STUDY OF ASSOCIATION BETWEEN HYPOTHYROIDISM AND GESTATIONAL DIABETES MELLITUS AND THEIR OBSTETRIC OUTCOME IN A RURAL TERTIARY CARE HOSPITAL

By

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DISSERTATION SUBMITTED TO SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, KOLAR, KARNATAKA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

DEGREE OF

MASTER OF SURGERY

IN

OBSTETRICS AND GYNAECOLOGY

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TAMAKA, KOLAR 563101

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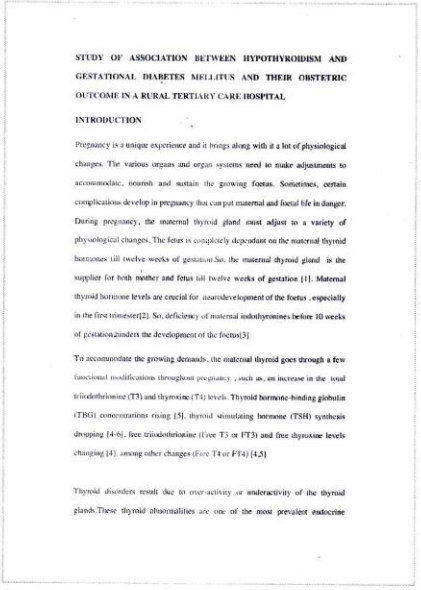

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INTRODUCTION

Pregnancy is a unique experience and it brings along with it a lot of physiological changes. The various organs and organ systems need to make adjustments to accommodate, nourish and sustain the growing foetus. Sometimes, certain complications develop in pregnancy that can put maternal and foetal life in danger. During pregnancy, the maternal thyroid gland must adjust to a variety of physiological changes. The fetus is completely dependant on the maternal thyroid hormones till twelve weeks of gestation.So, the maternal thyroid gland is the supplier for both mother and fetus till twelve weeks of gestation [1]. Maternal thyroid hormone levels are crucial for neurodevelopment of the foetus , especially in the first trimester[2]. So, deficiency of maternal iodothyronines before 10 weeks of gestation,hinders the development of the foetus[3]

To accommodate the growing demands, the maternal thyroid goes through a few functional modifications throughout pregnancy , such as, an increase in the total triiodothironine (T3) and thyroxine (T4) levels. Thyroid hormone-binding globulin (TBG) concentrations rising [5], thyroid stimulating hormone (TSH) synthesis dropping [4-6], free triiodothironine (Free T3 or FT3) and free thyroxine levels changing [4], among other changes (Free T4 or FT4) [4,5]

Thyroid disorders result due to over-activity or underactivity of the thyroid glands.These thyroid abnormalities are one of the most prevalent endocrine

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STUDY OF ASSOCIATION BETWEEN HYPOTHYROIDISM AND GESTATIONAL DIABETES MELLITUS AND THEIR OBSTETRIC OUTCOME IN A RURAL TERTIARY CARE HOSPITAL INTRODUCTION Pregnancy is a unique experience and it brings along with it a lot of physiological changes. The various organs and organ systems need to make adjustments to accommodate, nourish and sustain the growing foetus. Sometimes, certain complications develop in pregnancy that can put maternal and foetal life in danger. During pregnancy, the maternal thyroid gland must adjust to a variety of physiological changes. The fetus is completely dependant on the maternal thyroid hormones till twelve weeks of gestation.So, the maternal thyroid gland is the supplier for both mother and fetus till twelve weeks of gestation [1]. Maternal thyroid hormone levels are crucial for neurodevelopment of the foetus , especially in the first trimester[2]. So,

ACKNOWLEDGEMENT

This dissertation has been one of the most significant academic challenges I have ever had to face. Without the support, patience and guidance of the following people, this study would not have been impossible. It is to them I owe my deepest and most sincere gratitude.

Firstly, I would like to thank my Guide **Dr. VASANTHA KUMAR.S**, Professor of Department of Obstetrics and Gynaecology , SDUMC Kolar, for her utmost patience, continuous support, guidance and contribution. I would also like to thank her for her constant encouragement and guidance with respect to every aspect of my professional life.

I am sincerely thankful to **Dr. RATHNAMMA P**, Associate professor and head of Department of Obstetrics and Gynaecology for encouraging me to highest peak, paying close and continuous Attention towards me to finish all tasks, and also providing her kind support , valuable suggestions ,Immense patience and great care

I whole heartly acknowledge **Dr SHEELA S.R.** , **Dr MUNIKRISHNA .M** , Professor in the department of obstetrics and Gynaecology , for their Valuable teaching of perserverance professional ethics ,moral support and commitment . The precious advice on both the dissertation as well as on my career was invaluable.

I extend my gratitude towards all the patients who agreed to participate in this study, without their precious support it would not be possible to conduct this research. I thank my fellow post graduates and my friends **Dr. AKSHITHA**,DR PRATYUSHA,DR RAVEENA, DR SAHITHYA,DR SHRAVYA,DR NANDINI, DR SABAH, DR DHANUSHA for their support throught. I sincerely thank all assistant professor **Dr VIMARSHITHA , Dr AARSHITA,Dr NANDINI, Dr CHANDRACHUR , Dr YASHASWANI, Dr KRATHIKA ,** in the department of OBG ,SDUMC , KOLAR, for their constant guidance and encouragement.

I thank all the nurses who are our pillars of support , special thank to all labour room staff for their help and support throughout my study.

I expressed my profound gratitude to my beloved parents **PROF HIRALAL KONAR**, **Mrs.MADHUSRI KONAR** for always inspiring me, for giving me countinous encouragement , unfailing support , and unconditional love throughout my life.

Last but not the least , I extend my gratitude towards all the patient who agreed to participate in this study , without their precious support , it would not be possible to conduct this research.

DR.LISLEY KONAR

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LIST OF ABBREVIATIONS

GLOSSARY	ABBREVIATIONS
BMI	Body Mass Index
GDM	Gestational Diabetes Mellitus
SCH	Subclinical Hypothyroidism
SGH	Subclinical gestational hypothyroidism
OGCT	Oral Glucose Challenge Test
T3	Triiodothyronine
T4	Thyroxine
TBG	Thyroid Binding Globulin
TSH	Thyroid Stimulating Hormone
Free T3	free triiodothrionine
Free T4	free thyroxine
TTN	Transient tachypnoea of newborn
RDS	Respiratory distress syndrome
TPO Ab	Thyroid Peroxidase Antibody
ATA	American Thyroid Association
DIPSI	Diabetes in Pregnancy Study group India
AITD	auto-immune thyroid disease

ABSTRACT

BACKGROUND: In developing countries subclinical hypothyroidism(SCH) and gestational diabetes mellitus(GDM) constitute the 2 most common endocrinopathies complicating pregnancy.They have common pathophysiological mechanisms and thus are known to complicate the course of pregnancy and its outcome . In southern India, the prevalence of hypothyroidism is about 12.22%. No studies have defined the mechanism by which thyroid hormones affect glucose regulation in pregnancy.But a significant correlation was found between TSH and insulin resistance levels observed in the hypothyroidism group.SCH with antithyroid autoantibodies positive were seen to have increase in the risk of GDM.

AIMS: To find out the association, between hypothyroidism and gestational diabetes mellitus .To find out the maternal and fetal outcomes of such pregnancies complicated by both GDM and hypothyroidism.

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MATERIALS& METHODS: This is a hospital-based cross-sectional study done over a period of 18 months on all pregnant women attending the department of Obstetrics and Gynecology diagnosed with hypothyroidism. Gestational diabetes mellitus(GDM) is ruled out among them and the maternal and fetal outcomes of such pregnancies complicating with dual endocrinopathies is noted.

RESULTS: The mean age of patients with dual endocrinopathies was found to be 30 years.Mostly associated in the multiparous women and also associated with high BMI.Though there was no statistical significance found in the mode of delivery but all babies delivered to this dual endocrinopathies patients had NICU admission and postpartum complications of mainly surgical site infection .The most common cause of

cesarean section found in these patients was previous LSCS. A statistical significant difference was found between pregnancy-induced hypertension, anemia, hydramnios, and sepsis with GDM.

CONCLUSION: Preterm births, hypertensive problems, caesarean sections, and rates of infertility are all increased when DM and hypothyroidism coexist during pregnancy.

For a better

INTRODUCTION

Pregnancy is a unique experience and it brings along with it a lot of physiological changes. The various organs and organ systems need to make adjustments to accommodate, nourish and sustain the growing fetus. Sometimes, certain complications develop in pregnancy that can put both maternal and fetal life in danger. During pregnancy, the maternal thyroid gland must adjust to a variety of physiological changes. The fetus is completely dependent on the maternal thyroid hormones till twelve weeks of gestation.So, the maternal thyroid gland is the supplier for both mother and fetus till twelve weeks of gestation[1]. Maternal thyroid hormone levels are crucial for neurodevelopment of the fetus , especially in the first trimester[2]. So, deficiency of maternal iodothyronines before 10 weeks of gestation, hinders the development of the fetus[3]

To accommodate the growing demands, the maternal thyroid goes through a few functional modifications throughout pregnancy , such as, an increase in the total triiodothyronine (T3) and thyroxine (T4) levels. Thyroid hormone-binding globulin (TBG) concentrations rising[5] , thyroid stimulating hormone (TSH) synthesis dropping[4-6], free triiodothrionine (Free T3 or FT3) and free thyroxine levels changing[4], among other changes (Free T4 or FT4) [4,5]

Thyroid disorders result due to over-activity or underactivity of the thyroid glands.These thyroid abnormalities are one of the most prevalent endocrine problems in pregnant women[7]. Thyroid dysfunction, which affects 2% to 4% of pregnant women worldwide, is linked to bad pregnancy outcomes[8].According to

various studies, the frequency of maternal hypothyroidism in India ranged from 1.2% to 67%[9].

The link between maternal hypothyroidism and unfavourable pregnancy outcomes is not well-established[9]. Maternal hypothyroidism has been associated to preeclampsia, ecclampsia, pregnancy-induced hypertension, gestational diabetes mellitus, and fetal problems such low birth weight, premature delivery, neurological abnormalities, abruptio placenta, and anaemia[8-9]. A stillbirth, low birth weight, preterm, fetal discomfort, and perinatal death are among risks associated with overt hypothyroidism[11,12]. Additionally detrimental to prenatal neurological and cognitive development is associated with overt hypothyroidism. Untreated hypothyroidism increases the risk of cognitive developmental problems in offspring, which can show up as lower IQs and other learning difficulties[13].

Hypothyroidism and various kinds of diabetes mellitus have been linked in numerous studies though there are contradictory results present[14,15]. There may be a connection between autoimmune thyroid dysfunction and type 2 diabetes as anti-TPO antibody titers are found to be increased in autoimmune thyroid dysfunction patients who also had insulin resistance. While others have found no conclusive evidence of a link between the two illnesses and pregnancy[16,17,18]

About 7% of pregnancies have diabetes, the majority of which are gestational. Of note, the prevalence of diabetes mellitus has been steadily rising as a result of the recent obesity pandemic and the progressive rise in pregnant women's body mass indices[19].

The term gestational diabetes mellitus (GDM) refers to “glucose intolerance that manifests for the first time or is first noticed during pregnancy”. The increase in

concentration of human placental lactogen and estrogen is responsible for this phenomenon[20].

Insulin sensitivity is either maintained, lowered, or even raised during the early stages of pregnancy despite an increase in insulin secretion. The steady loss in insulin sensitivity begins in the middle of the third trimester. For the remainder of the pregnancy, it can develop worse, reaching a peak in the late third trimester. It recovers after placental delivery. As a result, GDM often appears in the second half of the third trimester and entirely disappears following delivery[21].

"The physiological changes during pregnancy results in increase in the beta hCG levels as the pregnancy progresses.This leads to increase in the synthesis of thyroid-stimulating hormone and increase in the thyroid binding globulin. Additionally, change in the peripheral metabolism of thyroid hormones at the placental level. Compared to women with overt hypothyroidism, SGH has fewer problems, but has been associated with a increased risk of severe preeclampsia, preterm birth, placental abruption, infantile respiratory distress syndrome, and miscarriage". Additionally, numerous studies have revealed a connection between SGH and insulin resistance, which may hasten the onset of gestational diabetes mellitus (GDM). The most common aberration in carbohydrate metabolism is GDM, which can cause problems with pregnancy, labour, and fetal development. A threatening miscarriage, a preterm or cesarean birth, polyhydramnios, and severe preeclampsia are more common in pregnant women with GDM. Examples of fetal issues include shoulder dystocia, traumatism after delivery, acute hypoxia, and cerebrovascular events with traumatic origins. The mother's diabetes mellitus also "increases the chance of long-term metabolic issues, such as obesity and type 2 diabetes mellitus

in offspring". They also act as insulin antagonists, enhancing gluconeogenesis in the process. "In addition to acting as insulin antagonists, by increasing gluconeogenesis, glycogenolysis, and the release of glucose from the liver into the blood as a result of increased GLUT2 expression, thyroid hormones also function as insulin synergists. They encourage the expression of GLUT4 in peripheral tissues such as muscle and fat to aid in the transport and utilisation of glucose"[22].

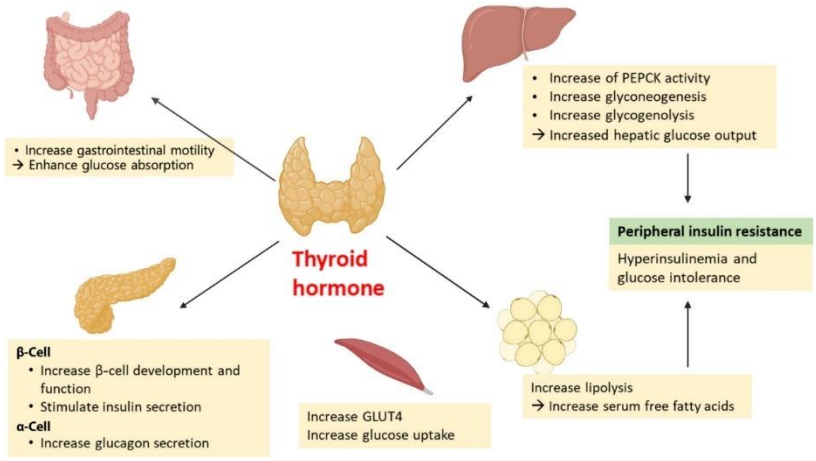

FIGURE 1: Effects of thyroid hormone on glucose metabolism. GLUT4, glucose transporter type 4; PEPCK, phosphoenolpyruvate carboxykinase[90].

"Some potential pathophysiologic mechanisms of carbohydrate metabolism disorders in hypothyroidism include a decrease in GLUT4 expression, a direct effect on insulin degradation, a compromised ratio between glucose release by the liver and its utilisation by peripheral tissues, and an increase in circulating free fatty acids.Data on how hypothyroidism affects the amount of insulin secretion are conflicting, but some research suggested a decrease in the latter"[22].

