Pattern & Treatment of Gestational Diabetes Mellitus in Bangladesh: A Survey Report

A thesis Work

Submitted to the Department of Pharmacy

EAST WEST UNIVERSITY

In Partial Fulfillment of the requirements for the degree of Masters of Pharmacy (M.PHARM)

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CERTIFICATE BY THE SUPERVISOR

This is to certify that the dissertation entitled "Pattern & Treatment of Gestational Diabetes Mellitus in Bangladesh: A Survey Report" is a thesis work done by Tamanna Ferdous Ananna, ID: 2014-3-79-004 in partial fulfilment of the requirement for the Degree of Masters of Pharmacy.

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DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled “Pattern & Treatment of Gestational Diabetes Mellitus in Bangladesh: A Survey Report” an authentic and genuine research work carried out by me under the guidance of Dr. Shamsun Nahar Khan, Chairperson, Department of Pharmacy, East West University, Dhaka, Bangladesh.

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CERTIFICATE

This is to certify that, the research work on "Pattern & Treatment of Gestational Diabetes Mellitus in Bangladesh: A Survey Report" submitted to the department of pharmacy, East West University, Dhaka, Bangladesh, in partial fulfillment of the requirement for the degree of Masters of pharmacy (M.Pharm) was carried out by Tamanna Ferdous Ananna, ID: 2014-3-79-004, under our guidance and supervision and that no part of the thesis has been submitted for any other degree. We further certify that all the resources of the information in this connection are duly acknowledged.

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ABSTRACT

The main objective of this study was to obtain information about the prevalence of the use of prescription drugs among Gestational Diabetic mothers in Bangladesh. This was a cross-sectional study conducted at different medical college & Hospital.

The maximum 300 number of information were collected from different Medical Collage &Hospital. The mean age of the patients found in Dhaka under study was between 31-35 years. The highest body weight of patients was found about 69- 72 kg, which is near about 27% among all. The height of patients was surveyed about 5 feet- 5 feet 4 inch, which is near about 80%.

On the other hand, only 300 gestational diabetic patients were found in 320 pregnant women. The highest number of information were collected from patients in their 2nd trimester of pregnancy (63.33%), followed by 3rd trimester (26.66%) and 1st trimester (8.33%). When patients first diagnosis for gestational diabetes had occurred, the fasting value was measured about below 6.5mmol/L (74% patients), and non-fasting value was about 6.5-8.5mmol/L (48% patients). Parents of 59% patients have a history of gestational diabetes, not applicable 12.3% and others 7% were observed by the patient'sprevious family history. In previous pregnancy, diabetes was not responded for 24 patients.

While analyzing the prescription of gestational diabetic patients, it was found that 86.76% patients were taking insulin as a drug. And some physicians suggested there patients to control diet & keeping regular exercise (13.7%).

Dedicated to My Parents & Honorable Teachers for their

Continuous Support and Encouragement

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1. Introductions

Pregnancy is the fertilization and development of one or more offspring, known as an embryo or fetus, in a woman's uterus. It is the common name for gestation in humans. A multiple pregnancy involves more than one embryo or fetus in a single pregnancy, such as with twins. Childbirth usually occurs about 38 weeks after conception; in women who have a menstrual cycle length of four weeks, this is approximately 40 weeks from the start of the last normal menstrual period (LNMP). Human pregnancy is the most studied of all mammalian pregnancies. Conception can be achieved through sexual intercourse or assisted reproductive technology.

Gestational diabetes generally has few symptoms and it is most commonly diagnosed by screening during pregnancy. Diagnostic tests detect inappropriately high levels of glucose in blood samples. Gestational diabetes affects 3–10% of pregnancies, depending on the population studied. Typically gestational diabetes will disappear after the baby is born.

Gestational diabetes also known as gestational diabetes mellitus (GDM), is a condition in which women without previously diagnosed diabetes exhibit high blood glucose (blood sugar) levels during pregnancy (especially during their third trimester). Gestational diabetes is caused by improper insulin responses. This is likely due to pregnancy-related factors such as the presence of human placental lactogen that interferes with susceptible insulin receptors. This in turn causes inappropriately elevated blood sugar levels. ("Gestational Diabetes")

1.1 Signs of pregnancy

1. Fatigue

Extreme, unexplainable fatigue is probably the most common sign of early pre0gnancy.

2. Food Aversions

Many women report that intense food aversions are one of the first signs of early pregnancy. These can be caused by rising levels of beta-HCG hormone, Moore says. The best thing you can do to help yourself through this is to steer clear of triggers.

3. Sensitivity to Smells

Scents that were never pleasant (like cigarette smoke) and even ones that were pleasing (like your partner's cologne) can make you queasy during pregnancy's early stages. "For some women, this can be a tip-off that they are expecting," Moore says. This is likely a result of rising hormone levels.

4. Nausea and Vomiting

Nausea and vomiting can be some of the first indications that you're pregnant. Blame it on rising hormones levels in early pregnancy.

5. Breast Swelling and Tenderness

Breast changes may be another early sign of pregnancy.

6. Frequent Urination

In early pregnancy, the uterus grows and pushes on the bladder, triggering the urge to urinate more often

7. Shortness of Breath

Some women feel mildly short of breath when they first become pregnant and sometimes throughout pregnancy.

8. Physical Changes

There are changes in the vagina's color and the softness of the cervix that an experienced clinician can identify during a pelvic exam.(Li,Liu and odouli 146-153)

1.2 Pregnancy test

The test for pregnancy which can give the quickest result after fertilization is a rosette inhibition assay for early pregnancy factor (EPF). EPF can be detected in blood within 48 hours of fertilization. However, testing for EPF is expensive and time-consuming.

Most chemical tests for pregnancy look for the presence of the beta subunit of HCG, or human chorionic gonadotropin, in the blood or urine. HCG can be detected in urine or blood after implantation, which occurs six to twelve days after fertilization. Quantitative blood (serum beta) tests can detect hCG levels as low as 1 mIU/mL, while urine test strips have published detection thresholds of 10 mIU/mL to 100 mIU/mL, depending on the brand. Qualitative blood tests generally have a threshold of 25 mIU/mL, and so are less sensitive than some available home pregnancy tests. Most home pregnancy tests are based on lateral-flow technology.

With obstetric ultrasonography the gestational sac sometimes can be visualized as early as four and a half weeks of gestation (approximately two and a half weeks after ovulation) and the yolk sac at about five weeks' gestation. The embryo can be observed and measured by about five and a half weeks. The heartbeat may be seen as early as six weeks, and is usually visible by seven weeks' gestation.

1.3 Types of period

Prenatal period

Prenatal or antenatal development is the process in which a human embryo or fetus (or foetus) gestates during pregnancy, from fertilization until birth. Often, the terms fetal development, foetal development, or embryology are used in a similar sense.

After fertilization, the process of embryogenesis, (the early stages of prenatal development) begins. By the end of the tenth week of gestational age the embryo has acquired its basic form and the next period is that of fetal development where the organs become fully developed. This fetal period is described both topically (by organ) and chrononlogically (by time) with major occurrences being listed by gestational age.

Postnatal Period

The postnatal period begins immediately after the birth of a child and then extends for about six weeks. During this period, the mother's body begins the return to prepregnancy conditions that includes changes in hormone levels and uterus size

Perinatal Period

Pertaining to the period immediately before and after birth. The perinatal period is defined in diverse ways. Depending on the definition, it starts at the 20th to 28th week of gestation and ends 1 to 4 weeks after birth.

1.4 Duration

There are, as a rule, 266 to 270 days between ovulation and childbirth, with extremes of 250 and 285 days. Physicians usually determine the date of the estimated time for delivery by adding seven days to the first day of the last menstrual period and counting forward nine calendar months; i.e., if the last period began on January 10, the date of delivery is October 17. Courts of law, in determining the legitimacy of a child, may accept much shorter or much longer periods of gestation as being within the periods of possible duration of a pregnancy. One court in the state of New York has accepted a pregnancy of 355 days as legitimate. British courts have recognized 331 and 346 days as legitimate with the approval of medical consultants. Fully developed infants have been born as early as 221 days after the first day of the mother's last menstrual period

Prenatal Stages of Development

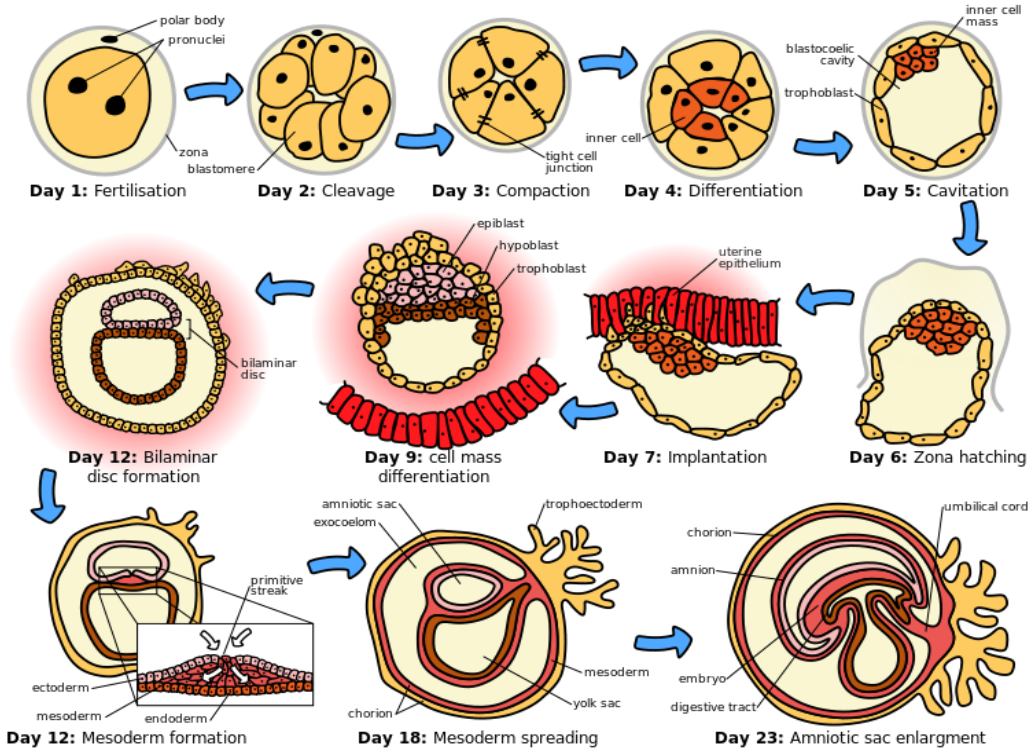


FIG: The initial stages of human embryogenesis

1.5 Embryonic and fetal development

The sperm and the egg cell, which has been released from one of the female's two ovaries, unite in one of the two fallopian tubes. The fertilized egg, known as a zygote, then moves toward the uterus, a journey that can take up to a week to complete. Cell division begins approximately 24 to 36 hours after the male and female cells unite. Cell division continues at a rapid rate and the cells then develop into what is known as a blastocyst. The blastocyst arrives at the uterus and attaches to the uterine wall, a process known as implantation.

The development of the mass of cells that will become the baby is called embryogenesis during the first approximately 10 weeks of gestation. During this time, cells begin to differentiate into the various body systems. The basic outlines of the organ, body, and nervous systems are established. By the end of the embryonic stage, the beginnings of features such as fingers, eyes, mouth, and ears become visible. Also during this time, there is development of structures important to the support of the embryo, including the placenta and umbilical cord. The placenta connects the developing embryo to the uterine wall to allow nutrient uptake, waste elimination, and gas exchange via the mother's blood supply. The umbilical cord is the connecting cord from the embryo or fetus to the placenta.

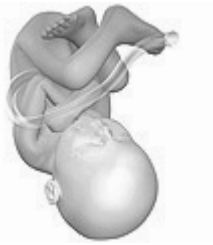
After about 10 weeks of gestational age, the embryo becomes known as a fetus instead. At the beginning of the fetal stage, the risk of miscarriage decreases sharply, When the fetal stage commences, a fetus is typically about 30 mm (1.2 inches) in length, and the heart can be seen beating via ultrasound; the fetus can be seen making various involuntary motions at this stage. During continued fetal development, the early body systems and structures that were established in the embryonic stage continue to develop. Sex organs begin to appear during the third month of gestation. The fetus continues to grow in both weight and length, although the majority of the physical growth occurs in the last weeks of pregnancy.Electrical brain activity is first detected between the 5th and 6th week of gestation, though this is still considered

primitive neural activity rather than the beginning of conscious thought, something that develops much later in fetation. Synapses begin forming at 17 weeks, and at about week 28 begin to multiply at a rapid pace which continues until 3 to 4 months after birth.

