AL-NAHRIN UNEVRSITY

COLLEGE OF MEDICINE

OBESTETRIC AND GYAENECOLOGY DEPARTMENT

THE INCEDINCE OF GESTATIONAL DIABETIS IN PREGNANT WOMEN ATTENDING AT AL-IMMAMAIN AL-KADHYMAIN MEDICAL CITY

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Research submitted to department of gyaenecology and obstetric

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Dedicated

to

My honey family ……

All patients involved in this study …….

My teachers and doctors who help me to complete this study……

Acknowledgment

First and foremost, praises and thanks to god, for his showers of blessings throughout my research work to complete this research successfully.

I would like to express my deep and sincere gratitude to my research supervisor , professor Hala abdul-alqadir , for giving me the opportunity to do research and providing invaluable guidance through this research. Her dynamism, vision, sincerity, and motivation have deeply inspired me.

She has taught me the methodology to carry out the research and to present the research works as clearly as possible .

It was great privilege and honor to work and study under her guidance .

I am extremely grateful for what she has offered me.

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GDM = gestational diabetes mellitus

DM = diabetes mellitus

IR = insulin resistance

GA = gestational age

PIH = pregnancy induced hypertension

WHO = world health organization

IADPSG =international association of diabetes and pregnancy study group

ACOG = American college of obstetrics and gyaenecology

ADA = American diabetes association

Abstract

Gestational diabetes mellitus (GDM) is an increasingly common condition of pregnancy. It is associated with adverse fetal, infant and maternal outcomes, as well as an increased risk of GDM in future pregnancies and type 2 diabetes for both mother and offspring. Previous studies have shown that GDM can result in an emotionally distressing pregnancy, but there is little research on the patient experience of GDM care.

Aim: to find the incidence of GDM in pregnant women who were attended consultation unit and who were admitted to gyaenecological and obstetrical department in AL-Immamain AL-kadhymain medical city.

Patients and method: a cross sectional study was conducted for the period between 1st/10/2018 to 31st/3/2019 which involved patients who were attended to consultation unit and who were admitted to gyaenecological and obstetrical department at AL-Immamain al-kadhymain medical city and found to have gestational diabetes after investigations or those who were already diagnosed as a gestational diabetes.

Result: there were 42 pregnant women out of 6155 pregnant women attended and admitted to the hospital found to have gestational diabetes during the period of this study.

Conclusion: the incidence of gestational diabetes in women attended AL-Immamain AL-kadhymain medical city was 0.68%.

The incidence of gestational diabetes was increase with increasing maternal age.

There is a relationship between gestational diabetes and adverse fetal and maternal outcomes.

INTRODUCTION

Definition of GDM

Gestational diabetes has been defined as any degree of glucose intolerance with an onset, or first recognition during pregnancy.[1] This definition does not exclude the possibility that unrecognized glucose intolerance may have antedated the pregnancy, and so, the term hyperglycemia in pregnancy emerges to be more appropriate as suggested lately by the Endocrine Society. [2] The International Association of Diabetes and Pregnancy Study Groups (IADPSG) classify hyperglycemia first detected during pregnancy as either 'overt diabetes' or 'gestational diabetes mellitus (GDM).[3] In 2013, the World Health Organization (WHO) recommended that hyperglycemia first detected during pregnancy be classified as either 'diabetes mellitus (DM) in pregnancy' or GDM.[4]

Pathophysiology

During normal pregnancy, a progressive IR(Insulin Resistance) develops beginning around mid-pregnancy, and progresses during the third trimester.[5] Hormones and adipokines secreted from the placenta, including tumor necrosis factor (TNF)-α, human placental lactogen, and human placental growth hormone are possible causes of IR in pregnancy. In addition, increased estrogen, progesterone, and cortisol during pregnancy contribute to a disruption of the glucose insulin balance. [6] To compensate for the peripheral IR during pregnancy, insulin secretion increases from a woman's pancreas. The development of GDM occurs when a woman's pancreas does not secrete enough insulin to keep up with the metabolic stress of the IR. In addition, increased maternal adipose deposition, decreased exercise, and increased caloric intake contribute to this state of relative glucose intolerance

Risk factors for GDM

Several risk factors are associated with the development of GDM. The most common risk factors are; obesity, older maternal age, past history of GDM, strong family history of diabetes, member of an ethnic group with a high prevalence of T2DM, polycystic ovary syndrome, and persistent glycosuria. A history of delivering big baby (birth weight ≥4000 g), history of recurrent abortions, and history of unexplained stillbirths, and history of essential hypertension, or pregnancy-related hypertension are other risk factors for GDM. [7]

Screening and diagnosis of GDM

Significance of screening:

Several adverse outcomes to the mother and the fetus have been associated with diabetes in pregnancy. These adverse outcomes increase as the maternal plasma glucose level increase in a continuous manner. Early screening and diagnosis GDM not only gives an opportunity to treat the mother in current pregnancy to avoid maternal and fetal adverse outcomes, but also to start various strategies to prevent diabetes in later life.

Whom to screen?

There are two schools of thought regarding screening of diabetes:

High risk or selective screening:

ACOG and NICE (2015) support this by assessing the risk factors at the first visit and recommend selective screening for high risk pregnant women. [8, 9] High risk factors are-

a. BMI> 30kg/m2

b. Previous macrosomic baby weighing 4.5 kg or above

c. Previous still birth or anomalous baby

d. Previous gestational diabetes

e. Family history of diabetes (first degree relative)

f. High risk ethnic population for DM- African, Asians and Non-Caucasians

g. History of polycystic ovarian syndrome (PCOS)

Universal screening:

Screening of the entire population or sub group irrespective of the risk factors is advocated by ADA, IADPSG, W.H.O. and Diabetes In Pregnancy Study group India (DIPSI). [10-12, 13]

Every country should decide whether to follow selective or universal screening depending upon it's incidence, feasibility and cost-benefit ratio. [13]

When to screen?

