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ORIGINAL RESEARCH

Study on clinical profile evaluation of patients with gestational diabetes mellitus

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Abstract
Introduction: Gestational Diabetes Mellitus (GDM) is a metabolic disorder characterized by carbohydrate intolerance detected for the first-time during pregnancy.
Objective- To study clinical profile of patients with gestational diabetes mellitus.
Material and Methods- Design: observational, cross-sectional study Duration: 2 years Setting: Tertiary hospital. Study population: 120 cases of GDM
Results- Majority of the patients had age between 26-30 years. 90 (75%) had family history of diabetes mellitus. According to BMI, 78 (65%) women were obese and 25 (20.8%) overweight. Most common maternal complication in previous pregnancy was pregnancy induced hypertension (7.50%) and prolonged labor (7.50%) whereas in current pregnancy most common complication was Pregnancy induced hypertension (9.8%) followed by Acute Respiratory Distress Syndrome (7.3%).
Conclusion- Women with GDM are more likely to have negative obstetric and neonatal outcomes. Age > 25 years, obesity, familial history of DM, age at marriage, multiparity, less physical activity, and previous history of GDM are all important risk factors. Spontaneous abortion was the most prevalent fetal problem. Improved screening, treatment, and prevention techniques for gestational diabetes mellitus are required to improve mother and child health. Educational programs to create awareness amongst community for frequent antenatal checkups, for maintaining healthy lifestyle are the key to better motherhood, and building a strong healthcare system.
Keywords- Gestational diabetes, overweight, diabetes

Introduction

Gestational Diabetes Mellitus (GDM) is a metabolic disorder characterized by carbohydrate intolerance detected for the first-time during pregnancy. The disorder is highly significant in the light of its impact on both maternal and fetal health.[1] GDM is said to hamper the course of pregnancy, resulting in various complications including recurrent abortions, congenital anomalies, preeclampsia, still births, macrosomia, preterm labor and emergency caesarean section.[2] Further, it also causes long term complications on both the mother and child, by

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predisposing them to increased preponderance towards type 2 diabetes mellitus. In this study we evaluate the clinical profile of patients with gestational diabetes mellitus to increase awareness and knowledge regarding this disease.

Materials and methods

An observational, cross-sectional study done at L.N. Medical College and Research Centre & J.K. Hospital, Bhopal for a time duration of 2 years. All patients diagnosed with gestational diabetes during the time period were taken in study. Age – above 18 years and pregnant women diagnosed with gestational diabetes were included in study and age- less than18 years, consent not given and pregnant women already known case of diabetes before conception were excluded from the study

Methodology

- The clinical profile of patients was evaluated as per the proforma.
- Patient's age, age at marriage, age at first pregnancy, BMI, education, residence, and SES by Kuppuswamy scale were recorded.
- Presenting complaint, gravida, history of abortion, previous IUD, neonatal death, still birth details were recorded.
- Family history of diabetes, family history of hypertension and hypothyroidism, any other past history of patients, diet followed, and physical activity level were also noted in a pre-approved proforma.
- Other details like GDM diagnosed at trimester, screening test at which patient reported positive, previous pregnancies: Maternal complication, previous pregnancy: fetal complications, previous pregnancy - method of delivery, and indication of LSCS were noted.
- Birth weight and current pregnancy complication were also recorded.
- Glycemic parameters such as DIPSI 2 hour, Hba1c, Random Blood Glucose, Fasting Blood Glucose, Post Prandial Blood Glucose, GTT-Blood-FBS, GTT-Blood-1hr, GTT-Blood-2hour, and GTT-Urine-FBS, GTT-Urine- 1 hour and GTT-Urine-2 hourwere tested in laboratory.
- USG was performed and findings of all the patients were noted.

Statistical analysis

The data was entered into Microsoft excel sheet. All the data were analyzed using IBM SPSS ver. 25 software. Data was summarized using frequency distribution and descriptive analysis. Chi square test was used to find the association of categorical variables.

Results

Majority of the patients with GDM had age between 26-30 years (48.3%) followed by 20-25 years (32.5%) and 31-25 years (16.7%). There were 2 (1.7%) patients who had age between 36-40 years and 1 (0.8%) woman had age more than 40 years.