"Timely detection of GDM is very important as it is known to adversely affect the obstetric outcomes like polyhydramnios, preeclampsia, an increased risk of

caesarean section, infection, and other postpartum problems. Additionally, it increases the risk of maternal obesity, type 2 diabetes, and hypertension in the future" [23,24]. Congenital abnormalities are not more common in these children since GDM often occurs at the end of the second trimester, when development is complete. "Nevertheless, there is a risk that the newborn will experience macrosomia, protracted labour, shoulder dystocia, bone fracture, erb palsy, hypoglycemia, hypocalcemia, hypomagnesemia, hyperbilirubinemia, respiratory distress syndrome, polycythemia, perinatal mortality, as well as adult obesity and type 2 diabetes"[25] ."Obesity, advanced maternal age, previous GDM, family history of diabetes, polycystic ovary syndrome, persistent glucosuria, history of giving birth to large babies (birth weight >4000 g), history of recurrent abortions, history of unexplained stillbirths, history of essential hypertension, and history of pregnancy-related hypertension are some risk factors for developing GDM"[26].

Common endocrinological problems linked to pregnancy include hypothyroidism and gestational diabetes mellitus. They are known to have negative effects on mother and fetal outcomes. To prevent issues for the mother and the growing baby during the first trimester of pregnancy, regular monitoring and subsequent thyroxine supplements are necessary because thyroid insufficiency is underdiagnosed. Similar to this, it is important to recognize pregnant women with GDM due to its association with significant metabolic alterations, elevated perinatal and maternal morbidity, and elevated maternal mortality, all of which contribute to long-term morbidity in both the mothers and their offspring[27].

There is a lack of evidence about the association between hypothyroidism and with gestational diabetes mellitus and obstetric outcome in cases complicated with this

dual endocrinopathies. The current study aims to "determine the association between hypothyroidism in pregnancy and gestational diabetes mellitus and to find out the maternal and fetal outcomes of such pregnancies complicated by both GDM and hypothyroidism".

NEED OF THE STUDY:

Thyroid dysfunctions and diabetes mellitus (DM) are the most common endocrine disorders in pregnancy

Both affect the pregnancy outcomes adversely

Adverse maternal outcomes are : Miscarriage, Hypertensive disorders in pregnancy, placental abruption, Anaemia, Polyhydramnios, Increased risk of cesarean delivery.

Adverse fatal outcomes are : Preterm birth, Prematurity, RDS, Neonatal Jaundice, LBW, Congenital malformations, lncreased NICU admission, High perinatal morbidity and mortality

AIMS AND OBJECTIVES

- "To find out the association,between hypothyroidism and gestational diabetes mellitus".
- "To find out the maternal and fetal outcomes of such pregnancies complicated by both GDM and hypothyroidism"

REVIEW OF LITERATURE

Pregnancy-related subclinical gestational hypothyroidism(SGH) and gestational diabetes mellitus (GDM) are the two most common endocrine diseases . SGH and GDM have common pathophysiological pathways and are related clinical disorders that have the potential to complicate the course of pregnancy, labour, and the postpartum period for both the mother and the fetus. Impaired glucose homeostasis is a feature of both GDM and T2DM; thyroid hormones may have different effects on these conditions. The concentration of TPO Ab can be used to identify thyroid autoimmune disease. A particular TPO Ab concentration, which is indicated in measurement kits, determines TPO Ab-positivity. TPO Ab positivity (as opposed to negativity) is related with an increased risk of developing GDM, and SCH may enhance this risk even further. Pregnancy-related hormonal and metabolic changes result in alterations in thyroid function[22].

Pregnancy brings a lot of physiological changes in the female body. The uterus undergoes extreme structural and cellular changes to accommodate the growing fetus. The elevated levels of estrogen stimulates the thyroid binding globulin[5] which in turn leads to increased levels of total triiodothrionine (T3) and thyroxine (T4)[5] .“The anterior pituitary gland produces thyroid stimulating hormone (TSH) due to elevated hCG levels in the first trimester”[4,5,6]. There is enhanced placental type 3 deiodinase activity which causes degradation of thyroid hormone. In addition to increasing a woman's daily iodine need, all these alterations result in an overall up to 50% rise in the total serum thyroid hormone levels[28].

Urinary iodine excretion increases in the first trimester of pregnancy and declines in the second and third trimesters. In order to help the thyroid axis fulfil its increased needs, the hormone human chorionic gonadotrophin (hCG), which is created during

pregnancy, encourages the thyroid to make thyroid hormone.Recent studies suggest that women who have elevated levels of the thyroid peroxidase (TPO) antibody (TPOAb) may experience a reduced thyroidal response to hCG15 and might not be able to meet the demands of pregnancy. Regardless of thyroid function, this may assist to explain why women with thyroid autoimmunity and positive TPOAb have a greater likelihood of experiencing unfavourable obstetric outcomes[29].

In women with reduced thyroid reserve, the stress during pregnancy can cause clinical or subclinical hypothyroidism. The prevalence of hypothyroisim in pregnant females in India is quite high i.e 13.13%[30]. Hypothyroidism is a condition that occurs "when the thyroid gland produces excessively little (underactive) thyroid hormones". Clinical hypothyroidism is seen to affect almost 0.3–0.5% pregnant women[12]. There are two types of hypothyroidism: subclinical and overt hypothyroidism. Pregnancy-related subclinical hypothyroidism (SCH) is defined as a "normal serum thyroxine [T 4] concentration, which can be either total (TT 4) or free (FT 4) with a serum thyroid-stimulating hormone (TSH) concentration more than the upper limit of the reference range. The tri-iodothyronine (T 3) level in the serum is normal".

Types

Subclinical hypothyroidism, in which there is an elevated blood TSH with normal free thyroxine, affects 3% to 5% of pregnant women (FT4)[31]. TSH values above 10 mU/l, regardless of FT4 levels, and FT4 levels below normal define overt hypothyroidism. It shows a 0.3% to 0.5% pregnancy prevalence rate[32].

Hashimoto's disease, an autoimmune thyroiditis, is the most frequent reason for hypothyroidism in females of reproductive age[12]. Prior radioactive iodine exposure, surgical thyroid removal for multinodular goitre or thyroid cancer[33], excessive thionamide treatment for hyperthyroidism, drugs that impair the absorption or metabolism of LT4, and central disorders that block the hypothalamic-pituitary-thyroid axis are some additional causes.

Because the signs and symptoms of hypothyroidism can vary from patient to patient and may be mild and nonspecific. Some of the classic symptoms, such as sensitivity to the cold, puffiness, decreased sweating, and skin abnormalities, might not always be present. Other signs and symptoms include dryness of skin, changes in voice , hairfall, constipation, exhaustion, cramps in the muscles, sensitivity to the cold, depression, anxiety, psychosis, memory loss, disrupted sleep, abnormal menstrual cycles, weight gain, and galactorrhea. Additional signs and symptoms that patients may suffer include an "enlarged thyroid gland, weight gain, dry skin, coarse hair, pallor and jaundice, dull facial expressions, macroglossia, bradycardia, and pericardial effusion"[34].

If untreated, maternal hypothyroidism can have disastrous effects. Preterm labour, newborn morbidity, spontaneous abortion, pregnancy-induced hypertension, gestational diabetes mellitus, anaemia, postpartum haemorrhage, placental abruption, and infant morbidity are all recognized side effects[39]. Its relationship with preeclampsia, caesarean section[40], low birth weight, fetal discomfort, delayed neuropsychological development, and worse intelligence scores has also been suggested by a number of research.

However, the occurrence of the most of these problems is lowered by regular thyroid function monitoring and balancing.

Screening of thyroid disease

The American Thyroid Association suggests beginning the procedure at 35 years of age and continuing it every five years, despite the fact that there are no established guidelines of screening for thyroid abnormalities. The group of people who are at risk of developing hypothyroidism are pregnant women, people over 60, people who have already undergone head and neck radiation therapy, persons with type 1 diabetes, and/or people with autoimmune illnesses[41]. Pregnant women's TSH or free thyroxine (fT4) reference ranges from non-pregnant populations fluctuate as a result of the physiological changes in thyroid function during pregnancy[28]. In order to reflect the expected magnitude of the TSH reduction, the American Thyroid Association (ATA) currently recommends that the pregnant "reference range be established at 0.5 mU/L and 0.4 mU/L less than the upper and lower nonpregnancy reference ranges, respectively"[42]. Throughout the first trimester and the subsequent four to six weeks, it is advisable to often assess thyroid function. early on in pregnancy

TABLE No.1:Recommendations for thyroid hormone screening in pregnant diabetic patients[90]:

Guideline	Screening recommendation	Comment
2017 Guidelines of the ATA for the diagnosis and management of thyroid disease during pregnancy and the postpartum [66]	Check TSH in pregnant women with T1DM or other autoimmune disorders.	They do not recommend universal screening for patients who are pregnant or are planning pregnancy. Screening is recommended if one of the following risk factors: (1) A history of or current symptoms/signs of thyroid dysfunction, (2) thyroid antibody positivity or goiter, (3) prior head and neck radiation or thyroid surgery, (4) age >30 years, (5) T1DM or other autoimmune disorders, (6) prior pregnancy loss, preterm delivery, or infertility, (7) prior pregnancies (≥2), (8) family history of AITD or thyroid dysfunction, (9) morbid obesity (BMI ≥40 kg/m^2), (10) use of amiodarone or lithium, or recent administration of iodinated radiologic contrast, (11) residing in an area of known iodine insufficiency.
BTA, 2006 UK guidelines for the use of thyroid function test [34]	Check TSH, FT4, and TPO Abs in women with T1DM prior to conception. Monitor thyroid function during pregnancy and 3 months post-partum.	They note that women with T1DM are three times more likely to develop post-partum thyroid dysfunction.
2014 Endocrine Society Recommendation [91]	Check TSH in pregnant women with T1DM.	T1DM is considered a significant risk factor as are: current thyroid therapy, family history of AITD, goiter, history of autoimmune disorder, high-dose neck radiation, postpartum thyroid dysfunction, and previous delivery of infant with thyroid disease.
ATA/AACE, clinical practice guidelines for hypothyroidism in adults, 2012 [60]		They do not recommend universal screening for patients who are pregnant or are planning pregnancy.
2014 KTA guideline for the diagnosis and management of thyroid disease during pregnancy and postpartum [92]	Check TSH in pregnant women with T1DM.	They recommend screening early in pregnancy in the setting of T1DM or if other high risk factors.
ACOG practice bulletin, clinical management guideline for obstetrician-gynecologists: thyroid disease in pregnancy [9]	Check TSH in pregnant women with T1DM.	They do not recommend universal screening for thyroid disease in pregnancy. Indications include personal or family history of thyroid disease, T1DM, or clinical suspicion of thyroid disease.

The glucose homeostasis regulation is greatly influenced by thyroid hormones, and insulin secretion and glucose metabolism can both be greatly impacted by hypothyroidism. Evidence supporting the link between hypothyroidism and GDM is contradictory. However, research has found that women who experienced hypothyroidism during pregnancy are at higher risk of developing diabetes later in life. Positive antithyroid autoantibodies are more common in women who are more likely to develop GDM, especially those who have a family history of both DM and hypothyroid diseases[16]. When compared to women who were euthyroid, those with subclinical hyperthyroidism had a noticeably higher chance of acquiring gestational diabetes. Gestational diabetes risk was not correlated with hypothyroxinemia[43].

Carbohydrate or glucose intolerance that first appears during pregnancy, with or without remission after childbirth, is referred to as "gestational diabetes mellitus" (GDM)[44]. Regardless of diagnostic standards or historical patterns, GDM is

significant for two reasons. In the first place, GDM raises the danger of difficulties for both the mother and the fetus during pregnancy, particularly those linked to excessive fetal development, obesity, and hypertensive disorders of pregnancy. In addition, a diagnosis of GDM pinpoints a group of mothers and their offspring who are more susceptible to diabetes, obesity, and cardiovascular disease in the future[45,46].

Depending on the region and the diagnostic techniques utilised, the prevalence of GDM varied across the nation from 3.8 to 21%[47]. In healthy pregnant women, basal endogenous glucose synthesis (mostly hepatic) climbs by 30% by the end of gestation to fulfil the fasting energy requirements of pregnancy, despite a marked increase in fasting insulin levels[48]. Nevertheless, circulating fasting glucose levels fall throughout pregnancy. This is most likely caused by a rise in plasma volume during the first trimester of pregnancy and a rise in the feto-placental unit's consumption of glucose during the last few weeks of pregnancy. Peripheral insulin sensitivity, which is defined as the ability of insulin to induce skeletal muscle and adipose tissue glucose absorption and is assessed during late gestation, falls by 50%[21].

These women first adapt to maintain normoglycemia in the early stages of pregnancy because pancreatic cells have the ability to increase their insulin response. The increase in insulin resistance, however, causes the insulin response to be insufficient at the end of pregnancy. Although this decrease in ß - cell function is typically present before pregnancy, it doesn't show up clinically until hyperglycemia due to pregnancy's increased insulin resistance[49].

The human placenta secretes estrogen, cortisol, and lactogen, all of which have insulin-blocking properties. Around 20 to 24 weeks during pregnancy, the contra-insulin effect, a phenomenon, typically begins. As the placenta matures and generates more of these hormones, there is a higher chance that insulin resistance will develop. The pancreas can often create more insulin to fight insulin resistance. The inability of the pancreas to produce enough insulin to balance the actions of the results of the placental hormone in the development of gestational diabetes[50].

Pathophysiology

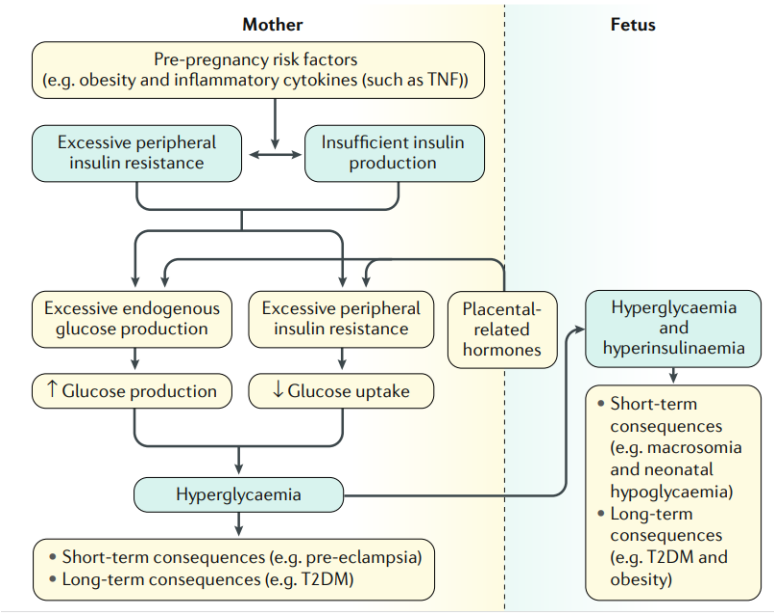

Figure 2: Pathophysiology of GDM[50]

Table No.2:Risk factors for GDM include:

Risk factors
Previous history of GDM or impaired glucose tolerance
Obesity
Ethnicity (higher risk for those of African, Hispanic, South or East Asian, Native American or Pacific Islander descent)
Family history of GDM or type 2 diabetes (especially in first-degree relatives)
Advanced maternal age
Excess weight gain in pregnancy
Previous history of macrosomic baby
Previous history of stillbirth
Previous history of baby with congenital abnormality
Pregnancy-induced or pre-existing hypertension
Other insulin-resistant conditions (for example, metabolic syndrome, polycystic ovary syndrome)
Smoking during pregnancy
Maternal high or low birth weight
Current glycosuria
High parity

Adverse outcomes associated with GDM

The main cause of fetal hyperglycemia is maternal hyperglycemia, which in turn promotes fetal insulin production. Fetal hyperinsulinemia may encourage abnormal development because insulin, in addition to its metabolic actions, also has anabolic effects . In particular, the "Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) Study" showed that "there are persistent links between maternal glycemia and undesirable outcomes, such as the need for a primary Caesarean section, preterm delivery, shoulder dystocia or birth injury, pre-eclampsia, neonatal hypoglycemia, neonatal hyperbilirubinemia, and the need for neonatal intensive care. Clinical ((birthweight above the 90th percentile)"[26].