It has been observed that fetal beta cells respond to maternal hyperglycemia as early as 16 weeks and undergo permanent epigenetic changes. Hence, screening in the first trimester helps to identify those women who already have pre-existing diabetes to control the sugar levels and avert the complications by modifying the nutrition and lifestyle at an early gestation.

a. ADA and IADPSG: Recommend screening at first ANC visit and then at 24-32 weeks in previously undiagnosed GDM.

b. DIPSI: Recommends screening at first visit, if normal then at 24-28 weeks and again at 30-32 weeks.

c. NICE: Recommends screening at 24-28 weeks in high risk population.

d. ACOG: Recommends screening at 24-28 weeks, except in women with high risk factors who are screened at first visit. [8]

How to screen and diagnose?

((A universal guideline for the ideal screening and diagnostic method is lacking)).

ACOG

Two step procedure:

A. Step 1 Glucose Challenge Test (GCT)/ Glucose Loading Test (GLT):

Patient is given 50 gram oral glucose load irrespective of last meal. If one hour venous plasma glucose >140mg/dl, second step with fasting OGTT is done. If one hour venous plasma glucose is ≥ 200mg/dl, then a diagnosis of diabetes in pregnancy is made. GCT has a sensitivity of 70- 88% and specificity of 69-89%.

b. Step 2 Glucose Tolerance Test (GTT):

After an overnight fast of 8-10 hours and three days of unrestricted diet, fasting plasma glucose is measured following which a glucose load of 100 grams is given orally and blood is then drawn 3 times at hourly intervals. If patient has any two or more than two deranged values, gestational diabetes mellitus is diagnosed. [14]

ADA and IADPSG

ADA and IADPSG recommend the screening during the first antenatal visit by fasting plasma glucose or random plasma glucose or HbA1c. If fasting glucose value is 92-125mg/dl, the woman is diagnosed as having GDM. If fasting glucose ≥126mg/ dl or HbA1c ≥6.5% or random plasma glucose ≥200mg/dl, then the woman is diagnosed as having diabetes in pregnancy. [10]

This is followed by repeat screening at 24-28 weeks. Fasting plasma glucose is measured followed by 75 gram oral glucose load and plasma glucose is estimated at one and two hours after glucose load. If any one or more values are deranged, diagnosis of GDM is made (Table 3). If fasting glucose ≥126mg/dl or any value >200mg /dl, diabetes in pregnancy is diagnosed. [13]

Table (1) : IADPSG/ADA criteria for diagnosis of GDM.

Time	Plasma Glucose (mg/dl)
Fasting	≥92
1 Hour	≥180
2 Hour	≥153

Complications of GDM

Maternal complication:-

Women with GDM are at higher risk for developing hypertension, adverse pregnancy outcomes (stillbirth, birth trauma, cesarean section, preeclampsia, and eclampsia); postpartum complications include obesity, diabetes, cardiovascular disease and risk of developing T2DM in the future. [15, 16]

Fetal complications:-

Fetuses for pregnant women with GDM are at higher risk for developing adverse outcomes like glucose mediated macrosomia, shoulder dystocia respiratory distress, hypoglycemia, Hyperbilirubinemia, polycythemia, hypocalcaemia, increased neonatal intensive care unit admissions and neonatal adiposity with its long-term sequelae including childhood obesity and diabetes.[17]

Management of GDM

Blood glucose monitoring

Self-monitoring of blood glucose (SMBG) 4 times a day:

Fasting glucose (upon awakening)

One or 2 hour post-meals

The glycosylated hemoglobin (HbA1C) values tend to be less in pregnant women than in non-pregnant. [18-20]

Glycemic targets

The target glycemic goals for women with GDM is to keep the fasting glucose ≤5-5.3 mmol/l (90-95 mg/dl), and either one-hour post-meal ≤ 7.8 mmol/l (140 mg/dl), or 2-h post-meal ≤ 6.7 mmol/l (120 mg/dl).2,36 These values are more stringent for pregnant women than they are for non-pregnant patients with diabetes.

Medical nutritional therapy

The optimal dietary prescription would be a diet that provides adequate nutrition to support fetal and maternal well-being, while maintaining normoglycemia with absence of ketones, and achieving appropriate weight gain in pregnancy. [21-24]

Exercise

Daily moderate exercise for 30 minutes or more.

Walk briskly, or do arm exercises while seated in a chair for at least 10 minutes after each meal. [25]

Pharmacological interventions : (Insulin therapy)

If the medical nutrition therapy and exercise fail to achieve glycemic goals for a woman with GDM.

The type and timing of insulin should be chosen based on the specific blood glucose elevation.

Basal and meal time insulin regimen is preferred over twice dose regimen.

Rapid-acting insulin or regular insulin should be prescribed before that specific meal, beginning with 2-4 units or a dose of one unit per 10-15 g of carbohydrates.

Basal insulin, long-acting insulin analog, or neutral protamine Hagedorn (NPH); 4 unit for example, should be started before bedtime. [21]

Non-insulin anti-hyperglycemic agent therapy

Less expensive, less invasive, and more acceptable, and could enhance patient compliance, and might achieve similar perinatal outcome as insulin. [26]

Glyburide (glibenclamide):

Suggested glyburide dosing in pregnancy is to start with 2.5 mg.

Increase glyburide to 5 mg in the morning.

add 5 mg in the evening when advisable.

5 mg should be added to the morning, and then to the evening doses for a total of 20 mg. [27]

Metformin:

A more logical alternative to insulin for women with GDM.

Not associated with risks of maternal hypoglycemia and weight gain.

Classified as a category B drug. [28]

No reported adverse side effects to the fetus when it is used to treat women with infertility caused by polycystic ovary syndrome (PCOS). [29]

Use of metformin in women with GDM was not associated with increased risk of congenital anomalies, or maternal and neonatal complications compared to insulin, except for higher rates of preterm labor. [30]

Intrapartum care

There is no universal recommendation on the ideal time for delivering mothers with GDM, and it is not known whether induction of labor or expectant labor is more efficacious.