Majority of the GDM patients got married between 26-30 years of age (42.50%) followed by 21-25 years (33.33%). There were 22 (18.33%) women who got married before the age of 20 years.

Majority of the GDM patients had age at first pregnancy between 26-30 years (44.2%) followed by 21-25 years (32.5%). (Figure 1)

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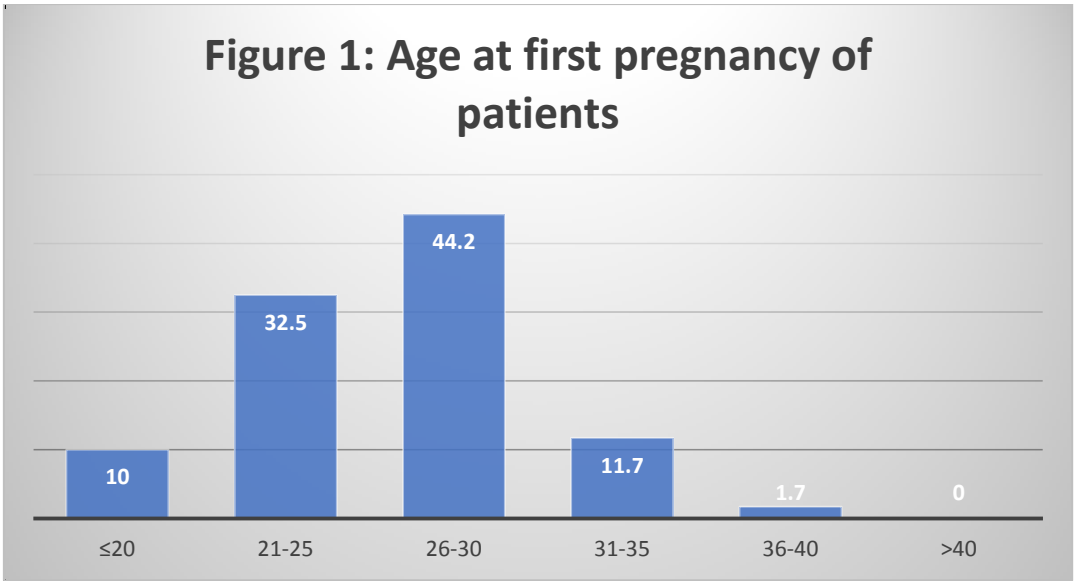

Majority of the GDM patients were graduate (35.8%) followed by education till high school (25%) and 14 (11.7%) were professional. Only 11 (9.2%) GDM patients were illiterate.

Maximum patients were from the urban area (64.2%) whereas 35.8% were from the rural area. Majority of the GDM patients belong to Upper Middle Class (47.5%) followed by lower Middle Class (30.8%) and Upper Lower Class (15.8%).

Most common presenting complain of GDM patients was Routine ANC checkup (51.7%) followed by Pain in abdomen (21.7%), decreased fetal movements (4.2%), safe confinement of pregnancy (3.3%) and vomiting (3.3%).

Majority of the GDM patients were multigravida (60.8%) compared to primigravida (39.2%). Among the 73 multigravida, 35 (47.9%) had the history of abortion. Out of 120 patients, 30 (25%) patients had 1 abortion in their life time, 3 (2.5%) patients had 2 abortions whereas 85 (70.8%) patients did not have any abortion in their life time.

Previous IUD, neonatal death, still birth was reported in 6 (5%) patients.

Out of 120 patients with GDM, 90 (75%) had family history of diabetes mellitus. Family history of mostly reported in first degree relatives of them majority were father (43.33%) followed by mother (18.33%). Among second degree relative mostly were grandfather. 12 (10%) had family history of hypertension and 5 (4.16%) had family history of hypothyroidism.

Most common past history among GDM patients was hypothyroidism (11.67%) followed by PCOS (3.33%), GDM (2.50%).

Majority of the patients were vegetarians 65.8% whereas 34.2% had mixed diet.

