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Screening and Management of Overt Hypothyroidism, Gestational Hypertension, Gestational Diabetes Mellitus During Pregnancy

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KEYWORDS

OH-Overt Hypothyroidism, GHTN-Gestational Hypertension, and GDM- Gestational Diabetes Mellitus, TSH- Thyroid Stimulating Hormone, FT4- Free Thyroxine, OGTT-Oral Glucose Tolerance Test, FBS-Fasting Blood Sugar, PPBS- Postprandial Blood Sugar, HbA1c, Systolic and Diastolic Blood Pressure, Tablet Levothyroxine, Tablet Labetalol, Tablet Metformin, maternal and fetal outcomes.

ABSTRACT:

Background: During pregnancy comorbidities such as Overt Hypothyroidism, Gestational Hypertension, and Gestational Diabetes Mellitus are common complications that affect maternal and fetal growth and may also complicate the delivery. Early diagnosis and treatment of these complications aid in the healthy living of the mother and the infant. This study aims to evaluate and assess the effectiveness of screening and management for these respective complications. The findings of this study help in the early screening and proper management of Overt Hypothyroidism, Gestational Hypertension, and Gestational Diabetes Mellitus, improving pregnancy outcomes i.e., maternal health and fetal health.

Method: This prospective observational study was conducted for 6 months in the Department of Obstetrics and Gynecology. Patients screened and diagnosed with Overt Hypothyroidism, Gestational Hypertension, and Gestational Diabetes Mellitus during pregnancy and on respective management were collected

Results: A total of 123 pregnant women have been diagnosed with Overt Hypothyroidism, Gestational Hypertension, and Gestational Diabetes Mellitus during pregnancy in 6 months. The prevalence of Gestational Hypertension at 39.84% was high in this study, whereas Gestational Diabetes Mellitus and Overt Hypothyroidism were 32.5% and 27.6% respectively. Pregnant women after being diagnosed with complications have been consuming medications namely Tablet Levothyroxine in varying doses, Tablet Labetalol 100mg, and Tablet Metformin 500mg respectively.

Conclusion: Early screening of comorbidity and intervention with respective management prevent maternal complications and aid in maternal and fetal health outcomes.

INTRODUCTION

A group of comorbidities women may experience during pregnancy includes Hypothyroidism, Gestational Hypertension, Gestational Diabetes Mellitus, Anemia, Seizures, etc.

Overt Hypothyroidism (OH):

The most common endocrine deficiency disorder in pregnant women is hypothyroidism. Women are prone to either Subclinical or Overt Hypothyroidism (OH) in the reproductive phase.[1] Subclinical Hypothyroidism refers to elevated levels of thyroid-stimulating hormone (TSH) with a prevalence of 6.47%.[5] In contrast, Overt Hypothyroidism is increased TSH and decreased serum-free T4 (Thyroxine) levels, with a prevalence of 1-2% in a North Indian tertiary care center study. [2] In pregnancy results number of hormonal and physiological changes to influence the two main hormones that are human chronic gonadotropin (HCG) and estrogen.14 Overt Hypothyroidism, if left untreated has been associated

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with pregnancy mother and fetal outcomes such as Miscarriage, preeclampsia, stillbirth, placental abruption, maternal anemia, low birth weight, spontaneous abortion, and neurocognitive impairment in children.[5,9]

Gestational Hypertension (GHTN):

5-10% of pregnancies are complicated by hypertensive disorders comprised of Gestational hypertension, pre-eclampsia, and eclampsia. GHTN (Gestational Hypertension) is referred to as elevated blood pressure of systolic 140mmHg or/and diastolic 90mmHg measured 4 – 6 hours apart after a gestation period of 20 weeks with the absence of proteinuria which is protein in urine is absent.[3]