Induction of labor at 38-39 weeks in the case of insulin-treated GDM patients, or when the ultrasound exam shows signs of fetal macrosomia. [31]

During labor and delivery, the goal is to maintain normoglycemia between 4-7 mmol/L (72-126 mg/dL) prevent neonatal hypoglycemia. [32]

Patients with diet-controlled diabetes will not require intrapartum insulin, and may simply need glucose level monitoring on admission, and then every 4-6 hours.

Patients with insulin-requiring GDM need capillary glucose monitoring every one to 2 hours.

Administer dextrose 5% normal saline (NS) at a rate of 125 cc/hour, and change it to NS or Ringer Lactate when glucose level exceeds 5.6 mmol/L (100 mg/dl).

Insulin infusion should be initiated when glucose level exceeds 7.8 mmol/L (140 mg/dl), and the dose should be titrated according to the capillary glucose level to keep the glucose level in the target range. [33]

Postpartum care

Fasting glucose level should be monitored 24-72 hours after delivery to ascertain that the mother is no longer hyperglycemic (according to the criteria for non-pregnant individuals).

If fasting glucose concentrations suggests overt diabetes (fasting ≥7 mmol/L [126 mg/dl]), or random glucose ≥11.1 mmol/L (200 mg/dL), treatment is warranted.

For those who have fasting glucose levels below 7 mmol/L (126 mg/dl), they should perform OGTT within 6-12 weeks after delivery to help detect the women who remain diabetic, and require further treatment.

If the OGTT is negative, there should be repeat screening for diabetes every 3 years. [34]

PATIENTS AND METHOD

The study was carried on pregnant women attended AL-Immamain AL-Kadhymain consultation unit and who were admitted to the obstetrical ward with gestational diabetes for observation or for delivery

The data was collected from each woman which involved full medical and obstetrical history and neonatal outcome from those who were delivered.

The data was studied and analyzed statistically by using SPSS statistics program.

QUSTIONARE ABOUT GESTATIONAL DIABETIS MELITUS

MOTHER	HUSBAND
Name: **Age :** **Address:** **Occupation:** **Blood group:** **Gravida:** **Para:** **Abortion:** **Ectopic pregnancy:** **H-mole:** **LMP:** **EDD:** **GA:** **DOA:** **DOH:** **Phone no. :**	**Name:** **Age:** **Address:** **Occupation:** **Blood group:** **Consanguinity:**

1-Type of delivery:

□Vaginal □C/S

2-Fetal condition during labor:

□Stable □In distress

3-outcome

□Male □ Female

□Healthy □Non healthy

□Low birth wt. □Normal birth wt. □macrosomia

4-Need NCU

□Yes

Duration:

□ More than day □Less than day

Reason:

□No

5-Family history of diabetes:

□Negative □Positive

6-Past obstetrical history:

□Negative □Positive

7-Past gyaenecologial history:

□Negative □Positive

8-Management of GDM:

□Diet

□Medication:

□Insulin □Metformin

9-Compliance with treatment:

□Yes □Intermediate □No

10-Other comorbidities:

□Yes □No

RESULTS

A study was involved 6155 women attended to AL-Immamain AL-Kadhymain medical city consultation unit and gyaenecology and obstetrical ward, 42 from them was pregnant with newly diagnosed GDM or pregnant with GDM who came for observation or for delivery.

Regarding the incidence of GDM in our medical city, 0.68% of women attended the consultation unit and admitted to gyaenecology and obstetrical ward was diagnosed as had gestational diabetes mellitus.

Regarding maternal age in women with GDM : there was 5 cases (11.9 %) in whom the maternal age was between 16-20 , 19 cases (45.2%) in whom maternal age was in between 21-30 , 17 cases (40.5%) in whom maternal age was between 31-40 , 1 case (2.4%) in whom maternal age was above 40.

Table 1 Maternal age in pregnant women with GDM.

value	No.	%
=< 20	5	11.9
21-30	19	45.2
31-40	17	40.5
>40	1	2.4
Total	42	100.0

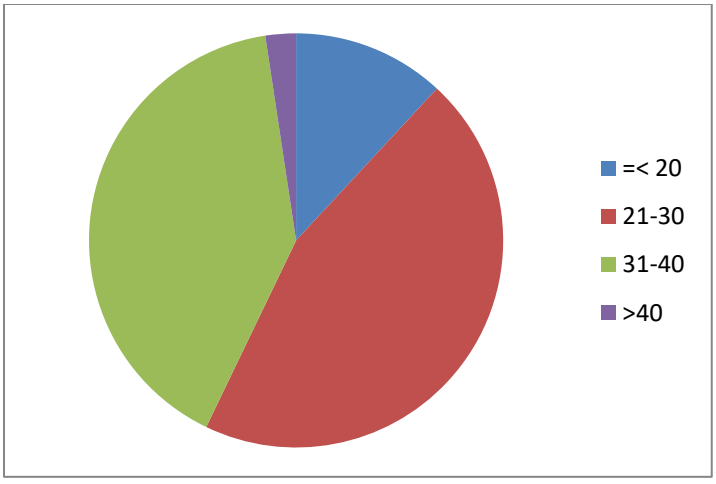

Chart 1: Maternal age of pregnant women with GDM.

Regarding gestational age of baby : from 42 cases babies delivered from pregnant women with GDM , 17 cases (40.5%) was preterm at time of delivery , 25 cases (59.5%) was term at time of delivery , with no post term cases at time of delivery.