TABLE No. 3:HAPO TRIAL OUTCOMES

PRIMARY OUTCOME OF HAPO TRIAL	**SECONDARY OUTCOME OF HAPO TRIAL**
BIRTH WEIGHT >90TH PERCENTILE	SHOULDER DYSTOCIA OR BIRTH INJURY
PRIMARY CESAREAN SECTION	INTENSIVE NEONATAL CARE
CLINICAL NEONATAL HYPOGLYCEMIA	HYPERBILIRUBINEMIA
CORD BLOOD SERUM C PEPTIDE>90TH PERCENTILE	PREECLAMPSIA
-	PREMATURE BIRTH

The outcome for both the mother and the fetus is known to be adversely affected by GDM. According to certain research, even very slight changes in glucose tolerance can lead to aberrant fetal growth, which can be avoided by straightforward but strong blood sugar management[51,52]. Pre-eclampsia, premature labour, miscarriage, fetal deformity, and perinatal mortality and morbidity have all been found to occur more frequently in diabetic pregnancies than in non-diabetic pregnancies. A large-sized fetus is frequently the cause of birth difficulties, such as increase in caesarean delivery rate, shoulder dystocia, and birth damage. According to the Pedersen theory [53], which was further developed by Freinkel[54], "high levels of circulating maternal glucose and other fuels that cross the placenta to give the baby energy substrates are the main cause of the increased fetal size". Fetal

hyperinsulinemia, the result of the fetus's increased insulin production in response to excessive energy sources, has a number of negative effects, including excessive fetal development for gestational age birth size In diabetes-complicated pregnancies, "fetal insulin binds to the insulin-like growth factor 1 receptor with an affinity equal to that of the insulin receptor"[55].

In utero, there is a relative fetal hypoxia that may lead to stillbirth and birth asphyxia[56]. The newborn develops polycythemia and hyperbilirubinemia as a result of the increased erythropoietin production brought on by this hypoxia. Lung surfactant synthesis is altered by fetal hyperinsulinemia, which puts a person at risk for respiratory distress syndrome. It has only recently been discovered that GDM kids have an abnormally high level of childhood body fat[57]. Developmental areas of the brain involved in the expressive language, memory recall, and facial recognition, varies in babies with GDM with those not complicated with GDM[58].

GDM detection is crucial because it increases the risk of postpartum complications like infection, polyhydramnios, preeclampsia, and increased caesarean sections in the current pregnancy. Furthermore, it increases the risk of maternal obesity, chances of type 2 diabetes mellitus and hypertension[28]. Negative pregnancy outcomes are still more common than in the general population, despite recent improvements in maternal hyperglycemia control and a drop in the incidence of neonatal issues. Pregnancy-related hypothyroidism is a prevalent diagnosis, but detection rates have not kept up with the severity of the issue, particularly in developing nations like India. Early detection and care could minimize the burden of unfavorable mother and fetal outcomes in pregnancy, which are frequently seen because hypothyroidism is a treatable illness.

"Two pathways have been used to connect TAI and GDM. Thyroid Autoimmunity is the most common cause of (sub)clinical hypothyroidism. The other method is through inflammatory pathways including IL-6 and TNF. Both of these pathways might result in insulin resistance (IR). Increased TPOAb levels early in pregnancy are significantly associated with the development of GDM later in pregnancy in women aged more than thirty years . Age, BMI, ethnicity, and subclinical thyroid disease are among the confounding factors. The frequency of GDM varies among women depending on their ancestry for a variety of reasons, including other lifestyle factors (exercise/diet), BMI, genes linked to IR, and access to healthcare services"[22].

"Hypothyroidism appeared to negatively affect glucose homeostasis by inducing insulin resistance. Pregnant women with hypothyroidism have further amplified insulin resistance, and thus have an increased risk of gestational diabetes. In this study, women with overt hypothyroidism were at a significantly greater risk of gestational diabetes when compared with euthyroid women. Women with subclinical hyperthyroidism also had a significantly higher risk of developing gestational diabetes when compared with euthyroid women".

"But among expecting mothers who have a high risk of thyroid disease, case-finding research has been suggested. High-risk women are those who have a personal history of type 1 diabetes or another autoimmune disease, a goitre, symptoms of thyroid dysfunction, a history of neck irradiation, previous miscarriages, or premature births. Despite the fact that the Diabetes in Pregnancy Study group India (DIPSI) recommends treatment in accordance with FIGO standards, all pregnant women should not be evaluated for hypothyroidism. This

is due to the lack of knowledge on the advantages of treating maternal thyroid insufficiency"[22].

Gayathri et al. found that 57.1% of persons with subclinical hypothyroidism had positive TPO antibodies, while 2.8% of pregnant women in Chennai had SCH[59].

Aggarwal et al. discovered that pregnant women with subclinical hypothyroidism had a frequency of SCH of 10.9% and a TPO antibody positivity of 59% in a research done in a reputed institute in north India[60].

In a subsequent investigation by Dhanwal et al.[61], even more pregnant women in Delhi were discovered to have SCH (13.8%), and many of them (57%) also tested positive for TPO antibodies. All of the aforementioned experiments used TSH > 4.5 IU/ml as the cut-off value to detect SCH.

In a study by Mandal et al., "32.94% of the pregnant women tested positive for anti-TPO Ab, and 12.15% of the study's participants and 33.93% of SCH pregnant women did as well"[62].

In 2016, Shuai Yang et al.[63] examined "the relationships between various thyroid hormone levels in the first trimester of pregnancy and the prevalence of gestational diabetes mellitus. Participants in the study, 27,513 mothers, provided early pregnancy serum samples for thyroid function tests. A 2 hour, 75 g oral glucose tolerance test was utilised to detect the existence of GDM during 24-28 weeks of gestation. The free T4 (FT4) levels of GDM women were shown to be lower than those of non-GDM women early in their pregnancies. Since growing FT4 levels were associated with a protective effect against GDM, it has been discovered that lower thyroid hormone levels in the early stages of pregnancy are a risk factor for the incidence of GDM."

In a retrospective study conducted between May 2015 and April 2017 among women delivered in a rural tertiary teaching hospital in Telangana, Reddy KM et al[64] examined the prevalence of GDM and risk factors related to it. They examined its impacts on feto-maternal outcomes as well. Carpenter and Couston criteria were used to corroborate the diagnosis of GDM made using an oral glucose tolerance test. In comparison to other research, the prevalence was modest (1.83%). The vast majority of the women lacked risk factors. The most frequent maternal problem observed was preeclampsia (18%). GDM was more frequently associated with hypothyroidism (15%). The percentage of C-sections was high (62%). Despite the high NICU admission rate (76%), neonatal outcome was found to be satisfactory.

In the 2017 study by Rawal S et al[65], "the adjusted OR (95% CI) contrasting the highest vs. lowest quartile of fT3 was 4.25 (1.67, 10.80) in the first trimester and 3.89 (1.50, 10.10) at the second trimester". Both fT3 and the fT3/fT4 ratio had a positive correlation with GDM. "For the first and second trimesters, respectively, the equivalent risk assessments for the fT3/fT4 ratio were 8.63 (2.87, 26.00) and 13.60". (3.97, 46.30). TSH and fT4 have no discernible relationship with GDM. It has been discovered that greater fT3 levels, presumably as a result of higher fT4 to fT3 conversion or de novo synthesis, are a risk factor for GDM beginning early in pregnancy.

Comparing women with DM and hypothyroidism to other groups, Amudha P et al[66] found that these women were more likely to experience intrauterine foetal death, preeclampsia, polyhydramnios, placental abruption, preterm births, caesarean sections, and first trimester abortions. The incidence of labour induction, foetal macrosomia, or LBW babies, on the other hand, did

not statistically differ between the groups. Pregnant women with both diabetes mellitus and hypothyroidism are at a high risk of perinatal complications and need regular monitoring for both conditions throughout their pregnancies, according to research. Pregnant women who have been diagnosed with one of these endocrinopathies should be tested for the other.

In 2019[69], Talat A and colleagues undertook a study to ascertain the frequency of different thyroid disorders in early pregnancy and to establish the necessity of local population-specific reference ranges for each trimester. A total of 293 female subjects were evaluated for serum TSH and FT4 levels. It was noted that the mean FT4 and TSH levels were 15.03 (±5.62) pmol/L and 2.53 (±6.82) mIU/L respectively; which put the prevalence rates of overt hyperthyroidism was 4.10%, subclinical hyperthyroidism was 16.38%; normal 70.65%, subclinical hypothyroidism 4.44% and overt hypothyroidism 4.44%. The study showed a considerable prevalence of thyroid dysfunction during the first trimester of pregnancy, it was determined. This suggests that early in a woman's pregnancy, her thyroid should be monitored more carefully.

Hasani F and colleagues[68], in 2020, "Thyroxine (P=0.0001) and anti-TPO (P=0.008) levels, both investigated by the Mann-Whitney test, and the differences between the groups were statistically significant in terms of the TSH level, as established by the independent t-test". TSH and anti-TPO levels were greater and thyroxine levels were lower in the diabetes group. "Anthropometric measures and Apgar scores did not differ between the groups (P>0.05)". It has been found that pregnant women with gestational diabetes mellitus are more likely than healthy pregnant women to experience

thyroid dysfunction, which appears as hypothyroidism with raised anti-TPO levels.

In 2020, Mahadik K and colleagues[67] carried out a study to show how hypothyroidism affects both the mother and the fetus negatively. They examined 198 expectant mothers who were carrying singletons in the third trimester. People who had several pregnancies, thyroid disorders that had previously been diagnosed, or any other pre-existing medical conditions were not included. T3, T4, and TSH estimations were made in addition to standard haematological markers. Then, patients with abnormal thyroid scans were examined for conditions that would harm the mother or the fetus. We have seen that subclinical hypothyroidism, overt hypothyroidism, and subclinical hyperthyroidism affecting 5.6, 3.5, and 1.5% of individuals, respectively whereas thyroid problems affect 11% of the population.In 26.3% of women with subclinical and overt hypothyroidism, anaemia was discovered, and the two conditions were strongly associated ($p = 0.008$). Hypothyroidism was statistically associated with poor foetal outcomes, including low birth weight (31.6%), NICU hospitalisation (42.1%), and low APGAR Score (21.1%, $p = 0.042$). In comparison to mothers who are euthyroid, mothers with hypothyroidism had a 4.8, 6.3, 0.14, and 3.64 times higher risk of anaemia, low birth weight, NICU admissions, and a low APGAR score. 5.6% of pregnant women had subclinical hypothyroidism at some point during the third trimester[69].

"Patients who acquired GDM in 2021 had significantly higher TSH and FT3 concentrations (p 0.0001), lower FT4 concentrations (p 0.0001), and higher FT3:FT4 ratios (p 0.0001)", according to Yanachkova V et al[70]. The results of

this pilot retrospective series point to the possibility that high FT3:Ft4 ratios, low FT4 levels, and high TSH levels may all be linked to an increased risk of developing GDM.

In order to establish the prevalence of hypothyroidism among pregnant women in India, Yadav V et al[71] conducted a meta-analysis in 2021. We examined observational studies demonstrating the "prevalence of hypothyroidism among pregnant women in India from PubMed, Web of Science, Scopus, Google Scholar, and Shodhganga (Indian thesis repository)". Procedures for carefully choosing studies and extracting data were used. The quality of each study was evaluated using the JBI critical assessment criteria. The effect sizes were pooled using a random effects model. The funnel plot and rank correlation test were used to determine the degree of publication bias. Subgroup analyses and meta-regression analysis were used to further analyse the heterogeneity in the pooled estimates. After being determined to be eligible, 61 studies might be included to the review.

According to research done in 2022 by Mahmood Moosazadeha, et al[72], "2–10% of pregnant women had subclinical hypothyroidism. GDM was more common in the hypothyroidism group than in the group without hypothyroidism (11.8% vs. 10.6%, p = 0.731)". Additionally, the risk of getting GDM was 1.11 times higher in hypothyroid women (95% CI: 0.61; 2.02). Despite this, there was no statistically significant correlation that was found. "The mean two-hour oral glucose tolerance test (OGTT) level in pregnant women with hypothyroidism was significantly higher than in the control group (104.49 18.43 mg/dl), with a p-value of 0.033".

Prakruti Dash et al[73], in 2022, in their study, screened 382 pregnant women between the ages of 11 and 34 weeks, with a median gestational age of 25 weeks. SCH was found to be prevalent in pregnancy at 37.69%. (144 out of 382 study participants). In 49.31% of SCH patients, there was an increased anti-TPO Ab titer, suggesting an autoimmune cause. Our study found a 12.04% prevalence of GDM (46 out of 382 study participants), a 34.7% prevalence of cases with SCH (16 instances), and a 6.5% prevalence of cases with both SCH and increased anti-TPO Ab titers. Out of the 30 instances (65.1%) with GDM that were euthyroid, four (8.5%) cases were discovered.

According to a study done in the "obstetric clinic of the CHU Saint-Pierre in Belgium" in 2022, gestational diabetes mellitus is more likely to occur in pregnant women with autoimmune (subclinical) hypothyroidism (GDM). However, the veracity of this association among euthyroid women with thyroid autoimmunity is still up for debate (TAI). "TAI and GDM were associated in women over the age of 30 (adjusted hazard ratio 1.68 (95% CI, 1.01-2.78; P = 0.048). Maternal age >30 years, pre-pregnancy BMI 30 kg/m2, and non-Caucasian ancestry were similarly associated with GDM, with aORs of 1.93 (95% CI, 1.46-2.56), 2.03 (95% CI, 1.46-2.81), and 1.46 (95% CI, 1.03-2.06), respectively".