Embryo at 4 weeks after fertilization

Fetus at 8 weeks after fertilization

Fetus at 18 weeks after fertilization

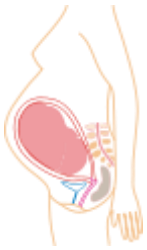


Fetus at 38 weeks after fertilization

Relative size in 1st month (simplified illustration)

Relative size in 3rd month (simplified illustration)

Relative size in 5th month (simplified illustration)



Relative size in 9th month (simplified illustration)

1.6 Physiology

One of the most noticeable alterations in pregnancy is the gain in weight. The enlarging uterus, the growing fetus, the placenta and liquor amnii, the acquisition of fat and water retention, all contribute to this increase in weight. The weight gain varies from person to person and can be anywhere from 5 pounds (2.3 kg) to over 100 pounds (45 kg). In America, the doctor-recommended weight gain range is 25 pounds (11 kg) to 35 pounds (16 kg), less if the woman is overweight, more (up to 40 pounds (18 kg)) if the woman is underweight.

1.7 Different types of Trimester

First trimester

Minute ventilation is increased by 40% in the first trimester. The womb will grown to the size of a lemon by eight weeks. Many symptoms and discomforts of pregnancy (further described in later sections) appear in the first trimester.

Second trimester

Weeks 13 to 28 of the pregnancy are called the second trimester. Most women feel more energized in this period, and begin to put on weight as the symptoms of morning sickness subside and eventually fade away. The uterus, the muscular organ that holds the developing fetus, can expand up to 20 times its normal size during pregnancy. Although the fetus begins to move and takes a recognizable human shape during the first trimester, it is not until the second trimester that movement of the fetus, often referred to as "quickening", can be felt. This typically happens in the fourth month, more specifically in the 20th to 21st week, or by the 19th week if the woman has been pregnant before. However, it is not uncommon for some women not to feel the fetus move until much later. During the second trimester, most women begin to wear maternity clothes

Third trimester

Final weight gain takes place, which is the most weight gain throughout the pregnancy. The woman's belly will transform in shape as the belly drops due to the fetus turning in a downward position ready for birth. During the second trimester, the woman's belly would have been very upright, whereas in the third trimester it will drop down quite low, and the woman will be able to lift her belly up and down. The fetus begins to move regularly, and is felt by the woman. Fetal movement can become quite strong and be disruptive to the woman. The woman's navel will sometimes become convex, "popping" out, due to her expanding abdomen. Head engagement, where the fetal head descends into cephalic presentation, relieves pressure on the upper abdomen with renewed ease in breathing. However, it severely reduces bladder capacity, increases pressure on the pelvic floor and the rectum.It is also during the third trimester that maternal activity and sleep positions may affect fetal development due to restricted blood flow. For instance, the enlarged uterus may impede blood flow by compressing the lower pressured vena cava, with the left lateral laying positions appearing to providing better oxygenation to the infant.

1.8 High risk during Pregnancy

Your pregnancy is called high-risk if you or your baby has an increased chance of a health problem. Many things can put you at high risk. Being called "high-risk" may sound scary. But it's just a way for doctors to make sure that you get special attention during your pregnancy. Your doctor will watch you closely during your pregnancy to find any problems early. The conditions listed below put you and your baby at a higher risk for problems, such as slowed growth for the baby, preterm labor, preeclampsia, and problems with the placenta. But it's important to remember that being at high risk doesn't mean that you or your baby will have problems.

Your health plan may have its own list of what makes a pregnancy high-risk. In general, your pregnancy may be high-risk if:

- You have a health problem, such as:
  - Diabetes.
  - Cancer.
  - High blood pressure.
  - Kidney disease.
  - Epilepsy.
- You use alcohol or illegal drugs, or you smoke.
- You are younger than 17 or older than 35.
- You are pregnant with more than one baby (multiple pregnancy).
- You have had three or more miscarriages.
- Your baby has been found to have a genetic condition, such as Down syndrome, or a heart, lung, or kidney problem.
- You had a problem in a past pregnancy, such as:
  - Preterm labor.
  - Preeclampsia or seizures (eclampsia).
  - Having a baby with a genetic problem, such as Down syndrome.

1.9 Complications of pregnancy:

Some common complications of pregnancy include, but are not limited to:

- High blood pressure
- Gestational diabetes
- Preeclampsia
- Preterm labor
- Pregnancy loss .

Iron-deficiency anemia. Pregnant women need more iron than normal for the increased amount of blood they produce during pregnancy. Symptoms of a deficiency in iron include feeling tired or faint, experiencing shortness of breath, and becoming pale

1.10 Physiological changes during pregnancy

Pregnancy occurs when a sperm penetrates an egg. This is called fertilization and usually takes place in the woman's fallopian tube. The fertilized egg immediately begins to divide into a growing cluster of cells. Between 5-7 days after ovulation the fertilized egg implants into the wall of uterus and starts forming the placenta. The placenta maintains and nourishes the baby by enabling the transfer of O_2, CO_2, amino acids, fats, vitamins and minerals from the mother's blood. It also allows transfer of waste substances from the growing baby. From the time of implantation into the wall of uterus until approximately eighth week of life the baby is known as embryo. Development is rapid during this stage as the specialized cells begin to form the vital organs, nervous system, bones, muscles and blood. After the eighth week of pregnancy the developing baby is called a fetus. It is 2.4 cm long with most of internal organs formed and external features such as eyes, nose, mouth and ears start to appear

As the fetus and placenta grow and place increasing demand on the mother, phenomenal alterations in metabolism occur. The most obvious physical changes are weight gain and altered body shape. Weight gain is due to increase in breast tissue, blood and water volume in the form of extra vascular and extra cellular fluid. Deposition of fat and protein and increased

cellular water are added to maternal stores. The average weight gain during pregnancy is 12.5 kg. During normal pregnancy 1 kg weight gain is due to protein. Also plasma albumin levels are decreased and fibrinogen levels are increased. Total body fat increases during pregnancy. During second half of pregnancy plasma lipids increase but triglycerides, cholesterol and lipoproteins decrease soon after delivery. The ratio of LDL to HDL increases during pregnancy.

1.11 The effect of drugs

Drugs that a pregnant woman takes can affect the fetus in several ways. They can act directly on the fetus causing damage or abnormal development leading to birth defects or death. They can also alter the function of the placenta usually by constricting blood vessels and reducing the blood supply of oxygen and nutrients to the fetus from the mother and thus resulting in a baby that is underweight and underdeveloped. Moreover they can cause the muscles of the uterus to contract forcefully; indirectly injuring the fetus by reducing the blood supply or triggering pre-term labor and delivery.

1.12 Pharmacokinetics

The unique physiologic changes of pregnancy affect the pharmacokinetics of medications used by pregnant women. During pregnancy a woman's plasma volume increases by 30-50% and cardiac output and glomerular filtration rate also increase in similar proportion. These factors contribute to lower circulating concentration of some drugs (especially those excreted by kidney) in a pregnant woman and possibly to sub therapeutic drug levels. Also there is increase in body fat during pregnancy; which increases the volume of distribution of fat soluble drugs. A decrease in plasma albumin concentration during pregnancy increases the volume of distribution for highly protein bound drugs e.g. anticonvulsants. But the unbound drugs are excreted out more rapidly by the kidney and liver; and this offsets the effect of

increased volume of distribution. Due to the effect of progesterone, gastric emptying time is decreased particularly in the third trimester thus delaying the onset of effect of the drug. Concurrent use of other common medications during pregnancy such as antacids, iron and vitamins could also bind and inactivate some drugs. Intramuscular absorption of drug is generally more rapid due to increased blood flow; which enhances systemic drug absorption and the rate of onset of action. Lastly estrogen and progesterone alter hepatic enzyme activity; which can increase drug accumulation or decrease elimination of some drugs.

1.13 How Drugs cross the placenta

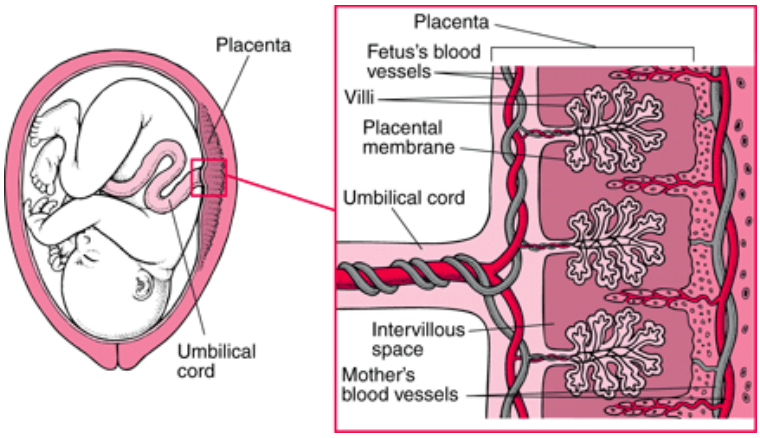


Fig: transfer of drug from mother to fetus.

Some of the fetus's blood vessels are contained in tiny hairlike projections (villi) of the placenta that extend into the wall of the uterus. The mother's blood passes through the space surrounding the villi (intervillous space). Only a thin membrane (placental membrane) separates the mother's blood in the intervillous space from the fetus's blood in the villi. Drugs in the mother's blood can cross this membrane into blood vessels in the villi and pass through the umbilical cord to the fetus.

1.14 Diabetes mellitus

Diabetes mellitus, or simply diabetes, is a group of metabolic diseases in which a person has high blood sugar, either because the pancreas does not produce enough insulin, or because cells do not respond to the insulin that is produced.[2] This high blood sugar produces the classical symptoms of polyuria (frequent urination), polydipsia (increased thirst), and polyphagia (increased hunger).

1.14.1 Classification of diabetes mellitus

There are three main types of diabetes mellitus (DM).

- Type 1 DM results from the body's failure to produce insulin, and currently requires the person to inject insulin or wear an insulin pump. This form was previously referred to as "insulin-dependent diabetes mellitus" (IDDM) or "juvenile diabetes".
- Type 2 DM results from insulin resistance, a condition in which cells fail to use insulin properly, sometimes combined with an absolute insulin deficiency. This form was previously referred to as non insulin-dependent diabetes mellitus (NIDDM) or "adult-onset diabetes".

The third main form, gestational diabetes, occurs when pregnant women without a previous diagnosis of diabetes develop a high blood glucose level. It may precede development of type 2 DM.

1.14.2 Type I diabetes

Type 1 diabetes mellitus is characterized by loss of the insulin-producing beta cells of the islets of Langerhans in the pancreas, leading to insulin deficiency. This type can be further classified as immune-mediated or idiopathic. The majority of type 1 diabetes is of the immune-mediated nature, in which beta cell loss is a T-cell-mediated autoimmune attack.[6] There is no known preventive measure against type 1 diabetes, which causes approximately 10% of diabetes mellitus cases in North America and Europe. Most affected people are

otherwise healthy and of a healthy weight when onset occurs. Sensitivity and responsiveness to insulin are usually normal, especially in the early stages. Type 1 diabetes can affect children or adults, but was traditionally termed "juvenile diabetes" because a majority of these diabetes cases were in children.

Type II diabetes

Type 2 diabetes mellitus is characterized by insulin resistance, which may be combined with relatively reduced insulin secretion. The defective responsiveness of body tissues to insulin is believed to involve the insulin receptor. However, the specific defects are not known. Diabetes mellitus cases due to a known defect are classified separately. Type 2 diabetes is the most common type.

In the early stage of type 2, the predominant abnormality is reduced insulin sensitivity. At this stage, hyperglycemia can be reversed by a variety of measures and medications that improve insulin sensitivity or reduce glucose production by the liver.

1.15 Gestational diabetes mellitus

Gestational diabetes mellitus (GDM) resembles type 2 diabetes in several respects, involving a combination of relatively inadequate insulin secretion and responsiveness. It occurs in about 2–5% of all pregnancies and may improve or disappear after delivery. Gestational diabetes is fully treatable, but requires careful medical supervision throughout the pregnancy. About 20–50% of affected women develop type 2 diabetes later in life.

Though it may be transient, untreated gestational diabetes can damage the health of the fetus or mother. Risks to the baby include macrosomia (high birth weight), congenital cardiac and central nervous system anomalies, and skeletal muscle malformations. Increased fetal insulin may inhibit fetal surfactant production and cause respiratory distress syndrome. Hyper bilirubinemia may result from red blood cell destruction. In severe cases, perinatal death may

occur, most commonly as a result of poor placental perfusion due to vascular impairment. Labor induction may be indicated with decreased placental function. A Caesarean section may be performed if there is marked fetal distress or an increased risk of injury associated with macrosomia, such as shoulder dystocia.