Pre-eclampsia, a hypertensive disorder in pregnancy is associated with gestational hypertension and the presence of proteinuria (≥ 300mg/dL in a 24-hour urine collection) or thrombocytopenia, impaired liver functions, and renal insufficiency. When pregnant women with pre-eclampsia further develop serious effects such as seizures, cerebral arterial ischemia and infarction or coma, the patient falls under the diagnosis of Eclampsia.[11]

Uncontrolled or untreated Gestational Hypertension during pregnancy may develop to pre-eclampsia and eclampsia, asphyxia in infants, and increase the risk of stillbirth, low birth weight, neonatal death, pre-term delivery, and intrauterine growth retardation, antepartum and postpartum hemorrhage. [8,10]

Gestational Diabetes Mellitus (GDM):

Between 10-14% of pregnancies are comprised of GDM which is a carbohydrate metabolic disorder associated with insulin resistance induced by placental hormones. In GDM, pregnant women develop hyperglycemia during pregnancy typically between 24 – 28 weeks of the gestation period with no history of diabetes before getting pregnant, and in most cases, GDM resolves after childbirth.[4] The History of maternal diabetes (33%) of women with GDM, India. Moreover, in healthcare, GDM imposes a major challenge, in the 21st century.[15] 75-g OGTT is used as one main diagnostic criterion for the detection of GDM.[6] Untreated Gestational Diabetes Mellitus leads to fetal and maternal outcomes such as macrosomia, shoulder dystocia, increased cesarean delivery rates, intrauterine fetal deaths, Future diabetes, hypertensive disorders, and maternal obesity.[7,12]

METHODS AND MATERIALS

This Prospective Observational Study was conducted in the Department of Obstetrics and Gynecology (OBG) at Malla Reddy Hospital, Suraram, Hyderabad, Telangana, over a period of 6 months from March 2024 to September 2024. It comprised 123 sample population with gestation weeks between 34 and 38 admitted to a tertiary care center for delivery and newborn care.

Inclusion Criteria:

Cases of pregnancy diagnosed with Overt Hypothyroidism, Gestational Diabetes Mellitus, Gestational Hypertension

Age group: Above 18 years – 35 years

Exclusion Criteria:

Cases of pregnancy without Overt Hypothyroidism, Gestational Diabetes Mellitus, Gestational Hypertension

Cases of pregnancy other than Overt Hypothyroidism, Gestational Diabetes Mellitus, Gestational Hypertension co-morbidities

Age group: Less than 18 years – above 35 years of age

Ethical considerations:

Before beginning the study, approval was obtained from the Institutional Ethics Committee of the institute (MRIMS/DHR-IEC-Pharm D 2024/169).

STUDY PROCEDURE:

Information was obtained regarding socio-demographic characteristics, pregnancy-related details, and medical history.

Inform consent was explained to the patient, based upon the suitable design data collection form patient data was collected.

The sample was collected based on inclusion and exclusion criteria.

The data includes levels of Thyroid stimulating hormone (TSH), Free Thyroxine(T4) in patients with overt hypothyroidism, Fasting Blood Sugar, Post-prandial Blood Sugar, Random Blood Sugar, HbA1C for Gestational Diabetes Mellitus, Blood pressure in Gestational Hypertension.

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The data also includes drugs and their dosages for the treatment of Overt Hypothyroidism, Gestational Diabetes Mellitus, and Gestational Hypertension obtained from the treatment chart.The data collected was entered into an organized database analysis.

Statistical Analysis:

MS-Excel 2019 was used for data entry, SPSS 16, Open epi 3.01, and Jamovi 2.3.21 were the software packages employed for the study data analysis.

