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Pregnancy Outcome in Gestational Diabetes Mellitus - A Prospective Observational Study

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ABSTRACT

Background: *Gestational diabetes is associated with significant metabolic alterations, increased maternal and perinatal morbidity and mortality. Indians fall into high risk ethnic group for diabetes mellitus.*

Objectives: *The objective of this study is early detection and treatment of gestational diabetes mellitus(GDM) in pregnant women and to assess perinatal outcome in a well controlled and poorly controlled gestational diabetes mellitus patients.*

Materials and Methods:

Sample: *All pregnant women attending to outpatient department in obstetrics and gynaecology department at NRI medical college hospital in Chinakakani Guntur(Dt) universally screened for GDM in all three trimesters.*

Methods: *single step oral glucose tolerance test(OGTT) with 75 grams glucose. This test is performed by asking the patient to come with overnight fasting. after collecting fasting venous sample from patient, solution made of 75 grams glucose mixed with 150 ml water is given. patients with fasting plasma glucose value ≥90 mg/dl and 2nd hour plasma glucose value≥140mg/dl are diagnosed to have gestational diabetes.*

Results: *Out of 71 pregnant women diagnosed as GDM, the commonest risk factors are age≥25 years(61.9%),followed by past history of abortion(33.8%), obesity(32.39%), overweight(32.39%), past history of GDM(16.9%), family history of diabetes to mother(22.5%),father(19.7%),both parents(4.2%). 9.8% of GDM patients were diagnosed ≤ 12 weeks, 61.9% between 13-28 weeks,22.5% between 29-34 weeks and 5.6%≥35 weeks. OGTT was carried out in all three trimesters for all antenatal women, so that GDM cases diagnosed in late weeks of gestation are not missed.GDM patients were followed up with 75 grams OGTT after 6 weeks, and 16.9% of women were positive for the test.*

Conclusion: *Single step OGTT with 75 grams glucose with cut-off values of fasting plasma sugar≥90mg/dl and 2nd hour plasma sugar≥140 mg/dl is very useful in diagnosing GDM. Universal screening for GDM is superior to selective screening(based on risk factors) for detecting more cases, facilitating early diagnosis and treatment of a disorder that carries an adverse prognosis in antenatal women with no symptoms of GDM.*

The criteria recommended by WHO are simple and cost effective and it is practised in many centres. Further assuming that effective treatment is available, WHO criteria of 2nd hour plasma sugar levels≥140mg is useful in identifying a large number of cases and may have greater potential for prevention.one step procedure of WHO serves dual purpose for screening and diagnosis.

INTRODUCTION

A new structure arises denovo during pregnancy, develops and matures and expelled at the completion of the gestational period. The metabolic adaptations that occur during pregnancy are to accommodate a rapidly growing tissue transplant, the conceptus. For its own normal growth and development, The conceptus brings about alterations in maternal fuel metabolism and placental harmones. The placenta facilitates embryogenesis, growth, maturation and viability of fetus. It synthesises steroid and peptide harmones and modulate and transport maternal fuel to the fetus and metabolic wastes from fetus to mother.

Pregnancy is considered as tissue culture experiment implicating that placenta and fetus develops in an incubation that is totally derived from maternal fuels consisting of glucose, amino acids and lipids. The growth and maturation of fetus are closely associated with delivery of maternal nutrients particularly glucose. This is the most crucial in the 3rd trimester and is directly related to the duration and degree of maternal glucose elevation.

GDM is defined as carbohydrate intolerance of variable severity with onset or first recognition during pregnancy. Women with GDM are characterized by insulin resistance and impaired insulin secretion. Approximately three-fourths have a family history of type-2 diabetes mellitus that was unmasked by the stress of pregnancy. Uncontrolled GDM is associated with increased risk of fetal macrosomia, birth trauma, neonatal hypoglycaemia and perinatal morbidity and mortality.

There is general consensus that the prevalence of GDM is increasing globally but there is considerable controversy about the clinical importance of GDM and the magnitude of its impact on mother and offspring .lack of uniformity in detection and diagnosis of GDM has hampered efforts to compare fetal effects of hyperglycemia. Clinical recognition of GDM is important because therapy including insulin when necessary and antepartum maternal and fetal monitoring can reduce the well-controlled GDM associated perinatal morbidity and mortality.

The recommendations of the international workshop conference on GDM emphasised the clinical importance of developing new diagnostic criteria that are based on potential to detect pregnancy at risk for adverse perinatal outcome as result of maternal hyperglycemia rather than placing emphasis on

identification of mothers at risk for progression to diabetes outside of pregnancy.

AIM AND OBJECTIVE

- Detecting GDM in a community level using simple and cost effective screening methods.
- Screening in every trimester so as to accurately detect cases of GDM
- For early detection and treatment of GDM in a pregnant woman to reduce adverse fetal effects.
- To assess perinatal outcome in a well controlled and poorly controlled GDM patients.

MATERIAL AND METHODS

This study was conducted at NRI Medical college hospital, (including all super specialities) in Guntur which serves as a tertiary center for approximately 3000 deliveries per year. This study was conducted from September 2011-july 2013.

CRITERIA FOR SELECTION OF CASES:

300 antenatal women attending to outpatient department in obstetrics are universally screened for gestational diabetes in all the three trimesters(at 6 weeks in first trimester,20-24 weeks in second trimester, 32-36 weeks in third trimester.)

EXCLUSION CRITERIA

Patients who are already known diabetic prior to conception are excluded from the study.

METHOD

Single step oral glucose tolerance test(OGTT) with 75 grams glucose. This test is performed by asking the patient to come with overnight fasting. Fasting venous blood sample is taken and sent to laboratory. A glucose solution is prepared by mixing 75 grams of glucose with 150 ml water and patient is made to drink this glucose solution in 5 minutes. 2^{nd} hour venous blood sample is collected and plasma sugar values are measured by O toludine method.

Patients with fasting plasma sugar value≥90mg/dl and 2^{nd} hour plasma sugar value ≥140mg/dl are diagnosed to have gestational diabetes.

GDM diagnosis defined by WHO using 75 grams OGTT is a single step approach. The criteria recommended by WHO are simple and cost effective and it is practised in many centres. Further assuming that effective treatment is available; WHO criteria of 2^{nd} hour post glucose more than 140mg/dl, identifying a large number of cases may have greater potential for prevention.one step procedure of WHO serves dual purpose of screening and diagnosis.

DATA COLLECTION: A standard proforma was used to interview each subject during antenatal visits. The completed forms were edited and analysed for family history of diabetes mellitus, history of previous birth of babies more than 3.8kgs, history of prior congenital anamolies / prematuriy/bad obstetric history and excessive weight gain.