Majority of the GDM patients had moderate physical activity level 78 (65%) followed by 41 (34.2%) women who had sedentary physical activity and only 1 (0.8%) patient had heavy physical activity level.

According to BMI, 78 (65%) women were obese, 25 (20.8%) overweight women whereas 3 (2.5%) were underweight. (Figure 2)

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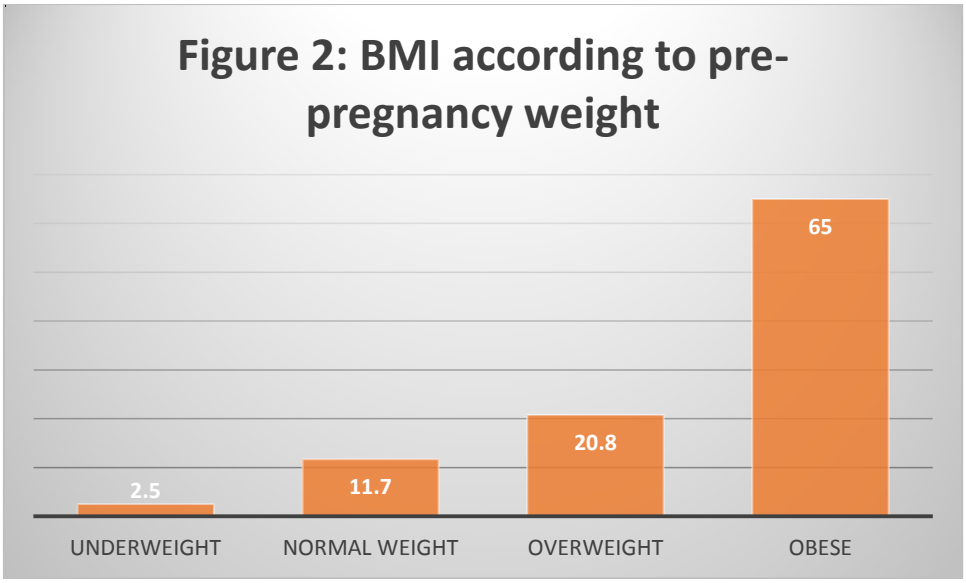
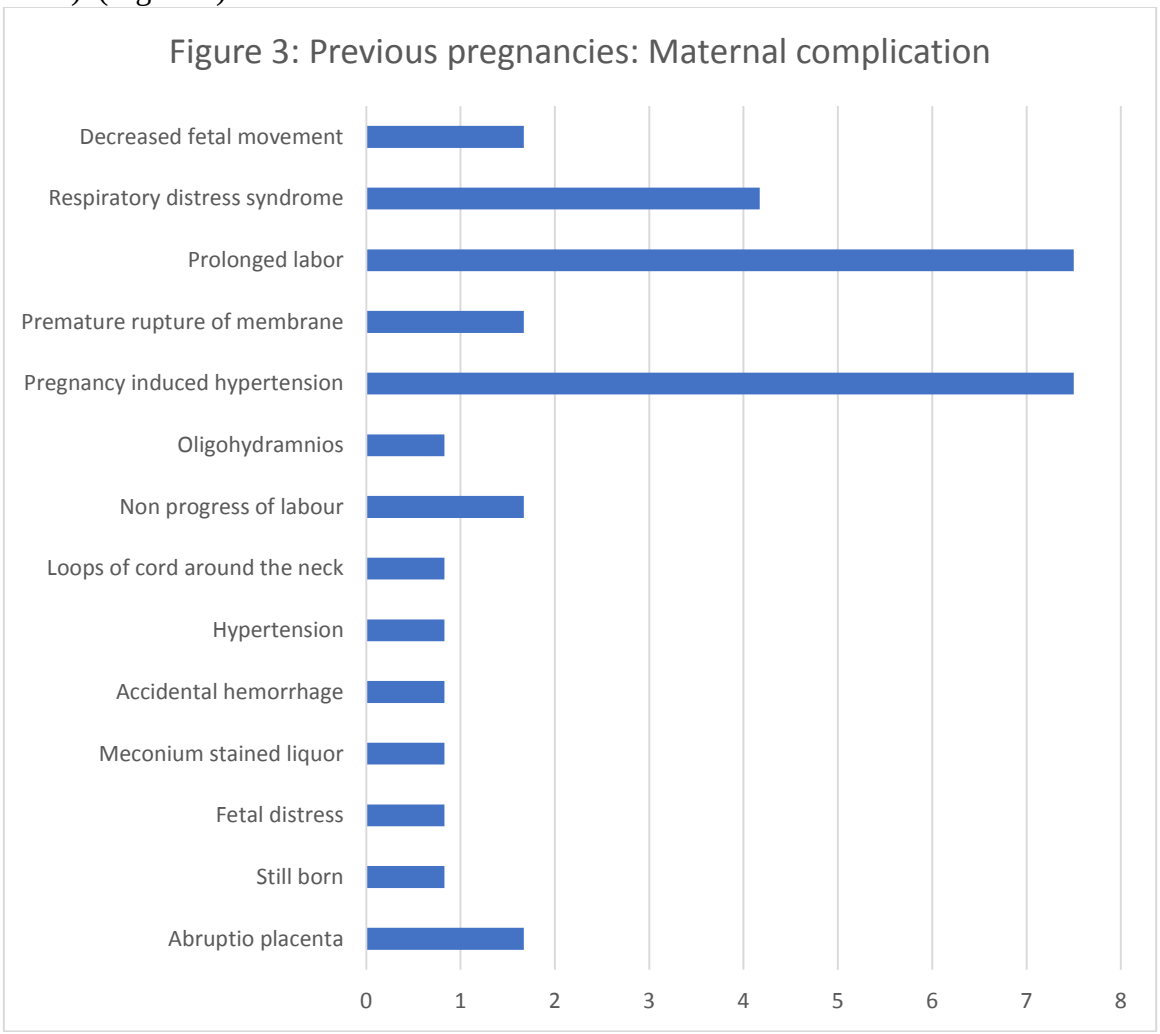