Table 2: Gestational age of babies of GDM mothers.

value	No.	%
Preterm	17	40.5
Normal	25	59.5
Post Term	0	0
Total	42	100.0

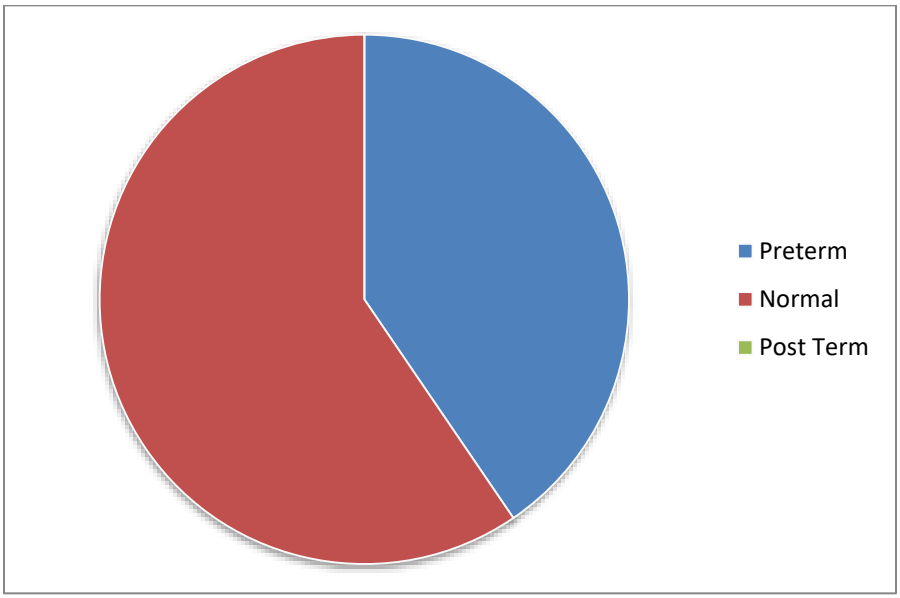

Chart 2: Gestational age of babies of pregnant women with GDM.

Regarding history of abortion or stillbirth among pregnant women with GDM: from 42 cases, 11 cases (26.2%) had history of abortion or stillbirth while 31 cases (73.8%) had no history of abortion or still birth.

Table 3: history of abortion or still birth among pregnant women with GDM.

value	No.	%
Yes	11	26.2
No	31	73.8
Total	42	100.0

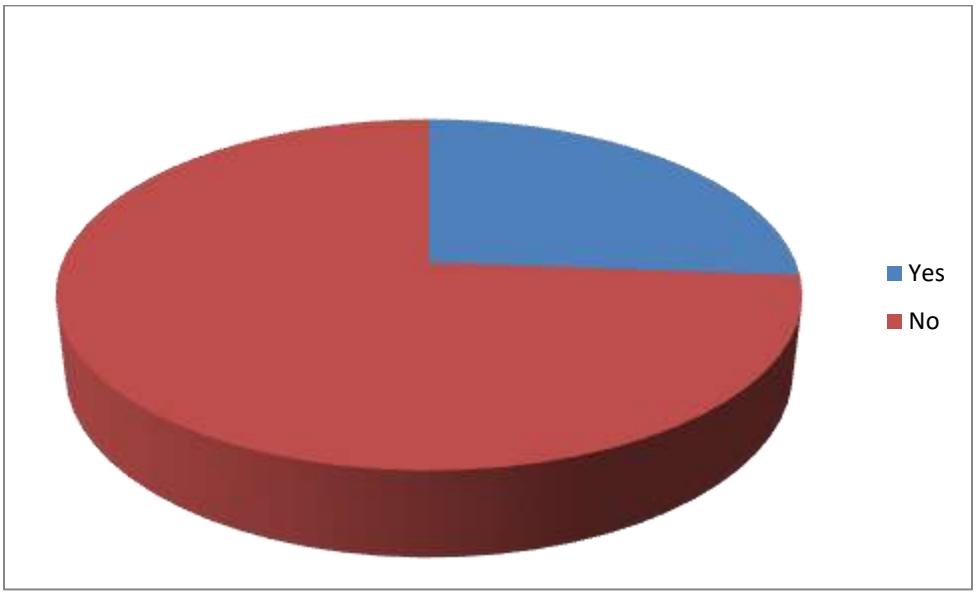

Chart 3: History of abortion or stillbirth among pregnant women with GDM.

Regarding obesity in pregnant women with GDM: from 42 cases, 11 cases (26.2%) have obesity while 31 cases (73.8%) had no obesity.

Table 4: obesity in pregnant women with GDM.

value	No.	%
Obese	11	26.2
Not obese	31	73.8
Total	42	100.0

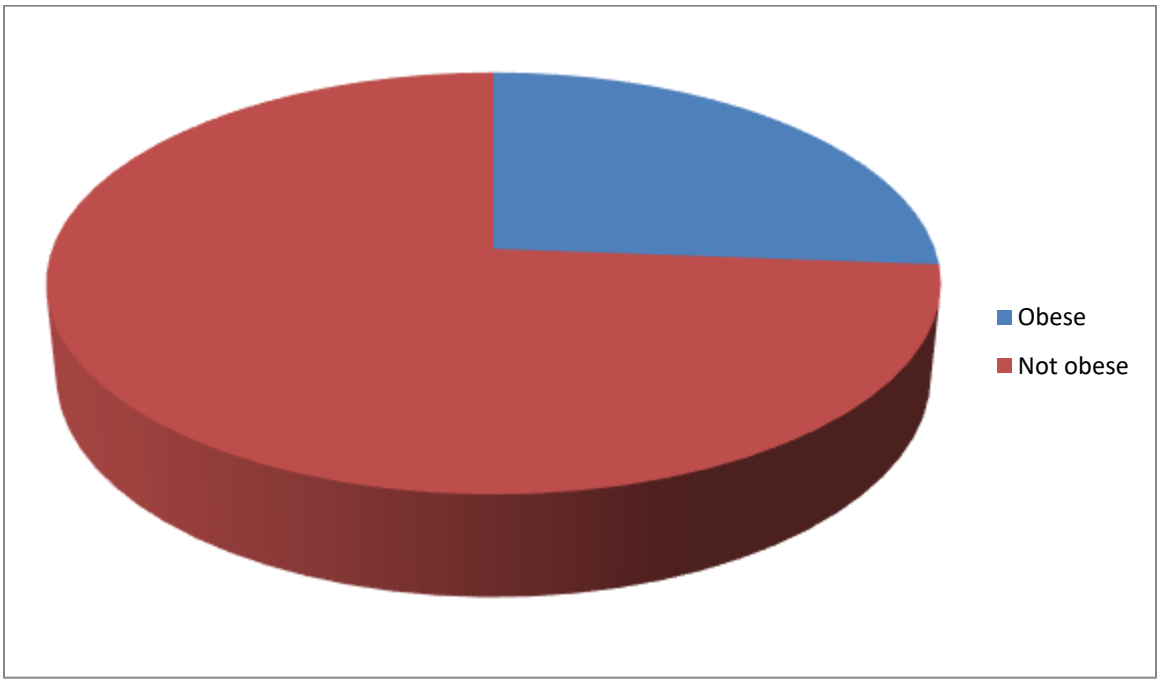

Chart 4: obesity among pregnant women with GDM.