DATA ANALYSIS: with the above mentioned data the following points are analysed.

1. Total number of patients diagnosed as GDM.
2. Of these the number of patients with family history of diabetes and who developed GDM.
3. Age incidence and % of woman diagnosed as GDM.
4. Incidence of maternal morbidity associated with GDM (post operative complications).
5. Incidence of macrosomic babies in patients with well controlled and poorly controlled GDM.

RESULTS

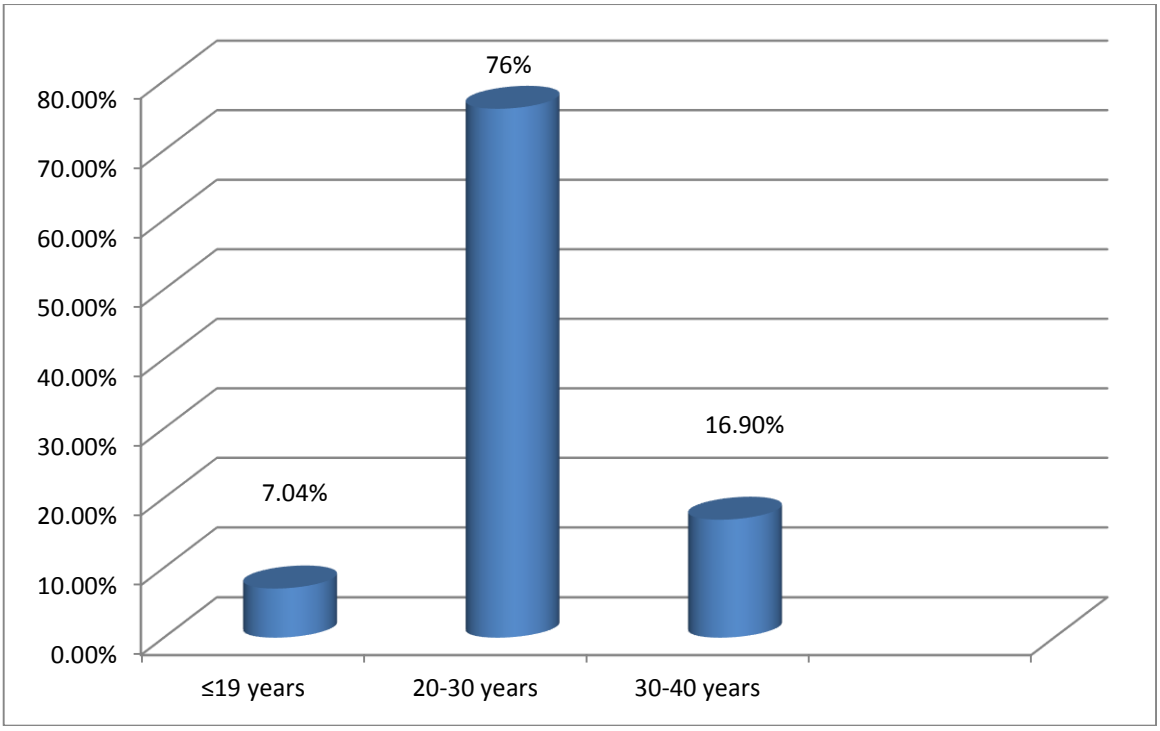
300 antenatal women attending to obstetric OPD at NRI Medical college hospital, during the time period september 2011 to july 2013, selected according to the requirement listed in material and methods were studied and analyzed.

DEMOGRAPHIC CHARACTERISTICS

The mean age of patients was 26.08 years.

AGE DISTRIBUTION OF STUDY POPULATION (GDM PATIENTS)

AGE (YEARS)	NUMBER OF CASES (n=71)	PERCENTAGE
≤19	5	7.04
20-30	54	76
31-40	12	16.9
Total	71	100

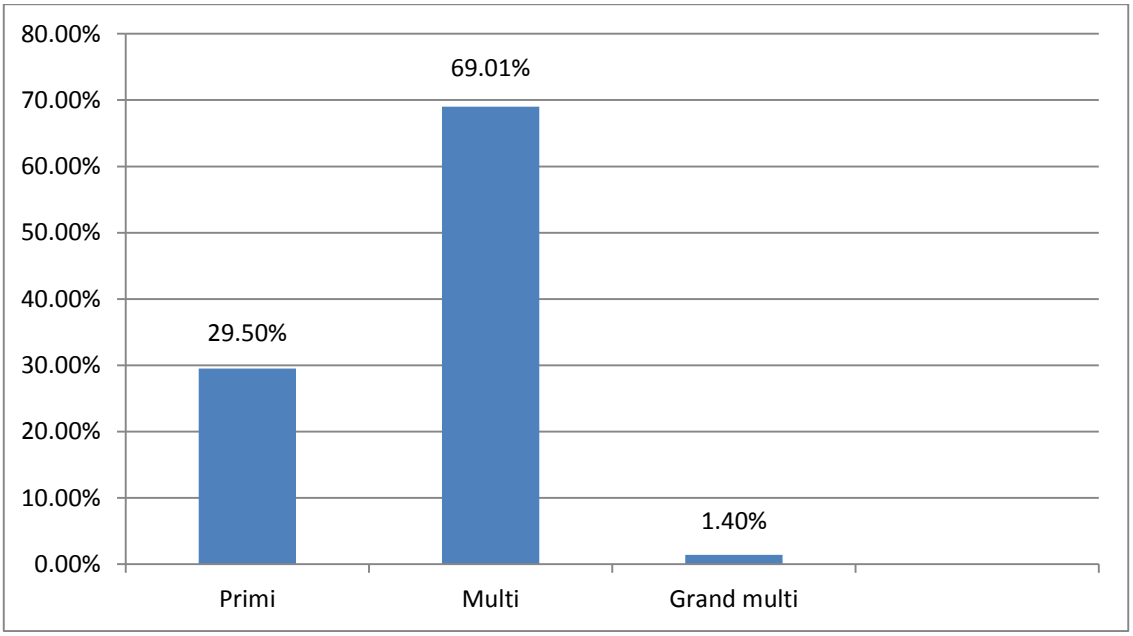


The minimum age at which GDM was diagnosed was 18 years. The maximum age at which GDM was diagnosed was 37 years.76% of study population belongs to the age group 20-30 years.

