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A Clinical Study of Fetomaternal Outcome in Gestational Diabetes Mellitus

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Abstract:-
BACKGROUND :-
GDM affects approximately 7% of all pregnancies, resulting in > 200,000 cases per year[1]. Of all pregnancies complicated by diabetes, GDM accounts for approximately 90%[2]. Women with a history of GDM are at increased risk of future diabetes, predominately type 2 diabetes, as are their children. The condition has been implicated as a risk factor for future diabetes and obesity in women as well as for impaired carbohydrate metabolism in their offspring[3-5]. The purpose of the screening, treatment, and management of GDM is two-fold: to prevent stillbirths and to decrease the number of large for gestational age births, ultimately reducing neonatal and maternal morbidity and mortality. Women with GDM also had a higher risk of Caesarean section, gestational hypertension, and large for gestational age (LGA) deliveries. Of women with GDM, those treated with insulin had a higher incidence of LGA deliveries than those on diet therapies alone. The introduction of insulin changed the gross fetal and maternal morbidity and mortality associated with diabetes complicating pregnancy. About 40-60% of women with GDM have no demonstrable risk factor; for this reason many advocate to screen all women[15] i.e. universal screening for GDM.
OBJECTIVES :
- *To determine the efficacy of treatment of GDM.*
- *To assess the complications of GDM on mother and foetus.*

METHODS :-
The study was conducted in Gandhi hospital, Secunderabad from November 2017 to May 2019. All antenatal women irrespective of gestational age who were diagnosed as GDM were included in the present study.
RESULTS :-
The mean age of subjects was 28±3.7 (24.3 years). Most of the cases (62%) were multipara and 38% were primigravida. Multiparity is an established risk factor which was observed in 62% of cases and obesity in 38% subjects.
Hypertensive disorders were seen in 35% of cases contributing to major complication associated with GDM followed by oligohydramnios, PROM and polyhydramnios.
43% subjects were managed with diet alone. 57% subjects were managed with diet and insulin. 83% cases delivered at term of which 37% were on diet and 46% were on diet with insulin.
70% cases had LSCS emergency or elective due to presence of combined risk factors and antenatal complications.
Total 15 cases were induced of which 12 delivered vaginally and 3 landed up in LSCS. Majority of cases had birth weights between 3-3.4 kg accounting for 34% cases, 31% had birth weight between 2.5-2.9kg and 4% had birth weight > 4kg.
Most common association observed in our study was multiparity with age>25 years with BMI>25kg/m2. The associated pre eclampsia and CPD due to LGA baby account for high rate of caesarean section. Most common indication for induction of labour was GDM itself followed by PIH complicating pregnancy in association with GDM.
CONCLUSION :-
Women with GDM are at an increased risk of obstetric and perinatal outcomes. Introduction of universal screening for detection of GDM has increased the prevalence rate of GDM with more cases being diagnosed.

Age > 25 years, obesity, family history of DM, multiparity and previous bad obstetric outcomes continue to be significant risk factors associated with development of GDM. Insulin usage or addition to management of GDM improves neonatal outcome though its need in achieving euglycemia has decreased because of good dietary therapy or medical nutritional therapy (MNT).

Keywords:- *Gestational diabetic mellitus, maternal outcome, fetal outcome.*

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I. Introduction:-

Gestational Diabetes Mellitus (GDM) is defined as 'carbohydrate intolerance with recognition or onset during pregnancy', irrespective of the treatment with diet or insulin. The importance of GDM is that two generations are at risk of developing diabetes in the future. Gestational diabetes mellitus complicates 2% to 5% of pregnancies and is associated with both neonatal morbidity and obstetric complications[6-10]. The purpose of the screening, treatment, and management of GDM is two-fold: to prevent stillbirths and to decrease the number of large for gestational age births, ultimately reducing neonatal and maternal morbidity and mortality. India falls under average risk group for GDM due to acculturation of Western lifestyles, advanced age at conception and increasing rates of infertility. This study has been undertaken to analyse the risk factors leading to GDM and to assess the maternal and fetal outcome in GDM patients.

AIMS:-

- To analyse the risk factors and assess the effect of GDM on maternal and perinatal outcome.

OBJECTIVES :-

- To determine the efficacy of treatment of GDM.
- To assess the complications of GDM on mother and foetus.

II. Materials And Methods:-

The present study was carried out over a period of 18 months at Gandhi Hospital, Secunderabad. It is a tertiary care hospital and a major referral centre for high risk obstetrics in Telangana State.
Duration of study: November 2017 – May 2019.
Type of study: Prospective Observational study.
Sample size: 100.

100 subjects were included in the study based on inclusion criteria and evaluated, according to the proforma attached Informed consent was taken and detailed history was taken including age, gestational age, parity, family history of diabetes, past history of GDM, history of previous pregnancies were obtained. Detailed examination was done and the body mass index (BMI) of the subjects was calculated from the pre-pregnancy weight and expressed in kg/m2.

To diagnose GDM, universal screening irrespective of presence of risk factors using a 75 g oral glucose tolerance test (OGTT) and 2-h plasma glucose (PG) was measured by the glucose oxidase-peroxidase (GOD-POD) method. GTT was done at 24-26 weeks of gestation in booked cases and at the first visit in unbooked cases when presented in later gestational age. GDM was diagnosed with 2-h PG $\geq$ 140 mg/dl (7.8mmol/L) (WHO criteria) and the rest were classified as normal glucose tolerant (NGT) women.GDM women were advised medical nutrition therapy (MNT) for two weeks. An average of 1950 – 2200 kcal/day was required. Of which 45 – 50% were in the form of carbohydrates, 20-25% protein and 25-30% fat. Total calories were divided into 6-7 meals daily (3 meals, 3 – 4 snacks) and bed time snack to prevent ketosis was advised. Those who failed to reach the target glycaemic level of blood sugars with MNT were advised insulin. All the patients were followed up till delivery and one week after delivery to assess maternal and fetal outcome.

INCLUSION CRITERIA:-

All antenatal women irrespective of gestational age who were diagnosed as GDM were included in the present study.

EXCLUSION CRITERIA:-

1. Antenatal women with normal oral glucose tolerance test.
2. Pregestational diabetes
3. Antenatal women using medications affecting glucose metabolism like steroids, progesterone, psychoactive agents, catecholamines, substance abuse, medications for asthma, beta-adrenergic therapy.
4. Liver disease, pancreatic disease, chronic renal disease and TB.