Regarding hypertension disorders during pregnancy among pregnant women with GDM: from 42 cases, 12 (28.6%) has some sort of hypertension disorders during pregnancy in form of gestational hypertension, pregnancy induced hypertension or pre-eclampsia, while 30 cases (71.4%) has no hypertension disorders during pregnancy.

Table 5: Hypertension disorders during pregnancy among pregnant women with GDM.

Value	No.	%
Yes	12	28.6
No	30	71.4
Total	42	100.0

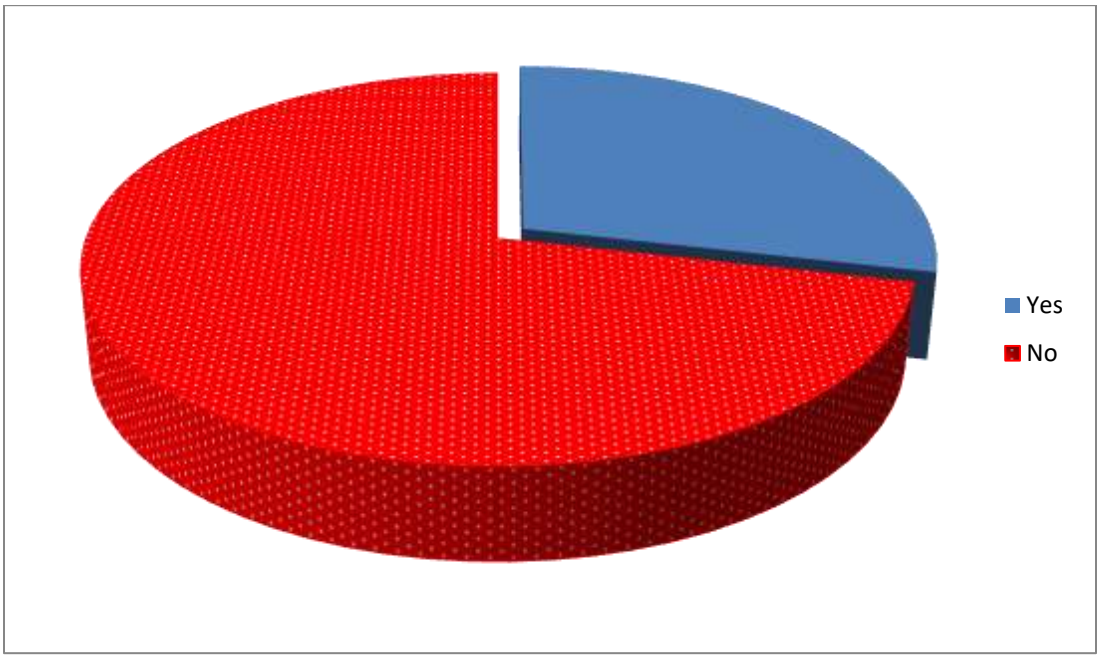

Chart 5: Hypertension disorders during pregnancy among pregnant women with GDM.

Regarding amniotic fluid amount in pregnant women with GDM: from 42 cases, 22 (52.4%) cases has polyhydraminos , 17 cases (40.5%) has normal amount of amniotic fluid , and 3 cases (7.1%) has decreased amount of amniotic fluid.

Table 6: Amniotic fluid amount in pregnant women with GDM.

Value	No.	%
Polyhydraminos	22	52.4
Normal	17	40.5
Oligohydraminos	3	7.1
Total	42	100.0

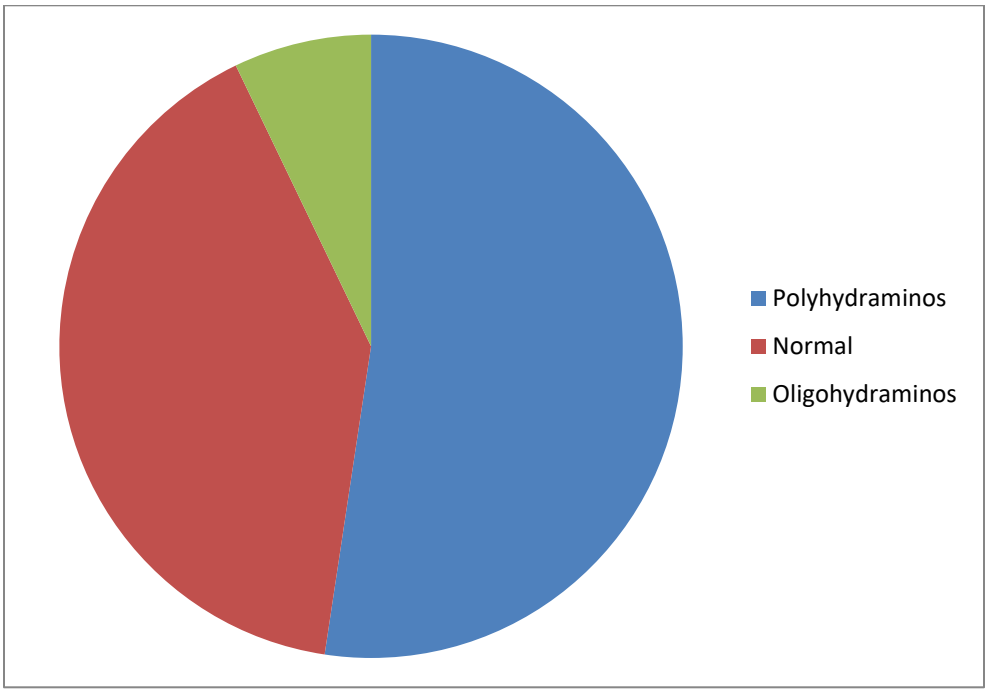

Chart 6: Amniotic fluid amount in pregnant women with GDM.