GRAVIDITY OF STUDY POPULATION (GDM PATIENTS)

GRAVIDA	NUMBER OF CASES(n=71)	PERCENTAGE (%)
Primi gravida	21	29.5
Multi gravida	49	69.01
Grand multi gravida	1	1.4
Total	71	100

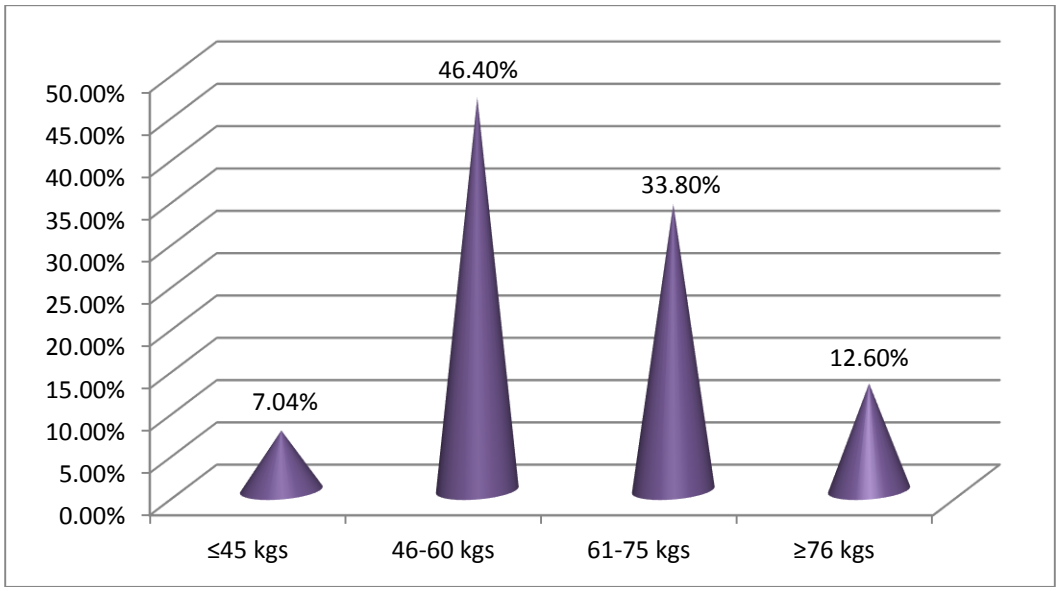
There are more number of multi gravida (69.01%) than primi(29.5%) and grand multi gravida women (1.4%) in our study population.



WEIGHT DISTRIBUTION OF STUDY POPULATION

WEIGHT (KGS)	NUMBER OF CASES (n=71)	PERCENTAGE
≤45	5	7.04
46-60	33	46.4
61-75	24	33.8
≥76	9	12.6

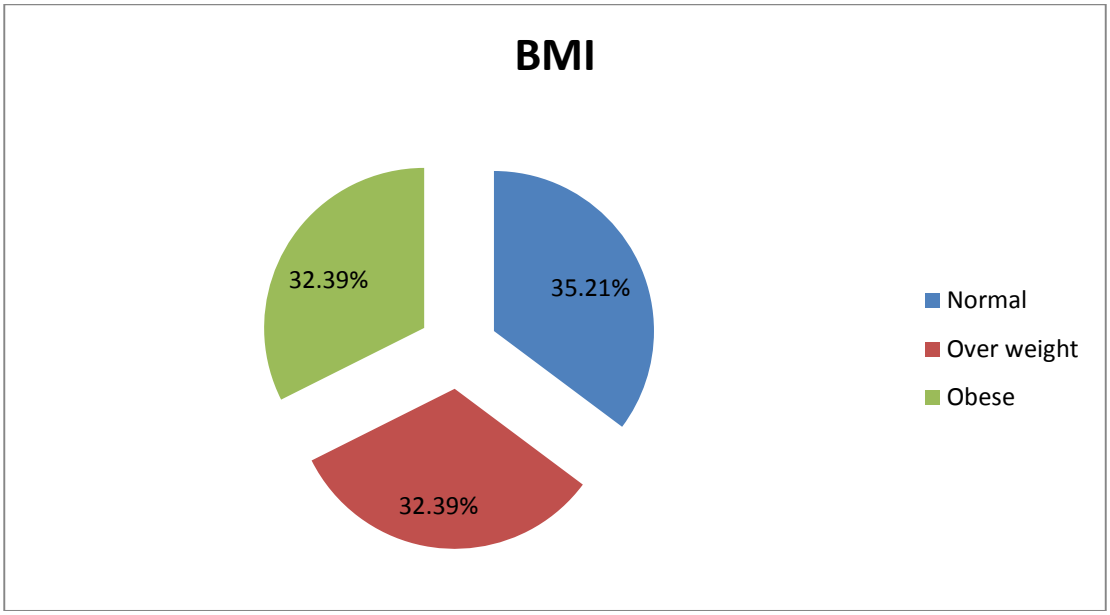
46.4% of GDM patients belongs to 46-60 kgs weight.33.8% of GDM patients belongs to 61-75 kgs weight. The minimum weight associated with GDM patients observed in our study was 35 kgs. The maximum weight associated with GDM patients observed in our study was 100 kgs.