Vera A et al.[75], in 2022, conducted a study involving 200 pregnant women who were observed at the "Perinatal Center of the Maternity Hospital of Bauman State Clinical Hospital No. 29" between 2018 and 2020 and discovered that "the odds of discovering GDM were 8.6 times higher in the hypothyroidism group than in the euthyroidism group". The TSH level that would indicate the

development of GDM in the first trimester was identified. "The model's sensitivity and specificity were 71.4% and 63.1%, respectively". Finally, it may be said that thyroid hypofunction and GDM are related endocrine illnesses. When hypothyroidism (both primary and SGH) is present, GDM develops significantly more commonly. TSH levels below 2.7 IU/mL in the first trimester more than 8 times enhance the risk of GDM, therefore they could be classified as dangerous.

MATERIALS AND METHODS:

Data Source:

All pregnant women attending the Dept. Ob- Gyn at R.L.JALAPPA Hospital

Study Design : This is a hospital based prospective, cross sectional, descriptive and observational study

Study period : 18 months

Inclusion criteria:

1. Pregnant women with hypothyroidism.

2. Pregnant women with hypothyroidism diagnosed with GDM by 75gm oral glucose challenge test.

Exclusion criteria:

Pregnant women without hypothyroidism

METHODOLOGY:

Total number of subject 100 studied

All the pregnant women will be investigated and followed up during: Ante-natal, Intrapartum upto delivery.

Evaluation of Thyroid Function Tests:

Serum- free T3 (FT3), free T4 (FT4), TSH

At first ANC visit, 20 weeks, at or above 34weeks and/or at or before delivery

Evaluation for PGDM, GDM done.

"According to American Thyroid Association (ATA) 2011 standards, the trimester-specific upper limit value for TSH was taken as 2.5 mIU/mL for the first trimester and 3 mIU/mL for the second and third trimesters. Patients were identified as

having SCH if their fT4 levels were normal and their TSH levels were higher than the trimester-specific limit.

Using a 75 g glucose challenge test (GCT) with fasting values greater than 92 mg/dl, post-glucose values greater than 180 mg/dl, and post-glucose values greater than 153 mg/dl, GDM was identified.

The Institute Ethics Committee has approved the study as ethical".

Formula used for sample size calculation:

Formula

$$n = \frac{2{s_p}^2\left[Z_{1-\alpha/2} + Z_{1-\beta}\right]^2}{\mu_d^2}$$

$$s_p^2 = \frac{s_1^2 + s_2^2}{2}$$

Where,

s_1^2 : Standard deviation in the first group

s_2^2 : Standard deviation in the second group

μ_d^2 : Mean difference between the samples

α : Significance level

1- β : Power

Study duration: The data collection was done between December 2020 to January 2022 for a period of 18 months.

Ethical considerations: The approval was obtained by the Institutional ethics committee . Informed written consent for all the study participants and only those participants given consent were included in the study. The risks and benefits involved in the study and the voluntary nature

of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained.

Data collection tools: All the relevant parameters were documented in a structured study proforma.

Methodology:

Pregnant women hospitalized to the labor room were recruited for the study

General examination includes

- Maternal pulse rate.
- Blood pressure.
- Uterine contraction.
- Fetal heart rate.

Routine examination

- Complete blood count.
- Serology: HIV and Hepatitis B.
- Bleeding time.
- Clotting time.
- Random blood sugar.
- TSH.
- OGCT

STATISTICAL METHODS:

"Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. **Chi-square test or Fischer's exact test** (for 2x2 tables only) was used as test of significance for qualitative data.

Continuous data was represented as mean and standard deviation. **Independent t test** was used as test of significance to identify the mean difference between two quantitative variables

Graphical representation of data: MS Excel and MS word was used to obtain various types of graphs

P value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Statistical software: MS Excel**,** SPSS version 22 **(**IBM SPSS Statistics, Somers NY, USA) was used to analyze data"

RESULTS:

Table No.4:- Distribution of subjects according to age group.

Age	Frequency(n)	Percent(%)
<20yrs	15	15.0
21-24yrs	32	32.0
25-29yrs	23	23.0
30-34yrs	25	25.0
35-40yrs	5	5.0

Minimum age was 18yrs Maximum age was 36yrs. Mean age was 25.9yrs with Standard deviation 4.98yrs

Figure No.3:- Graph showing Distribution of subjects according to age group.

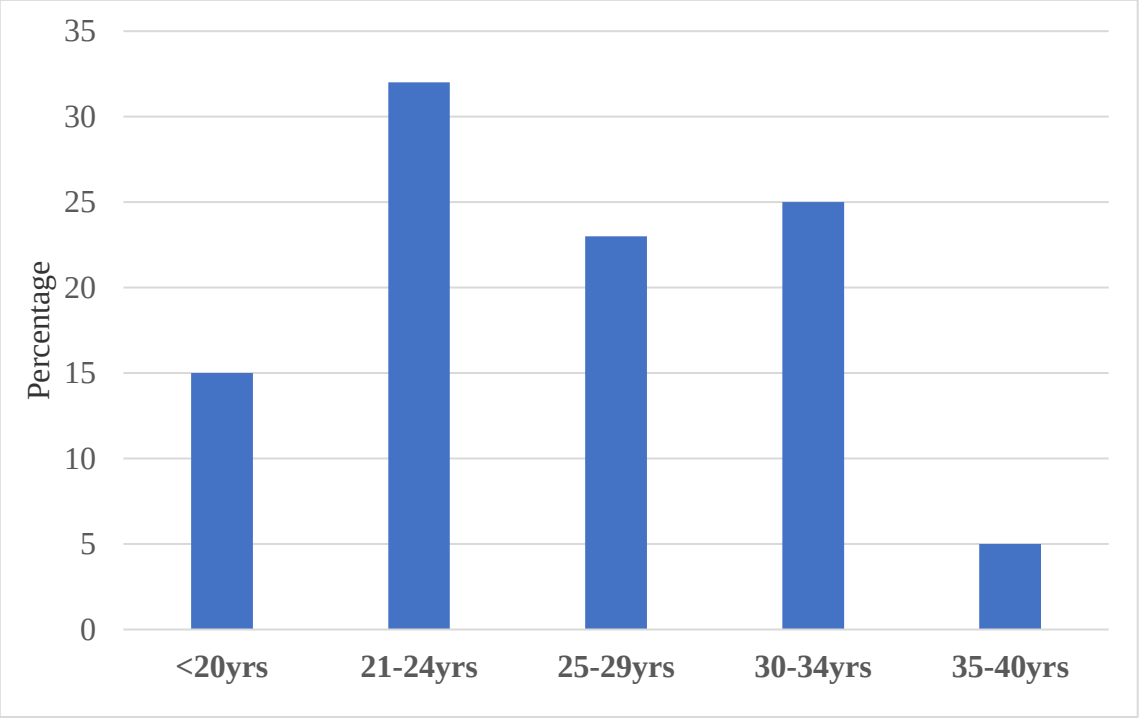

Table No.5:- Distribution of subjects according to parity.

PARITY	Frequency(n)	Percent (%)
PRIMIGRAVIDA	30	30.0
MULTIGRAVIDA	70	70.0
Total	100	100.0

70% of the patients in the study were multigravidas.

Figure No.4:- Graph showing Distribution of subjects according to parity.

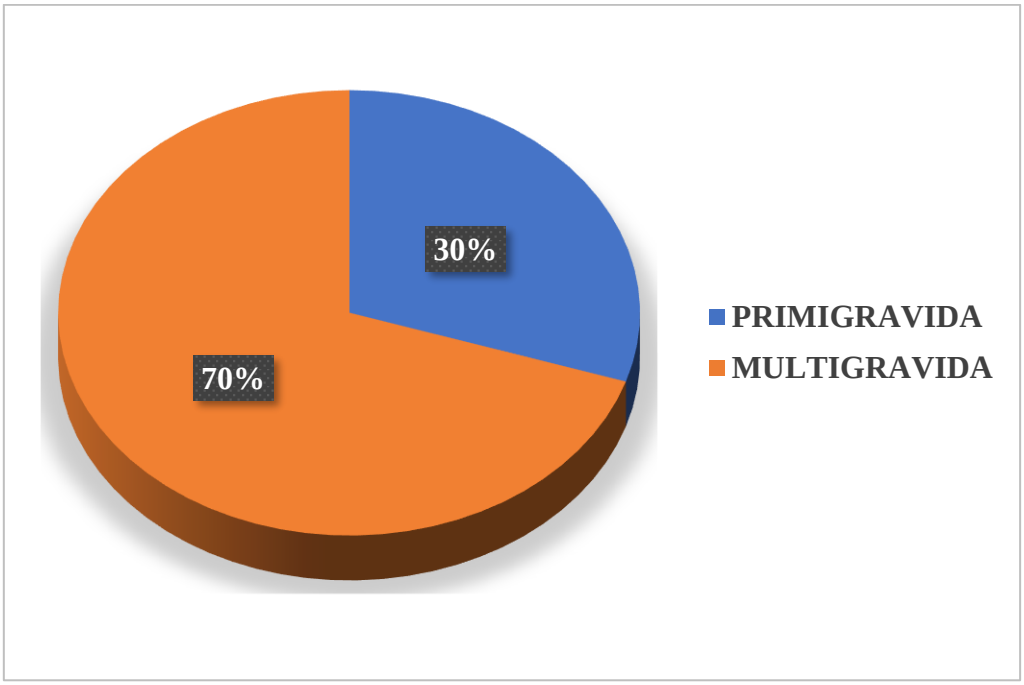

Table No.6:- Distribution of subjects according to BMI

BMI	Frequency(n)	Percentage(%)
<18.5	25	25.0
18.5-24.9	40	40.0
25-29.9	21	21.0
≥30	14	14.0
Total	100	100.0

Most of the patients(40%) belonged to the BMI group of 18.5 and 24.9kg/m2.

Figure No. 5:- Graph showing Distribution of subjects according to BMI.

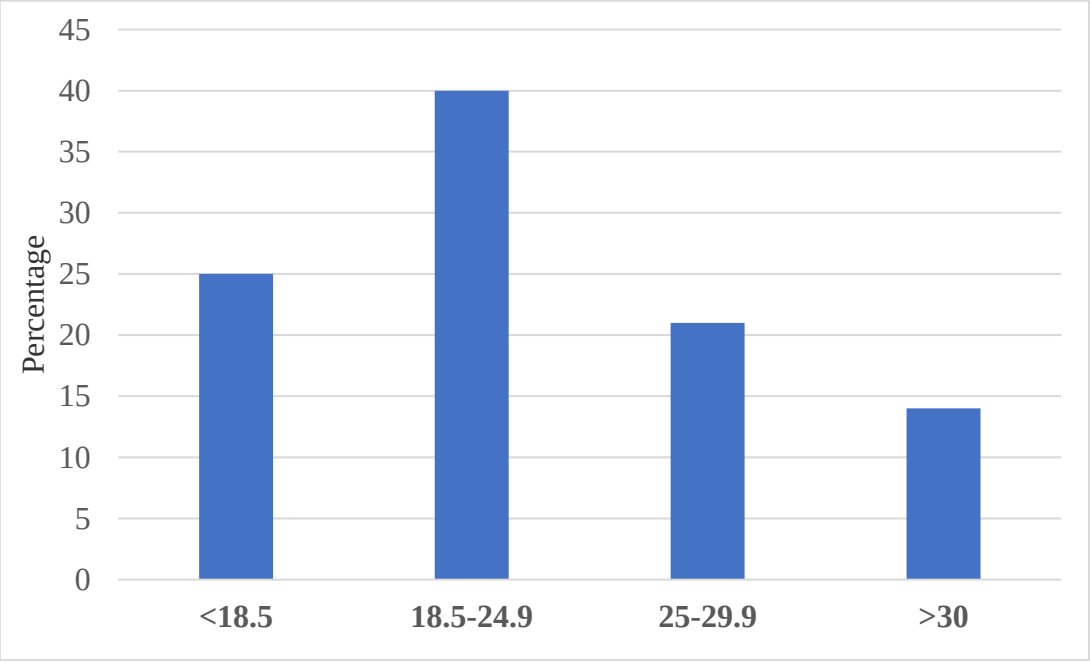

Table No.7:- Distribution of subjects according to mode of delivery

MODE OF DELIVERY	Frequency(n)	Percent age(%)
VAGINAL DELIVERY	33	33.0
CESAREAN SECTION	67	67.0
Total	100	100.0

Cesarean section was done in 67 patients accounting to 67%.

Figure No.6:- Graph showing Distribution of subjects according to mode of delivery

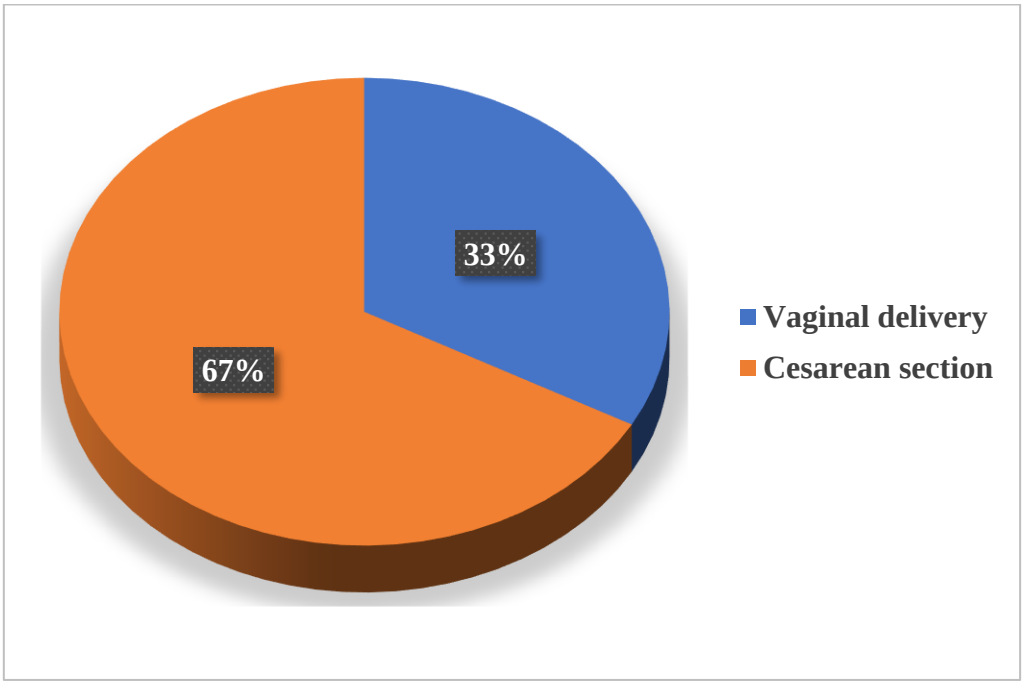

Table No.8:- Distribution of subjects according to maternal complications

Maternal complications	Frequency (n)	Percentage(%)
Pregnancy induced hypertension	15	15
Preterm delivery	23	23
Postpartum complications	2	2
Anemia	25	25
Hydraminos	8	8
Oligohydramnios	10	10

Most common associated maternal complications seen in these patients were , anemia, preterm delivery and pregnancy induced hypertension.