1.16 Diagonosis:

A one-step approach to establishing the diagnosis of GDM using a 75-g, 2-hour OGTT has been used and promoted by other organizations. In 2010, the International Association of Diabetes and Pregnancy Study Group convened a workshop conference to recommend new diagnostic criteria based on the Hyperglycemia and Adverse Pregnancy Outcome study data. Based on expert consensus, an odds ratio of 1.75 (compared with the population mean) for various adverse outcomes was used to define blood glucose thresholds for diagnosis of GDM. The International Association of Diabetes and Pregnancy Study Group recommended that a universal 75-g, 2-hour OGTT be performed during pregnancy and that the diagnosis of GDM be established when any single threshold value on the 75-g, 2-hour OGTT was met or exceeded (fasting value, 92 mg/dL; 1-hour value, 180 mg/dL; and 2-hour value, 153 mg/dL). Overall, using the proposed International Association of Diabetes and Pregnancy Study Group criteria would identify approximately 18% of the U.S. population as having GDM, although in some subpopulations, the proportion of women in whom GDM is diagnosed would be even higher.

Condition	2 hour glucose	Fasting glucose	HbA_{1c}
	mmol/l(mg/dl)	mmol/l(mg/dl)	%
Normal	<7.8 (<140)	<6.1 (<110)	<6.0
Impaired fasting glycaemia	<7.8 (<140)	≥ 6.1(≥110) & <7.0(<126)	6.0–6.4
Impaired glucose tolerance	≥7.8 (≥140)	<7.0 (<126)	6.0–6.4
Diabetes mellitus	≥11.1 (≥200)	≥7.0 (≥126)	≥6.5

1.17 Oral glucose tolerance test (OGTT)

The oral glucose tolerance test (OGTT) is done to:

Check pregnant women for gestational diabetes. You have an increased chance of developing gestational diabetes if you:

Have had gestational diabetes during a previous pregnancy.

Have previously given birth to a baby who weighed more than 9 lb (4.1 kg).

Are younger than age 25 and were overweight before getting pregnant.

Diagnose prediabetes and diabetes.

Fasting blood glucose (FBG):

Fasting blood glucose (FBG) is a blood test done to measure the amount of glucose present in the blood after an eight-hour fast. It is thus not affected by recent food intake.

Purpose of the test

The values obtained can:

- diagnose whether a person has diabetes mellitus (DM), or
- be used to monitor glucose control in those already known to have DM.

Most carbohydrates in the diet are converted into glucose. If the body's ability to use glucose is impaired, the levels in the blood rise, and the state of DM may exist. Establishing the diagnosis is important, because the complications of untreated DM can be fatal. Once diagnosed, treatment must be monitored to ensure optimum glucose control: good control delays the onset, and reduces the impact of, possible complications. Regular FBGs will show the effectiveness of treatment, or the need to change therapy. Once diagnosed, treatment must be monitored to ensure optimum glucose control: good control delays the onset, and reduces the impact of, possible complications. Regular FBGs will show the effectiveness of treatment, or the need to change therapy. FBG may also be used as part of the investigation of other conditions associated with abnormalities in glucose metabolism or fluctuations in glucose levels, like:

- adrenal gland disorders
- delirium/dementia
- seizures
- hormone-secreting tumours
- transient ischaemic attacks, and
- trauma, heart attack and surgery.

1.17.1 Random blood glucose(RBG)

Random blood glucose tests can be performed by anyone. When you visit your doctor's office and they perform a glucose test without having you fast beforehand, that is a random blood glucose test. When you perform a glucose test outside of your normal testing schedule, you are performing a random blood glucose test. Random glucose testing is an important piece of the puzzle that makes up your diabetes management strategy. If you test at random and your glucose levels are acceptable, then your diabetes management strategy is working. Alternatively, if you notice wide changes in your levels, then it may be time to rethink and re-orient how you're managing your diabetes.

1.18 Signs and symptoms of diabetes:

The classic symptoms of untreated diabetes are loss of weight, polyuria (frequent urination), polydipsia (increased thirst), and polyphagia (increased hunger). Symptoms may develop rapidly (weeks or months) in type 1 diabetes, while they usually develop much more slowly and may be subtle or absent in type 2 diabetes.

Prolonged high blood glucose can cause glucose absorption in the lens of the eye, which leads to changes in its shape, resulting in vision changes. Blurred vision is a common complaint leading to a diabetes diagnosis. A number of skin rashes that can occur in diabetes are collectively known as diabetic dermadromes.

1.19 Management of diabetes

Diabetes mellitus is a chronic disease, for which there is no known cure except in very specific situations. Management concentrates on keeping blood sugar levels as close to normal ("euglycemia") as possible, without causing hypoglycemia. This can usually be accomplished with diet, exercise, and use of appropriate medications (insulin in the case of type 1 diabetes; oral medications, as well as possibly insulin, in type 2 diabetes). Patient education, understanding, and participation is vital, since the complications of diabetes are far less common and less severe in people who have well-managed blood sugar levels. The goal of treatment is an HbA1C level of 6.5%, but should not be lower than that, and may be set

higher. Attention is also paid to other health problems that may accelerate the deleterious effects of diabetes. These include smoking, elevated cholesterol levels, obesity, high blood pressure, and lack of regular exercise. Specialised footwear is widely used to reduce the risk of ulceration, or re-ulceration, in at-risk diabetic feet. Evidence for the efficacy of this remains equivocal, however.

1.20 Oral anti-diabetic drugs(OADs)

Currently, six classes of oral antidiabetic drugs (OADs) are available: biguanides (e.g., metformin), sulfonylureas (e.g., glimepiride), meglitinides (e.g., repaglinide), thiazolidinediones (e.g., pioglitazone), dipeptidyl peptidase IV inhibitors (e.g., sitagliptin), and α-glucosidase inhibitors (e.g., acarbose).

Sulfonylureas

Sulfonylureas (SUs) are the oldest and most widely used medications for the treatment of T2DM. Although SU therapy effectively lowers blood glucose concentrations (average decrease in FPG of 2–4 mmol/l, accompanied by a decrease in HbA_{1c} of 1–2%) by stimulating insulin secretion from β-cells, treatment with SUs is associated with a progressive linear decline in β-cell function. Eventual inability to maintain glycemic control reflects an advanced stage of β-cell failure. Hypoglycemia is the most common and most serious adverse event associated with SU therapy, mainly because of insulin release being initiated even when glucose concentrations are below the normal threshold for normal physiologic glucose-stimulated insulin release. Weight gain, regarded as a class effect of SUs, is thought to result from an anabolic effect of increased insulin concentration. Owing to decreased effectiveness of SUs over time and an associated decline in the insulin secretory reserve, combination therapy has focused mainly on adding insulin-sensitizing medications, including metformin and thiazolidinediones.

α-glucosidase Inhibitors

α-glucose inhibitors, including acarbose, are competitive inhibitors of membrane-bound intestinal α-glucosidases that hydrolyze oligosaccharides, trisaccharides and disaccharides to glucose and other monosaccharides in the small intestine and thereby delay postprandial glucose absorption. These agents are available as a first-line treatment in patients with slightly raised basal glucose concentrations and marked postprandial hyperglycemia (average decrease in HbA_{1c} of 0.5–1%). Derosa et al. demonstrated that both repaglinide and acarbose had a similar effect on reducing postprandial glucose levels (-14.9%, $p < 0.05$; -16.2%, $p < 0.05$; both vs baseline, respectively). A meta-analysis of seven major studies on the use of acarbose in the treatment of diabetes indicated that acarbose treatment was associated with a 35% risk reduction of cardiovascular disease through diminution of oxidative stress induced by postprandial hyperglycemia. In a nationwide analysis of risk of cardiovascular death according to different glucose-lowering drugs used as monotherapy, it was concluded that, in terms of cardiovascular profile, acarbose, repaglinide and gliclazide were as safe as metformin, while other SUs were associated with higher risk. The use of α-glucosidase inhibitors in combination with SUs, metformin or insulin can improve glycemic control. Despite their good safety record, limited gastrointestinal tolerability has substantially restricted their use. α-glucosidase inhibitors are more commonly used in Europe and Japan than in the USA.

Glinides

Meglitinides such as repaglinide and nateglinide are prandial insulin releasers that stimulate rapid insulin secretion. Repaglinide (NovoNorm®, Prandin®, GlucoNorm®) is the first clinically available insulin secretagog that specifically enhances early-phase prandial insulin response by increasing the sensitivity of β-cells to elevated glucose levels, producing a greater insulin release under hyperglycemic conditions. In this regard, it has been shown in vitro that repaglinide is five-times more potent than glibenclamide in stimulating insulin secretion, with half-maximal stimulation observed at 40 and 200 nmol/l, respectively. Repaglinide is taken

orally immediately before a meal and has been shown to particularly reduce postprandial hyperglycemia. Rapid-acting insulin releasers can be suitable for lifestyles where meals are unpredictable or missed. Lower risk of hypoglycemia makes these agents an attractive option for some elderly patients, in particular when other agents may be contraindicated. Repaglinide has been shown to be associated with 60% fewer hypoglycemic episodes compared with a second-generation SU. This could be related to an in vitro finding that repaglinide increases insulin release from β-cells only in the presence of glucose (as seen in the presence of 5 and 10 mmol/l of glucose), whereas glibenclamide stimulates insulin secretion in the absence of glucose.

Thiazolidinediones

The thiazolidinediones are insulin-sensitizing drugs that improve whole-body insulin sensitivity through gene regulation. These agents increase glucose uptake via glucose transporter-4 in skeletal muscle and reduce rates of gluconeogenesis in the liver. Reductions in plasma insulin concentration and lowering of circulating triglycerides are additional indirect mechanisms that may help improve whole-body insulin sensitivity. Thiazolidinediones have also been known to improve β-cell function and reduce insulin resistance; however, they are associated with weight gain and can cause peripheral edema.

Biguanides

Metformin, a biguanide that acts directly against insulin resistance, is regarded as an insulin sensitizing drug and is considered to be a cornerstone in the treatment of T2DM. Available formulations include Glucophage®, Glucophage XR®, Riomet®, Fortamet®, Glumetza®, Obimet®, Dianben®, Diabex® and Diaformin®. Because of its safety and efficacy, metformin is the cornerstone of monotherapy, and joint guidelines from the AACE and ACE recommend that metformin be initiated as first line monotherapy unless a contraindication such as renal disease, hepatic disease, gastrointestinal intolerance or risk of lactic acidosis coexists.

Despite being the most widely used OAD in the world, metformin can reach a plateau of effectiveness due to progressive β-cell failure. Metformin is only effective when there is sufficient endogenous or exogenous insulin and, because of this, patients are unable to maintain tight glycemic control as their disease progresses.

Metformin also forms the cornerstone of dual therapy and is used extensively in combination with several classes of OADs. The safety and efficacy of SU plus metformin, a commonly prescribed combination, is well documented. Metformin is available in combination with the following agents: rosiglitazone (Avandamet®), pioglitazone (Actoplus Met®), glipizide (Metaglip®), glibenclamide (Glucovance®), sitagliptin (Janumet®), and repaglinide (PrandiMet®). Generic formulations of metformin/glipizide and metformin/glibenclamide are also available. A generic formulation of metformin/rosiglitazone from Teva has received tentative approval from the US FDA and is expected to reach the market in early 2012.

Dipeptidyl Peptidase-IV Inhibitors

Dipeptidyl peptidase-IV (DPP-IV) inhibitors suppress the degradation of a variety of bio0active peptides, including glucagon-like peptide-1, leading to an enhancement of their action. DPP-IV inhibitors are orally administered drugs with a significant effect on glucose tolerance and lasting improvement of HbA_{1c}. Several agents are in different stages of clinical development. Sitagliptin was approved by the FDA in 2006 as an adjunct to diet and exercise in patients with T2DM. A combination of sitagliptin and metformin was approved in 2007 and is also indicated as an adjunct to diet and exercise to improve glycemic control in adults with T2DM, when treatment with both sitagliptin and metformin is appropriate. DPP-IV inhibitors are weight-neutral and well tolerated.

Insulin

Insulin is a peptide hormone, produced by beta cells of the pancreas, and is central to regulating carbohydrate and fat metabolism in the body. It causes cells in the liver, skeletal muscles, and fat tissue to absorb glucose from the blood.

Insulin stops the use of fat as an energy source by inhibiting the release of glucagon. With the exception of the metabolic disorder diabetes mellitus and metabolic syndrome, insulin is provided within the body in a constant proportion to remove excess glucose from the blood, which otherwise would be toxic. When blood glucose levels fall below a certain level, the body begins to use stored sugar as an energy source through glycogenolysis, which breaks down the glycogen stored in the liver and muscles into glucose, which can then be utilized as an energy source. As a central metabolic control mechanism, its status is also used as a control signal to other body systems (such as amino acid uptake by body cells). In addition, it has several other anabolic effects throughout the body.