In majority of the patients GDM was diagnosed in second trimester (58.3%) followed by first trimester (25%) and third trimester (16.7%).

Out of 120 patients, in 91 (75.8%) GDM was diagnosed in 1st test only whereas in 29 (24.2%) patients GDM was diagnosed in 2nd test.

Most common maternal complication in previous pregnancy was pregnancy induced hypertension (7.50%) and prolonged labor (7.50%) followed by respiratory distress syndrome (4.17%). (Figure 3)



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Most common fetal complication in previous pregnancy was spontaneous abortion (27.50%) and followed by medical termination of pregnancy (3.33%).The congenital anomaly found was open neural tube defect, spina bifida with ventriculomegaly with kyphoscoliosis defect.
Most common method of delivery among GDM patients in their previous pregnancy was LSCS (22.5%) whereas 21 (1.5%) had normal vaginal delivery.
Out of 27 patients who had LSCS, most common indication was prolonged labor (29.63%) followed by Pre-Eclampsia (22.22%).
On analyzing the birth weight of babies in previous and current pregnancy showed that 1 baby had macrosomia in previous pregnancy whereas in current pregnancy none of them had it. (Table 1)

Table 1: Distribution according to Birth weight of newborn

Birth weight (kg)	Previous pregnancy	Current pregnancy
Macrosomia (>4kg)	1	0
Normal (2.5- 4kg)	14	11
LBW (1.5-2.5 kg)	0	6
VLBW (1-1.5 kg)	0	1
ELBW (<1 kg)	0	0
Total	15	18

Out of 41 patients who came for follow up 29 had complications. Most common current pregnancy complication was Pregnancy induced hypertension (9.8%) followed by acute respiratory distress syndrome (7.3%), IUD (7.3%) and Fetal distress (7.3%). (Table 2)

Table 2: Current pregnancy complications

Current pregnancy complication	Frequency	Percent
Oligohydramnios	2	4.9
Oblique lie with floating head	1	2.4
Non reassuring CTG	1	2.4
Low lying placenta	1	2.4
Decrease fetal movement	1	2.4
Missed abortion	1	2.4
IUD	3	7.3
Bleeding per Vaginum	1	2.4
IUGR	1	2.4
Fetal distress	3	7.3
Non progress of labor	1	2.4
Pregnancy induced hypertension	4	9.8
Low birth weight	1	2.4
Acute Respiratory Distress Syndrome	3	7.3
Lethargic Baby	1	2.4
Preterm	2	4.9
Face Presentation	1	2.4
Prolonged Labor	1	2.4
No complication	12	29.3
Total	41	100.0