Figure No.7:- Graph showing Distribution of subjects according to maternal complications

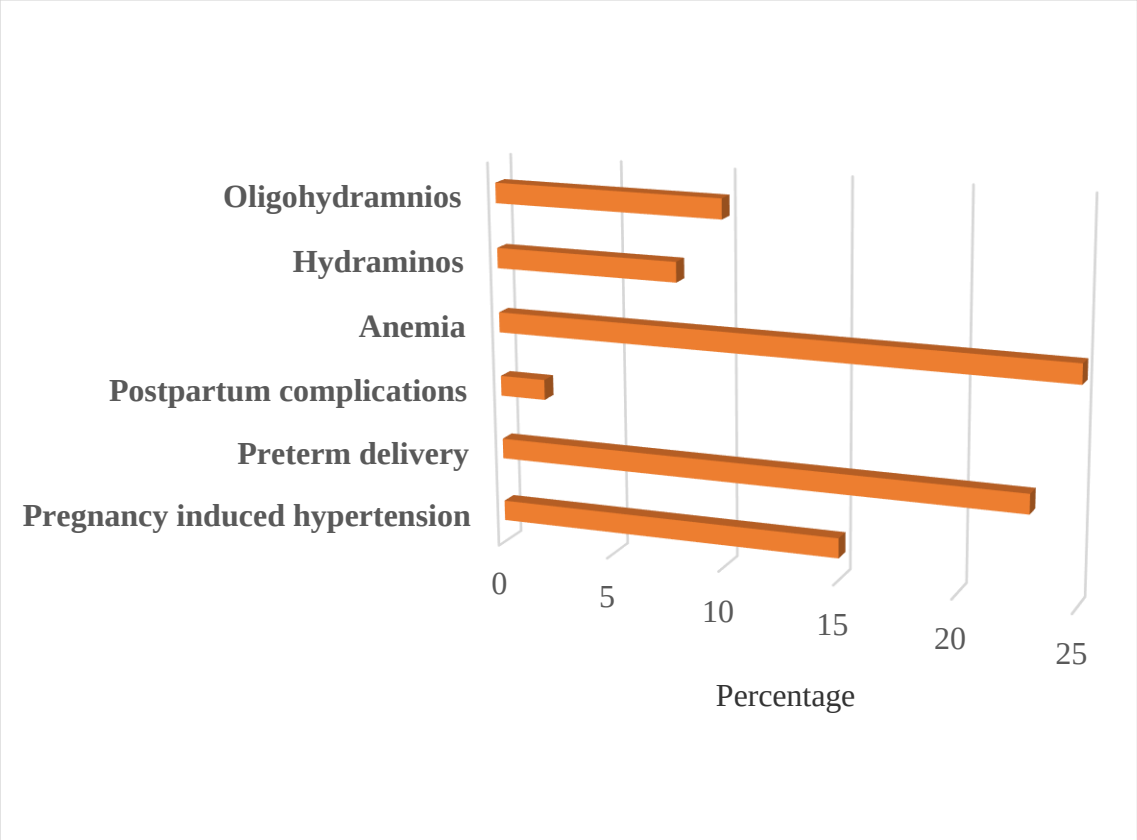

Table No.9:- Distribution of subjects according to neonatal complications

NEONATAL COMPLICATION	CASES(n)	PERCENTAGE(%)
RESPIRATORY DISTRESS	26	28
TRANSIENT TACHYPNOEA OF NEWBORN	16	17
SEPSIS	23	24
HYPOGLYCEMIA	19	20
MECONIUM ASPIRATION SYNDROME	2	2
HYPERBILIRUBINEMIA	8	9

Figure 7:- Graph showing Distribution of subjects according to neonatal complications

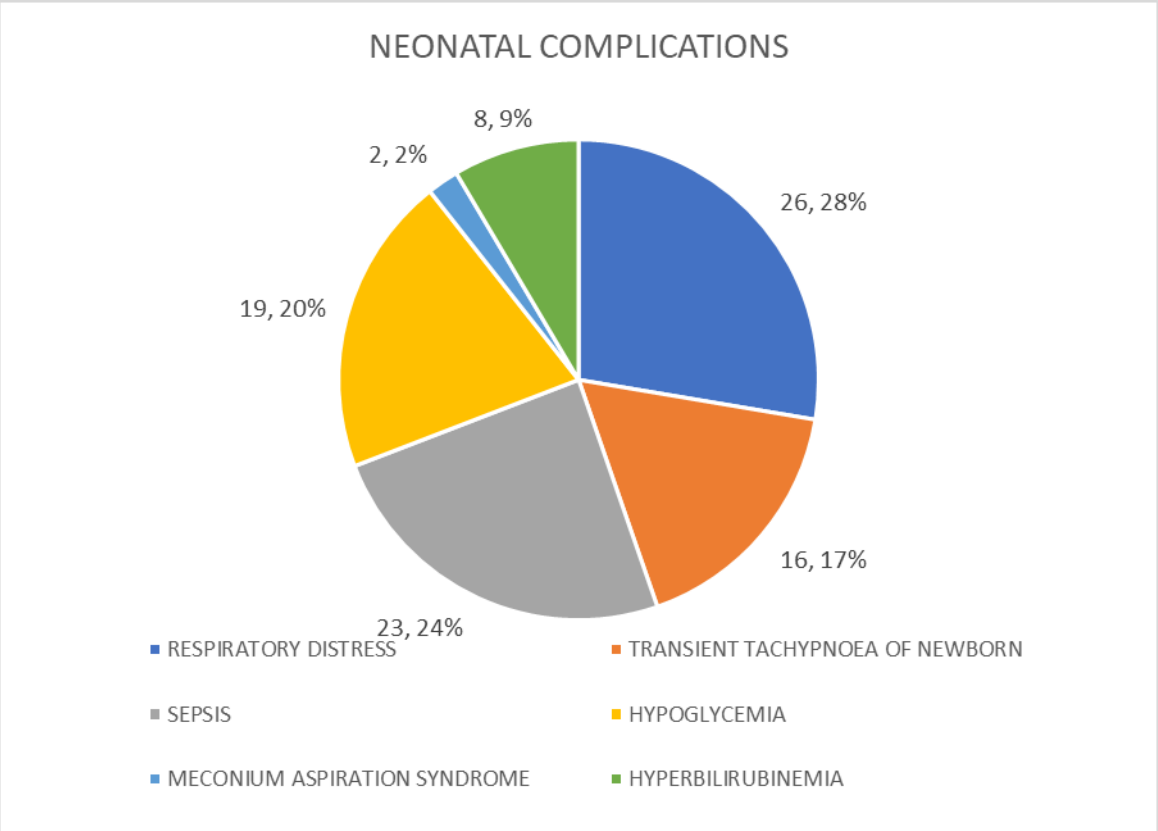

Table No.10:- Distribution of subjects according to GDM

GDM	Frequency(n)	Percent(%)
No	77	77.0
Yes	23	23.0
Total	100	100.0

Pre gestational diabetes mellitus was present in 15 subject (78.2%) and gestational diabetes mellitus was present in 8 subject (21.8%)

Figure 9:- Graph showing Distribution of subjects according to GDM

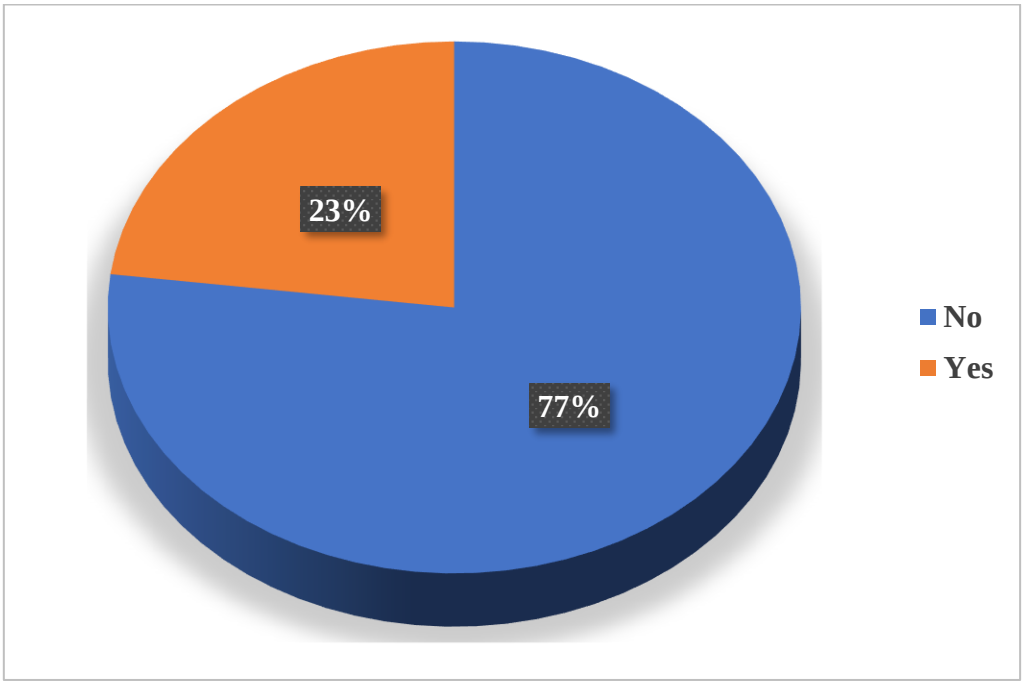

Table 10a:- Distribution of subjects according to GDM and age group

Age	GDM	
	NO	YES
<20yrs	15	0
	100.0%	.0%
21-24yrs	31	1
	96.9%	3.1%
25-29yrs	17	6
	73.9%	26.1%
30-34yrs	11	14
	44.0%	56.0%
35-40yrs	3	2
	60.0%	40.0%
Total	77	23
	77.0%	23.0%

P value <0.001, There was statistically significant difference found between Age and GDM.

Figure 9a:- Graph showing Distribution of subjects according to GDM and age group

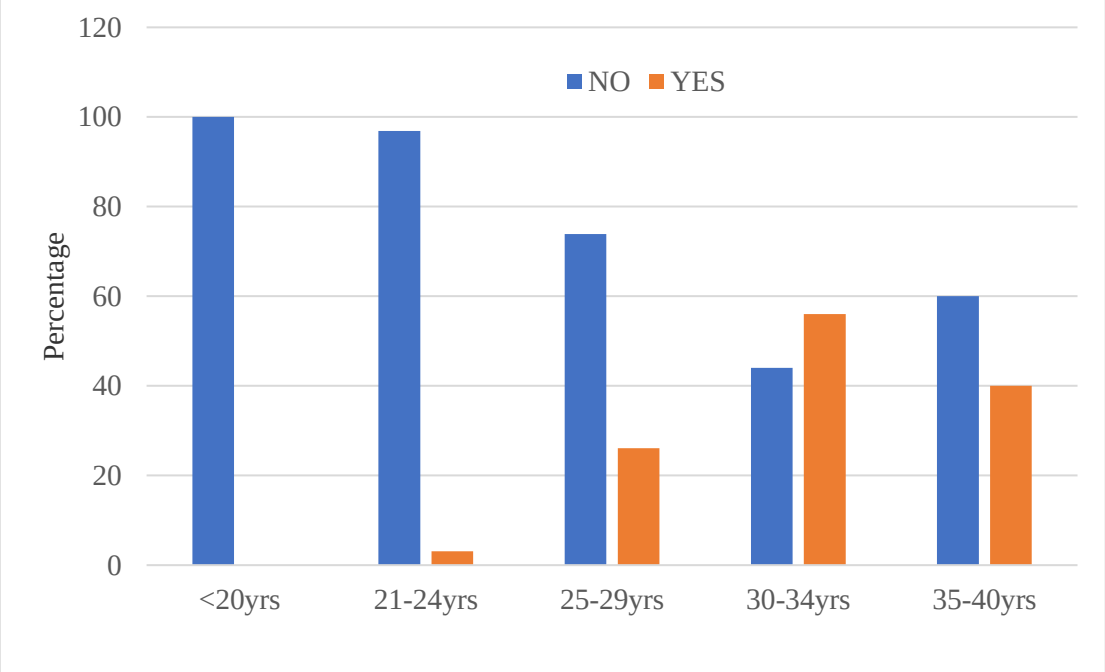

Table 10b:- Comparison of mean age among subjects with GDM and without GDM

GDM	Mean	Std. Deviation	P Value
Without GDM	24.70	4.66	<0.001
With GDM	30.09	3.64	

The mean age among subjects with GDM was 30.09+ 3.64yrs and the mean age among subjects without GDM was 24.70± 4.66yrs.There was a statistically significant difference found between age and GDM

Figure 9b:- Graph showing Comparison of mean age among subjects with GDM and without GDM

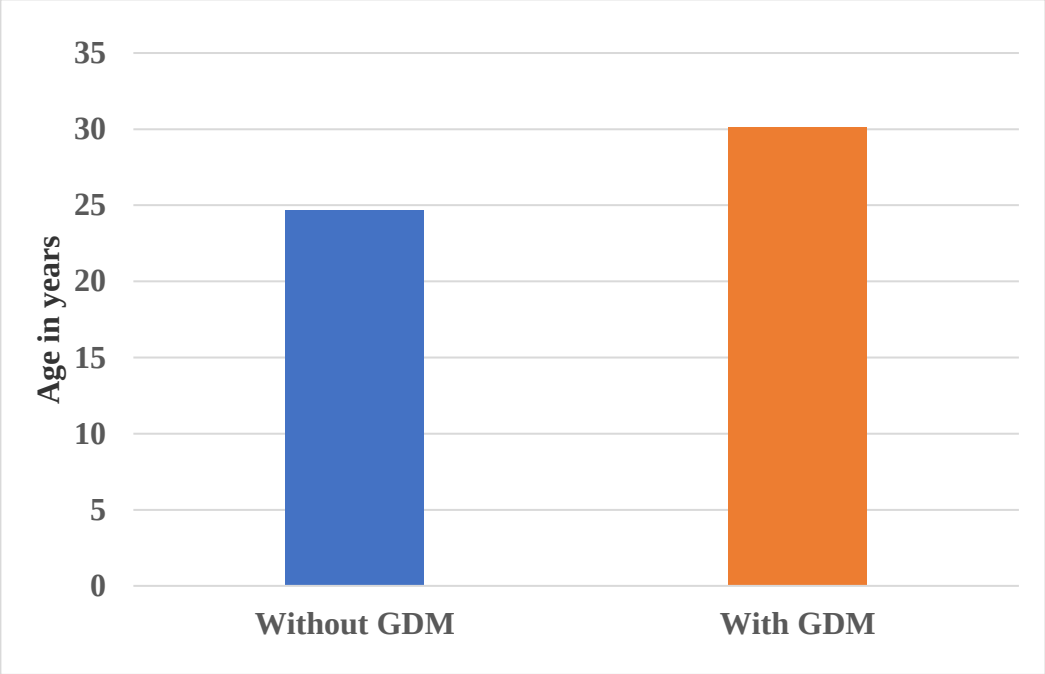

Table No. 11:- Distribution of subjects according to GDM and parity

PARITY	GDM	
	NO	YES
PRIMIGRAVIDA	29	1
	96.7%	3.3%
MULTIGRAVIDA	48	22
	68.6%	31.4%
Total	77	23
	77.0%	23.0%

P value 0.002, there was statistically significant difference found between parity and GDM.