Regarding family history of diabetes mellitus among pregnant women with GDM: from 42 cases, 32 cases (76.2%) had positive family history of DM. 10 cases (23.8%) had negative family history of DM.

Table 7: Family history of diabetes mellitus among pregnant women with GDM.

Value	No.	%
Positive	32	76.2
Negative	10	23.8
Total	42	100.0

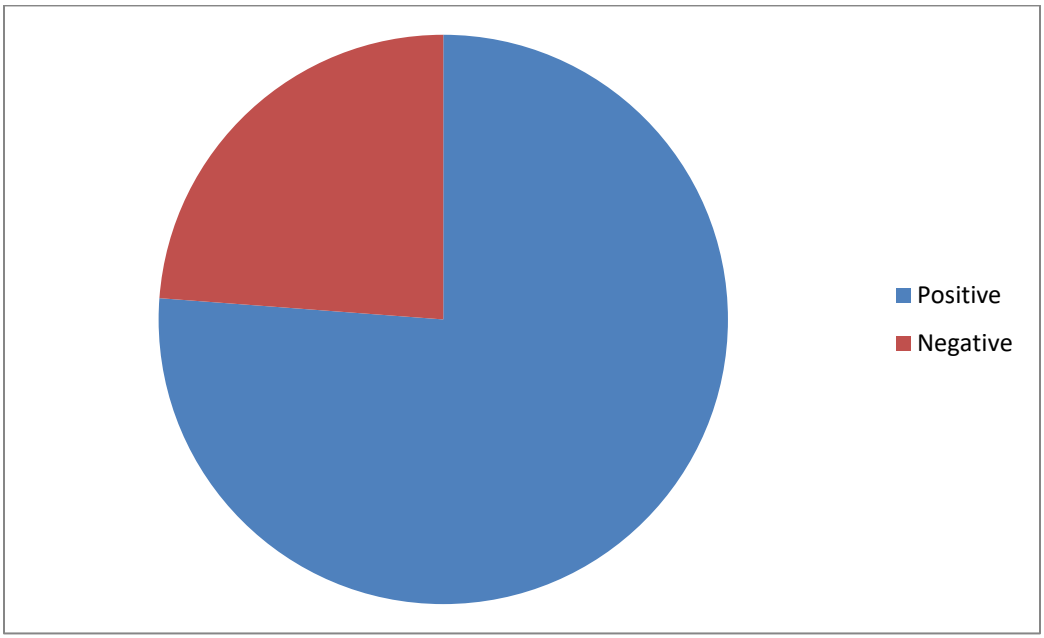

Chart 7: Family history of diabetes mellitus among pregnant women with GDM.

Regarding type of delivery in pregnant women with GDM : from 42 cases , 7 cases (16.7%) was delivered by vaginal delivery and 35 cases (83.3%) was delivered by C –section.

Table 8: Type of delivery in pregnant women with GDM.

Value	No.	%
Vaginal	7	16.7
C-section	35	83.3
Total	42	100.0

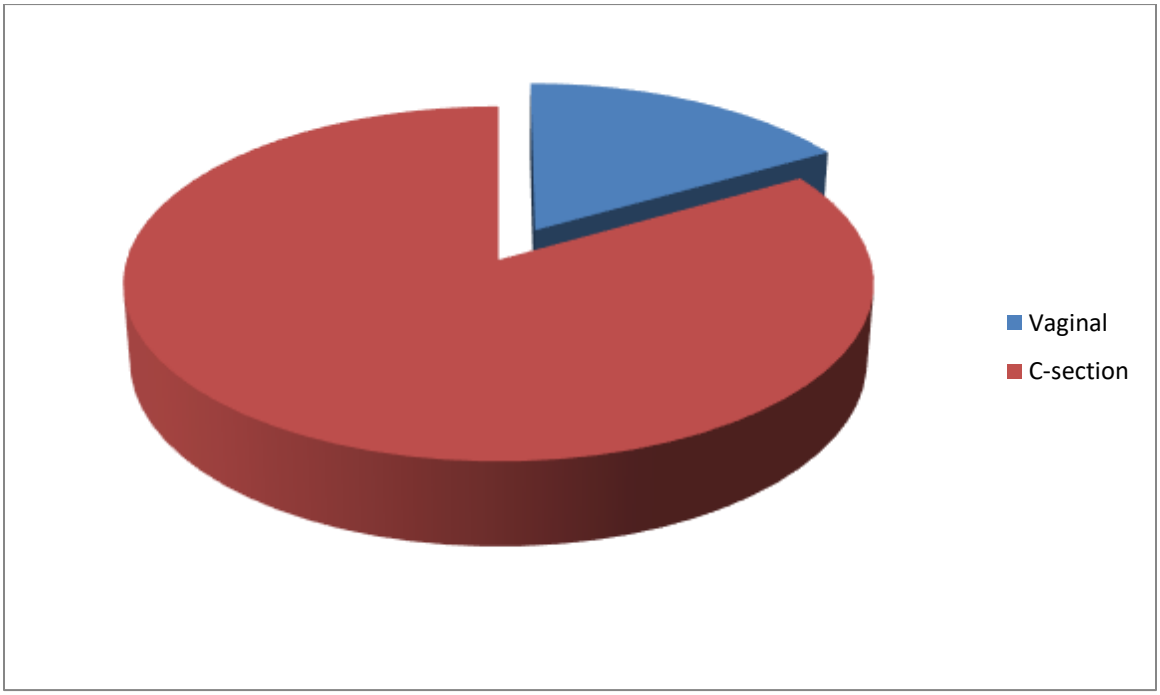

Chart 8: Type of delivery in pregnant women with GDM.

Regarding birth weight of babies of pregnant women with GDM: from 42 cases, 2 cases (4.8%) have low birth weight, 30 cases (71.4%) have normal birth weight, and 10 cases (23.8%) has macrosmic baby.

Table 9: birth weight of babies of pregnant women with GDM.