1.21 Gestational diabetes mellitus (gdm)

Gestational diabetes mellitus (GDM) resembles type 2 diabetes in several respects, involving a combination of relatively inadequate insulin secretion and responsiveness. It occurs in about 2–5% of all pregnancies and may improve or disappear after delivery. Gestational diabetes is fully treatable, but requires careful medical supervision throughout the pregnancy. About 20–50% of affected women develop type 2 diabetes later in life

Why is not insulin doing its normal function

Insulin resistance is not a disease as such but rather a state or condition in which a person's body tissues have a lowered level of response to insulin, a hormone secreted by the pancreas that helps to regulate the level of glucose (sugar) in the body. As a result, the person's body produces larger quantities of insulin to maintain normal levels of glucose in the blood. There is considerable individual variation in sensitivity to insulin within the general population, with the most insulin-sensitive persons being as much as six times as sensitive to the hormone as those identified as most resistant. Some doctors use an arbitrary number, defining insulin resistance as a need for 200 or more units of insulin per day to control blood sugar levels. Various researchers have estimated that 3-16 percent of the general population in the United

States and Canada is insulin-resistant; another figure that is sometimes given is 70-80 million Americans.

Insulin resistance can be thought of as a set of metabolic dysfunctions associated with or contributing to a range of serious health problems. These disorders include type 2 diabetes (formerly called adult-onset or non-insulin-dependent diabetes), the metabolic syndrome (formerly known as syndrome X), obesity, and polycystic ovary syndrome. Some doctors prefer the term "insulin resistance syndrome" to "metabolic syndrome."

1.22 Risk factors associated with Gestational diabetes

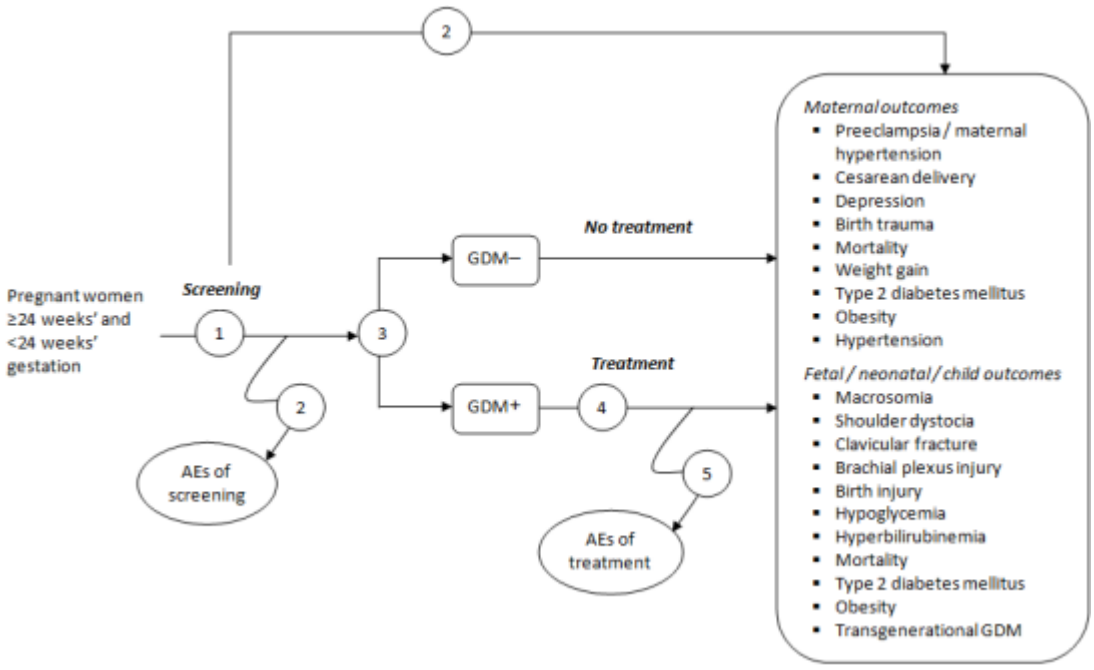
Although any woman may develop gestational diabetes during pregnancy, some of the factors that may increase risk are:

- family history of diabetes
- obesity
- having given birth previously to a very large infant, a stillbirth, or a child with a birth defect
- age (women who are older than 25 are at greater risk than younger women)

Although increased glucose in the urine is often included in the list of risk factors, it is not believed to be a reliable indicator for gestational diabetes

Screening and diagnosis of gestational diabetes

Analytic Framework for Diagnosing Gestational Diabetes Mellitus



AE = adverse event; GDM = gestational diabetes mellitus.

1.22.1Screening for diabetes mellitus during pregnancy

Gestational diabetes

The following 2-step screening system for gestational diabetes is currently recommended in the United States:

- 50gm, 1- hour glucose challenge test(GCT).
- 100gm, 3 hour oral glucose tolerance test (OGTT)- for patients with an abnormal GCT result.

Alternatively, for high-risk women or in areas in which the prevalence of insulin resistance is 5% or higher (eg, the southwestern and southeastern United States), a 1-step approach can be used by proceeding directly to the 100-g, 3-hour OGTT.

1.23 Prognosis

Prognosis (Greek *πρόγνωση* - literally fore-knowing, foreseeing) is a medical term for predicting the likely outcome of one's current standing. When applied to large statistical populations, prognostic estimates can be very accurate: for example the statement "45% of

patients with severe septic shock will die within 28 days" can be made with some confidence, because previous research found that this proportion of patients died. However, it is much harder to translate this into a prognosis for an individual patient: additional information is needed to determine whether a patient belongs to the 45% who will die, or to the 55% who survive. A complete prognosis includes the expected duration, the function, and a description of the course of the disease, such as progressive decline, intermittent crisis, or sudden, unpredictable crisis.

1.24 Management of pregnancy with diabetes

Diet

The goal of dietary therapy is to avoid single large meals and foods with a large percentage of simple carbohydrates. The diet should include foods with complex carbohydrates and cellulose, such as whole grain breads and legumes.

Insulin

The goal of insulin therapy during pregnancy is to achieve glucose profiles similar to those of nondiabetic pregnant women. In gestational diabetes, early intervention with insulin or an oral agent is key to achieving a good outcome when diet therapy fails to provide adequate glycemic control.

Glyburide and metformin

The efficacy and safety of insulin have made it the standard for treatment of diabetes during pregnancy. Diabetic therapy with the oral agents glyburide and metformin, however, has been

gaining in popularity. Trials have shown these 2 drugs to be effective, and no evidence of harm to the fetus has been found, although the potential for long-term adverse effects remains a concern.

Prenatal obstetric management

Various fetal biophysical tests can ensure that the fetus is well oxygenated, including fetal heart rate testing, fetal movement assessment, ultrasonographic biophysical scoring, and fetal umbilical Doppler ultrasonographic studies.

Current recommendations for infants of diabetic mothers—the most critical metabolic problem for whom is hypoglycemia—include the employment of frequent blood glucose checks and early oral feeding (ideally from the breast) when possible, with infusion of intravenous glucose if oral measures prove insufficient.

Pre-counseling

Pre-conception counseling (also called pre-conceptual counseling) is a meeting with a health-care professional (generally a physician) by a woman *before* attempting to become pregnant. It generally includes a pre-conception risk assessment for any potential complications of pregnancy as well as modifications of risk factors, such as increasing folic acid intake to reduce the risk of neural tube defects and counseling on smoking cessation, alcohol reduction, and medications that may compromise fetal development.[1] Physicians and baby experts recommend that a woman visit her physician as soon as the woman is contemplating having a child, and optimally around 3 to 6 months before actual attempts are made to conceive.[*citation needed*] This time frame allows a woman to better prepare her body for successful conception (fertilization) and pregnancy, and allows her to reduce any health risks which are within her control. Agencies such as the March of Dimes. have developed screening tools that physicians can use with their patients. In addition, obstetricians (see Obstetrics and General Practitioner) have developed comprehensive check-lists and assessments for the woman who is planning to become pregnant.

In one sense, pre-conception counseling and assessment can be compared to a well-baby visit in which a baby is screened for normal health, normal development, with the benefit of identifying emerging problems that may have gone unnoticed in an infant. For a woman, the Pre-Conception Counseling Assessment and Screening is intended to assess normal health of a child-bearing woman, while at the same time identifying:

1.24.1Dietary advice

Calories

Preconception — Make sure you get enough calories to maintain a reasonable weight. Adjust the number of calories you eat as needed to attain your weight gain or weight loss goals.

Pregnancy — Increase your diet by 300 calories per day starting in the second trimester. Monitor for appropriate weight gain and adjust your diet as needed.

Breastfeeding — Add 500 calories a day to your normal pre-pregnancy diet.

Protein

- **Preconception —** Protein should account for 12 percent to 20 percent of your daily calories. Make sure to eat 0.8 grams of protein per kilogram of your body weight (to convert pounds to kilograms, divide the pounds by 2.2), with a minimum of 40 grams of protein a day. For example, if you weigh 120 pounds, you should eat roughly 44 grams of protein a day.
- **Pregnancy —** Some women experience gestational diabetes, or diabetes during pregnancy, which may require them to limit their carbohydrate intake to 40

percent to 50 percent of their daily calories. To learn more, please see Dietary Recommendations for Gestational Diabetes.

Fat

- Preconception — The amount of fat you should eat varies from person to person and should be based on an individualized nutritional assessment. For most people, less than 10 percent of their daily calories should come from saturated fat and up to 10 percent from polyunsaturated fat. Eating monounsaturated fat is preferred.
- Pregnancy — During pregnancy your body needs more fat. Roughly 25 percent to 35 percent of your daily calories should come from fat, depending on your carbohydrate goals. Eating monounsaturated fat is preferred over saturated varieties.

Fiber

Both before and during pregnancy it is important to eat between 20 and 35 grams of fiber each day. This is the same as the guidelines for the general population.

Sodium

Sodium intake recommendations both before and during pregnancy are the same as those for the general population: 3000 milligrams a day. In some cases, there are medical reasons to restrict the amount of sodium in your diet. Talk with your doctor if you are unsure about your sodium intake.

Alcohol

It is important not to drink alcohol both if you are planning to get pregnant and if you are pregnant. Alcohol exposure during early fetal development can cause serious problems for your baby.

Artificial Sweeteners

- **Preconception —** It is safe to use any artificial sweetener on the market.
- **Pregnancy —** The Food and Drug Administration (FDA) has approved aspartame, acesulfame-K and sucralose for use during pregnancy. Check with your doctor before using other artificial sweeteners.

Folic Acid

- **Preconception —** It is important to get enough folic acid, or folate, before you become pregnant. Begin adding 400 micrograms a day prior to conception to reduce risks of neural tube defects, such as spina bifida and anencephaly.
- **Pregnancy —** During pregnancy, increase your folic acid consumption to 600 micrograms a day.
- **Breastfeeding —** While breastfeeding, make sure to get 500 micrograms of folic acid a day.

Iron

- **Preconception —** Between the ages of 14 and 18, you need 15 milligrams of iron a day. Between 19 and 50 years of age, you should get 18 milligrams of iron a day.
- **Pregnancy —** During pregnancy you need more iron and should get 27 milligrams a day. Some women suffer from anemia and need even more iron, up to 60 milligrams a day as directed by their doctor.
- **Breastfeeding —** While breastfeeding you don't need as much iron and can reduce your intake to 9 milligrams a day, 10 milligrams a day if you are 18 years or younger.

Zinc

- **Preconception —** Between the ages of 14 and 18 you need 9 milligrams of zinc a day. Between 19 and 50 years of age, you should get 8 milligrams of zinc a day.
- **Pregnancy —** During pregnancy you need more zinc and should get 11 milligrams a day, 13 milligrams if you are 18 years old or younger.
- **Breastfeeding —** While breastfeeding you should get 12 milligrams of zinc a day, 14 milligrams if you are 18 years old or younger.

Calcium

Before, during and after pregnancy while breastfeeding, you need the same amount of calcium, although it does vary slightly by age. If you are 18 years old or younger, you need 1300 milligrams a day. If you are between 19 and 50 years old, you need 1000 milligrams of calcium a day.

Indications of insulin administration:

Insulin is a peptide hormone with a molecular weight of about 5808 (human). It has two chains A and B linked by disulphide bond. Insulin is effective in all types of diabetes and is most effective in IDDM. It is a must in diabetes ketoacidosis which occurs in IDDM. It is also used in hyperosmolar (Non ketotic hyperglycemic) coma.

1.25 Insulin regimens

The insulin regimen that your doctor creates for you will be based on several factors in order to match your needs and lifestyle:

- The type of diabetes you have and amount of insulin your body is producing.
- Your age.
- Your weight.
- Your blood sugar targets.
- Your eating patterns.
- Your activity level.
- How closely you monitor your glucose levels.
- How well you take care of yourself.
- What you are willing and able to do to reach your target blood glucose levels.

Whether you're able to recognize and prevent the symptoms of low blood sugar (hypoglycemia).