5. Hematological and autoimmune diseases like hemoglobinopathies and SLE.

STASTISTICAL ANALYSIS :-

Data was tabulated in Excel 2013 and analysed using SPSS (software version 16). Qualitative and quantitative variables are expressd as descriptive statistics. The values of epidemiological factors are presented as mean ± standard deviation. The statistical tool applied was by using the mad cal calculator. The results were considered statistically significant when the probability of the null hypothesis was less than atleast 5% ($p<0.05$).

RESULTS AND ANALYSIS:-

1. MATERNAL AGE WISE DISTRIBUTION IN GDM CASES :-

In the present study 18% of subjects were in Age group <25 years, 62% belonged to age group 25-30 years and 20% belonged to age group >30 years. The mean age of subjects was 28±3.7(24.3 years).

2. PARITY DISTRIBUTION IN GDM:-

Most of the cases (62%) were multipara and 38% were primigravida. Multiparity is an established risk factor which was observed in 62% of cases.

3. (BMI) FREQUENCY NO (%)

Most of the subjects (56%) belonged to BMI of 25-29.9 kg/m2 followed by 18.5-24.9 kg/m2 (26%) in GDM group.

4. RISKFACTORS IN GDM CASES:-

Advanced maternal age > 25 years was seen as a major risk factor in 82% of subjects followed by multiparity in 62% subjects and obesity in 38% subjects.

5. MATERNAL COMPLICATIONS IN GDM CASES:-

Hypertensive disorders were seen in 35% of cases contributing to major complication associated with GDM followed by oligohydramnios, PROM and polyhydramnios.

6. MODE OF TREATMENT AND OUTCOME OF PREGNANCY IN GDM CASES

43% subjects were managed with diet alone. 57% subjects were managed with diet and insulin. 83% cases delivered at term of which 37% were on diet and 46% were on diet with insulin.

7. MODE OF DELIVERY IN STUDY POPULATION:-

70% cases had LSCS emergency or elective due to presence of combined risk factors and antenatal complications.

8. INDICATIONS FOR INDUCTION OF LABOUR AND EMERGENCY LSCS IN GDM CASES:-

Most common indication for induction of labour was GDM itself followed by PIH complicating pregnancy in association with GDM. The most common indication for emergency and elective LSCS was previous section with CPD.

9. BIRTH WEIGHT IN ALL SUBJECTS OF GDM :-

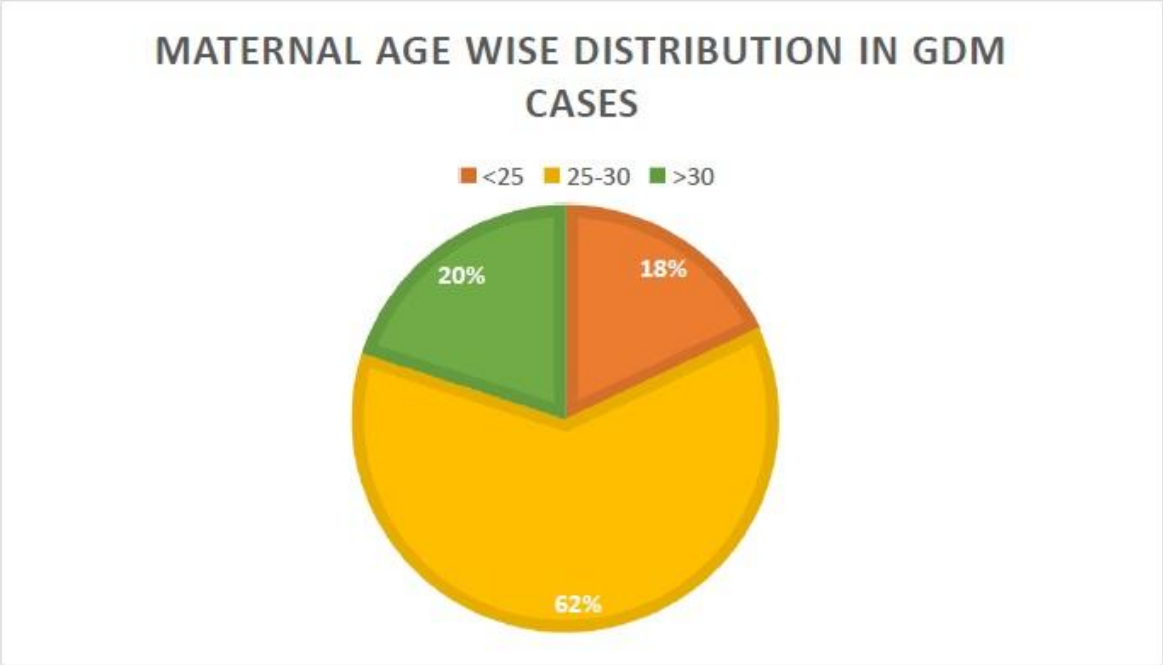
Majority of cases had birth weights between 3-3.4 kgs accounting for 34% cases, 31% had birth weight between 2.5-2.9 kgs and 4% had birth weight > 4kg. With patients on diet, 14% cases had birth weight between 3-3.4 kgs followed by 12% cases had between 2.5-2.9 kgs. With patients on diet with insulin, 20% cases had birth weight between 3-3.4 kg and 19% cases had birth weight between 2.5- 2.9 kgs. Mean birth weight in both groups were 3.02±0.68 kgs and 2.93±0.51kgs respectively. Overall mean birth weight was 2.97±0.60 kgs.