BMI DISTRIBUTION OF STUDY POPULATION

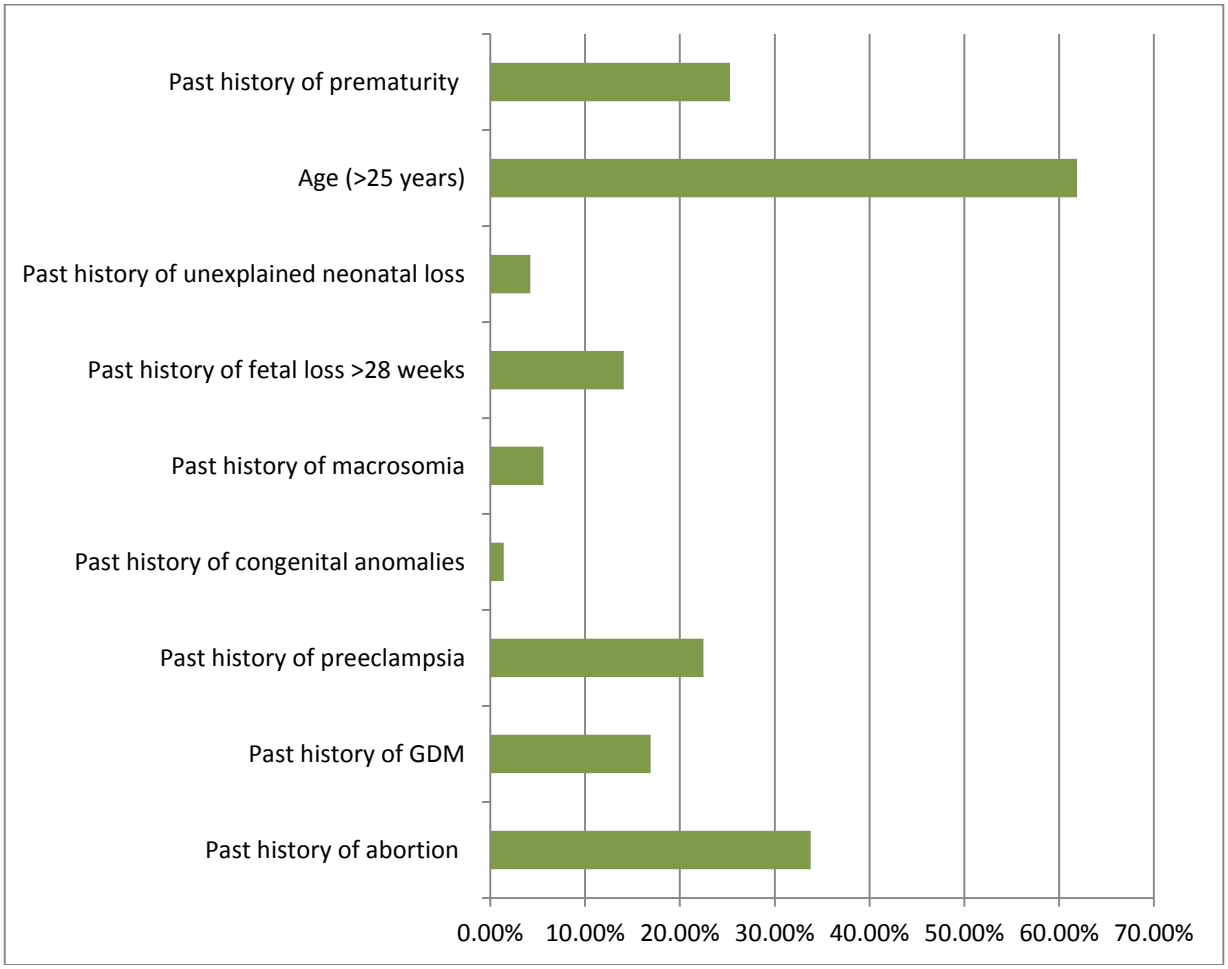
CLASSIFICATION	VALUE	NUMBER OF CASES (n=71)	PERCENTAGE
Normal range	≤24	25	35.21
Over weight	25-29.99	23	32.39
Obese	≥30	23	32.39

Prevalence of GDM is equal both in overweight (32.39%) and obese (32.39%) patients in the present study.



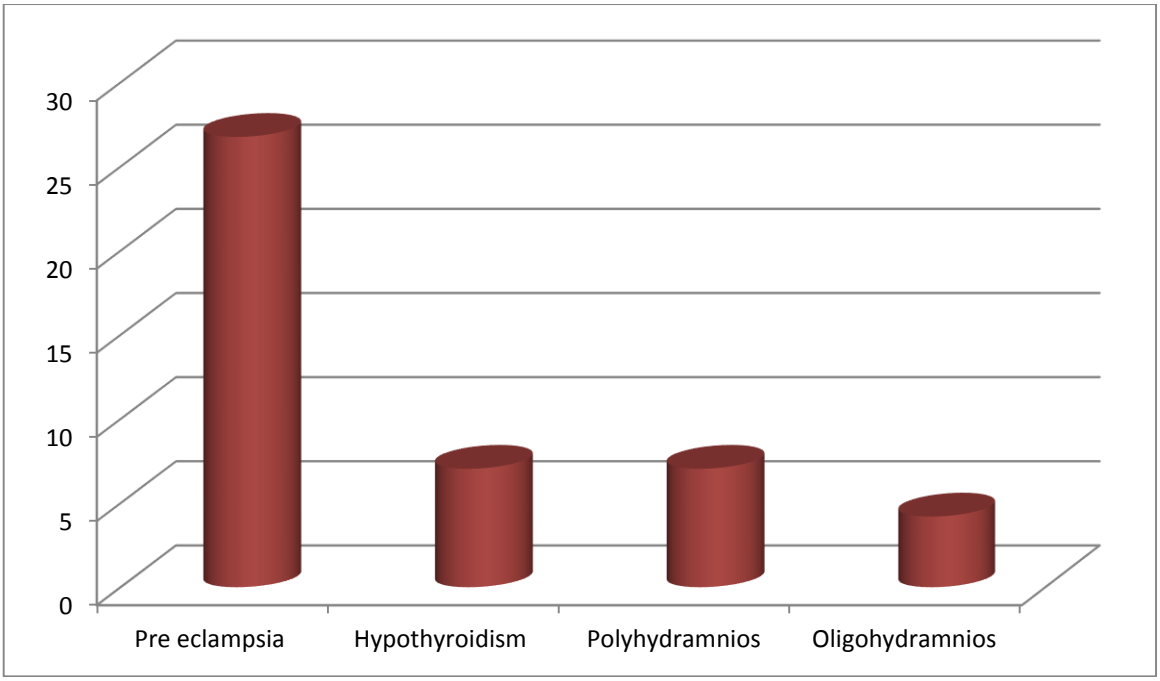
RISK FACTORS IN STUDY POPULATION

RISK FACTORS	NUMBER OF CASES (n=71)	PERCENTAGE
Age (>25 years)	44	61.9
Past history of unexplained neonatal loss	3	4.2
Past history of fetal loss>28 weeks	10	14.08
Past history of macrosomia	4	5.6
Past history of congenital anamolies	1	1.4
Past history of preeclampsia	16	22.5
Past history of GDM	12	16.9
Past history of abortion	24	33.8
Past history of prematurity	18	25.3