1.26 Post-delivery follow-up for GDM

After the intensified treatment often required for treating gestational diabetes mellitus (GDM), clinicians may be tempted to relax after delivery of the baby. If it is assumed that no further management is needed, an excellent opportunity to improve the future health status of these high-risk women may be lost. There are special concerns for the early postpartum care of women with GDM. Encouragement and facilitation of exclusive breastfeeding is very important because of the profound short-term as well as long-term health benefits to the infant and the reduced risks for subsequent obesity and glucose intolerance demonstrated in many breastfeeding women. A method of contraception should be chosen that does not increase the risk of glucose intolerance in the mother. Some women with GDM will have persisting hyperglycemia in the days after delivery that will justify medical management for diabetes and perhaps for hypertension, microalbuminuria, and dyslipidemia. Treatment should be maintained according to the guidelines of the American Diabetes Association and other

relevant organizations and adjusted for the needs of lactation. Treatment should be continued in adequate fashion to minimize risks to the early conceptus if there is a subsequent planned or unplanned pregnancy.

Most women with GDM will not have severe hyperglycemia after delivery. This group should be followed for at least 6–12 weeks to determine their glucose status. Many studies over 3 decades on all continents of the globe demonstrate the high risk of subsequent diabetes in this female population. The degree of this risk is best assessed by glucose tolerance testing. Randomized controlled trials have proven that several interventions (diet and planned exercise 30–60 min daily at least 5 days per week and antidiabetic medications) can significantly delay or prevent the appearance of type 2 diabetes in the women with impaired glucose tolerance (IGT). The high-risk women can also be assessed for cardiovascular risk factors, with appropriate management and follow-up to reduce the risk of coronary heart disease, cardiomyopathy, and stroke. These women should be educated to seek specific preconception consultation before the next pregnancy to avoid the teratogenic effect of unrecognized diabetes.

1.27 Management of the neonate

After birth, most newborn infants require only routine care to make a successful transition to extrauterine life. The major components of routine care for the term (gestational age ≥37 weeks) and late preterm (gestational age between 34 to 36 6/7 weeks) neonate are:

-Delivery room and transitional care, including early bonding

- Newborn assessment including a comprehensive review of the maternal history and a complete physical examination

- Prophylaxis care to prevent serious disorders.

1.27.1 Breast feeding

Breastfeeding is the normal way of providing young infants with the nutrients they need for healthy growth and development. Virtually all mothers can breastfeed, provided they have

accurate information, and the support of their family, the health care system and society at large.

1.28 Education tips

Typical topics covered in childbirth education classes include:

Normal labor, birth and early postpartum

- Positioning for labor and birth
- Pain management techniques
- Labor support
- Communication skills
- Comfort measures (breathing strategies, relaxation and massage techniques)
- Risks and benefits of medical procedures
- Breastfeeding
- Healthy lifestyles.

2. Methodology

2.1 Study design:

The survey conducted at different Medical college & Hospital. Our survey sample was drawn from the target population and the information obtained from the sample once by questioning them and collect the information provided by them.

2.2 Sample Selection:

In those hospital, I provided with questionnaire sheets as a representative of the survey, a total 10 questionnaire were processed for patient survey and total of 300 questionnaire sheets for the patient survey were considered., I interviewed registered physician they are all specialized individual sectors and they are responsible for patient healthcare service.

2.3 Field work:

The survey data were collected from those Institutes, after 6^{th} months of field work which were use for the development of study tools, collection of data and analysis.

2.4 Data collection and Analysis:

This paper and pencil field survey consisted of open, closed ended and multiple choice questions. An English language survey was developed based on information drawn from relevant literatures pertaining to use of Prescription drugs used during Gestational Diabetes in Bangladesh. Separate questionnaires were prepared for patient survey. Questionnaires for pregnant women is related to gestation period, age, hight, Fasting value ,non fasting value, patient history and list of drugs included.

2.5 Methods of data collection:

In this survey the statistical analysis were performed using MS Excel 2007.

2.6 Patient Category: Gestational Diabetes

2.7 Place of investigation: Different level of Medical college & Hospital,. Gynecology Department, Outdoor and Indoor.

2.8 Questions for the patients are as follows

Questionnaires on Pattern and Treatment of Gestational Diabetes:

1. What is your Age? (Years)

…..below20	21…….25	26….30	31……35	Above35…

2. What is your body Weight (kg)?

3. What is your height? Ans. _____

4. Are you suffering from Diabetes? Yes / No

   If yes mention type of your diabetes

TypeI
TypeII

5. From which trimester you are suffering from Diabetes with exact month?

First	Second	Third

6. What was the sugar level wheh first diagnosed?

Fasting value……
Non fasting value……..

7. What is the present sugar level?

Fasting value……
Non fasting value……..

8. Mention your previous history.

   a) Diabetes of your family members: Parents / grand parents / others/Not applicable.
   b) Diabetes during previous pregnancy: Yes / No / Not applicable.

9. Do you take any type of medicine for your Diabetes?

   Yes / No

10. Which drugs have been prescribed to treat your Gestational diabetes?
    a) b) c)

3.Results & Discussions :

3.1. Results

Table 3.1.1Age of patients:

Age	Number of patients
Below 20	45
21-25	62
26-30	76
31-35	90
Above 35	27
Total	300

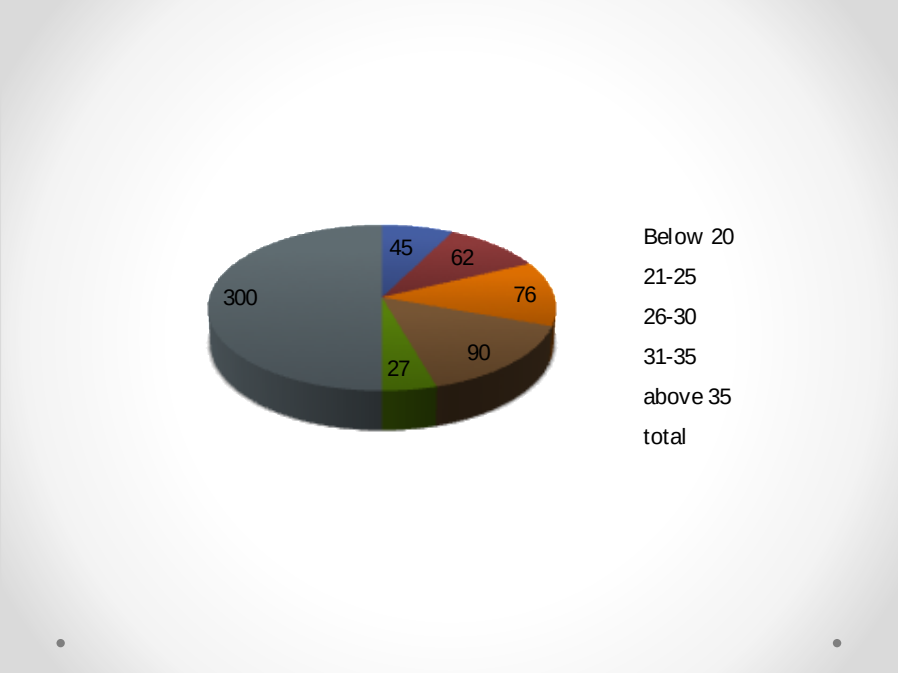


Figure 3.1.1 Ages of various pregnant of Patient

The table and the graph represent the frequency and percentage of age of various pregnant patients. From this table we can see that, the age of the women between 31-35 (30%) became more pregnant than that of other ages women.

Table 3.1.2Body weight of the patients:

Body weight of the patients	Number of patients
51-54	48
55-68	56
69-72	80
73-86	63
Above 86	53
Total	300

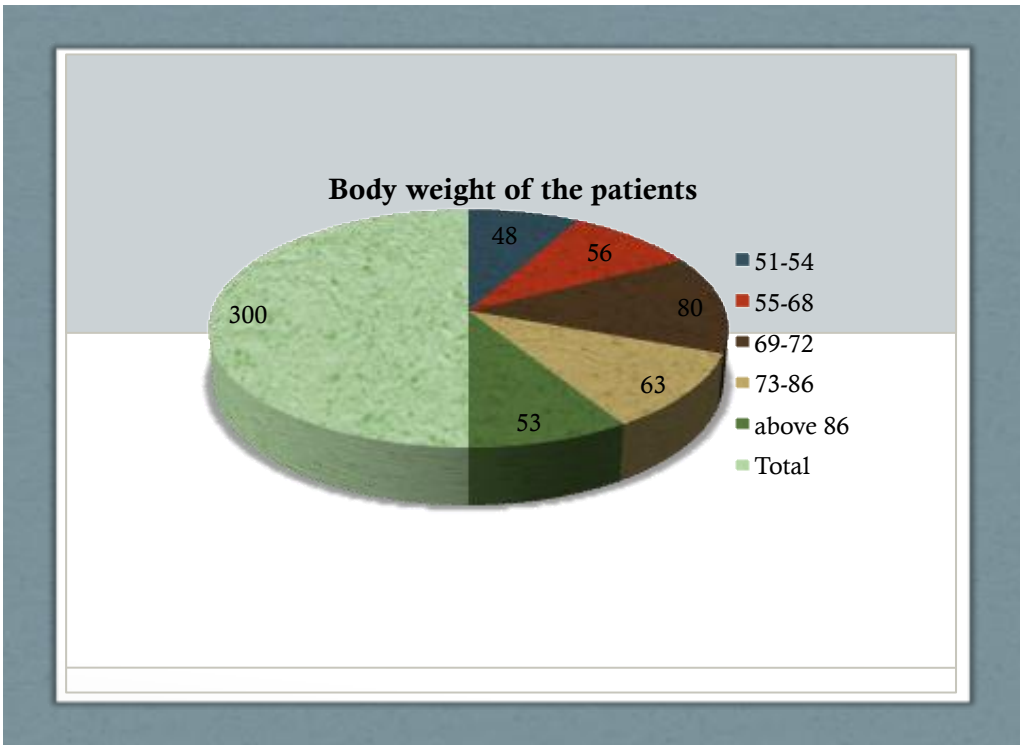


Figure 3.1.2 Body Weight of Patient

The table and the graph represent the frequency and percentage of body weight (Kg) of pregnant patient. From this table we can see that, the body weights between 69-72 (26%) most of the pregnant patient.

Table 3.1.3 Hight of the patients:

Hight of the patients	Number of patients
Below 5’	100
5-5.4’	160
5.5-5.9’	40

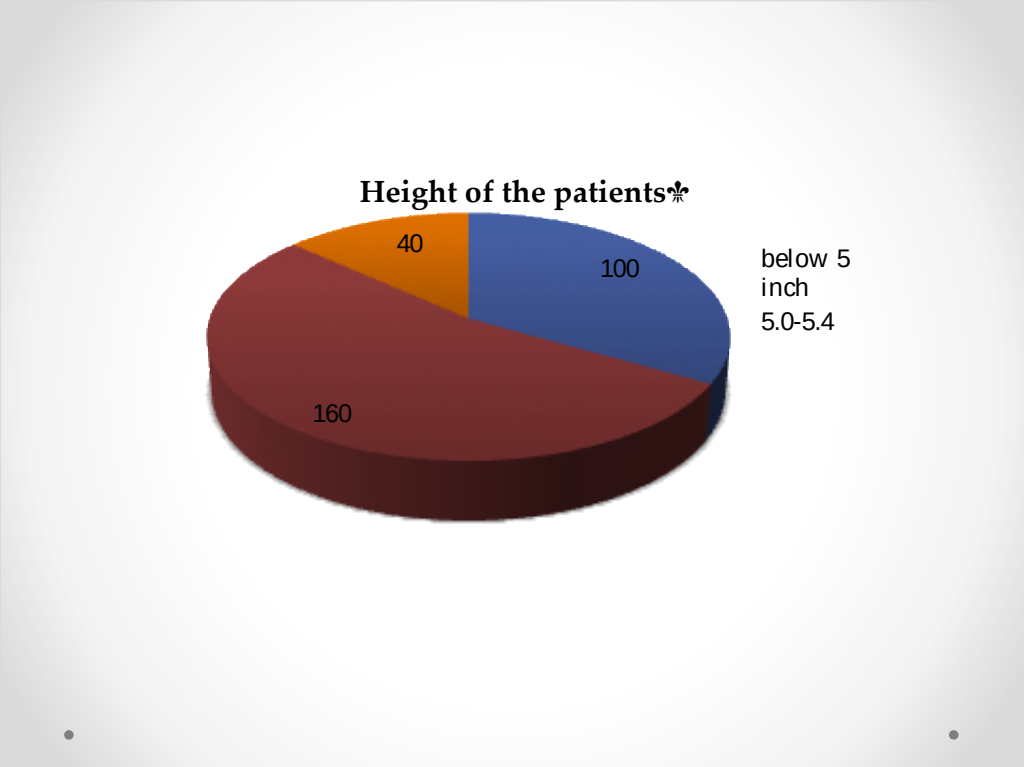


Figure 3.1.3 Height of Patient

The table and the graph represent the frequency and percentage height of patient (inches) of pregnant patient. From this table we can see that, the maximum patient height between 5-5.4(53%) inches