Mean age, age at first pregnancy, BMI, total energy requirement (kcal/day), age at marriage, height and weight of GDM patients in present study were evaluated. (Table3)

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Table 3: Characteristic of the study population

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**SD**
Age	120	20	51	27.53	4.567
Age at first pregnancy	120	19	37	26.07	4.018
BMI	120	15.70	40.05	26.20	3.70
Total energy requirement (kcal/day)	120	1750	3080	2149.83	313.28
Age at marriage	120	17	36	25.05	3.98
Pulse	120	66	120	79.37	9.10
Respiratory rate	120	12	20	15.60	2.06
Height	120	1.370	1.790	1.59	.063
Weight	120	44	100	66.53	9.71
Hb	95	7.8	14.6	11.23	1.19
RBC	9	3.78	4.60	4.2233	.27
MCV	10	63.40	94.90	79.03	11.09
MCH	10	18.90	31.00	26.75	4.13
MCHC	10	28.90	38.10	33.83	2.47
RDW	8	11.7	15.2	13.737	1.30
TLC	95	4700	15000	8327.58	2298.97
P.C.	93	1.00	4.18	2.32	.56
Serum urea	67	6.0	30.0	18.33	5.89
Serum creatinine	67	.12	1.42	.70	.259
Sodium	53	130	145	136.87	3.08
Potassium	53	3.0	4.2	3.80	.2961
Total bilirubin	52	.20	.96	.46	.18
Direct bilirubin	52	.05	.40	.12	.062
Indirect bilirubin	52	.13	.73	.33	.137
SGOT/AST	52	8	83	20.83	13.67
SGPT/ALT	52	10	148	25.77	26.12
Alkaline phosphatase	52	49	245	134.85	53.83
Total protein	50	5.7	7.4	6.63	.50
Albumin	50	2.3	4.0	2.81	.37
Globulin	49	2.4	4.8	3.85	.48
A/G Ratio	50	.50	1.43	.73	.158
T3	19	.850	5.570	2.02	1.01
T4	19	.70	87.40	9.27	19.82
TSH	40	.390	9.120	2.86	2.44

Mean DIPSI 2 hour, Hba1c, Random Blood Glucose, Fasting Blood Glucose, Post Prandial Blood Glucose, GTT-Blood-FBS, GTT-Blood-1hr and GTT-Blood-2hr were evaluated (Table 4)

GTT-Urine for glucose level was performed for 21 GDM patients and found negative for all. GTT-urine test after 2 hours revealed that a total 21 undergone this test, and 8 (6.7%) were found to have 1+ glucose level and in 2 (1.7%) it was 2+ glucose level and in another 2 (1.7%) trace glucose was reported.

Most common USG finding in patients with GDM was Oligohydramnios (2.50%) followed by Breech presentation (0.83%), Compound Presentation (0.83%) and Polyhydramnios (0.83%).

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Table 4: Glycemic parameters of patients

Parameters	N	Minimum	Maximum	Mean	Std. Deviation
DIPSI 2 hour	56	140	235	159.14	15.805
Hba1c	37	4.0	10.2	4.932	1.0768
Random Blood Glucose	35	73	261	128.26	46.976
Fasting Blood Glucose	29	70	192	106.76	32.330
Post Prandial Blood Glucose	19	81	193	127.95	30.312
GTT-Blood-FBS	60	71	204	102.78	26.702
GTT-Blood-1hour	58	95	235	169.05	28.594
GTT-Blood-2hour	59	57	209	135.64	34.000

Discussion

Gestational diabetes mellitus (GDM) is defined as impaired glucose tolerance with onset or first recognition during pregnancy.[3] It is a significant public health issue that increases the risk to pregnant women and new born and leads to poor pregnancy outcomes.