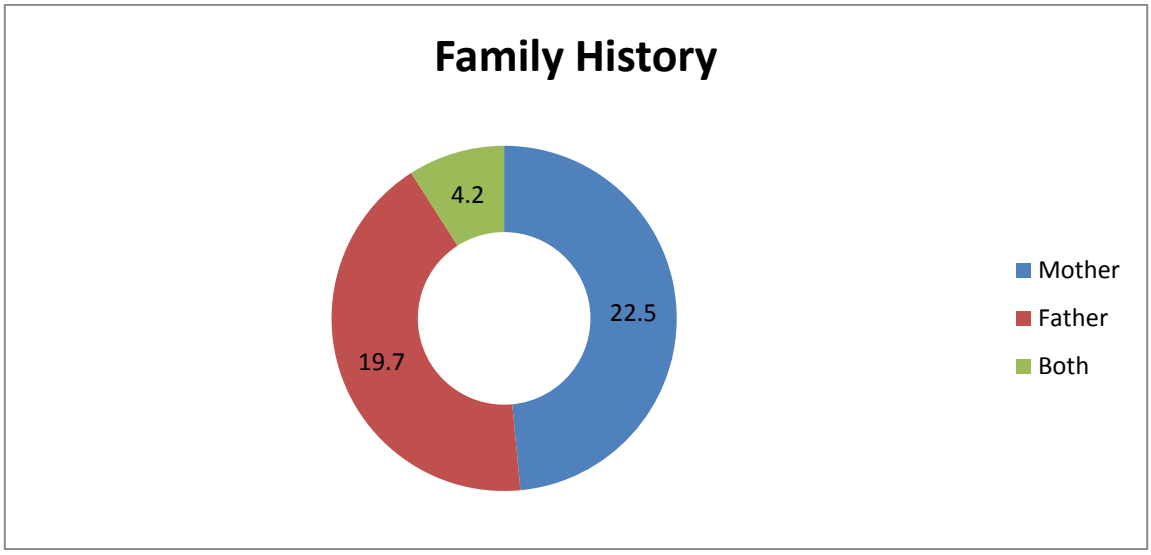
COMORBIDITIES IN PRESENT PREGNANCY IN STUDY POPULATION

COMORBIDITIES	NUMBER OF CASES (n=71)	PERCENTAGE
Preeclampsia	19	26.76
Hypothyroidism	5	7.04
Polyhydramnios	5	7.04
Oligohydramnios	3	4.2



FAMILY HISTORY OF DIABETES IN STUDY POPULATION

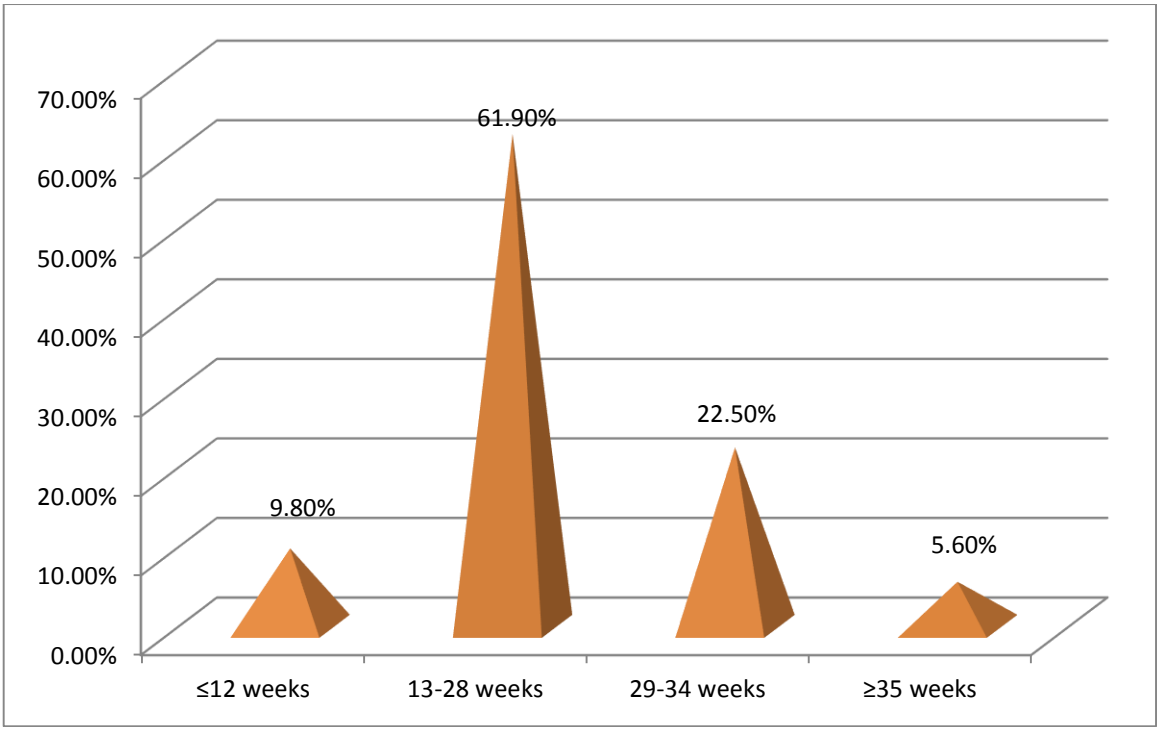
RELATION	NUMBER OF CASES (n=71)	PERCENTAGE
Mother	16	22.5
Father	14	19.7
Both	3	4.2



GESTATIONAL DIABETES AT WHICH GDM IS DIAGNOSED

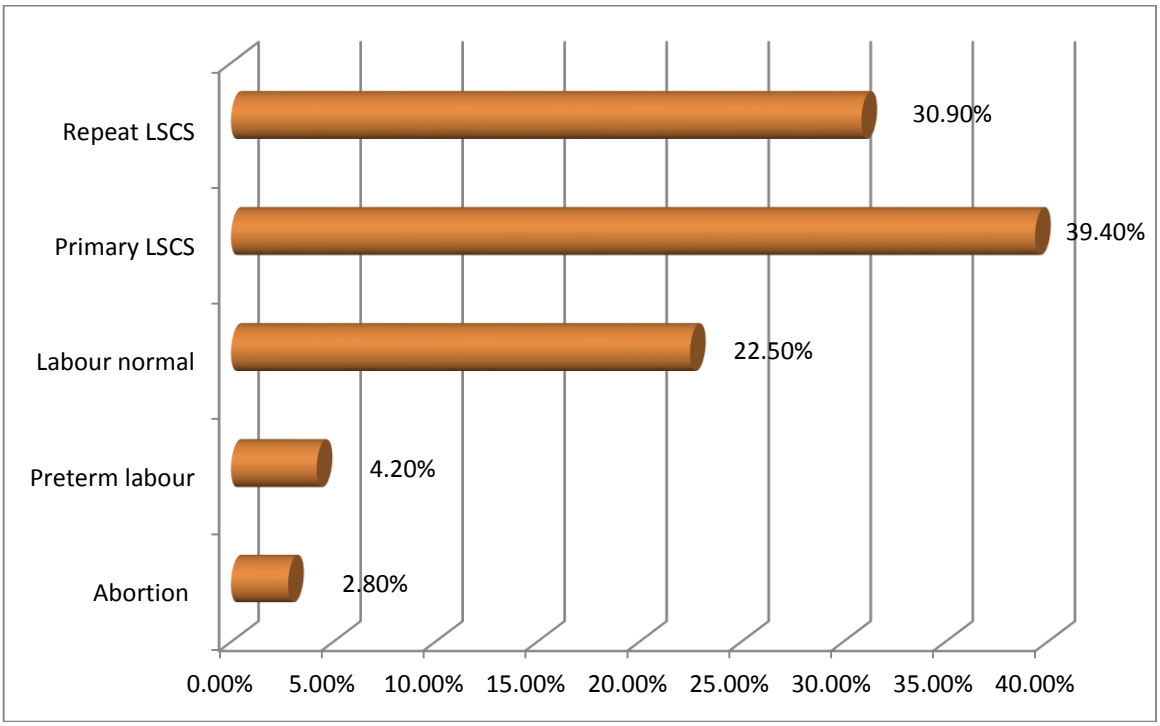
GESTATIONAL WEEKS	NUMBER OF CASES (n=71)	PERCENTAGE
≤12 weeks	7	9.8
13-28 weeks	44	61.9
29-34 weeks	16	22.5
≥35 weeks	4	5.6
Total	71	100