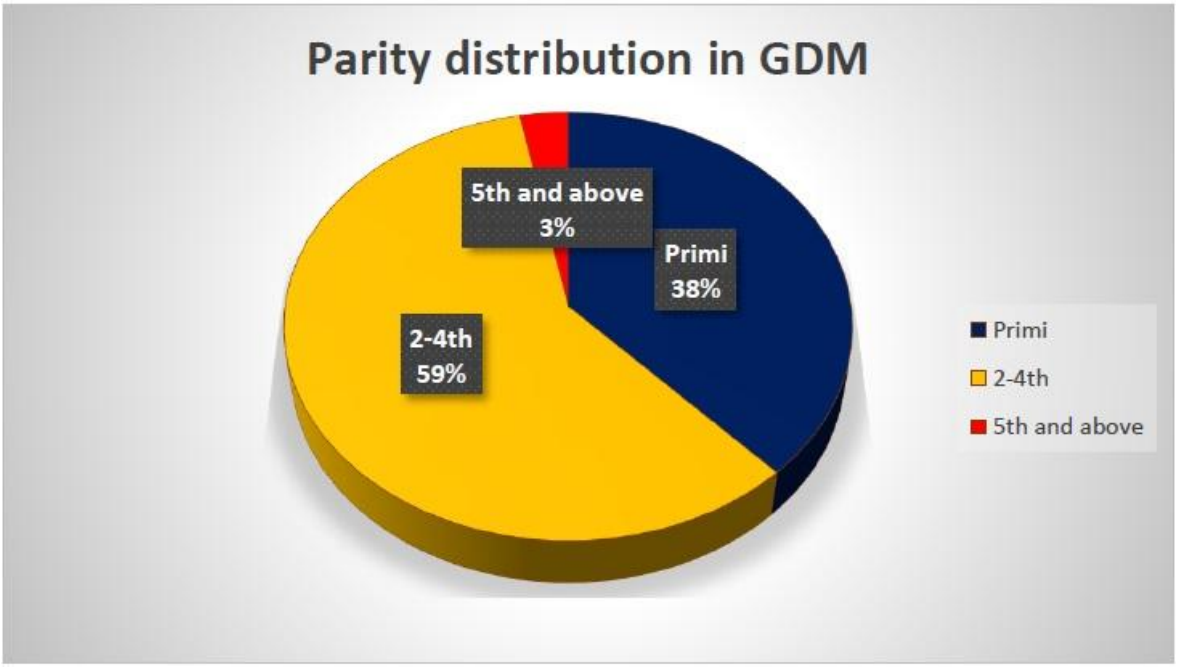
10. NICU ADMISSIONS & NEONATAL COMPLICATIONS IN GDM CASES:-

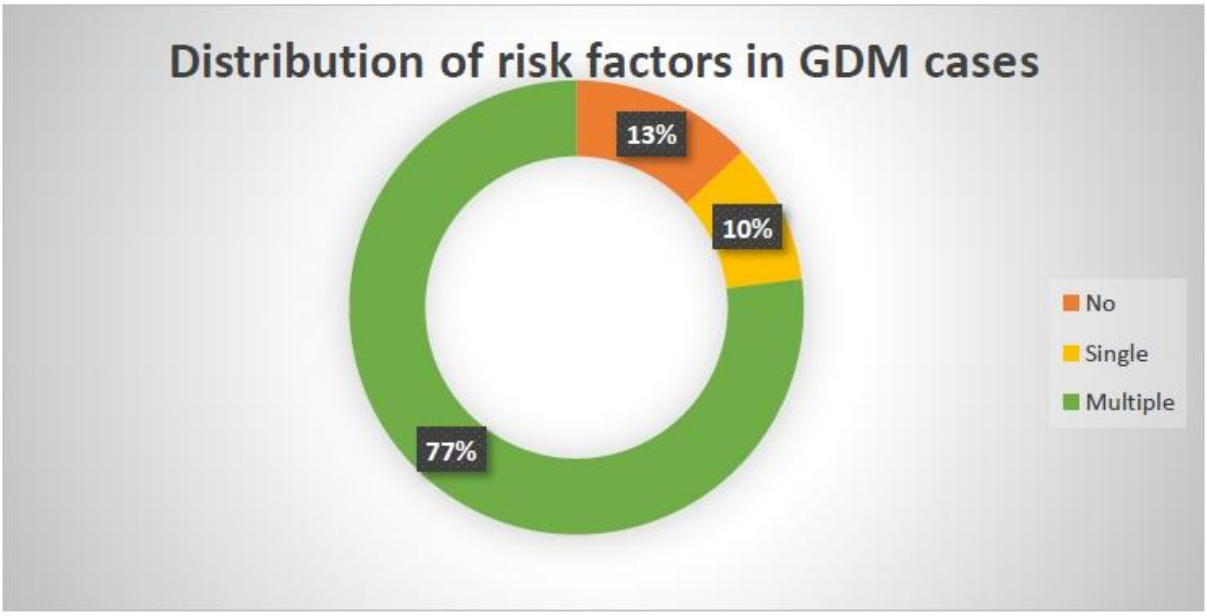
One case of neonatal hypoglycaemia was observed, 10 cases (47.6%) had low birth weight and 9 cases (42.8%) had respiratory distress which needed NICU admission.