In the present study, majority of the patients with GDM had age between 26-30 years (48.3%) followed by 20-25 years (32.5%). Similarly, most of the women (70.9%) with gestational diabetes were above 25 years of age.[4]

Majority of the GDM patients got married between 26-30 years of age (42.50%)subsequently leading to higher age at pregnancy, this shift in marriage age can be due to the change in status of women where education is given priority over marriage.

In the present study majority of the GDM patients were graduate (35.8%) followed by education till high school (25%). Similarly in a study 21.9% were professional, postgraduate or graduate, 61.3% were educated till high school, intermediate or middle school and 4.9% women were illiterate.[5] Better education status of woman helps in upliftment of women, good understanding of pregnancy complications and care, but delaying child birth leads them to high-risk pregnancies.

There were 60.8% multigravida compared to 39.2% primi gravida. The prevalence of GDM rose with gravid, rising from 18.1 percent (confidence limits 14.38-22.29 percent) in primigravida to 25.8% (confidence limits 11.86-44.61 percent) in gravidas >4.[6]

Pregnancy loss is a challenging problem for couples and clinicians alike. In the current study, 35 (47.9%) of the 73 multigravidas had a history of abortion, 30 (25%) had one abortion in their lifetime, 3 (2.5%) had two abortions, whereas 1 had 6 abortions (0.8%). Singh et al assessed the risk factors and outcome of pregnancies in cases of bad obstetric history (BOH) and compare the results with control group. Author reported that higher incidence of GDM (2.53% vs 2.33%) in BOH group but none of it was found statistically significant.[7]

Fetal risk of spontaneous abortion can be a consequence of GDM in previous pregnancy which may or may not have been diagnosed.

In the current study, 75% had a family history of diabetes mellitus, which agrees with the findings of a study in 180 pregnant diabetic mothers.[8]Family history of diabetes is one of the most crucial and non-modifiable risk factors. It also emphasizes on the need to create awareness regarding early testing of patients with family history of diabetes.

In the present study most common past history among GDM patients was hypothyroidism (11.67%) followed by PCOS (3.33%) and GDM (2.50%). 2(1.66%) patients took treatment for infertility whereas 1(0.83%) patient conceived through invitro fertilization. Hospital-based prospective studies carried out in different parts of India identified past history of GDM, PIH, abortions, and caesarean sections to be more likely among GDM subjects.[9.10]

Traditional risk factors like stress and physical inactivity incriminated for DM have also been proposed as risk factors for GDM. In the present study out of 120 patients, majority of the GDM patients had moderate physical activity level (65%) followed by 41 (34.2%) women

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who had sedentary physical activity and only 1 (0.8%) patient had heavy physical activity level. Similarly in a study a low level of physical activity was reported by 380 (90.5%).[11] It reflects that pregnant female are sedentary, more in later part of pregnancy as they are not aware of benefits of physical activity.

In the present study majority of the GDM women were obese (65%). There were 25 (20.8%) overweight women whereas 3 (2.5%) were underweight. Obesity is a significant risk factor for GDM, according to multiple studies, which show that being overweight or obese at the onset of pregnancy increases the risk of GDM. According to the study by Kalyani KR et al, majority (24 out of 25, 96%) of patients who had gestational diabetes mellitus had BMI >25 with 76% being obese i.e., having BMI >30 thereby showing a significant correlation between BMI and gestational diabetes mellitus.[12]

Sedentary lifestyle and consumption of high calorie, processed and junk food has led to obesity leading to insulin resistance. Education regarding health and lifestyle modification is a need of the hour.

In present study majority of the patients with GDM were diagnosed in second trimester (58.3%) followed by first trimester (25%) and third trimester (16.7%). In pan India study conducted by FOGSI and DIPSI shows about one-third of the pregnant women are diagnosed with GDM during the first trimester.[11] Similar findings were also found in GDM demonstration project in Hoshangabad where pregnant women diagnosed for GDM during first, second and third trimester were 33%, 40% and 28% respectively.[13]

In present study, out of 120 patients, in 91 (75.8%) GDM was diagnosed in 1st test only whereas in 29 (24.2%) patients GDM was diagnosed in 2nd test. Many patients were diagnosed by only one test as their first point of contact was late in pregnancy focusing on lack of awareness regarding antenatal checkup.