The minimum gestational period at which GDM was diagnosed was 8 weeks and the maximum gestational period at which GDM was diagnosed was 36 weeks.



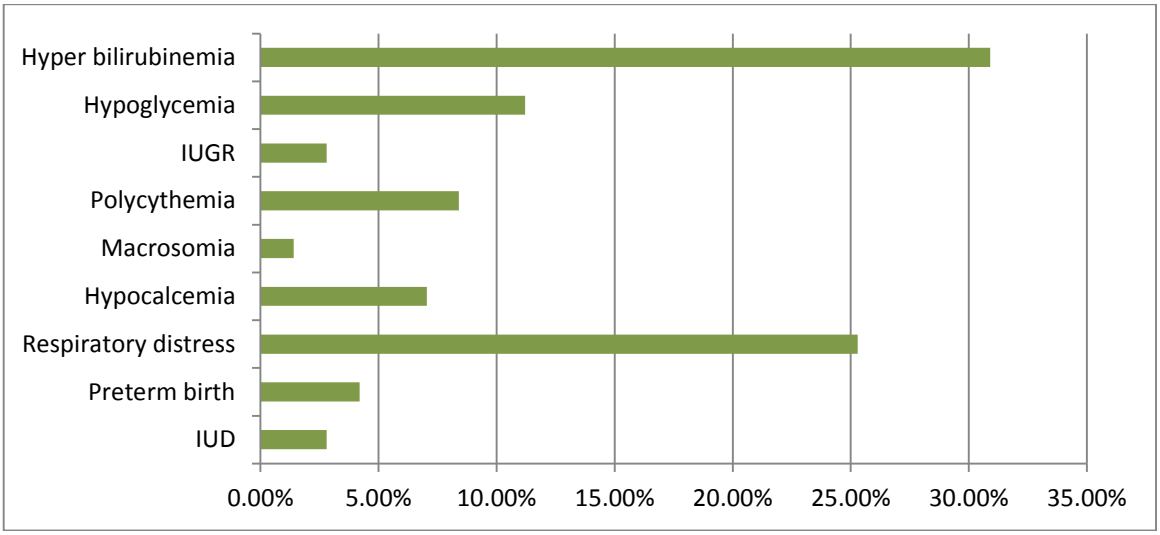
PREGNANCY OUTCOME IN STUDY POPULATION

MODE OF DELIVERY	NUMBER OF CASES (n=71)	PERCENTAGE
Abortion	2	2.8
Preterm labour	3	4.2
Labour normal	16	22.5
Primary LSCS	28	39.4
Repeat LSCS	22	30.9
Total	71	100



FETAL OUTCOME IN STUDY POPULATION

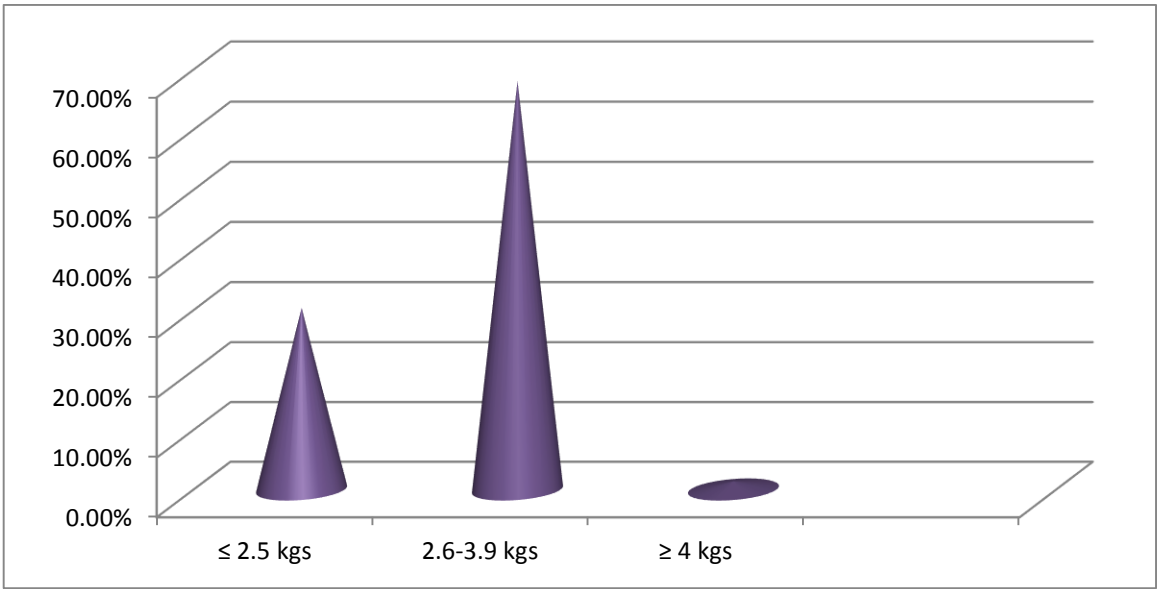
FETAL OUTCOME	NUMBER OF CASES (n=71)	PERCENTAGE
Hyper bilirubinemia	22	30.9%
Hypoglycemia	8	11.2%
IUGR	2	2.8%
Polycythemia	6	8.4%
Macrosomia	1	1.4%
Hypocalcemia	5	7.04%
Respiratory distress	18	25.3%
Preterm births	3	4.2%
IUD	2	2.8%