RESULT

A total number of 123 pregnant women with gestational hypertension, overt hypothyroidism, and Gestational diabetes mellitus data was collected and analyzed. Out of 123 pregnant women, 39.84% are diagnosed with Gestational Hypertension, 32.5%, are diagnosed with Gestational Diabetes Mellitus, and 27.6% are diagnosed with Overt Hypothyroidism

Table 1: TSH and FT4 parameters are evaluated for the screening of OH

Parameter	N (Number)	Percentage %	Nill N (Number)	Nill percentage %	Total Percentage %
TSH (0.98-9.45) and FT4 (0.36-1.18)	34	27.6%	89	72.4 %	100%
Total Number	34		89		123

Table 1 shows parameters TSH and FT4 (27.6%) are tested for diagnosis of OH and 72.4% ruling out other parameters screened for comorbidities

Table 2: Parameters used to rule out the comorbidity GDM

Parameter	OGTT (96-176)	FBS (74-144)	PPBS (90-180)	HbA1c (4.6-7.4%)
Number of pts tested	40	38	38	17
Percentage	32.5%	30.9%	30.9%	13.8%
Nill number	83	85	85	106
Nill %	67.4%	69.1%	69.1%	86.2%
Total number	123	123	123	123
Total %	100%	100%	100%	100%

Table 2 shows that the Oral Glucose Tolerance Test (32.5%) is the preceding parameter in the screening of Gestational Diabetes Mellitus. Other parameters such as FBS, PPBS, and HbA1c account for 30.9% and 13.8% respectively.

Table 3: Systolic and Diastolic Blood pressure to rule out GHTN

Parameter	N (Number)	Percentage %	Nill N(Number)	Nill percentage%	Total Percentage %
Systolic pressure (120-140) And Diastolic Pressure (80-90)	49	39.84%	74	60.16%	100 %
Total number	49		74		123

Table 3 shows that both Systolic and Diastolic Blood pressure (39.84%) are measured to diagnose Gestational Hypertension. The other comorbidities ruled out 60.16%.

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Table 4: Percentages of comorbidity prevalence diagnosed in pregnant women and the laboratory parameters of OH, GHTN, GDM

Parameter	N=123	Percentage
Overt Hypothyroidism (OH)	34	27.6%
TSH (0.98-3.83)	11	8.9%
TSH (4.01-4.98)	12	9.8%
TSH (5.01-5.49)	8	6.5%
TSH (6.37-9.45)	3	2.4%
Free T4 (0.36-0.60)	11	8.9%
Free T4 (0.61-0.97)	19	15.4%
Free T4 (1.03-1.18)	4	3.25%
Gestational Hypertension (GHTN)	49	39.84%
Systolic pressure 120	20	16.3%
Systolic pressure 130	23	18.7%
Systolic pressure 140	6	4.8%
Diastolic pressure 80	22	17.8%
Diastolic pressure 90	27	22%
Gestational Diabetes Mellitus (GDM)	40	32.5%
OGTT (96-116)	7	5.7%
OGTT (124-150)	12	9.7%
OGTT (154-176)	21	17.1%
FBS (74-90)	8	6.5%
FBS (94-120)	22	17.8%
FBS (124-144)	8	6.5%
PPBS (90-120)	4	3.2%
PPBS (121-148)	22	17.8%
PPBS (151-180)	12	9.8%
HbA1c (4.6-5.5)	9	7.3%
HbA1c (6.1-7.4)	8	6.5%

Table 4 shows that out of 123 pregnant women between the age of 19-35 years, 34 women were diagnosed with Overt Hypothyroidism (27.6%), Gestational Hypertension (39.84%), and Gestational Diabetes Mellitus (32.5%) with respective laboratory interpretations. TSH (8.9%, 9.8%, 6.5%, 2.4%) and Free T4 (8.9%, 15.4%, 3.25%) were monitored for OH. Systolic pressure (16.3%,18.7%, 4.8%) and diastolic pressure (17.8%, 22%) were monitored for GHTN. OGTT (5.7%, 9.7%, 17.1%), FBS (6.5%, 17.8%, 6.5%), PPBS (3.2%, 17.8%, 9.8%), HbA1c (7.3%, 6.5%) were monitored for GDM.