Value	No.	%
Low birth wt.	2	4.8
Normal wt.	30	71.4
Macrosomic	10	23.8
Total	42	100.0

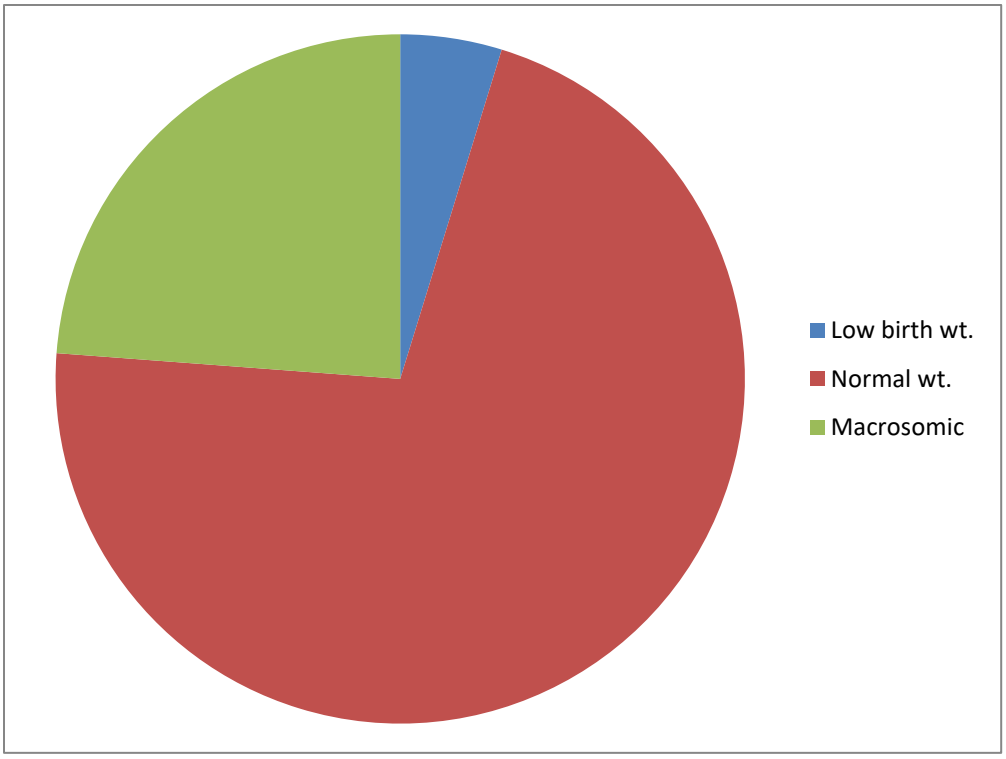

Chart 9: Birth weight of babies of pregnant women with GDM.

Regarding frequency of macrosomia in untreated or partially treated (low or intermediate compliance with treatment) pregnant women with GDM : from 42 cases , 7 cases (70%) was macrosomic , and 3 cases (30%) wasn't macrosomic.

Table 10: Frequency of macrosomia in untreated or partially treated pregnant women with GDM.

Value	No.	%
Macrosomia	7	70.0
Not macrosomia	3	30.0
Total	10	100.0

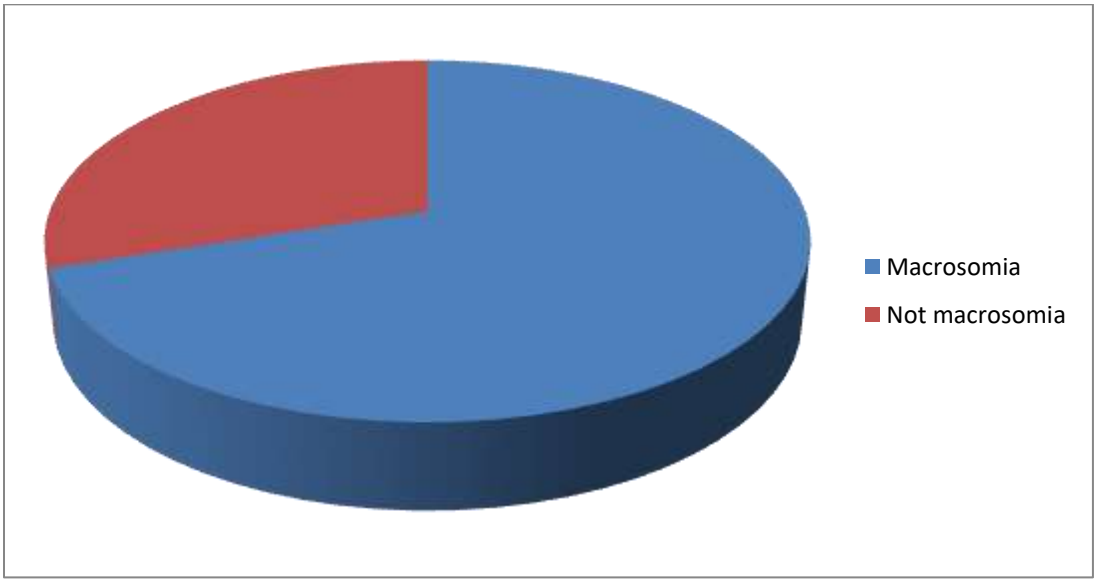

Chart 10: Frequency of macrosomia in untreated or partially treated pregnant women with GDM.

Regarding fetal outcome in pregnant women with GDM: 13 cases (31.0%) had neonatal complications in form of hypoglycemia, fetal distress, or neonatal death and 29 cases (69%) had not such complications.

Table 11: Fetal outcome in pregnant women with GDM.