DISTRIBUTION OF BIRTH WEIGHT IF NEWBORN IN STUDY POPULATION

BIRTH WEIGHT (KGS)	NUMBER OF CASES (n=71)	PERCENTAGE
≤2.5	21	30.4
2.6-3.9	47	68.11
≥4	1	1.4
Total	69	100

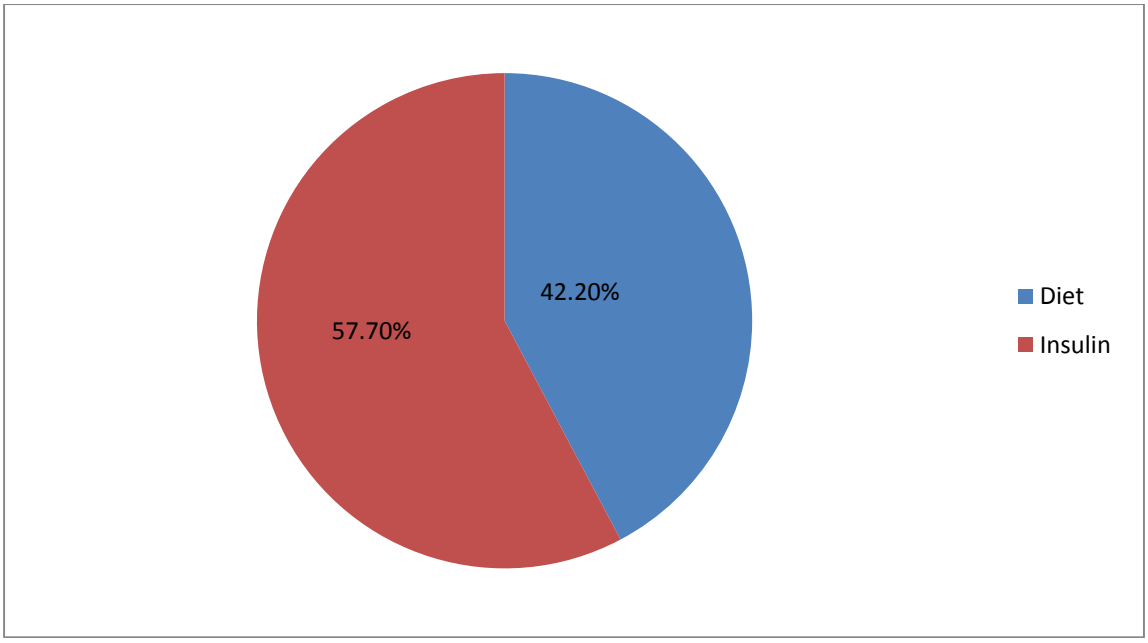
The minimum weight observed was 700 grams and the maximum weight observed was 4.5 kgs.



MODE OF MANAGEMENT IN STUDY POPULATION

MODE OF MANAGEMENT	NUMBER OF CASES (n=71)	PERCENTAGE
Diet	30	42.2
Insulin	41	57.7
Total	71	100

Diabetic diet maintained was 30-40 kcal/kg/day in GDM patients with normal weight.
Type of insulin used was both regular and intermediate acting insulin, which is given in varied doses known as mixed split insulin.
The least amount of insulin required to control GDM was 4 units-single morning dose.
The maximum amount of insulin required to control GDM was 32 units (20 units in the morning and 12 units in the evening)



FOLLOW-UP OF GDM PATIENTS

GDM patients were followed up by asking them to come after 6 weeks postpartum.
75 grams OGTT is performed and patients were analysed 12 out of 71 patients, accounting for 16.9% were tested positive and were advised strict diabetic diet and advised to have regular checkups for blood sugar and asked to review after 6 months for OGTT.

DISCUSSION

Clinical recognition of GDM is important because therapy, including diet, insulin when indicated and antepartum fetal surveillance can reduce the perinatal morbidity and mortality. The frequency of GDM is highly variable and generally reflects the underlying pattern of non-insulin dependent diabetes mellitus (NIDDM) in the particular population. There is no universal agreement on the screening strategies and diagnostic criteria of GDM.
In the present study, 300 antenatal women attending OPD were screened with 75 grams OGTT proposed by WHO, diagnosed as cases of GDM according to the plasma glucose values, were included in the study.

Demographic characteristics

Comparison of age distribution of study population

STUDY GROUP	YEARS	POPULATION (%)
Bhattacharya et al	≥25	33.7
	≥30	6
Binny Thomas et al	20-30	27.02
	31-40	22.25
Present study	20-30	76
	31-40	16.9

It is expected that prevalence of GDM in a population will depend on the age distribution of the population studied. a number of investigators have found that maternal age is highly correlated with risk of GDM.in the present study ,76% of patients were less than 30 years age.in the present study population was younger when compared to other studies.

Comparison of gravidity of study population

STUDY GROUP	GRAVIDITY	PERCENTAGE
Binny Thomas et al	Primi	47.74
	multi	50.36
Present study	Primi	29.5
	multi	69.01

GDM is more in multigravida (69.01%) compared to primigravida (29.5%) in present study group.

STUDY GROUP	BMI Kg/M^2	PERCENTAGE
Binny Thomas et al	≤ 24 25-29 ≥30	19.46 53.60 27.02
Priyanka kalra	25-29 ≥30	66.67 18.18
Aruna nigam	≥30	52
Present study	≤24 25-29 ≥30	35.21 32.39 32.39

Present study is showing equal distribution of patients in both over weight and obese category.

Comparison of prevalence of risk factors in study population

RISK FACTORS	Dixon Drd et al	Jindal et al	Aruna Nigam et al	Bhattacharya et al	Present Study
Age >25 years	90.4%	44.4%	-	66.66%	61.9%
Past history of fetal loss (abortion/IUD)	2.7%	44.4%	24%	8.33%	33.8%
History of unexplained neonatal loss	-	18.5%	-	-	4.2%
Past history of congenital anamolies	-	3.7%	-	-	1.4%
Past history of GDM	19.4%	22.2%	11.9%	-	16.9%
Past history of prematurity	-	-	-	-	25.3%
Past history of macrosomia	29.2%	29.6%	-	-	5.6%

In our study age >25 years was the common risk associated with GDM following by past history of fetal loss. The risk factors are almost comparable with jindal et al study.in present study, there is low prevalence of past history of congenital anamolies and past history of macrosomia.

Lavin and co-worker and Marquette and co-workers reported the sensitivity of taking history of GDM in previous pregnancy to be 46% and 50% respectively.

In a larger study of 6214 universally screened pregnant women, coustan and his colleagues found that the taking of a history of GDM was 56% sensitive for diagnosing GDM.