Table3.1.4 Suffering from diabetes patients:

Suffering from Gestational diabetes	Number of patients
Yes	270
No	30
Total	300

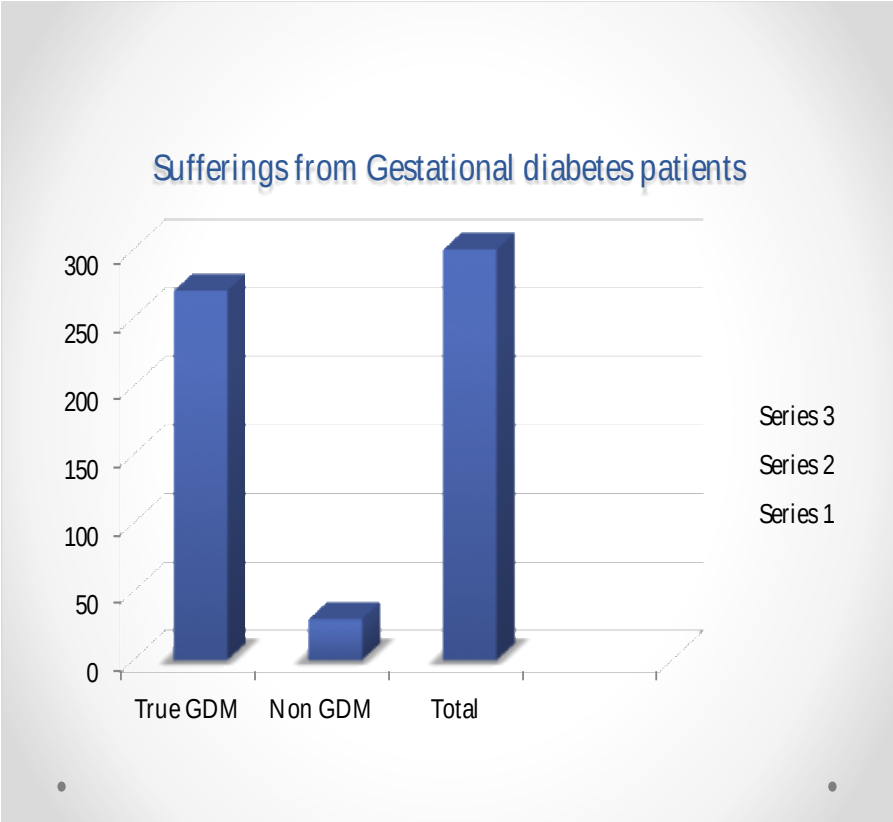


Figure 3.1.4 Patients Suffering from Gestational Diabetes

The table and the graph represent the frequency and percentage of patient suffering from gestational diabetes. From this table we can see that, the maximum patients are answer no 30 women is approximately higher, but answer yes 270 women indicate the gestational diabetes presents.

Table 3.1.5 Which Trimester patients are suffering from Gestational diabetes :

Trimester	Number of patients
1st	25
2nd	195
3rd	80

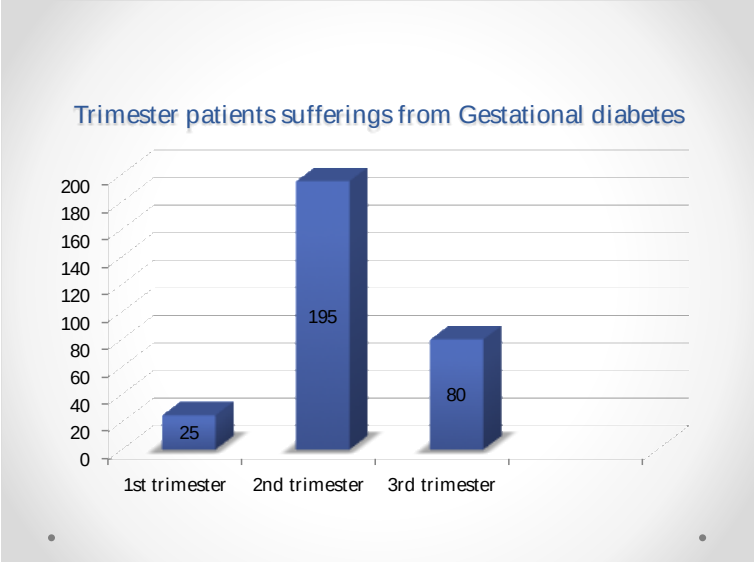


Figure 3.6 Which Trimester Patient are Suffering from Gestational Diabetes

The table and the graph represent the frequency and percentages which trimester patients are suffering from Gestational Diabetes. From this table we can see that, the maximum patients are suffering from 2nd trimester 195(65%) women is approximately higher.

Table 3.1.6 Sugar level at first diagnosed:

3.1.6 (A) Fasting value:

Fasting value of patients(mmol/L)	Number of patients
Below 6.5	223
6.6-10.5	69
Above 10.6	8

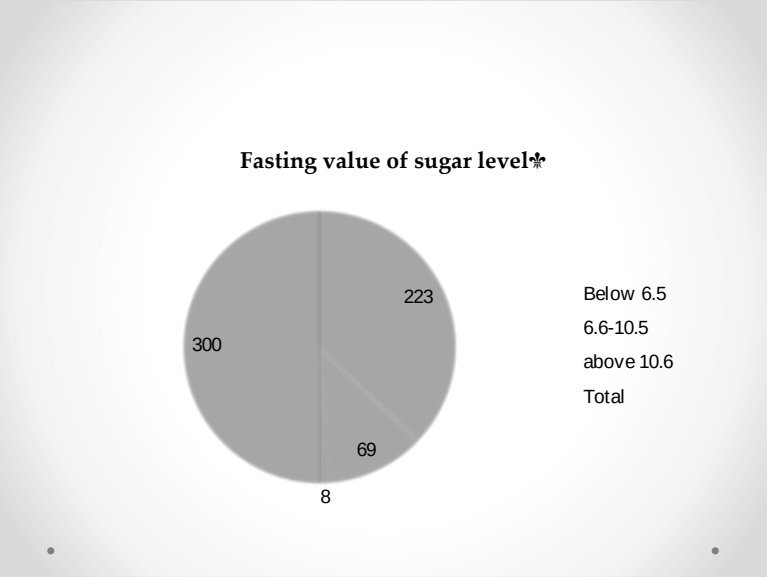


Figure 3.1.6(A) Fasting Value when first Diagnosis

The table and the graph represent the frequency and percentages of Fasting Value when first Diagnosis of patients. From this table we can see that, the maximum patients Fasting Value (below 6.5)mmol/L when first diagnoses are 223(74%)patients.

Table 3.1.7 Sugar level at present diagnosis:

3.1.7(A) Fasting value:

Fasting value of patients(mmol/L)	Number of patients
Below 6.5	180
6.6-10.5	108
Above 10.5	12

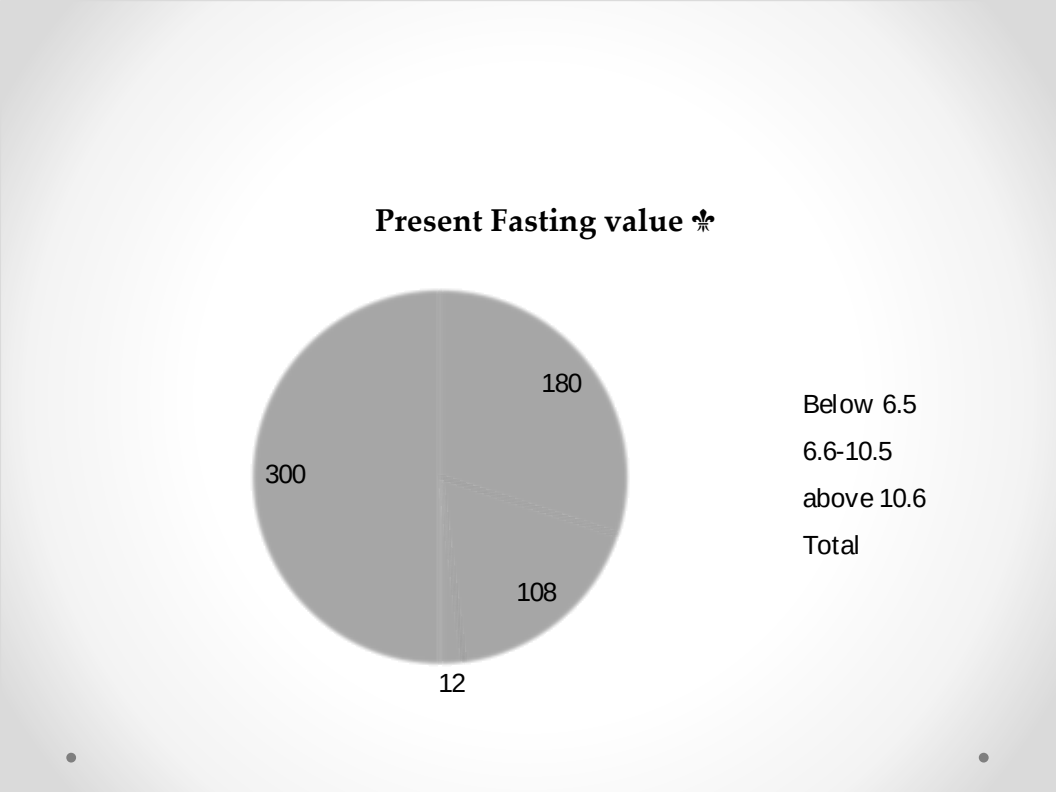


Figure 3.1.7(A) Fasting Value at present Diagnosis

The table and the graph represent the frequency and percentages of Fasting Value at present Diagnosis of patients. From this table we can see that, the maximum patients Fasting Value below6.5 mmol/L, are 180 patients.

Table 3.1.8 History of the patients:

3.1.8 (A) Diabetes in family members:

Diabetes in family members	Number of patients
Parents	179
Not applicable	37
Grand parients	62
Others	22

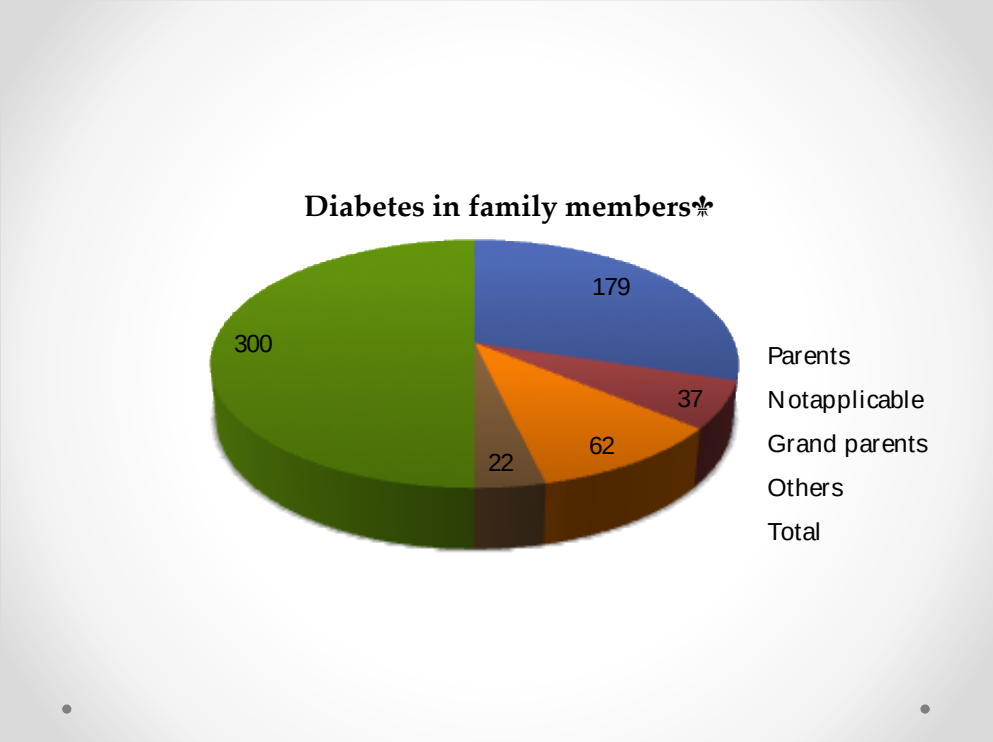


Figure 3.1.8 (A) Previous History of Diabetes of patient family Member

The table and the graph represent the frequency and percentages Previous History of Diabetes of patient family Member. From this table we can see that, the maximum patient's family history of parents are suffering from Diabetes 59% is approximately high risk factors.