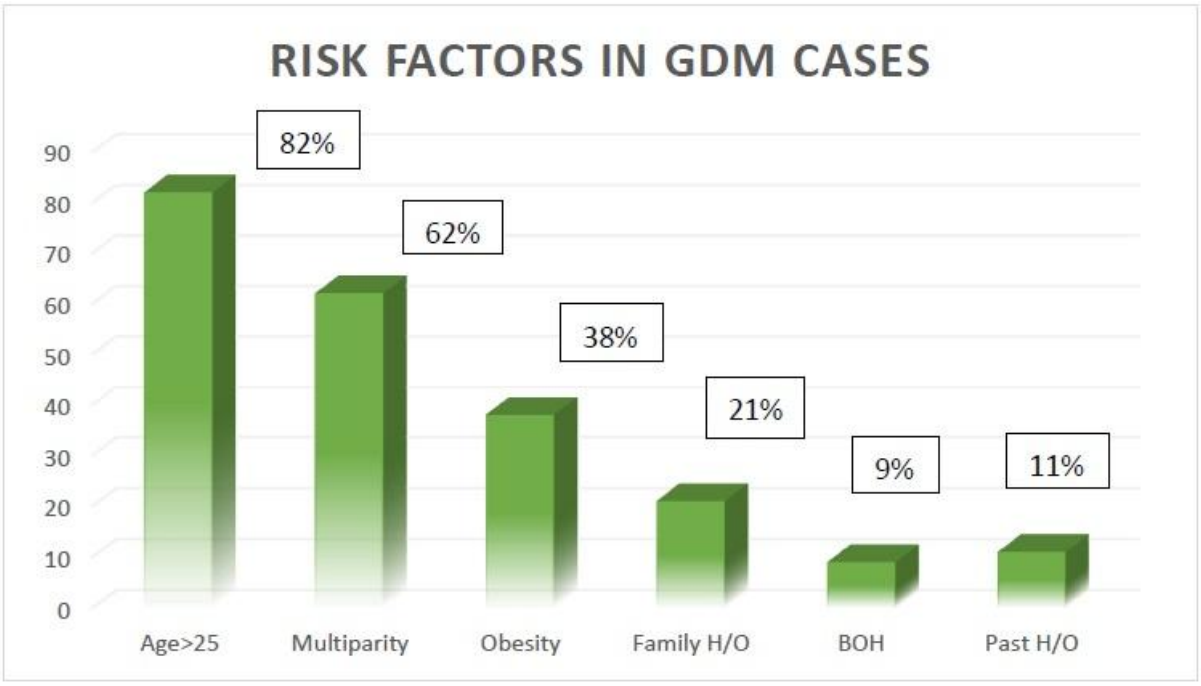
11. POSTNATAL TREATMENT :-

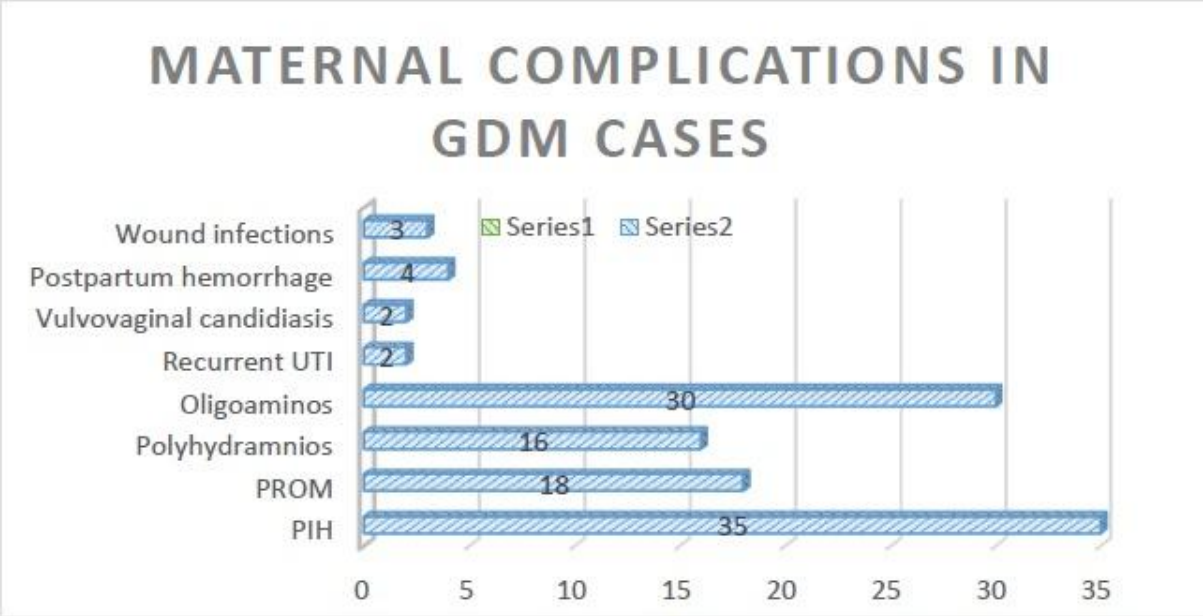
Postnatal insulin requirement was seen in only 7 % subjects of which 4 were multiparous.

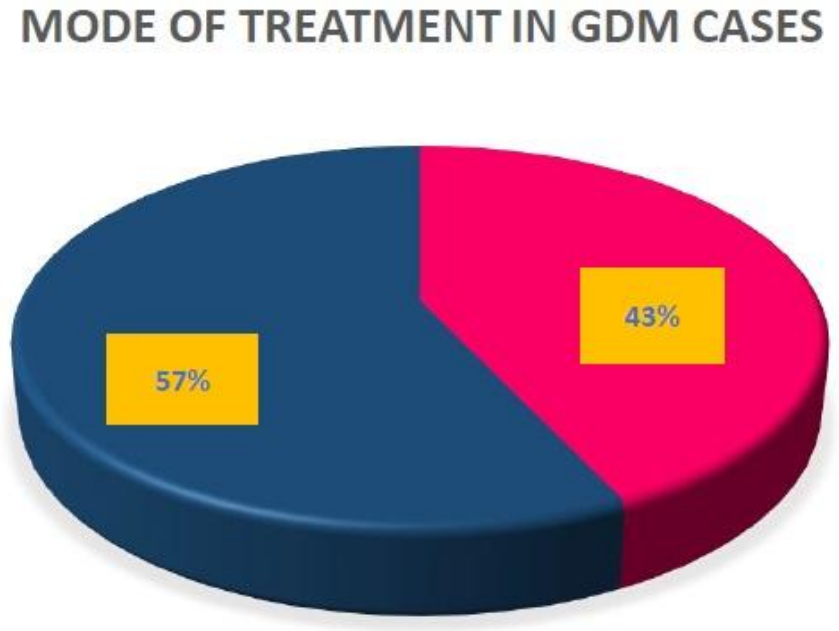

MATERNAL AGE WISE DISTRIBUTION IN GDM CASES
<25
25-30
>30
20%
18%
62%


Parity distribution in GDM
5th and above 3%
Primi 38%
2-4th 59%
Primi
2-4th
5th and above