Table 5: Clinical management for OH

Tablet/Dose	12.5mcg	25mcg	37.5mcg	50mcg	62.5mcg	75mcg	100mcg
No. of Patients using Tablet Levothyroxine	5	10	2	8	1	5	3
Percentage %	4.1 %	8.1 %	1.6 %	6.5 %	0.8 %	4.1 %	2.4 %

Table 5 conveys that Tablet Levothyroxine (P=0.03) was administered to patients with OH of varying doses i.e., 12.5mcg (4.1%), 25mcg (8.1%), 37.5mcg (1.6%), 50mcg (6.5%), 62.5mcg (0.8%), 75mcg (4.1%) and 100mcg (2.4%).

Table 6: Clinical management for GHTN

Tablet	Dose	Percentage %
Tablet Labetalol	100mg	39.84 %

Table 6 indicates that the Tablet Labetalol 100mg (P=0.02, 39.84%) was administered to manage Gestational Hypertension.

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Table 7: Clinical management for GDM

Tablet	Dose	Percentage %
Tablet Metformin	500mg	32.5 %

Table 7 expresses that 40 women have been consuming the medication, Tablet Metformin 500mg ($P<0.01$, 32.5%) for the management of Gestational Diabetes Mellitus.

DISCUSSION:

Complications such as Overt Hypothyroidism, Gestational Hypertension, and Gestational Diabetes Mellitus are commonly seen during pregnancy, untreated resulting in maternal complications and fetal outcomes. Our study focused on the detection parameters and management of these complications during pregnancy.

A previous study shows the prevalence of Overt hypothyroidism to be 1.4% out of 1055 samples (Meenakshi, Prabhat, Sahu D, 2019)[2], in our study, the prevalence of OH was observed to be 27.6% (n=123), and have been under management with Tablet Levothyroxine at varying dosages, controlling the complications and all these gave birth to a healthy child, which highlights the urgent need for early detection and intervention. In the literature (Subha Sivagami Sengodan, Sreeprathi N, Dec-2019) out of 2028 cases, gestational hypertension was diagnosed in 962 cases (47.4%)[3]. 49 (39.84%) women from our sample size have been diagnosed with GHTN and were being treated with the Tablet Labetalol 100mg thereby preventing maternal and fetal outcomes, all 49 women gave birth to healthy children.

In the study by Nicholas Lee Wen Sheng, Daniel Wong Bang Lung et al., 2021, A total of 246 (24.9%) women were diagnosed with GDM from the sample group (n=987)[13]. In contrast, our study shows that 32.5% of Pregnant women have been diagnosed with Gestational Diabetes Mellitus and are consuming the Tablet Metformin 500mg under clinical guidance to prevent further complications of maternal and fetal outcomes, all the women with GDM and on medication gave birth to healthy children with only 4 children weighing over 4.5 kg as a result of late screening.

During the study, we found a significant increase in the alkaline phosphate levels in association with GHTN.

STRENGTHS: Early detection, enhanced maternal well-being, comprehensive data collection, Promotes Evidence-Based Treatment.

LIMITATIONS: Small sample size, Single-center study, limited follow-up period, Follow-up of the mother or infant after discharge was challenging.

CONCLUSION: This study shows the critical importance of comprehensive screening and management strategies for overt hypothyroidism, gestational hypertension, and gestational diabetes mellitus during pregnancy. Our findings show a significant Prevalence rate of 39.84% GHTN, 32.5% GDM, and 27.6% OH screened and are on medication with Tablet Labetalol 100mg, Tablet Metformin 500mg, and Tablet Levothyroxine of varying doses (12.5,25,37.5,50,62.5,75,100 mcg) respectively highlights the significant impact of these conditions and their management on maternal and fetal health outcomes. This study provides insight into early screening and detection of comorbidity and intervention with proper drug and dosage therapy under medical guidance by prioritizing the health and well-being of pregnant women and their offspring, we can improve maternal and child health outcomes globally.

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CONFLICT OF INTEREST: None

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