3.1.8 (B) Diabetes during previous pregnancy:

Diabetes during previous pregnancy	Number of patients
Yes	228
No	57
Not applicable	15

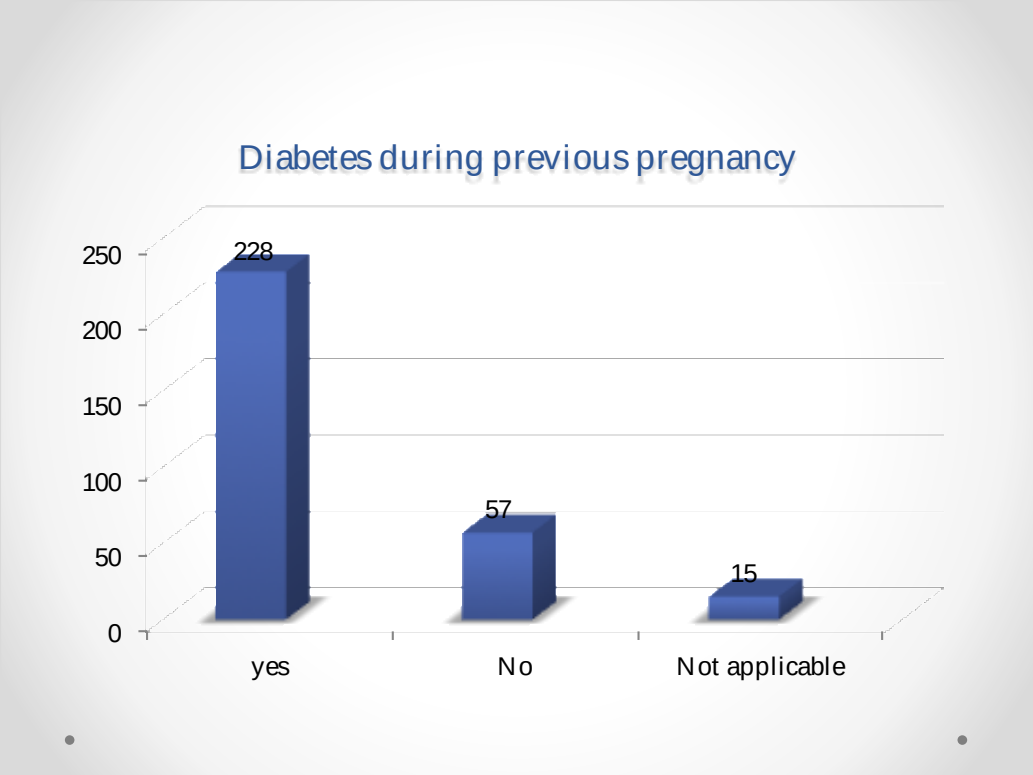


Figure 3.1.8 (B) Diabetes during Previous Pregnancy

The table and the graph represent the frequency and percentages history of Diabetes of previous pregnancy. From this table we can see that, the maximum patient's history of previous pregnancy diabetes answer 228(76%) women and 15(5%) is not applicable are approximately higher.

Table 3.1.9. Taken any type of medicine:

Taken medicine or insulin	Number of patients
Yes	289
No	11

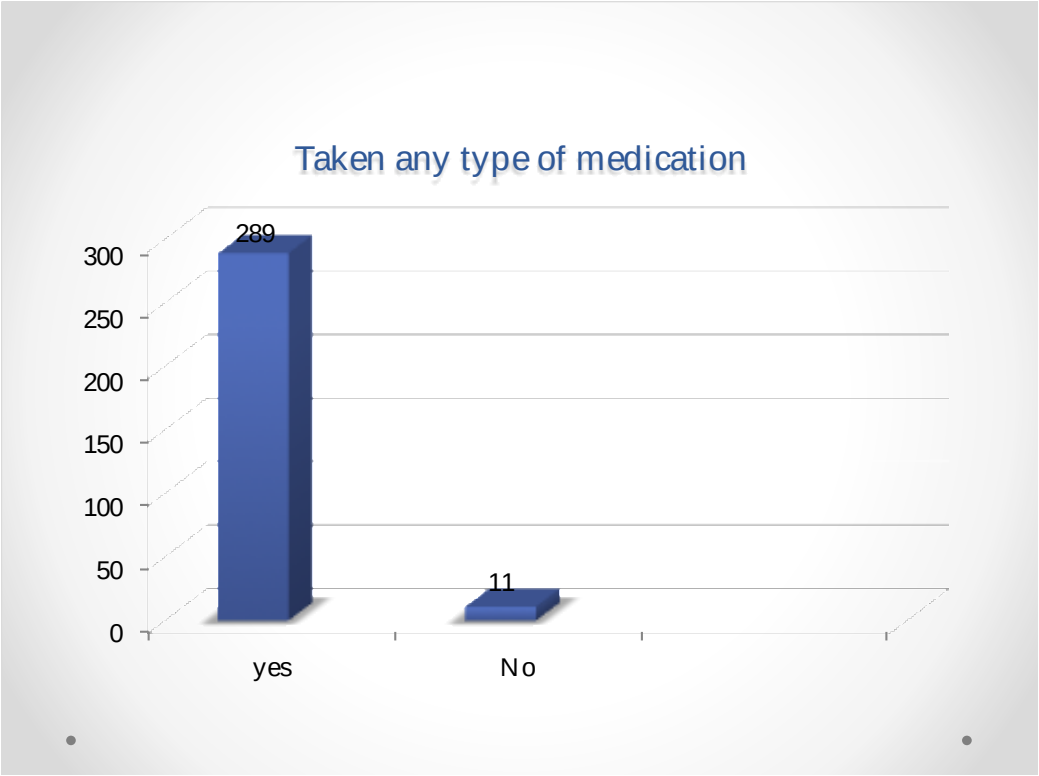


Figure 3.1.9 Take any type of medicine when suffer from Diabetes

The table and the graph represent the frequency and percentages take any type of medicine when suffering from diabetes. From this table we can see that, the maximum patients are answer Yes 289(96%) patients are approximately higher.

Table 3.1.10 Drug have been prescribed to treat gestational diabetes:

Prescribed drugs to treat diabetes	Number of patients
Insulin/tablet	259
Diet control & exercise	41

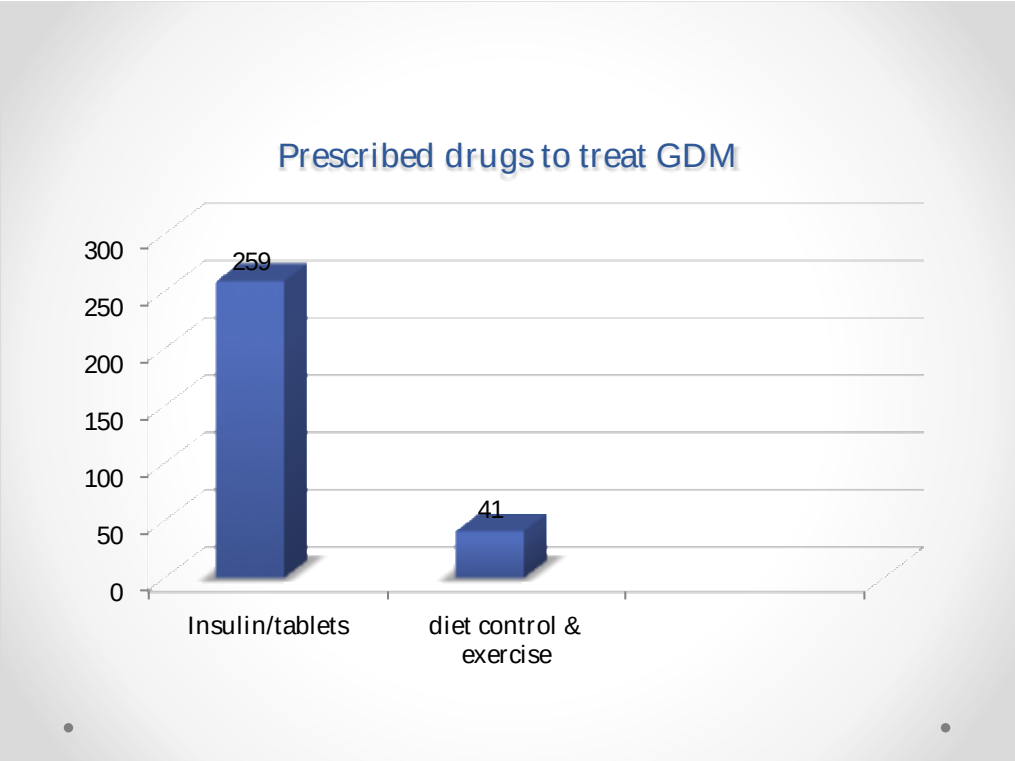


Figure 3.1.10 Medicine consume for treatment of Diabetes

The table and the graph represent the frequency of the patients who are taken medicine for treatment of Diabetes. From this table we can see that, the maximum patients are consumed Insulin ,259(86%) patients.

Literature review :

Women with gestational diabetes mellitus are rarely treated with a sulfonylurea drug, because of concern about teratogenicity and neonatal hypoglycemia. There is little information about the efficacy of these drugs in this group of women.

There, they studied 404 women with singleton pregnancies and gestational diabetes that required treatment. The women were randomly assigned between 11 and 33 weeks of gestation to receive glyburide or insulin according to an intensified treatment protocol. The primary end point was achievement of the desired level of glycemic control. Secondary end points included maternal and neonatal complications. The mean (±SD) pretreatment blood glu- cose concentration as measured at home for one week was 114±19 mg per deciliter (6.4±1.1 mmol per liter) in the glyburide group and 116±22 mg per deciliter (6.5±1.2 mmol per liter) in the insulin group (P=0.33). The mean concentrations during treatment were 105± 16 mg per deciliter (5.9±0.9 mmol per liter) in the glyburide group and 105±18 mg per deciliter (5.9±1.0 mmol per liter) in the insulin group (P=0.99). Eight women in the glyburide group (4 percent) required insulin therapy. There were no significant differences between the glyburide and insulin groups in the per- centage of infants who were large for gestational age (12 percent and 13 percent, respectively); who had macrosomia, defined as a birth weight of 4000 g or more (7 percent and 4 percent); who had lung compli- cations (8 percent and 6 percent); who had hypoglycemia (9 percent and 6 percent); who were admitted to a neonatal intensive care unit (6 percent and 7 per- cent); or who had fetal anomalies (2 percent and 2 percent). The cord-serum insulin concentrations were similar in the two groups, and glyburide was not detected in the cord serum of any infant in the glyburide group. In women with gestational diabetes, glyburide is a clinically effective alternative to insulin therapy. (Langer et al.126-127)

To investigate the effect of a macro-nutrient preload (Inzone Vitality) on blood glucose

levels and pregnancy outcomes of gestational diabetes. The preload method involves the

ingestion of a smaller amount of a macronutrient composition half an hour before regular meals. The hypothesis was that preload treatment will reduce postprandial glycaemia in gestational Diabetes.There, 66 diagnosed cases of gestational diabetes were randomly selected from gynecology and obstetrics outpatient clinic at Xinqiao Hospital in Chongqing. The patients were divided into an intervention group (33 cases) and a control group (33 cases), according to odd-even numbers of the random cases. The intervention group was treated with a macro-nutrient preload given 0.5h before regular meals and the control group was given a comparative treatment consisting of a milk powder with similar energy content. The two groups were studied until delivery and the measured parameters included fasting blood glucose (FBG), 2-hour postprandial blood glucose (2h-PBG), delivery mode and neonatal birth weight.

The two groups showed no differences in FBG or 2h-PBG before the nutritional intervention. FBG and 2h-PBG after intervention and before delivery were significantly lower in the intervention group, treated with the macro nutrient preload compared to the control group ($P < 0.01$). Changes in FBG and 2h-PBG before and after the intervention were investigated and the difference in the intervention group was significantly greater than corresponding values in the control group ($P < 0.05$, $P < 0.01$). The neonatal birth weight and delivery mode was not significantly different ($P > 0.05$). 39 A macro-nutrient composition, used as a preload is effective in controlling FBG and PBG of gestational diabetes.(Li et al .)