In present study most common maternal complication in previous pregnancy was pregnancy induced hypertension (7.50%) and prolonged labor (7.50%) followed by respiratory distress syndrome (4.17%). A study reported that previous associated risk factors like pregnancy induced hypertension, hypothyroidism, increased induction, high rate of induction failure and suspected fetal macrosomia were associated with the GDM patients.[14]

It reflects that patient might have gestational diabetes in previous pregnancy but remained undiagnosed. It might be due to lack of education regarding antenatal visits. Such complications are cause of maternal morbidity and mortality which need to be further evaluated.

Most common fetal complication in previous pregnancy was spontaneous abortion (27.50%) and followed by medical termination of pregnancy (3.33%). 1 (0.83%) patient had history of congenital anomaly in foetus- open neural tube defect spina bifida with Ventriculomegaly with Kyphoscoliosis defect.In a similar study, two neonates (one male and one female) had major congenital malformation diagnosed antenatally (Gastroschisis, Hydrocephalus with Meningomyelocele) and one male neonate had Congenital Heart defect (Truncus arteriosus) diagnosed after birth (expired at 4 months age).[15]

Fetal complications, abortion lead a negative impact and distress on mother and their family, a holistic approach and vigilant fetal surveillance is needed to decrease such events.

In the present study most common method of delivery among GDM patients in their previous pregnancy was LSCS (22.5%) whereas 21 (1.5%) had normal vaginal delivery. Most common indication was prolonged labor and Pre-Eclampsia (22.22%). Pandey U et al in their study observed that many Caesareans were due to cephalopelvic disproportion, failed induction, failed progress of labor and abnormal presentation.[15]

Macrosomia is due to elevation of fetal growth factors due to hyperglycaemia. In the present study on analysing the birth weight of babies in previous and current pregnancy showed that 1 baby had macrosomia in previous pregnancy whereas in current pregnancy 6 babies had

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LBW and 1 had VLBW. In Pandey U et al study two foetuses were weighing 4.2 kg, while four foetuses weighed 4 kg.[15]

Though HbA1C has been recognized as the best tool to assess the glycaemic status of antenatal mother, with nonavailability and high cost of this test, average of antenatal blood sugar values in the 3rd trimester was taken to assess the overall glycaemic control.

The low number of patients for urine testing reflects the reluctance in waiting 2 hours for the test. Patients leave mid-test hence emphasising on role of counselling.

In the present study most common USG finding in patients with GDM was Oligohydramnios (2.50%) followed by Breech presentation (0.83%), Compound Presentation (0.83%) and Polyhydramnios (0.83%). In a study it was found that incidence of polyhydramnios in GDM to be 19.4% which was higher as compared to the controls (6.5%).[16]

Conclusion

According to the findings, women with GDM are more likely to have negative obstetric and neonatal outcomes. In the GDM population, age > 25 years, obesity, familial history of DM, hypertension, and hypothyroidism, age at marriage, age at menarche 14 years, multiparity, less physical activity, and previous history of GDM are all important risk factors. Pregnancy-induced hypertension was the most common maternal consequence. Spontaneous abortion was the most prevalent fetal problem. Medical nutrition therapy was the most common treatment approach for GDM patients. Improved screening, treatment, and prevention techniques for gestational diabetes mellitus are required to improve mother and child health.

We found that patients were unaware about diabetes, had fear for their unborn child, of a safe pregnancy and delivery. Patients were unaware about diet modification and that it is easy to control blood sugar levels. Through personal counselling these doubts were encountered. Patients were educated about gestational diabetes, its consequences, and how we can together prevent them.

The guidelines for gestational diabetes care and assessment during ANC checkup has to be inculcated at grass root level. Patients, their care takers, nursing staff, doctors have to be involved as a team in providing care and implementing these guidelines. Educational programs to create awareness amongst community for frequent antenatal checkups, for maintaining healthy lifestyle are the key to better motherhood, and building a strong healthcare system.

Conflicts Of Interest

The authors have no conflicts of interest.

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