Figure No. 10:- Graph showing Distribution of subjects according to GDM and parity

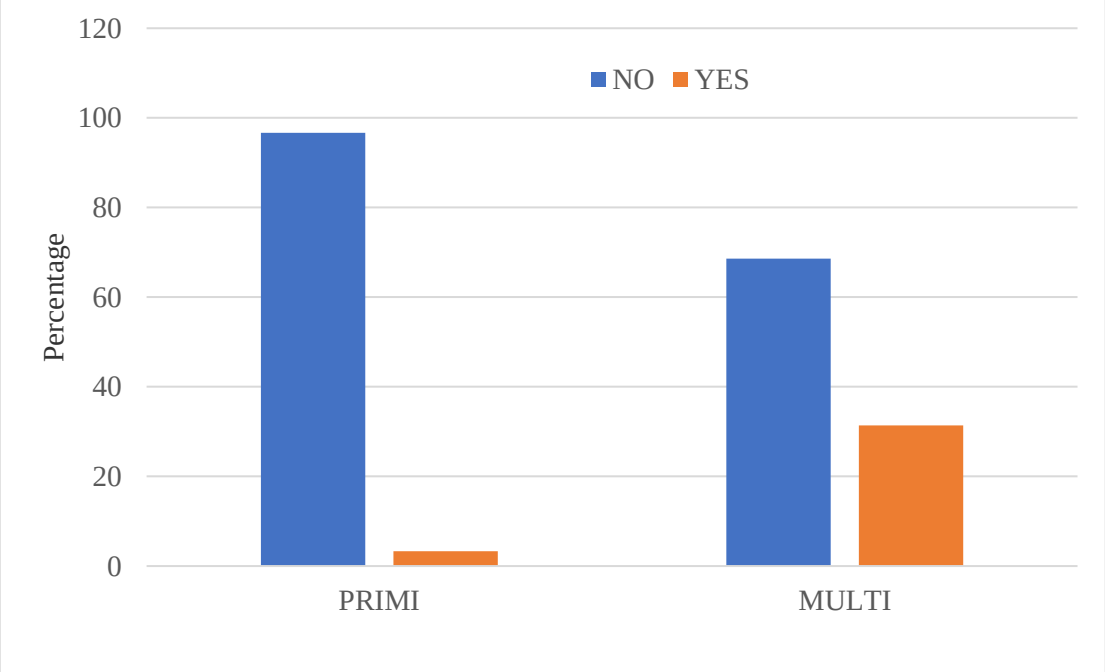

Table 11a:- Distribution of subjects according to GDM and BMI

BMI	GDM	
	NO	YES
<18.5	25	0
	100.0%	.0%
18.5-24.9	37	3
	92.5%	7.5%
25-29.9	13	8
	61.9%	38.1%
≥30	2	12
	14.3%	85.7%
Total	77	23
	77.0%	23.0%

P value <0.001, There was statistically significant difference found between BMI and GDM.

Figure 10a:- Graph showing Distribution of subjects according to GDM and BMI

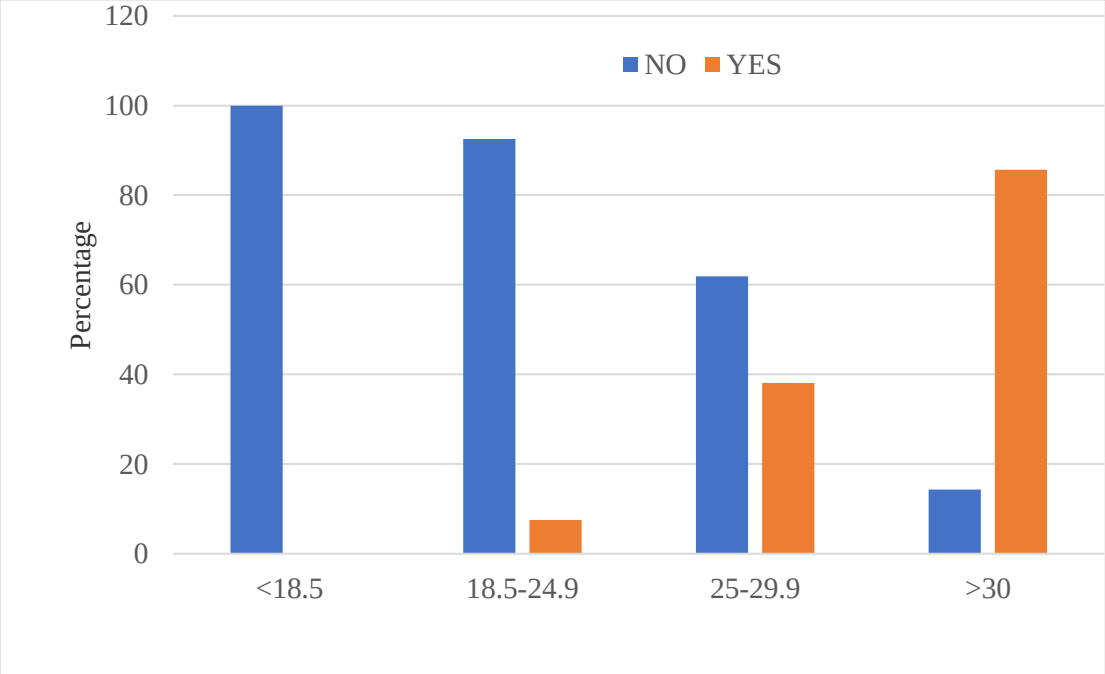

Table No.11b:- Comparison of mean BMI among subjects with GDM and without GDM

GDM	Mean	Std. Deviation	P Value
Without GDM	21.87	3.74	<0.001
With GDM	28.52	3.11	

There was a statistically significant difference found between BMI and GDM

Figure 10b:- Graph showing Comparison of mean BMI among subjects with GDM and without GDM

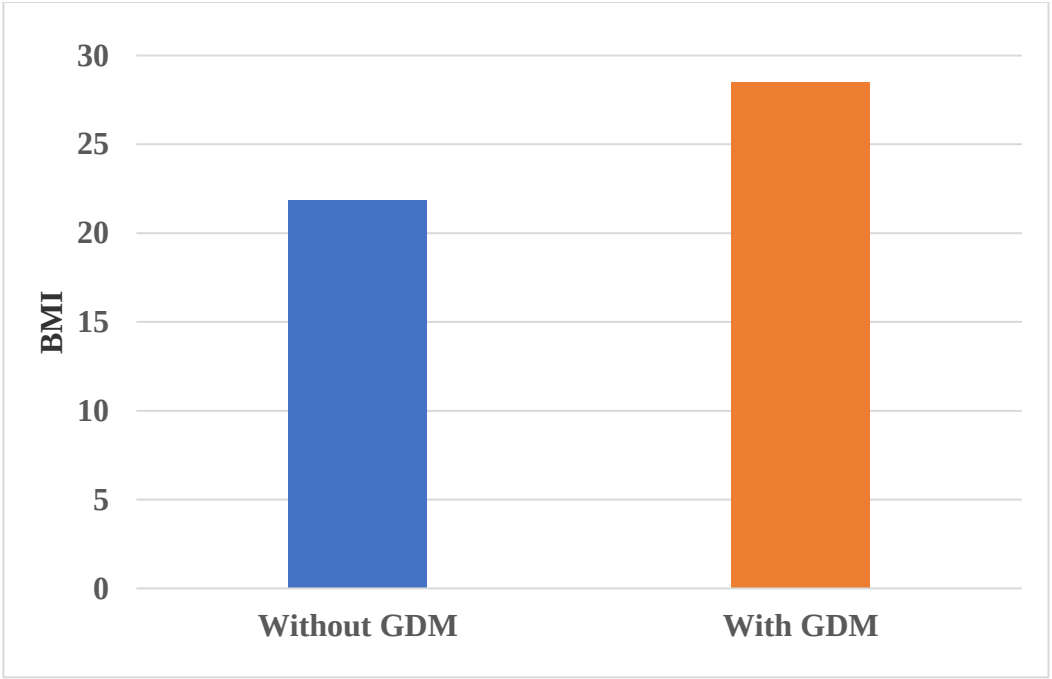

Table No.12:- Distribution of subjects according to GDM and mode of delivery

MODE OF DELIVERY	GDM	
	NO	YES
VAGINAL DELIVERY	24	9
	72.7%	27.3%
CESAREAN SECTION	53	14
	79.1%	20.9%
Total	77	23
	77.0%	23.0%

P value 0.641, there was no statistically significant difference found between mode of delivery and GDM.

Figure 11:- Graph showing Distribution of subjects according to GDM and mode of delivery

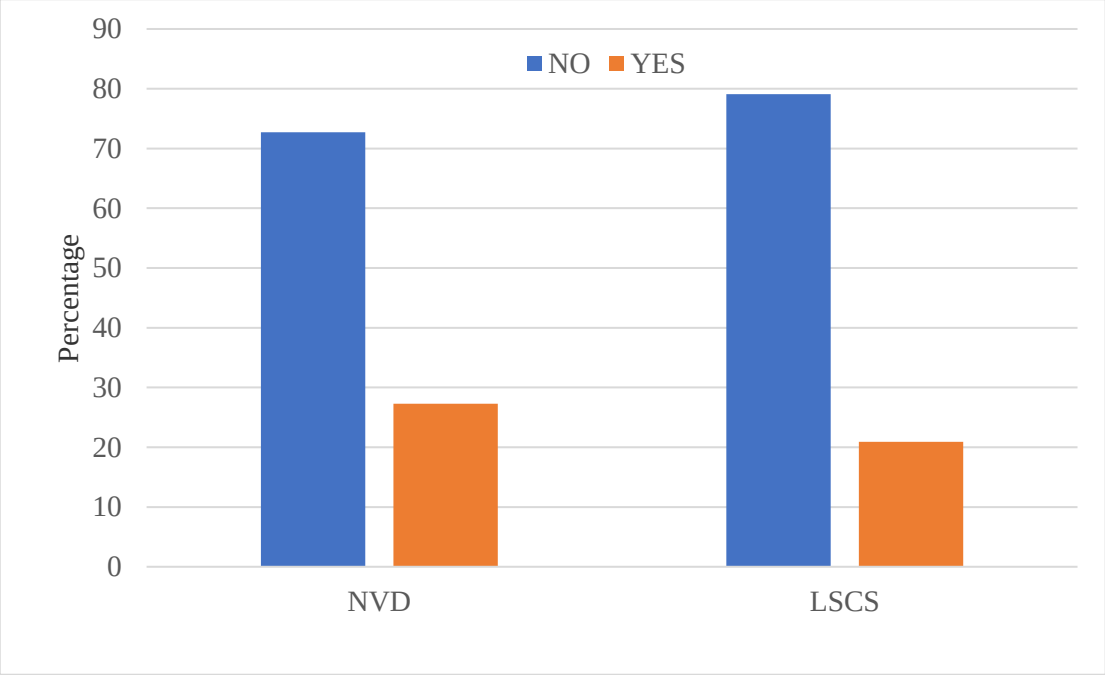

Table No.13:- Distribution of subjects according to GDM and maternal complications

Maternal complications	GDM				P value
	NO		YES		
	n	%	N	%	
Pregnancy induced hypertension	8	53.3%	7	46.7%	**0.040**
Preterm delivery	17	73.9%	6	26.1%	0.779
Anemia	24	96.0%	1	4.0%	**0.012**
Postpartum complications	1	50.0%	1	50.0%	0.409
Hydraminos	0	.0%	8	100.0%	**<0.001**
Oligohydramnios	10	100.0%	0	.0%	0.111

A statistical significance was found between GDM and pregnancy-induced hypertension ; between anaemia and GDM ; and between Hydraminos and GDM.

Preterm birth and GDM did not differ in a statistically meaningful way.

There was no statistical significance found between postpartum complications and GDM or between Oligohydramnios and GDM.

Figure 12:- Distribution of subjects according to GDM and maternal complications.

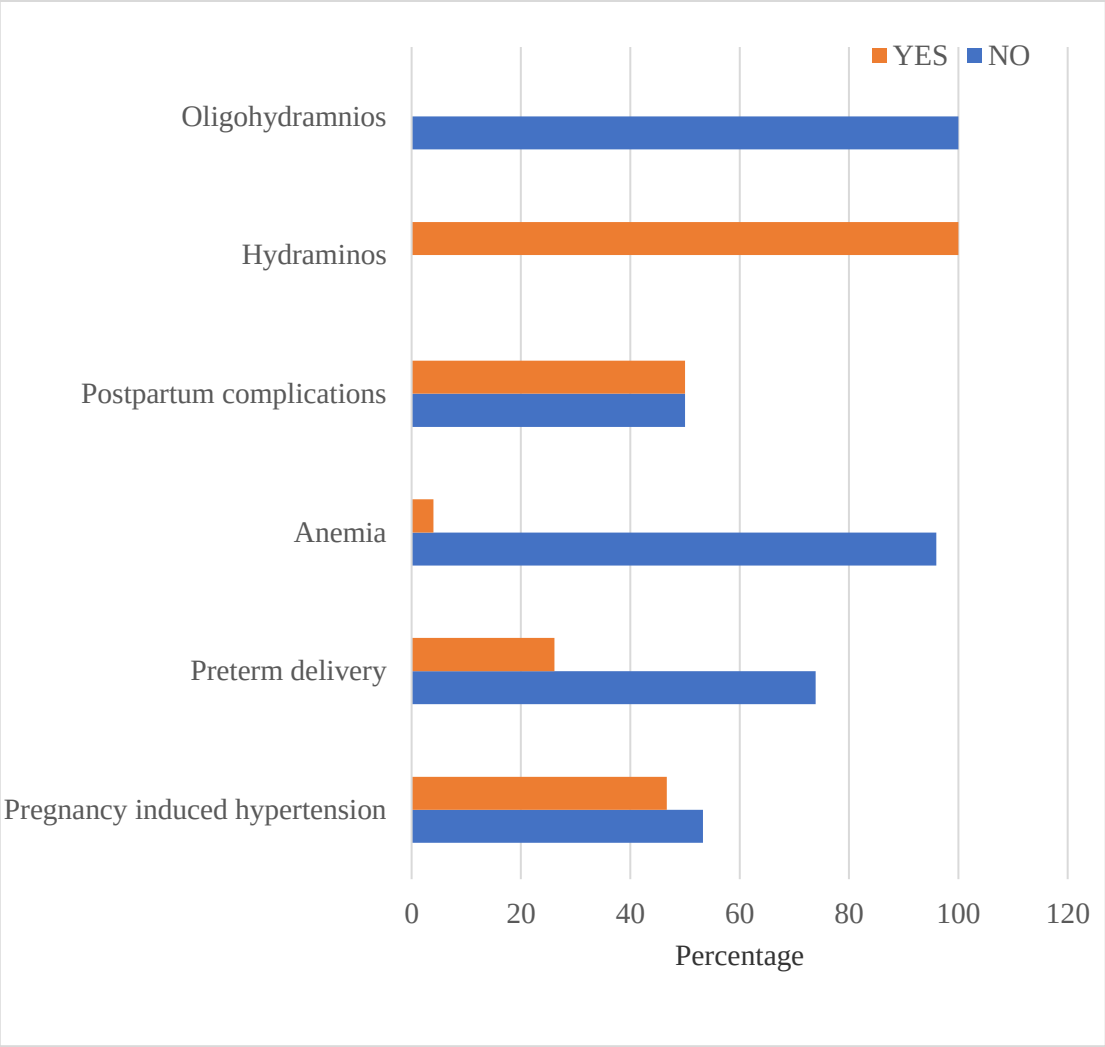

Table No. 14:- Distribution of subjects according to GDM and neonatal complications

Neonatal complications	GDM				P value
	NO		YES		
	N	%	N	%	
Respiratory distress	26	74.2%	9	25.8%	0.639
TTN	16	64%	9	36%	0.074
Sepsis	23	92%	2	8%	**0.039**
Hypoglycaemia	19	73%	7	27%	0.580
Meconium aspiration syndrome	2	66.7%	1	33.3%	0.665
Hyperbilirubinemia	8	72.7%	3	27.3%	0.721

Statistical significance found between Sepsis and GDM.