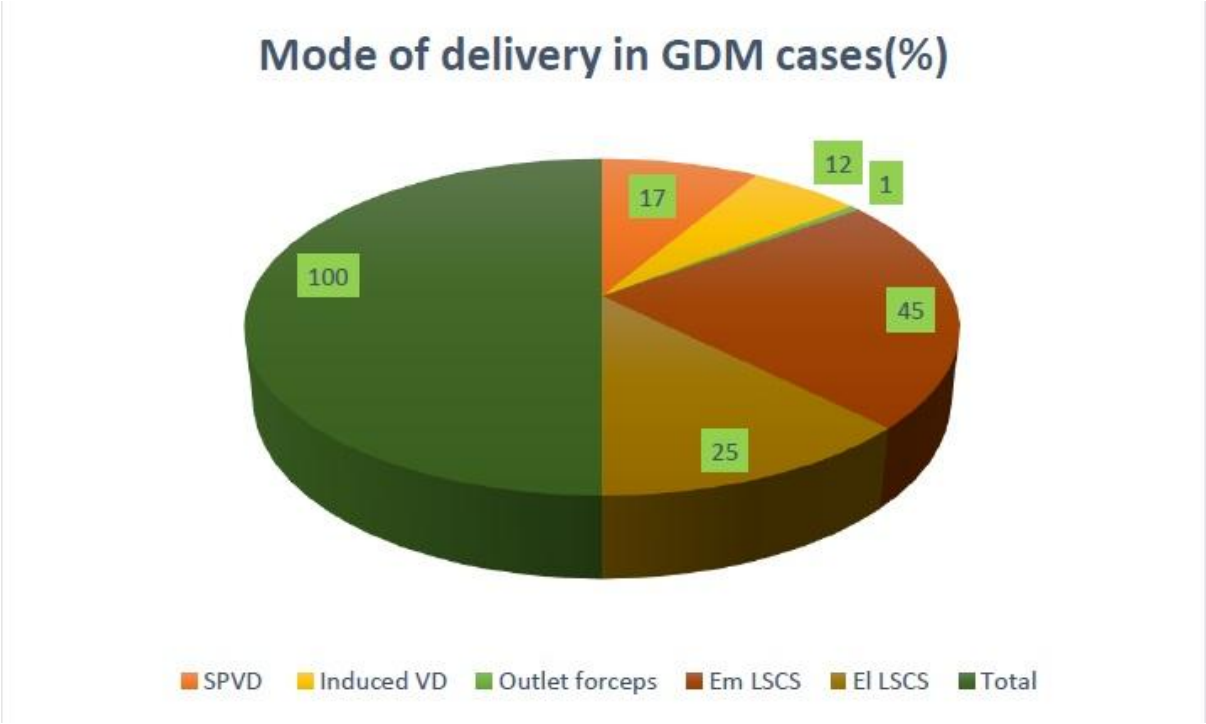

Distribution of risk factors in GDM cases
13%
10%
77%
No
Single
Multiple

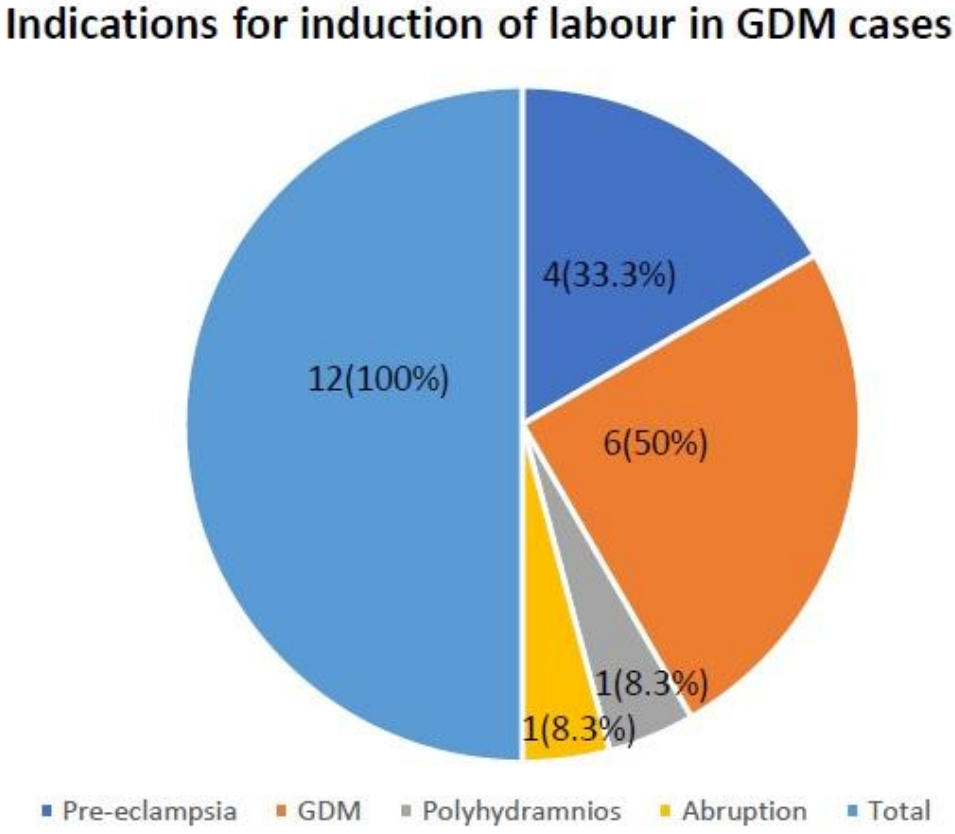

RISK FACTORS IN GDM CASES
90
80
70
60
50
40
30
20
10
0
82%
62%
38%
21%
9%
11%
Age>25
Multiparity
Obesity
Family H/O
BOH
Past H/O

