburide has shown encouraging results. Metformin has also been used.^(1,2,3)

Timing of delivery depends on fetal well-being – if GDM is well controlled with no macrosomia or hydramnios pregnancy may be continued till date with fetal surveillance.^(1,2,3,4,5,8)

Indications for a section are usually obstetric, except when the expected fetal weight is >4 kg.^(1,2,3)

The new born may need expert care. In this case control study we compared maternal and perinatal out come in gestational diabetes.

The prevalence increased with age i. e. 75% of GDM cases belonged to age group >25 years and only 23% of cases were seen in <25 years age group. With regard to age effect, a model of linear trend was statistically significant (p-value of 0. 001) in this study.

The prevalence of GDM increases with BMI. All the diagnosed cases of GDM belonged to the >25.1 BMI group with p value of 0. 001 which is significant.

The prevalence of GDM increases with parity. Among the GDM cases 72% belong to multiparous with p value of 0. 005 which is highly significant.

The prevalence of PIH was about 21% in GDM compared to 8% in controls. There is increased prevalence of Polyhydramnios of about 10% in GDM cases compared to 4% in controls.

There is increased prevalence of hypothyroidism in GDM of about 4 cases which may be due to associated autoimmune disorders. About 4 cases of PCOD seen in GDM cases which may be due to associated obesity, insulin resistance.

There is increased prevalence of risk factors like h/o abortions in 40% GDM cases compared to 9% in controls., h/o BOH in 12% of GDM cases. That there are even cases without associated risk factors shows the need of universal screening, early diagnosis and strict glycemic control to prevent complications.

There is increased incidence of Malpresentations of 22% of GDM cases. An increased rate of cesarean section of 79% is seen in GDM cases compared to 47% in controls. Increased rate of induction is seen in GDM compared to controls.

There is 10% increase of preterm deliveries, 14% increase of Birth weight >4kg 5% in controls, 75% of Macrosomic babies.

Two percent of SGA, oligohydramnios seen in GDM cases which could be due to associated gestational hypertension.

The incidence of neonates of GDM mothers admitted to the NICU in this study was significantly higher than the control. Although, the Apgar scores were not strikingly different between the two groups studied; this may reflect the routine policy of observation of these infants at the hospital where this study was based and not necessarily associated with any medical problems. With strict glycemic control, the birth injury rate was only slightly higher than controls.

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To maintain glucose levels as near to normal as possible before conception, throughout the pregnancy, during labor and in postpartum period so as to reduce complications should be our goal. The fact that majority of GDM women are asymptomatic and even mild GDM seems to have significant consequences for women and their babies; it has been recommended to screen for GDM for all antenatal women.

This study has its limitations. The subjects in the present study are not representative of general population but represent women of predominantly of lower socioeconomic status, which may explain the lower incidence of GDM in our study. The number of patients with GDM is low suggesting poor statistical power in defining pregnancy outcomes in patients with GDM in the present study.

CONCLUSION: According to Government of India order universal screening at 24-28 weeks with 2hour 75 gm OGTT or post lunch blood sugar level is mandatory irrespective of her fasting sugar levels. A venous blood sugar levels >140mg% are suggestive of GDM and more than 90% are managed by meal plan alone.

The maternal and fetal outcome depends on the committed team of endocrinologists, Obstetricians and neonatologists. A short term intensive care gives a long term pay off in the primary prevention of obesity, IGT and diabetes in the off spring, as the preventive medicine starts before birth.

There is increased rate of maternal and fetal complications with increased surgical intervention at delivery.

Outcomes of pregnancy in women with GDM in this study showed significantly raised incidences of hypertensive disorders, LGA neonates, Macrosomia and NICU admissions for >24 hours compared with the non-diabetic mothers who delivered at the hospital.

These findings support the paradigm of increased rates of some maternal and neonatal complications in pregnant women with GDM. There is strong evidence which suggests that the reduction of complications can be significantly prevented by simple but aggressive control of blood sugars in order to ameliorate many of the complications for the mother and the baby. Dietary intervention and insulin therapy, with their safety profile, have been considered the gold standard of pharmacotherapy for GDM. On the other hand, a number of trials, including prospective randomized trials, have demonstrated the efficacy of oral hypoglycaemic agents, particularly glyburide and Metformin, used in managing pregnant diabetics.

A multicenter, randomized controlled trial, based on universally accepted criteria for GDM screening test, standardized diagnostic OGTT and management of all patients with GDM versus the standard obstetric management of the control is warranted.

REFERENCES:

1. Fernando Arias - Practical guide to high risk pregnancy and delivery, A South Asian perspective, 3rd ed. 441 – 452.
2. Cunningham G, Macdonald P, Norman F Gant, Kenneth J Leveno – Williams's obstetrics 23rd ed: 1106 -1113.

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3. Philip J Steer, Carl Weiner, Bernard Gonik - High Risk Pregnancy, Management options 4th ed.795- 805.
4. D C Dutta –Textbook of obstetrics including Perinatology and contraception -7th ed; 281, 282.
5. Gopalan S, Jain V, Mudaliar and Menons Clinical Obstetrics. 10th ed. 211, 212.
6. Sudha Salhan - Textbook of Obstetrics 296- 298.
7. Krishna U, Daftary S. D K Tank - Pregnancy at risk, Current concepts – 2nd ed. 231- 241.
8. Asian Journal of OBS and GYNAEC practice vol 2 April –June 2010.7-10.

AUTHORS:

1. P. Vijaya Sheela
2. R. Padmaja
3. Vijayalakshmi

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Gynaecology & Obstetrics, Andhra Medical College.
2. Assistant Professor, Department of Gynaecology & Obstetrics, Andhra Medical College.
3. Senior Resident, Department of Gynaecology & Obstetrics, Andhra Medical College.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. R. Padmaja,
Flat No. 101,
New sea Scape Ap5-15-9-4/17,
Maharanipeta, Vizag.
E-mail: rajupadmaja1971@gmail.com

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