Comparison of family history of DM in study population

STUDY GROUP	MOTHER	FATHER	BOTH
Binny Thomas et al	42%	31.5%	11.26%
Priyanka kalra et al	18.18%	9.09%	-
Present study	22.5%	19.7%	4.2%

In the present study 22.5% of women have maternal history of diabetes mellitus and 19.7% have paternal history of diabetes mellitus, 4.2% of women have history of diabetes mellitus in both mother and father.

Comparison of comorbidities in present pregnancy in study population

COMORBIDITY	BINNY THOMAS ET AL	PRESENT STUDY
Pre-eclampsia	14.4%	26.76%
Hypothyroidism	2.25%	7.04%
Polyhydramnios	2.7%	7.04%
Oligohydramnios	3.6%	4.2%

Comparison of gestational weeks at which GDM is diagnosed

GESTATIONAL WEEKS	BINNY THOMAS ET AL	PRESENT STUDY
≤ 12 weeks	14.41%	9.8%
13-28 weeks	34.46%	61.9%
29-34 weeks	38.73%	22.5%
≥35 weeks	12.16%	5.6%

61.9% of pregnant women were diagnosed to have GDM between 13-28 weeks, compared to 22.5% of pregnant women who were diagnosed between 29-34 weeks. Only 5.6% pregnant women were diagnosed to have GDM ≥35 weeks.
In study conducted by binny Thomas et al, 34.46% of pregnant women were diagnosed with GDM Between 13-28 weeks, compared to 38.73% who were diagnosed between 29-34 weeks.

Comparison of pregnancy outcome in study population

Pregnancy Outcome	Binny Thomas et al	Priyanka Kalra et al	Present Study
Abortion	3%	-	2.8%
Preterm labour	4.84%	-	4.2%
Labour normal	7.20%	-	22.5%
Primary LSCS	-	30%	39.4%
Repeat LSCS	-	49%	30.9%

79% of GDM patients were delivered by caesarean section and 22.5% of GDM patients were delivered by vaginal route.

Comparison of fetal outcome in study population

Fetal Outcome	Aruna Nigam et al	Priyanka Kalra et al	Present Study
Hyperbilirubinaemia	34%	5.78%	30.9%
Hypoglycaemia	-	5.13%	11.2%
IUGR	24%	-	2.8%
Polycythemia	8%	-	8.4%
Macrosomia	28%	3.64%	1.4%
Hypocalcemia	14%	-	7.04%
Respiratory distress	10%	-	25.3%
Preterm birth	12%	-	4.2%
IUD	6%	-	2.8%

Comparison of distribution of birth weight of newborn in study population

Birth Weight (Kg's)	Binny Thomas et al	Present Study
≤2.5	40.07%	30.4%
2.6-3.9	45.25%	68.11%
≥4.0	8.18%	1.4%

68.11% of babies are having birth weight between 2.6-3.9 kgs. only 1.4% of babies are having birth weight ≥4 kgs indicating good glycemic control.

Comparison of mode of management in study population

Mode of Management	Binny Thomas et al	Present Study
Diet	16.2%	42.2%
Insulin	83.78%	57.7%

42.2% of GDM patients were managed with diabetic diet compared to 16.2% of GDM patients who were managed with diet in study conducted by binny Thomas et al.57.7% of GDM patients were managed with insulin compared to 83.78% of GDM patient who were managed with insulin in study conducted by binny Thomas et al.

CONCLUSION

Single step OGTT with 75 grams glucose with cut-off values of fasting plasma sugar≥90mg/dl and 2nd hour post prandial plasma sugar≥140 mg/dl is very useful in diagnosing GDM. Universal screening for GDM is superior to selective screening (based on risk factors) for detecting more cases, facilitating early diagnosis and treatment of a disorder that carries and adverse prognosis in antenatal women with no symptoms of GDM. Universal screening is done in all three trimesters.

The criteria recommended by WHO are simple, cost effective and convenient for the pregnant women of developing countries and should be included in the antenatal care of each and every pregnant women. Further assuming that effective treatment is available, WHO criteria of 2nd hour plasma sugar levels≥140mg is useful in identifying a large number of cases and may have greater potential for prevention.one step procedure

of WHO serves dual purpose for screening and diagnosis.

REFERENCES:

1. Harrison's Principles Of Internal Medicine.16th Ed.Mcgraw-Hill 2005,II:2152-2153.
2. Park's Preventive And Social Medicine.18th Ed.Banarsidas Bhanot 2005;312-314.
3. Albert Re.Diabetes In Pregnancy Obstetrics And Gynaecology.Clinics Of North America.Wb Saunders Company 1996;23(1):10.
4. American Diabetic Association: Summary And Recommendations Of Second International Workshop Conference On Gestational Diabetes Mellitus 1985;34(Suppl 2):123-126.
5. Coustan Dr,Nelson C,Carpenter Mw,Carr Sr,Rotendol,Widness Ja.Maternal Age And Screening For Gestational Diabetes:A Population Based Study.Obstet Gynecol 1989;73:557-561.
6. Lavin Jp.Screening For High Risk And General Population For Gestational Diabetes:Clinical Application And Cost Analysis.Diabetes 1985;34(Suppl 2):24-27.
7. Marquette Gp,Klein Vr,Niebyl Jr.Efficacy Of Screening For Gestational Diabetes.Am J Perinatol 1985;2:7-9.
8. Mr.Binny Thomas Et Al:The Prevalence,Risk Factors,Maternal And Fetal Outcomes In Gestational Diabetes Mellitus.International Journal Of Drug Development And Research 2012;4(3):356-368.
9. Priyanka Kalra Et Al.Prevalence Of Gestational Diabetes Mellitus And Its Outcome In Western Rajasthan.J Obstet Gynaecol 2013;12(5):13-17.
10. Aruna Nigam Et Al:Pregnancy Outcome Of Women With Gestational Diabetes In A Tertiary Level Hospital Of North India .J Obstet Gynaecol 2011;6(2):8-11.
11. Bhattacharya C,Awasathi Rt,Kumar S,Lamba Ps.Routine Screening For Gestational Diabetes Mellitus With Glucose Challenge Test In Antenatal Patients.J Obstet Gyn Of India 2001;51-59.
12. Jindal A, Ahmed F, Bhardwaj B, Chaturvedi B.Prevalence,Clinical Profile And Outcome Of Gestational Diabetes Mellitus.J Obst Gyn Of India 2001;51:46-49.
13. Dixon Drd, Winter Jtv, Nelson Rl, Ogburn Pl Jr. Universal Versus Selective Gestational Diabetes Screening: Application Of 1997.American Diabetes Association Recommendation. Am J Obstet Gynecol 1997;181:798-802.