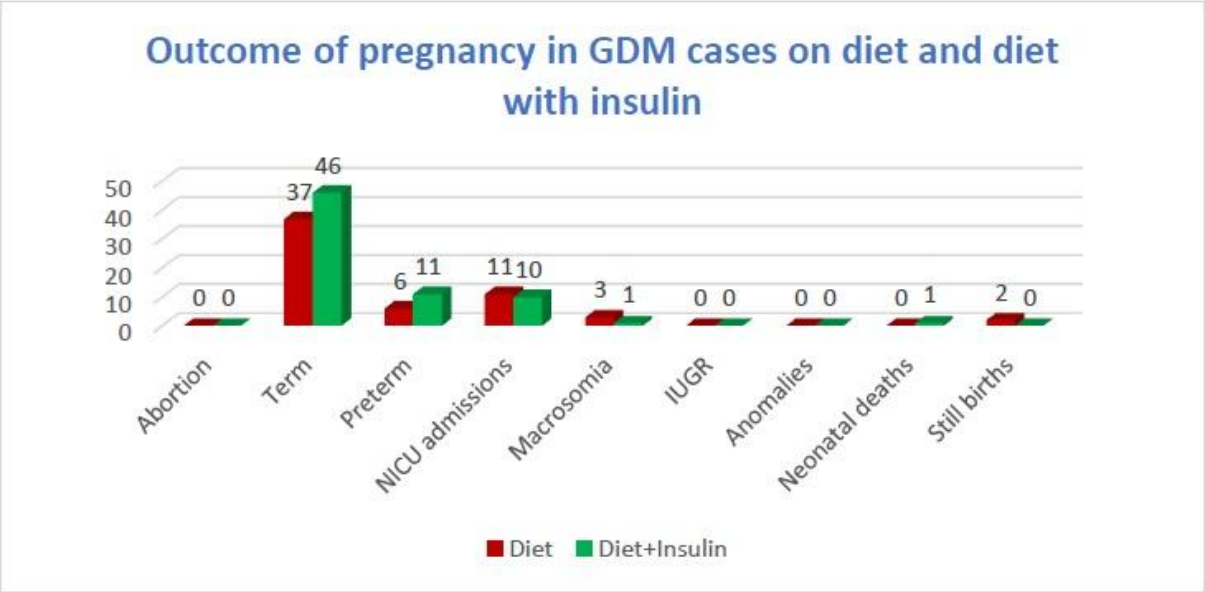


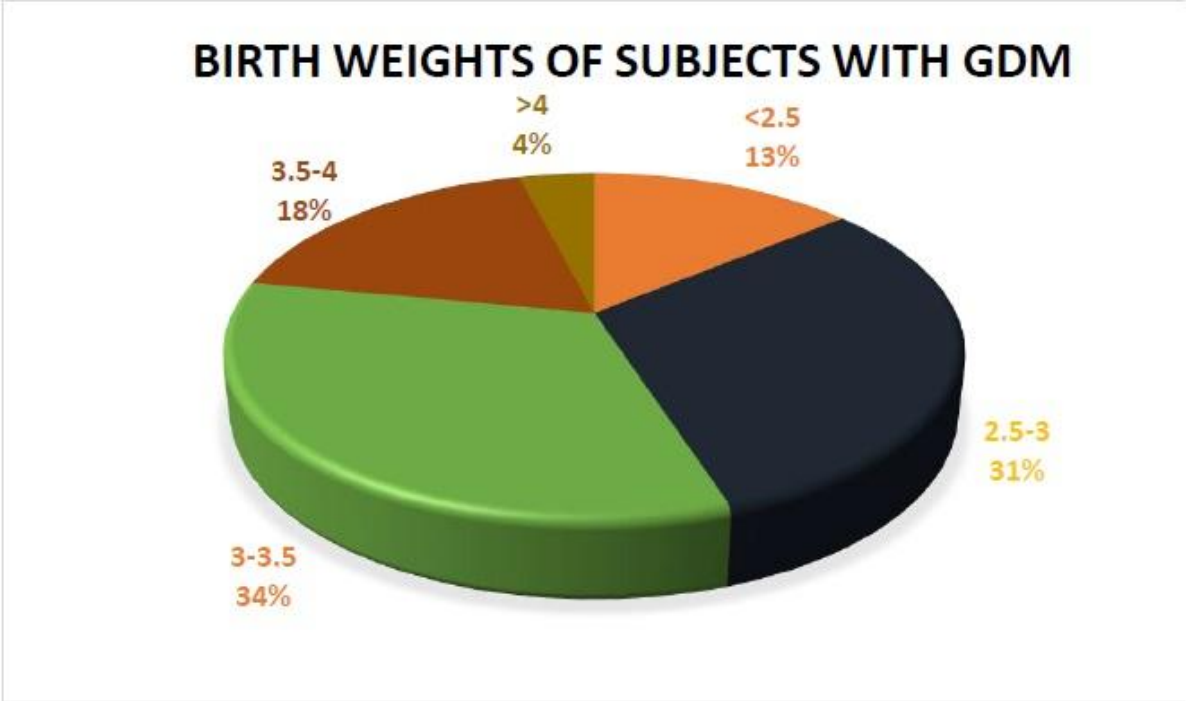


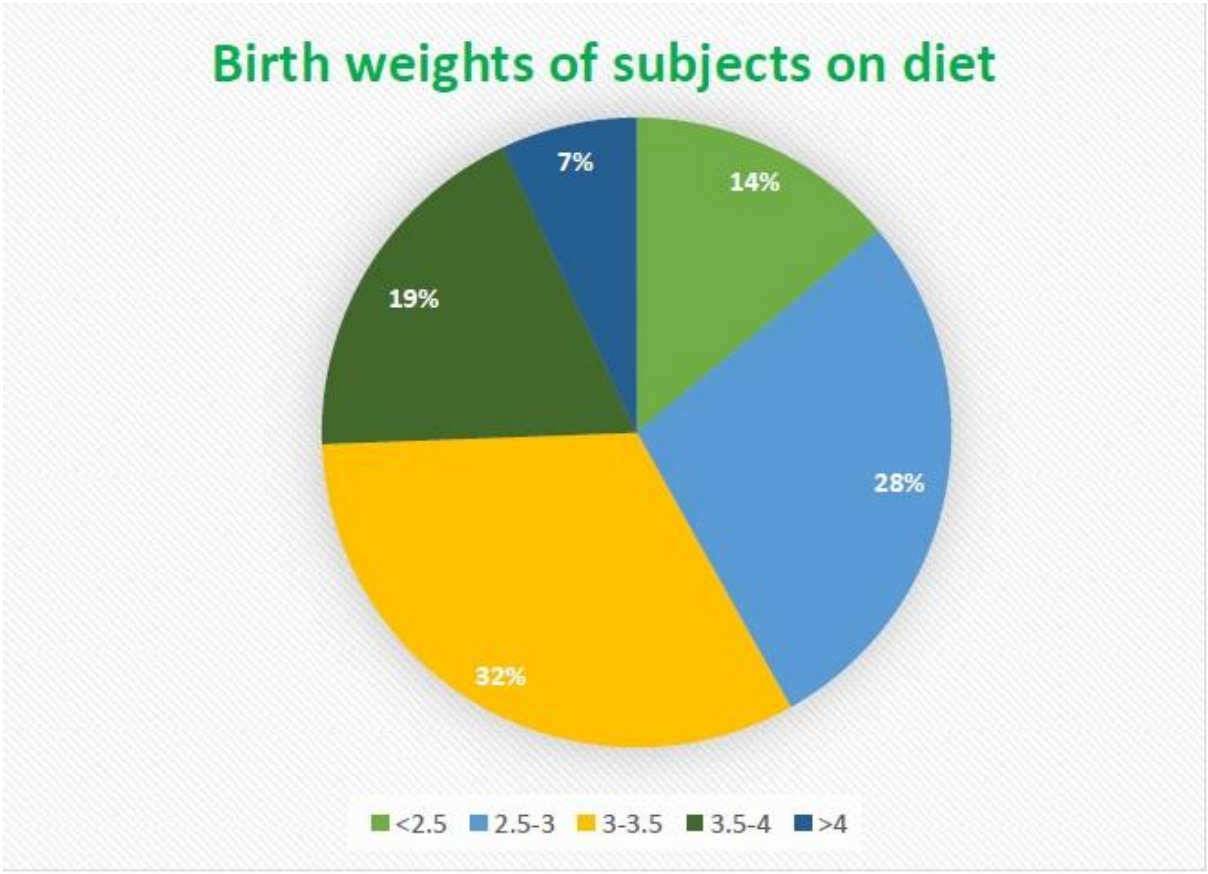
43% subjects were managed with diet alone. 57% subjects were managed with diet and insulin. Most of the cases were prescribed Human Mixtard type of insulin.