Value	No.	%
Complications	13	31.0
No complications	29	69.0
Total	42	100.0

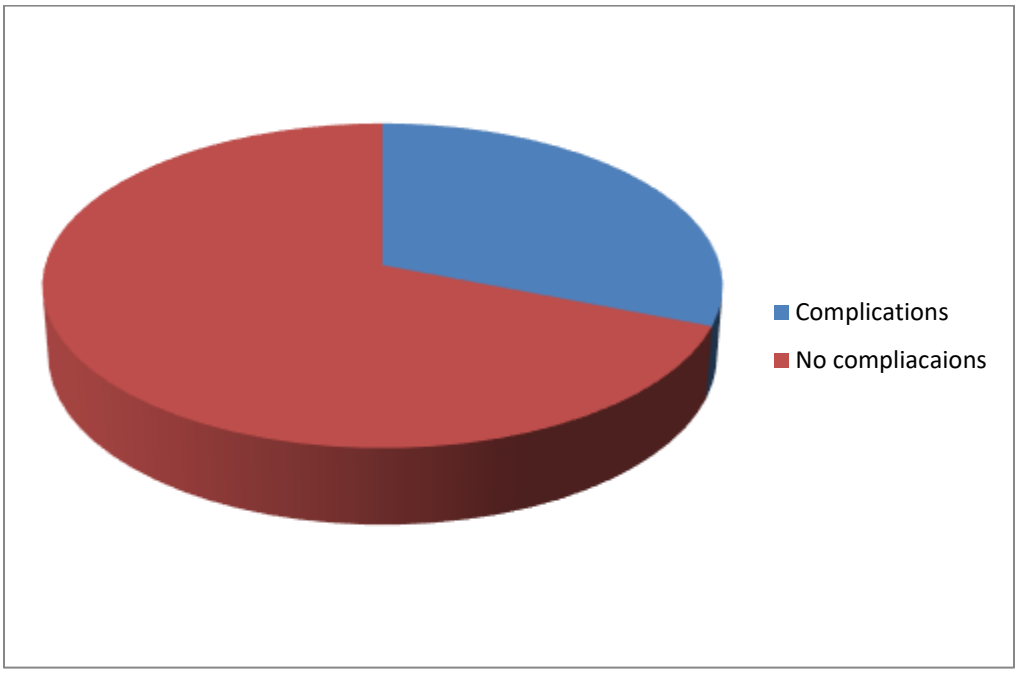

Figure 11: Fetal outcome in pregnant women with GDM.

DISCUSSION

Regarding incidence of gestational diabetes in this study: there was decreased in incidence of gestational diabetes in pregnant women attending our medical city in comparison with other studies conducted in Iraq, Iran, and Afghanistan. [35, 36]

This result can be explained by some factors , which are decreased data, no so particular statistics informations from hospital administration, short duration of the study and missing of cases attended the consultation unit and obstetrical and gyaenecological ward in that some cases leave ward before get questioned for the study.

Regarding maternal age at time of diagnosis: our study showed that gestational diabetes is associated with increased maternal age; this finding is similar to the finding reported by another study carried out at in Babylon Iraq during the year 2014. [37]

Regarding gestational age of baby: this study shows that women with DM tended significantly more often to preterm births as show in study. [38, 39]

Regarding frequency of abortion or still birth in previous pregnancies in patient with GDM: our study show a strong relation between stillbirth and abortions in previous pregnancies and GDM, this result doesn't agree with t other study in Iran in that we found increasing in the frequency of abortion and still birth in previous pregnancies in our study in comparison with that conducted in Iran.

We suggest that this difference in our study was due to decreased level of screening and follow up for women with suspected or proved glucose intolerance and also due to decreased compliance of treatment in some

patients lead to increased level of adverse maternal outcome, which abortion and stillbirth represent one of these outcomes. [40]

There is a relationship between GDM and being obese or overweight according to study published by American journal of perinatology , our findings doesn't agree with findings of American journal of perinatology in that the percentage of obesity is much more in our medical city.

That's probably belongs to many contributors in that decreased level of screening and follow up , lack of management of diabetic disorder , lack of exercise lead to increase frequency of obesity. [41]

In this study, there is association between GDM and hypertension disorders in pregnancy as shown in other study. [39]

Regarding amniotic fluid amount our study show relationship between increased amniotic fluid amount (polyhydraminos) and GDM which is in agreement with study conducted in Hawler. [38]

Regarding family history of diabetes mellitus, this study shows that there is an obvious association between family history of diabetes, and GDM this findings goes with the findings of other study. [42]

Regarding delivery type, this study show a relationship between gestational diabetes and increasing rate of C – section that agree with other study. [43]

Regarding baby weight at birth , this study showed that macrosomia was common among women with gestational diabetes this finding agrees with findings of other studies. [37, 43, 44]

Regarding frequency of macrosomia in untreated or partially treated patient with GDM, Our study shows a relationship between untreated patients and the macrosomia in patients with GDM, this finding agree with finding of other study. [45]

Regarding adverse fetal outcomes in patient with GDM , there is relationship between GDM and fetal complications (hypoglycemia , intrauterine death , respiratory distress syndrome , stillbirth , neonatal death , shoulder dystocia) which is agree with results of study conducted in Hawler. [39]

CONCLUSIONS

In this study, the incidence of gestational diabetes in pregnant women attended AL-Immamain AL-Kadhymain medical city is 0.68%.

High rate cesareans section in comparison to normal vaginal delivery.

The GDM is increasing with increased maternal age.

Gestational diabetes is associated with positive family history for diabetes mellitus, high body mass index, and history of miscarriages or stillbirth during pregnancy.

Good management and adherence to treatment in patient with GDM is associated with marked decreased in fetal and maternal adverse outcomes.

Early diagnosis of gestational diabetes can decrease maternal and fetal complications and improve fetal outcomes.

RECOMMENDATIONS

Because of certain limitations that interfere with this study which are:

The sample size of population study was low.

There was a difficulties in obtaining statistical data from hospital administration statistic department and also consultation unit and obstetrical and gyaenecological ward.

The time factor plays a role in limiting ability to collect more data and so more cases.

Unexpected obstacles had a role in limiting the capability to have more cases.

We need good registration program in our hospitals especially large tertiary centers and education of medical and administration staff to be more aware to the significance and importance of registration as a reference for scientific researches and resolutions of medical problems.

A good screening program for pregnant women attending primary and secondary health centers is needed especially those having high risk factors for gestational diabetes.

Increase health education programs through social media about the importance of gestational diabetes as cause of poor fetal outcome and adverse maternal health.

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