No statistical significance found between Respiratory Distress and GDM.

No statistical significance found between TTN and GDM.

No statistical significance found between Hypoglycaemia and GDM.

No statistical significance found between Meconium aspiration syndrome and GDM.

No statistical significance found between Hyperbilirubinemia and GDM.

Figure 13:- Distribution of subjects according to GDM and neonatal complications.

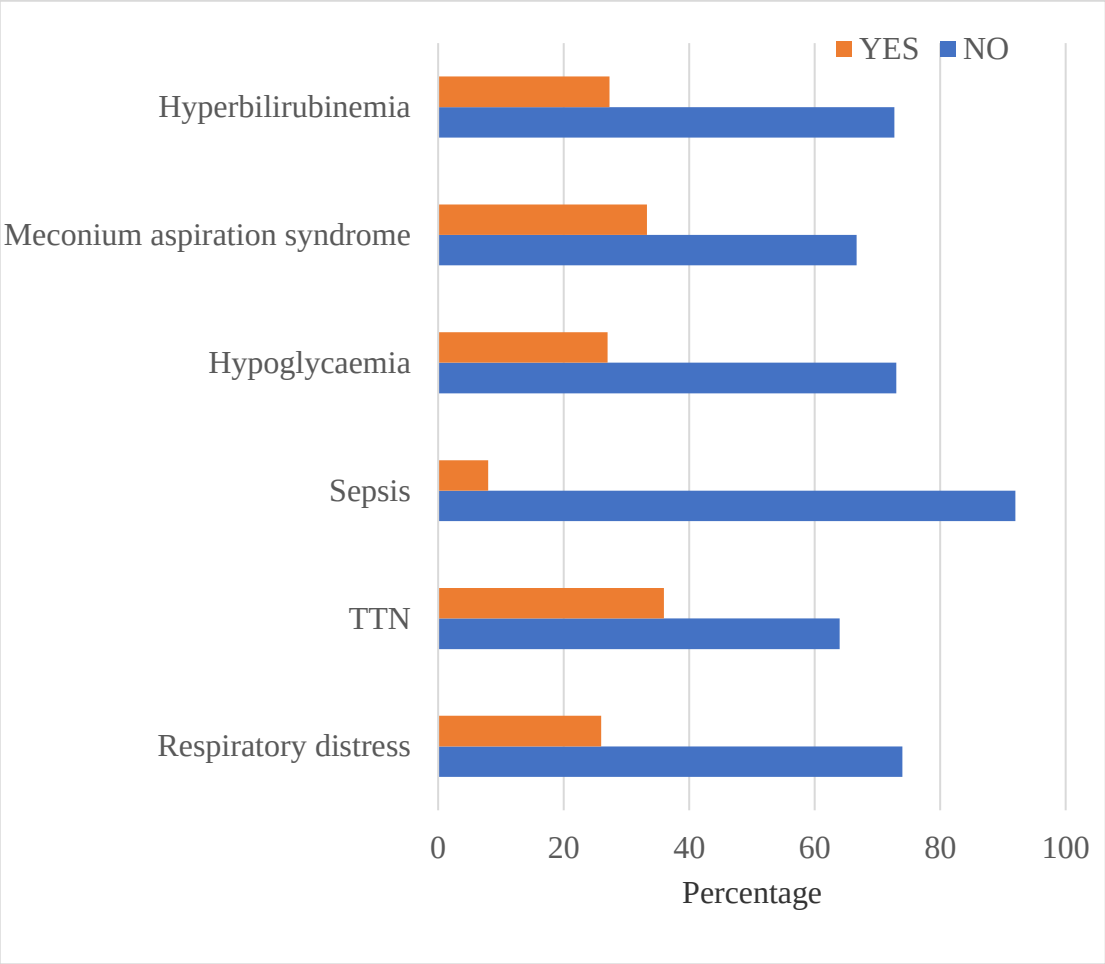

TABLE No.15:NICU ADMISSION RATE

NICU ADMISSION RATE	n=100	N=23
PERCENTAGE	44	100

Table No.16:Distribution as per the indications for caesarean section

INDICATION	n=67	N=14
NON PROGRESSION	8(8%)	1(4.3%)
POST CESAREAN SECTION	32(32%)	5(21.7%)
FETAL DISTRESS	18(18%)	2(8.69%)
CEPHALOPELVIC DISPROPORTION	5(5%)	2(8.69%)
PRETERM BREECH	3(3%)	1(4.3%)
CESAREAN DELIVERY AT MATERNAL REQUEST	1(1%)	3(13.04%)
TOTAL	67	14

Most common cause for caesarean section was due to previous LSCS rounding upto 32% and others mostly of obstetric complications.

Table No.17: Distribution as per postpartum complications

POSTPARTUM COMPLICATIONS	CASES n=100	N=23
SURGICAL SITE WOUND INFECTION	1	1
EPISIOTOMY WOUND INFECTION	1	

Among the common post partum complications , surgical site infection was seen in a morbid obese patient with dual endocrinopathies and preeclampsia

DISCUSSION

This hospital based prospective, cross sectional, descriptive and observational study was done to find out the association, between hypothyroidism and gestational diabetes

mellitus and to find out the maternal and fetal outcomes of such pregnancies complicated by both GDM and hypothyroidism on all pregnant women attending the Dept. Ob- Gyn at R.L. JALAPPA Hospital for 18 months.

GDM and hypothyroidism are frequent side effects during pregnancy. Each of these has been shown to have a detrimental effect on obstetric outcomes. Thyroid dysfunction and gestational diabetes mellitus are found to be related to "maternal problems such as miscarriage, hypertensive illnesses (gestational hypertension, preeclampsia), abruptio placentae, preterm delivery, caesarean deliveries, and birth trauma. Studies suggest that pregnant women with GDM should routinely have their TSH levels evaluated since they may be more likely to develop hypothyroidism"[76].

In our study, the minimum and maximum ages were 18 and 36 respectively. The standard deviation was 4.98 years, with a mean age of 25.9 years. According to the study, there were 70% MULTI subjects and 30% PRIMI subjects. 40% of the participants had a BMI of 18.5 to 24.9. LSCS was the mode of delivery in 67% of the participants with the most common cause being previous LSCS cases. Maternal complications included anaemia in 25% of the individuals. In 15 subjects (78.2%), pre prenatal diabetes mellitus was present, and in 8 subjects (21.8%), gestational diabetes mellitus existed. In subjects with GDM, the mean age was 30.09 + 3.64 years, while in subjects without GDM, the mean age was 24.70 + 4.66 years. Age, BMI, parity, anaemia, and GDM were all found to differ statistically significantly. Similar results were discovered in Yanachkova's research, which determined that the "mean age of the women in the GDM group was 33.3 years and 32.8 years for the control group[70]. The mean BMI in the GDM group was 26.078 (5.35), whereas it was 22.9 (5.81) in the control group ($p = 0.422$)". The incidence rate of GDM has progressively increased along with the rise in pre-pregnancy BMI, according

to Yang et al's studies[63]. The individuals' mean ages in the study by Amudha et al.[66] were 28.5.2 in Group A, 25.4.6 in Group B, and 27.5.1 in Group C. In accordance with the parity distribution, Group A, which made up 64% (n=96) of the study population, had the highest proportion of women with higher order parity (46.4%).Age, BMI, and having a family history of diabetes all had a significantly raised risk of GDM, and pregnant women with DM had considerably lower serum FT4 levels[68]. In the study by Dhanwal et al., the study population's mean age was 25.5 +/- 5 years, and the mean gestational age was 19.3 weeks[30]. According to Tirosh D et al.[77], the hypothyroidism and DM groups underwent 23% and 27% caesarean sections, respectively. Most caesarean deliveries took place on non-urgent occasions.

Maternal glucose homeostasis during pregnancy may be impacted by abnormal thyroid function. The half-life of insulin is shortened, and the concentration of GLUT-2 on the hepatocyte membrane is increased by endogenous thyroid hormone synthesis, among other causes[70].A statistically significant difference between pregnancy-induced hypertension and GDM was discovered in our investigation as well. It is found that the half-life of insulin is halved in hyperthyroidism. "By lowering the C-peptide/pro-insulin ratio, pro-insulin levels rise. Insulin resistance and reduced carbohydrate tolerance are the results of increased intestinal glucose absorption, endogenous glucose synthesis, lipolysis, catecholamine levels, and glucagon and growth hormone levels"[65]. Delays in peripheral glucose assimilation and delayed absorption as well as decreased hepatic glucose synthesis are all symptoms of hypothyroidism. Insulin resistance and decreased peripheral glucose consumption follow from this[65].

According to research by Yang et al. and Beucher et al.[63], premature delivery is more likely with both GDM and pre GDM. Despite this, our investigation found no statistically significant association between preterm birth and GDM.

In comparison to the other 2 research groups, women with both DM and hypothyroidism had a considerably higher incidence of severe preeclampsia (28.6%), according to Amudha et al.[66], which was similar to the incidence of 25% described by Tirosh et al.[77]. Many writers have noted that women with overt and subclinical hypothyroidism are more likely than the general population to experience pregnancy-related hypertension problems. In comparison to the other 2 research groups, women with both DM and hypothyroidism in the current study had a considerably higher incidence of severe preeclampsia (28.6%), which was comparable to the incidence (25%) described by Tirosh et al.[77]. Many writers have noted that women with overt and subclinical hypothyroidism are more likely than the general population to experience pregnancy-related hypertension problems. Postpartum complications and GDM did not differ statistically significantly in our study. Between Oligohydramnios and GDM, no statistically significant difference was detected.

Perinatal and neonatal morbidities associated with GDM and thyroid dysfunction include the following: Macrosomia, shoulder dystocia, newborn hypoglycemia, polycythaemia, hyperbilirubinaemia, neonatal respiratory distress syndrome, and other disorders that affect low birth weight[78,79]. In the current study, the distribution of the individuals by neonatal problems was 29% for respiratory distress, 28% for prematurity, and 19% for low birth weight (LBW). Respiratory distress and GDM did not differ statistically significantly from one another. Between Sepsis and GDM, a statistically significant difference was discovered. Maternal TSH levels >4mIU/L were linked to higher risks of

preterm and infant respiratory distress syndrome, according to a study by Sun et al.[80]. It is consistent with past studies that have identified a connection between women with GDM and a greater rate of neonatal morbidity that a large US cohort research linking maternal hypothyroidism to an elevated risk of neonatal sepsis, respiratory distress syndrome, transient infant tachypnea, and apnea.

In 15 subjects (78.2%), pre prenatal diabetes mellitus was present, and in 8 subjects (21.8%), gestational diabetes mellitus existed. P. Amudha and others[66]. The study comprised 150 pregnant women with singleton gestation who had been evaluated for GDM and/or hypothyroidism. Yanachkova V et al.[70] examined the medical files of 662 pregnant women who were split into two groups: 412 had gestational diabetes mellitus and 250 did not.

No statistically significant association between TTN and GDM, Hypoglycemia and GDM, Meconium Aspiration Syndrome and GDM, or Hyperbilirubinemia and GDM was discovered in our study.

SUMMARY:

This hospital-based prospective, cross-sectional, descriptive, and observational study followed all expectant patients who visited the Department of Obstetrics at R.L. Jalappa Hospital over an 18-month period.

"The SPSS 22 version of software used to analyse the data, which was entered into a Microsoft Excel data sheet. Data that was categorical was displayed as frequencies and proportions. The chi-square test or Fischer's exact test (for 2x2 tables only) were also employed as a test of significance for qualitative data.

Mean and standard deviation were used to depict continuous data. To determine the mean difference between two quantitative variables, an independent t-test was utilized as a measure of significance. MS Word and Excel were used to create several sorts of graphs using a graphical representation of the data After taking into consideration all the guidelines for statistical tests, a (probability that the result is true) of 0.05 was deemed statistically significant".

Minimum age was 18yrs Maximum age was 36yrs. Mean age was 25.9yrs with Standard deviation 4.98yrs. 70 had multi parity, majority had BMI between 18.5-24.9, LSCS was the mode of delivery in most of the patients, and anemia was the complication in majority. Neonatal complication was respiratory distress in 29, Prematurity in 28, and LBW in 19. Pre gestational diabetes mellitus was present in 15 subject (78.2%) and gestational diabetes mellitus was present in 8 subject (21.8%). The mean age among subjects with GDM was 30.09+ 3.64yrs and the mean age among subjects without GDM was 24.70+ 4.66yrs. There was statistical significance found between parity, age, BMI, mode of delivery with GDM. A statistical significant difference was found between pregnancy-induced hypertension, anemia, hydramnios, and sepsis with GDM. The most common

cause of Cesarean section overall and in the group with dual endocriopathies was previous LSCS(32% & 35.7) followed with fetal distress(18% & 14.2%).There were postpartum complications seen .Mostly associated with surgical site infection, post LSCS in a morbid obese patient with dual endocrinopathies complicated with preeclampsia.Full length wound gap was see.Cultures were sent ad came positive for Klebsiella.Patient had a prolonged stay in the hospital along with higher antibiotics administrations. No statistically significant association between TTN and GDM, Hypoglycemia and GDM, Meconium Aspiration Syndrome and GDM, or Hyperbilirubinemia and GDM was discovered in our study.

CONCLUSION

Preterm births, hypertensive problems, caesarean sections, and rates of infertility are all increased when DM and hypothyroidism coexist during pregnancy. In this study, we found a statistical significance between anaemia with GDM, hydraminos, and pregnancy-induced hypertensionOur results suggest the potential advantages of thyroid screening among pregnant women, along with earlier indications of thyroid-related poor pregnancy outcomes.

For a better outcome, women with dual endocrinopathy need more thorough monitoring throughout pregnancy. Additionally, it will be advantageous to check for the other endocrinopathy in a woman who has been diagnosed with one. Autoimmunity is an important element for understanding the linkage between T1DM and auto-immune thyroid disease (AITD) while the relationship between T2DM and thyroid disorders is more complex.