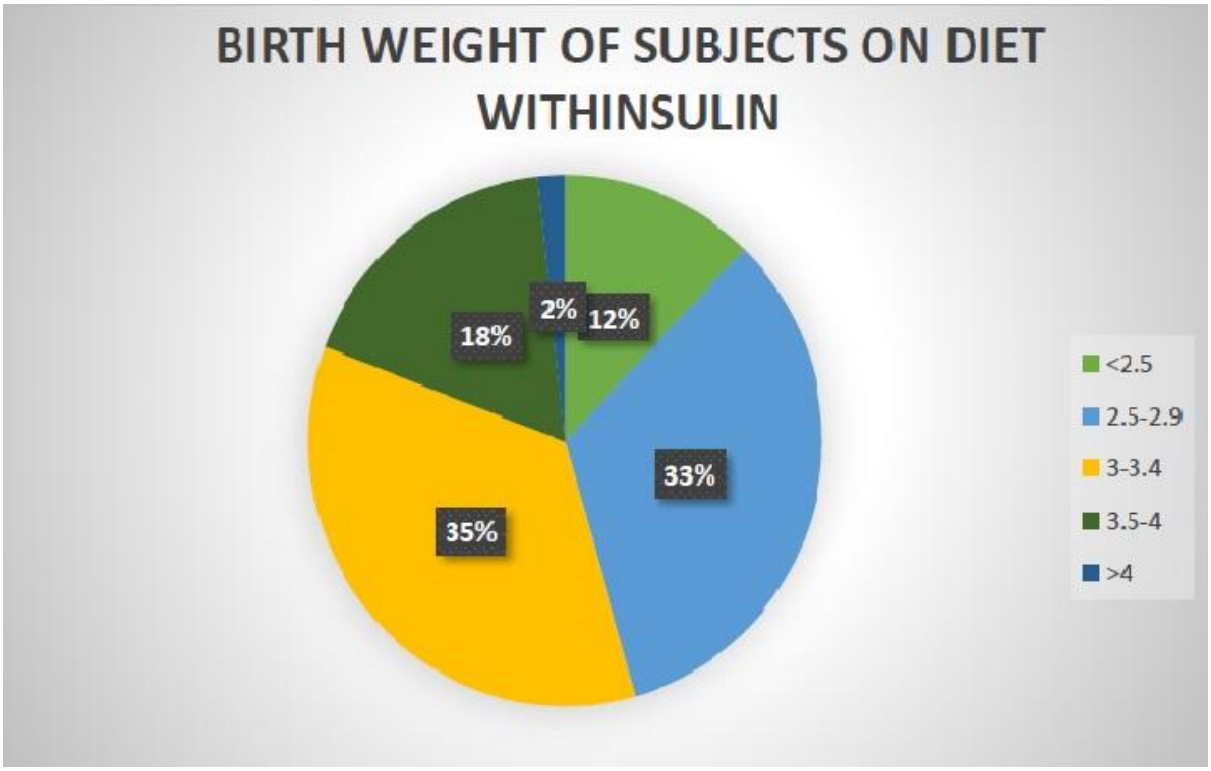

Mode of delivery in GDM cases(%)
17
12
1
45
25
100
SPVD
Induced VD
Outlet forceps
Em LSCS
El LSCS
Total


Indications for induction of labour in GDM cases
4(33.3%)
6(50%)
1(8.3%)
1(8.3%)
12(100%)
Pre-eclampsia
GDM
Polyhydramnios
Abruption
Total


Outcome of pregnancy in GDM cases on diet and diet with insulin
50
40
30
20
10
0
0 0
37
46
6
11
11
10
3
1
0 0
0 0
0
1
2
0
Abortion
Term
Preterm
NICU admissions
Macrosomia
IUGR
Anomalies
Neonatal deaths
Still births
Diet
Diet+Insulin