In 2005, conducted a randomized clinical trial to determine whether treatment of women with gestational diabetes mellitus reduced the risk of perinatal complications.

they randomly assigned women between 24 and 34 weeks' gestation who had gestation- al diabetes to receive dietary advice, blood glucose monitoring, and insulin therapy as needed (the intervention group) or routine care. Primary outcomes included serious perinatal complications (defined as death, shoulder dystocia, bone fracture, and nerve palsy), admission to the neonatal nursery, jaundice requiring phototherapy, induction of labor, cesarean birth, and maternal anxiety, depression, and health status. The rate of serious perinatal complications was significantly lower among the infants of the 490 women in the intervention group than among the infants of the 510 women in the routine-care group (1 percent vs. 4 percent; relative risk adjusted for maternal age, race or ethnic group, and parity, 0.33; 95 percent confidence interval, 0.14 to 0.75; P=0.01). However, more infants of women in the intervention group were admitted to the neonatal nursery (71 percent vs. 61 percent; adjusted relative risk, 1.13; 95 percent confidence interval,1.03to1.23;P=0.01).Women in the intervention group had a higher rate of induction of labor than the women in the routine-care group (39 percent vs. 29 percent; adjusted relative risk, 1.36; 95 percent confidence interval, 1.15 to 1.62; P<0.001), although the rates of cesarean delivery were similar (31 percent and 32 per- cent, respectively; adjusted relative risk, 0.97; 95 percent confidence interval, 0.81 to 1.16; P=0.73). At three months post partum, data on the women's mood and quality of life, available for 573 women, revealed lower rates of depression and higher scores, consistent with improved health status, in the intervention group.

Treatment of gestational diabetes reduces serious perinatal morbidity and may also improve the woman's health-related quality of life. (Caroline A. et al,2005)

It is uncertain whether treatment of mild gestational diabetes mellitus improves preg- nancy outcomes. Women who were in the 24th to 31st week of gestation and who met the criteria for mild gestational diabetes mellitus (i.e., an abnormal result on an oral glucose-tol- erance test but a fasting glucose level below 95 mg per deciliter [5.3 mmol per liter]) were randomly assigned to usual prenatal care (control group) or dietary interven- tion, self-monitoring of blood glucose, and insulin therapy, if necessary (treatment group). The primary outcome was a composite of stillbirth or perinatal death and neonatal complications, including hyperbilirubinemia, hypoglycemia, hyperinsuline- mia, and birth trauma.

A total of 958 women were randomly assigned to a study group 485 to the treatment group and 473 to the control group. We observed no significant difference between groups in the frequency of the composite outcome (32.4% and 37.0% in the treatment and control groups, respectively; P = 0.14). There were no perinatal deaths. However, there were significant reductions with treatment as compared with usual care in several prespecified secondary outcomes, including mean birth weight (3302 vs. 3408 g), neonatal fat mass (427 vs. 464 g), the frequency of large-for-gestational- age infants (7.1% vs. 14.5%), birth weight greater than 4000 g (5.9% vs. 14.3%), shoulder dystocia (1.5% vs. 4.0%), and cesarean delivery (26.9% vs. 33.8%). Treatment of gestational diabetes mellitus, as compared with usual care, was also associated with reduced rates of preeclampsia and gestational hypertension (combined rates for the two conditions, 8.6% vs. 13.6%; P=0.01).

Although treatment of mild gestational diabetes mellitus did not significantly re- duce the frequency of a composite outcome that included stillbirth or perinatal death and several neonatal complications, it did reduce the risks of fetal overgrowth, shoulder dystocia, cesarean delivery, and hypertensive disorders. (Mark B Landon et al, 2009)

Excessive fetal and placental growth are very common in diabetic pregnancy. We aimed to analyze in women with gestational diabetes mellitus (GDM) the association with birth weight (BW), placental weight (PW) and placental-to-birth weight (PWBW) ratio of acknowledged BW predictors.We performed a retrospective analysis of a prospective cohort database from a tertiary hospital. Inclusion criteria were singleton pregnancy, diagnosis of GDM, delivery between 1982 and 2011 and gestational age at birth ≥23 weeks. Multiple regression analysis was performed using as dependent variables BW, PW and PWBW ratio and as independent ones maternal characteristics at baseline, metabolic characteristics (GDM diagnosis, treatment, control), pregnancy-induced hypertension, gestational age at delivery and fetal sex. Two sensitivity analyses were performed.

We evaluated 2547 women, PW being available in 85.3%. BW was 3260 g (2976, 3575), PW 620 g (540, 720) and PWBW ratio 19.27 (17.20, 21.47). Among the 24 analyzed variables, there was an important overlap among those associated with BW, PW and PWBW ratio. For most characteristics associated with both BW and PW, the magnitude of the association was greater for the latter, both when promoting growth (i.e. prepregnancy body mass index, 3 h plasma glucose at diagnosis) and when restricting it (insulin treatment).(A.Ramos et al,2016)

A diagnosis of Gestational Diabetes (GDM) confers adverse risk to the health of the mother and fetus both in pregnancy and later life. The background rate in pregnancy varies between 2 and 14% with incidences reported to be as high as 40% in obese populations. GDM diagnoses are escalating because of rising numbers of overweight and obesity in the reproductive age group but also because of different screening and diagnostic criteria. Lifestyle modification in those diagnosed with GDM has been proven to be an effective treatment in attenuating the metabolic dysregulation associated with this and potentially avoiding the need for medical therapy with either metformin or insulin. Emerging evidence in previous years suggests lifestyle interventions (dietary ± physical activity and behavior modification) either pre-

pregnancy or antenatally may reduce the incidence of GDM. The first trimester is also becoming an important interrogation period for the prediction of many adverse obstetric outcomes including abnormal glucose metabolism. This review outlines the most contemporary evidence on the prediction and non-pharmacological antenatal prevention strategies used for Gestational Diabetes. (Kennelly and McAuliffe ,92-98)

The use of metformin in gestational diabetes is safe and effective, yet some women require additional insulin therapy to achieve glycaemic targets. We found a significant association between earlier gestational age at initiation of metformin therapy and the necessity for supplemental insulin in women treated with metformin during pregnancy.(McGrath et al. 96-99)

We aimed to examine the association of gestational hypertension and chronic hypertension at the inter-conception examination with type 2 diabetes risk among women with a history of gestational diabetes.We conducted a population-based study among 1261 women who had a history of gestational diabetes at 1–5 years after delivery in Tianjin, China. Logistic regression or Cox regression was used to assess the associations of gestational hypertension and chronic hypertension at the inter-conception examination with pre-diabetes and type 2 diabetes risks.

Gestational diabetic women who had a history of gestational hypertension but did not use antihypertensive drugs during pregnancy had a 3.94-fold higher risk (95% CI: 1.94–8.02) of developing type 2 diabetes compared with those who were normotensive in index pregnancy. Compared with gestational diabetic women who had normal blood pressure at the inter-conception examination, hypertensive women at the inter-conception examination were 3.38 times (95% CI: 1.66–6.87) and 2.97 times (95% CI: 1.75–5.05) more likely to develop diabetes and prediabetes, respectively. The odds ratios of type 2 diabetes and prediabetes associated with each 5 mmHg increase in systolic blood pressure were 1.25 (95% CI: 1.03–1.51) and 1.20 (95% CI: 1.06–1.35). Each 5 mmHg increase in diastolic blood pressure contributed to a 1.49-fold higher risk (95% CI: 1.18–1.88) for type 2 diabetes and a 1.42-fold higher risk (95% CI: 1.22–1.65) for prediabetes.

For women with prior gestational diabetes, gestational hypertension and chronic hypertension at the inter-conception examination were risk factors for type 2 diabetes.(Yuan et al.)

gesstational diabetes mellitus (GDM), is characterized by chronic, low-grade subclinical inflammation with altered production of cytokines and mediators. Recently, a new protein acting as a “danger signal”, high mobility group box 1 (HMGB1), that migrates quickly during electrophoresis, has been identified. The aim of our study was to analyze serum levels of HMGB1 in pregnant women, with or without GDM, in the third trimester of pregnancy to evaluate correlation with insulin resistance and other risk factors for GDM.

Seventy five pregnant women positive to the 75 g oral glucose tolerance test (OGTT) were included in the study group and 48 pregnant women who were negative to the screening test, were randomly selected using a computer-generated randomisation table.

A significant positive univariate correlation was observed between serum HMGB1 levels, HOMA-IR index, glycaemia values at OGTT and pre-pregnancy BMI. Moreover, logistic regression analysis showed that serum HMGB1 was independent linked to GDM.Our study demonstrated that HMGB1, a marker of chronic inflammation, is associated to GDM and insulin resistance level, in the third trimester of pregnancy.(Giacobbe et al. 414-418)

Gestational diabetes mellitus (GDM) is a disease commonly occurs during mid to late pregnancy with pathologies such as hyperglycemia, hyperinsulinemia and mal-development of fetus. We have previously demonstrated that pancreatic endoderm (PE) derived from human embryonic stem cells (hESCs) effectively alleviated diabetic symptoms in a mouse model of GDM, although the clinical efficacy was limited due to oxidative stress. In this study, using the anti-oxidant agent naringenin, we aimed to further enhance the efficacy of hESC-derived PE transplant. Insulin-secreting PE was differentiated from hESCs, which were then transplanted into GDM mice. Naringenin was administered to mice receiving the PE transplant, with sham operated mice serving as negative control, to assess its effect on alleviation of GDM symptoms. We found that naringenin supplement further improved insulin response, glucose metabolism and reproductive outcome of the PE-transplanted female mice. Our new findings further potentiates the feasibility of using differentiated hESCs to treat GDM, in which anti-oxidative agent such as naringenin could greatly enhance the clinical efficacy of stem cell based therapies.(Xing,Yang and Wu)

Summary of research:

1. It usually resolves soon after the women gives birth. GDM occurs in bet in 20 in 100 pregnancies.

2. It usually starts in the 2^{nd} half of pregnancy.

3. There is a high risk of it returning in a future pregnancy.

4. GDM is likely due to pregnancy related factors such as presence of human placental lactogen that interferes with susceptible insulin receptor. This is turn causes inappropriately elevated blood sugar level.

5. GDM can occur in 2^{nd}- 3^{rd} trimester in rare. It may form in 1^{st} trimester. This is because in 1^{st} & 2^{nd} month placenta cannot formed. So placental hormone cannot also secrets.

   Another reason is, family history also BMI more than 30 is higher risk.

   * Stress, family condition are one of the major factor.

   * Higher systolic BP can also may cause GDM.

3.2 Discussion:

The extent of the prescribing and the area of greatest concern regarding the occurrence potential prescribing errors in pregnant mothers require further definition. We evaluated the recent medication prescribing experience.

The maximum 300 number of information were collected from different Medical Collage & Hospital. The patients found in these survey the mean age of the women under study was 30-45 years. The highest body weights of patient were found about 69- 72 kg (44%). The heights of patient were surveyed about 60- 64 inch in (80%) patients.

Other then only 300 gestational diabetic patients were found 320 pregnant women. The highest number of prescriptions was collected from women in their 3rd trimester of pregnancy (26.12%), followed by 2nd trimester (65%) and 1st trimester (8.33%) patients. When patient first Diagnosis of gestational diabetes that's time fasting value was counted about 74% patients,(below 6.5) and non fasting value was counted about 48%,(6.5-8.5mmol/L).Parents (59%), not applicable(12.3%)and others (7%) were observed by the patient previous family history. Previous pregnancy of patents diabetes were not responded for 57 patients .

While analyzing the prescription of gestational diabetic patients, it was found that,259(86.7%) patient were taken drugs., which is insulin. And some physician prescribe to there patient is diet control & exercise (13.6%)

4. Conclusion:

Information on the use of drugs during Gestational Diabetes is not available in Bangladesh. Reducing medication errors and improving patient safety are the important areas of discussion. The use of drugs during Gestational Diabetes calls for special attention because in this case in addition to the mother, the health and life of her unborn child is also at risk.

Prescribing drugs during pregnancy presents a challenge for the physicians. Most drugs cross placenta and expose the developing embryo and fetus to their pharmacological and teratogenic effects of pregnant women. Pregnant women very commonly use OTC drugs. Although most OTC drugs have an excellent safety profile, some have unproven safety or are known to adversely affect the fetus.

The main objective of this study was to obtain information about the use of prescription drugs among Gestational Diabetic mother in Bangladesh. Only 300 gestational diabetic patients were found in 320 pregnant women and the highest number of prescriptions were collected from patients in their 1^{st} trimester of pregnancy (8.33%), followed by 2^{nd} trimester (65%) and 3^{rd} trimester (26.12%). When patients first diagnosis for gestational diabetes had occurred, the fasting value was measured about below 6.5mmol/L (78% patients), and non fasting value was about 6.5-8.5mmol/L (48% patients). Parents of 59% patients have a history of gestational diabetes, not applicable 12.33% and others 7.3% were observed by the patient previous family history. In previous pregnancy, diabetes was not responded for 57 patients.

While analyzing the prescription of gestational diabetic patients, it was found that 86.76% patients were taking insulin as a drug. And some physicians suggested there patients to control diet & keeping regular exercise (13.6%). Oral anti-diabetic drug are not prescribe during pregnancy, because of their side effect.

From the survey of those medical college & hospitals under Dhaka district, we found that, the pregnancy safe drugs are used in gestational diabetes, following standard guidelines.

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