It would be appropriate to organize prepregnancy counseling for all women to detect and treat such disorders. This is to improve the maternal and perinatal outcomes.

LIMITATIONS:

The study was performed in a single center. So, more studies are required with a further analysis on Anti TPO antibody testing in these patients with dual endocrinopathies, to find out an association.

RECOMMENDATIONS:

Larger studies at multiple centers are required to gain a better understanding of the association between these two endocrinopathies.Following which the adverse maternal and fetal outcomes can also be tackled well.

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CASE PROFORMA

NAME: **IP NO:**

AGE: **DOA:**

OCCUPATION: **DOD:**

ADDRESS:

EDUCATION:

HUSBANDS

OCCUPATION:

SOCIOECONOIC

STATUS:

CHIEF COMPLAINTS:

HISTORY OF PRESENT ILLNESS:

OBSTETRIC HISTORY:

Marital life: Consanguinity:
Gravida: Para: living: Abortion: Dead: Details of

previous pregnancy: Details of present pregnancy:

MENSTRUAL HISTORY:

Last menstrual period: Age of menarche:

Expected delivery date:

Period of gestation:

Period of gestation according to

early scan: Past menstrual cycles:

PAST HISTORY:

Hypertension /Diabetes Mellitus/Bronchial Asthma/Tuberculosis /Blood

Dyscrasias/ Epilepsy/ Thyroid Disorder/ Cardiac Disease/Allergy

H/O blood transfusions:

H/O Surgeries or hospitalization:

PERSONAL HISTORY:

Sleep and appetite:

Diet:

Bowel and bladder:

FAMILY HISTORY:

DRUG HISTORY:

GENERAL EXAMINATION:

General condition:

Fair/ moderate/ Poor

Built: Nourishment:
Ht: cms Wt: kgs BMI:

Pallor: Icterus: Cyanosis:

Clubbing:

Lymphadenopathy:

Edema:

VITALS:

Pulse rate: Respiratory rate:

Blood pressure: Temperature: Breast: Spine: Thyroid:

SYSTEMIC EXAMINATION:

Cardiovascular system: Respiratory system: Central nervous system:

Per abdomen: Uterus size:

Relaxed / Irritable / Acting

Presentation: cephalic/ Breech/ other FHS:

LOCAL EXAMINATION:
Per Speculum: leaking PV Vaginal discharge

Per Vaginum: Effacement:

Dilatation:

Station:

Membranes:

Consistency

OS POSITION

PROVISIONAL DIAGNOSIS:

MODE OF DELIVERY:

INDICATION OF CESAREAN SECTION:

ASSOCIATED MATERNAL COMORBIDITY:

DETAILS OF THE NEONATE:

Sex: Date: Time: Birth weight: APGAR

score: 1'- 5'-

Admission to NICU:

Neonatal resuscitation

Perinatal

morbidity/mortality

INVESTIGATIONS:

Blood group and Rh typing:

CBC: HB: HIV:

PCV: HbsAG:

RBC: VDRL:

WBC:

PLT: RBS:

Urine analysis: Albumin-

Su ga

TSH,T3,T4:

OGCT:

OBSTETRICS SCAN:

PATIENT INFORMATION SHEET

Study title: **STUDY OF ASSOCIATION BETWEEN HYPOTHYROIDISM AND GESTATIONAL DIABETES MELLITUS AND THEIR OBSTETRIC OUTCOME IN A RURAL TERTIARY CARE HOSPITAL**

Study location: R L Jalappa Hospital and Research Centre

attached to Sri Devaraj Urs Medical College, Tamaka, Kolar.

Details-

Pregnant women admitted to the labor room with known cases of hypothyroidism are screened for gestational diabetes mellitus using OGCT.

Patients in this study will have to undergo a complete general physical examination, obstetric examination, routine blood investigations such as complete blood count, viral serology, urine routine, and random blood sugar levels. To assess fetal wellbeing, a cardiotocograph and an obstetric ultrasound with a biophysical profile will also be done.To determine the mode of delivery, indication of cesarean section and the fetal outcome .

Please read the following information and discuss with your family members. You can ask any questions regarding the study. If you agree to participate in the study, we will collect information (as per proforma) from you or a person responsible for you or both. Relevant history will be taken. This information collected will be used only for dissertation and publication.

All information collected from you will be kept confidential and will not be disclosed to any outsider. Your identity will not be revealed. This study has been reviewed by the Institutional Ethics Committee, and you are free to contact the member of the Institutional Ethics Committee. There is no compulsion to agree to this study. The care you will get will not change if you don't wish to participate. You are required to sign/ provide a thumb impression only if you voluntarily agree to participate in this study.

For further information, contact

Dr. LISLEY KONAR

Postgraduate,

Department of obstetrics and

gynecology, Sri Devaraj Urs

Medical College,

Kolar.

INFORMED CONSENT FORM

Case no:

I have read the foregoing information, or it has been read to me and has been explained to me in my own understanding language. I have had the opportunity to ask questions about it, and any questions that I have asked have been answered to my satisfaction. I have understood that I have the right to refuse consent or withdraw it at any time during the study, and this will not affect my treatment in any way. I consent voluntarily to participate in this study

"STUDY OF ASSOCIATION BETWEEN HYPOTHYROIDISM AND GESTATIONAL DIABETES MELLITUS AND THEIR OBSTETRIC OUTCOME IN A RURAL TERTIARY CARE HOSPITAL"

Name of Participant_____

Signature/ thumbprint of Participant _____

Date _____

R.L Jalappa Hospital Tamaka, Kolar.

ಮಾಹಿತಿ ಕಾನ್ಸೆಂಟ್ ಫಾರ್ಮ್

ನಾನು ಶ್ರೀ / ಶ್ರೀ. _____ ಅನ್ನು ನನ್ನ ಸಂ್ಪತ ಅರ್ಥವಾಗುವ ಭಾಷೆಯಲ್ಲಿ

ವಿವರಿಸಲಾಗಿದೆ, ಅದು ನನ್ನನ್ನು ಅಧ್ಯಯನದಲ್ಲಿ ಸೇರಿಸಲಾಗುವುದು, ಅದು

ಹೈಪೋಥೈರಾಯ್ಡಿಸಮ್ ಮತ್ತು ಗರ್ಭಾವಸ್ಥೆಯ ಮಧುಮೇಹ ಮೆಲ್ಲಿಟಸ್ ಮತ್ತು ಗ್ರಾಮೀಣ ತೃತೀಯ ಆರೈಕೆ

ಆಸ್ಪತ್ರೆಯಲ್ಲಿ ಅವರ ಪ್ರಸೂತಿ ಫಲಿತಾಂಶಗಳ ನಡುವಿನ ಸಂಬಂಧದ ಅಧ್ಯಯನ

ನನ್ನ ಕ್ಲಿನಿಕಲ್ ಆವಿಷ್ಕಾರಗಳು, ತನಿಖೆಗಳು ಮತ್ತು ಸಂಬಂಧಿತ ಆವಿಷ್ಕಾರಗಳನ್ನು ಅಧ್ಯಯನದ ಉದ್ದೇಶಕ್ಕಾಗಿ ಮೌಲ್ಯಮಾಪನ ಮಾಡಲಾಗುತ್ತದೆ ಮತ್ತು ದಾಖಲಿಸಲಾಗುತ್ತದೆ ಎಂದು ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನನ್ನ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆ ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ ಎಂದು ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ, ಮತ್ತು ನಾನು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಅಧ್ಯಯನದಿಂದ ಹಿಂದೆ ಸರಿಯಬಹುದು ಮತ್ತು ಇದು ನನ್ನ ವೈದ್ಯರೊಂದಿಗಿನ ನನ್ನ ಸಂಬಂಧ ಅಥವಾ ನನ್ನ ಕಾಯಿಲೆಗೆ ಚಿಕಿತ್ಸೆಯ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ.
ನನ್ನ ಸಂ್ಪತ ಅರ್ಥವಾಗುವ ಭಾಷೆಯಲ್ಲಿ, ಮಧ್ಯಸ್ಥಿಕೆಗಳ ಕಾರಣದಿಂದಾಗಿ ಸಂಭವನೀಯ ಪ್ರಯೋಜನಗಳು ಮತ್ತು ಪ್ರತಿಕೂಲತೆಗಳ ಅಗತ್ಯವಿರುವ ಮಧ್ಯಸ್ಥಿಕೆಗಳ ಬಗ್ಗೆ ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ.

ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ಕಂಡುಬರುವ ನನ್ನ ಎಲ್ಲಾ ವಿವರಗಳನ್ನು ಗೌಪ್ಯವಾಗಿಡಲಾಗಿದೆ ಮತ್ತು ಸಂಶೋಧನೆಗಳನ್ನು ಪ್ರಕಟಿಸುವಾಗ ಅಥವಾ ಹಂಚಿಕೊಳ್ಳುವಾಗ, ನನ್ನ ವಿವರಗಳನ್ನು ಮರೆಮಾಚಲಾಗುತ್ತದೆ ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ.

ವಿಚಾರಣೆಗಾಗಿ ನನ್ನ ಬಳಿ ಪ್ರಧಾನ ತನಿಖಾಧಿಕಾರಿ ಮೊಬೈಲ್ ಸಂಖ್ಯೆ ಇದೆ.

ಈ ಅಧ್ಯಯನದ ಭಾಗದಲ್ಲಿ ಸೇರಿಸಲು ನನ್ನ ಸಂಪೂರ್ಣ ಮನಸ್ಸಿನಲ್ಲಿ ನಾನು ಸಂಪೂರ್ಣ ಒಪ್ಪಿಗೆ ನೀಡುತ್ತೇನೆ.

ರೋಗಿಯ ಸಹಿ:
ಹೆಸರು:

ಸಾಕ್ಷಿಯ ಸಹಿ:
ಹೆಸರು:
ರೋಗಿಗೆ ಸಂಬಂಧ:

ದಿನಾಂಕ:
ಸ್ಥಳ:

MASTER CHART

serial no	age	parity	bmi	maternal complication	mod	neonatal complication	postpartum complications
1	2	2	3	4	1	3	1
2	3	2	4	2	2	3	2
3	1	1	1	1	2	4	2
4	2	2	2	5	2		2
5	3	2	2	6	2		2
6	4	2	2	3	2	2	1
7	3	2	2		2	3	1
8	1	1	3	2	2	3	2
9	2	1	4	4	2	4	2
10	3	2	1	6	1		2
11	3	2	4	5	2	2	3
12	3	1	4	4	1	1	4
13	2	2	2	4	1	4	6
14	1	1	2	1	1	1	5
15	3	2	1		2	1	4
16	2	2	1	2	2	4	4
17	3	2	4	5	2		1
18	5	2	2	4	2	2	1
19	2	1	2	2	2	4	2
20	1	1	1	4	2		2
21	3	2	2	4	2	1	2
22	2	2	3	6	2	2	2
23	2	1	4	6	2	1	2
24	3	2	3	2	1	2	2
25	3	2	2	4	2	1	2
26	2	2	3	6	2	3	2

27	1	2	2	1	2	1	4
28	3	2	1		1	1	2
29	4	2	4		1	2	2
30	2	2	2	4	2	1	2
31	3	2	2	1	2	4	2
32	2	1	2	4	1	3	3
33	1	1	2	2	2	4	3
34	1	2	3	4	2	3	3
35	2	2	2	1	1	3	3
36	3	2	2		1	1	3
37	5	2	1	4	2		2
38	4	2	2		1	1	2
39	2	2	1	4	2		2
40	3	2	3		2	1	1
41	2	1	3	1	1	1	3
42	1	1	3	1	1	3	3
43	2	1	2	2	2	1	4
44	1	1	2	4	1	1	3
45	3	2	2	4	2		3
46	4	2	1		2	1	2
47	2	2	3	2	2	4	2
48	3	2	4	2	2	2	3
49	2	2	2	6	2	1	2
50	1	2	2	2	2	4	5
51	4	2	3	5	2	1	3
52	2	1	3	5	2	1	3
53	3	2	3		2	3	3
54	3	2	1		1	3	3
55	2	2	1	5	1	3	2
56	2	2	3	4	2	3	2

57	1	1	2	5	2	2	2
58	2	1	2	4	2	2	3
59	3	2	1	4	2		2
60	1	1	1	2	1	1	3
61	2	2	2	5	2	3	2
62	4	2	2		1		3
63	3	2	2	2	2	3	4
64	2	2	1	2	1	4	3
65	3	2	3	2	1	4	3
66	5	2	3	2	1	1	3
67	4	2	1	2	1	4	3
68	2	1	2	3	1	4	3
69	1	1	3	1	1	2	3
70	3	2	2	4	2		3
71	2	2	2	1	2	3	3
72	1	1	1	4	2	1	3
73	5	2	1		2	1	3
74	2	2	4	4	1		2
75	3	2	1		2	2	2
76	4	2	4	2	2	4	2
77	1	1	3	1	2	2	2
78	2	1	2	6	2		1
79	3	1	2	2	2	4	2
80	2	2	4	4	1	4	4
81	2	2	2	6	1	3	2
82	5	2	1	2	2	1	4
83	3	2	3	1	2	4	1
84	1	1	1	1	2	4	2
85	2	1	1	2	2	3	2
86	3	2	2	1	2	2	2

87	3	2	2		2		2
88	2	2	2	4	2	2	2
89	4	2	4		2	3	2
90	1	2	1	5	1	1	2
91	2	1	4	1	1	4	2
92	2	2	2	1	2	3	2
93	1	1	2	2	2	2	2
94	2	2	3	2	2	1	3
95	3	2	1	4	2	3	3
96	1	1	2	2	1	3	2
97	2	2	2	6	2		2
98	4	2	1	4	1	2	3
99	3	2	1		1		2
100	1	1	4	6	2	3	3

MASTERCHART KEY

1.AGE DISTRIBUTION

AGE	KEY
<20yrs	1
21-24yrs	2
25-29yrs	3
30-34yrs	4
35-40yrs	5

2.BMI

BMI	KEY
<18.5	1
18.5-24.9	2
25-29.9	3
≥30	4

3.PARITY

PARITY	KEY
PRIMI	1
MULTI	2

4.MODE OF DELIVERY

MODE OF DELIVERY	KEY
NVD	1
LSCS	2

5.MATERNAL COMPLICATIONS

MATERNAL COMPLICATIONS	KEY
Pregnancy induced hypertension	1
Preterm delivery	2
Anemia	3
Postpartum complications	4
Hydraminos	5
Oligohydramnios	6

6.NEONATAL COMPLICATIONS

NEONATAL COMPLICATIONS	KEY
Respiratory distress	1
TTN	2
Sepsis	3
Hypoglycaemia	4
Meconium aspiration syndrome	5
Hyperbilirubinemia	6

POSTPARTUM COMPLICATION

POSTPARTUM COMPLICATIONS	KEY
NON PROGRESSION OF LABOUR	1
POST LSCS	2
FETAL DISTRESS	3
CEPHALOPELVIC DISPROPORTION	4
PRETERM BREECH	5
CDMR	6