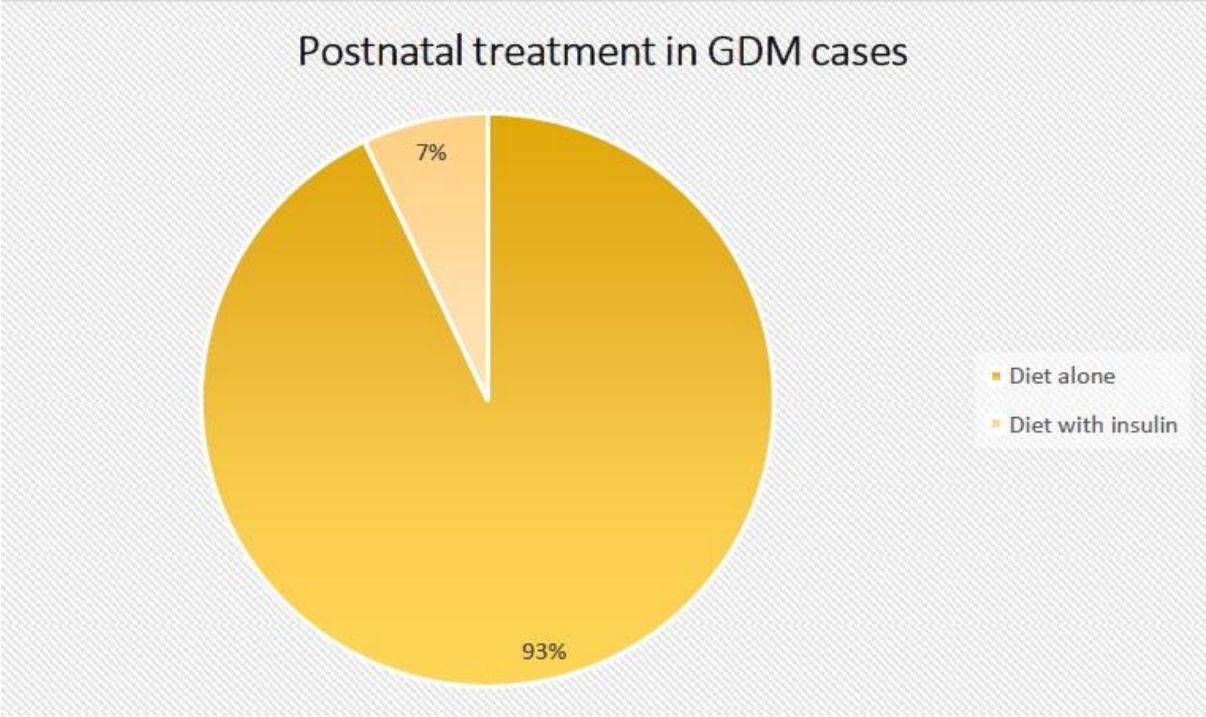

BIRTH WEIGHTS OF SUBJECTS WITH GDM
>4
4%
<2.5
13%
3.5-4
18%
2.5-3
31%
3-3.5
34%


Birth weights of subjects on diet
14%
28%
32%
19%
7%
<2.5
2.5-3
3-3.5
3.5-4
>4


BIRTH WEIGHT OF SUBJECTS ON DIET WITHINSULIN
12%
33%
35%
18%
2%
<2.5
2.5-2.9
3-3.4
3.5-4
>4

NICU ADMISSIONS & NEONATAL COMPLICATIONS IN GDM CASES

Complications	No. of cases (%)
LBW	10(47.6)
Hypoglycaemia	01(4.7)
Cong. Anomalies	0
RDS	09(42.8)
Meconium aspiration	01(4.7)
Sepsis	0
Total	**21(100)**



III. Discussion :-

DM in pregnancy has several consequences for maternal and perinatal mortality and morbidity. Multiple studies support the idea that GDM appears more frequently in pregnancy after age 25 because of age related metabolic changes and the confluence of conditions like PIH, increased body mass are also risk factors for developing GDM. In the present study, 82% subjects had age >25 years. Multiparity is an established risk factor for glucose intolerance and, ultimately, development of GDM. 62% subjects were multipara. Obesity is a significant risk factor for GDM and overweight and obesity before pregnancy predispose to GDM. We found 69% subjects had BMI >25 kg/m2. Our study shows that 9% of the diabetic mothers had previous bad obstetric outcome with previous abortions or neonatal deaths, this being one of the reasons for referral of some of them to our centre. The present study had 35% of hypertensive cases in comparison to study conducted by Prakash et al 2017 which had 31% cases of PIH and 9% cases of chronic hypertension[11]. In the present study, 16% of subjects had polyhydramnios whereas study conducted by Saadia Tariq et al 2010 had 26.8% of polyhydramnios cases. The present study had 30% of oligohydramnios cases and the study of Kevin Johns in 2006 showed 2.8%[12].This increase is due to increase in PROM cases which are associated with oligohydramnios. Family H/O DM was present in 21% subjects which is comparable with the results of study done by V. Balaji et al in 2011 which was 18.3%.[13]

In our study, 43% subjects were managed with dietary therapy. 57% subjects required insulin along with dietary therapy compared to 65% subjects in study by Prakash et al 2017[11]. Antenatal fetal monitoring was done using daily fetal kick count (DFKC) from 28 weeks of gestation, AFI weekly and Non Stress Test biweekly from 32-34weeks of gestation, monthly ultrasonography for fetal biometry in uncomplicated cases was done.

Of 100 cases, 83% of subjects had term deliveries and 17% had preterm deliveries may be due to presence of PPROM, polyhydramnios and twin gestation. Our study had a rate of 70% of caesarean sections, this can be attributable to increase in rate of medical complications associated with GDM like PIH, precious

pregnancy with advanced age or complications of labour like PROM, polyhydramnios malpresentations, previous sections and CPD with big baby. Wound infections were seen in 3% subjects post LSCS.

FETAL AND NEONATAL COMPLICATIONS:-

Macrosomia defined as birth weight greater than 4 kg (90th percentile) was observed in 4% of cases in our study and 3% in study of Prakash et al 2017[11]. 3 cases were in dietary intervention group and 1 case was on diet with insulin.

Neonatal hypoglycaemia is much more common in infants born to GDM mothers.

Our study had 9% neonates with RDS in concurrent with study by Prakash et al 2017 which had 11% neonates with RDS[11].

There were no congenital anomalies in our study concurrent with Nilofer et al 2012 study[14]. We had 2 cases of stillbirth and 1 case of neonatal death in our study as compared to no adverse outcomes in the study by Nilofer AR, 2012[14]. We had 21% NICU admissions concurrent with Prakash et al which had 20% NICU admissions.

IV. Conclusion :-

Women with GDM are at an increased risk of obstetric and perinatal outcomes. Introduction of universal screening for detection of GDM has increased the prevalence rate of GDM with more cases being diagnosed. Age > 25 years, obesity, family history of DM, multiparity and previous bad obstetric outcomes continue to be significant risk factors associated with development of GDM. PIH still remains a major complication associated with GDM. Dietary therapy in management of GDM, when followed strictly and with patient's motivation proves to be satisfactory in achieving adequate sugar control. Insulin usage or addition to management of GDM improves neonatal outcome though its need in achieving euglycemia has decreased because of good dietary therapy or medical nutritional therapy (MNT). Good maternal and fetal outcomes can be achieved with timely interventions and good prenatal and antenatal care.

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