PREVALENCE AND TRIMESTER WISE RISK OF GESTATIONAL DIABETES MELLITUS AND THYROID DISORDERS IN SOUTH INDIAN POPULATION.

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ABSTARCT

BACKGROUND: The pregnancy is seen as a risk factor for developing thyroid disorders and Gestational diabetes mellitus. This may lead to increased risk of abortions, premature delivery.

The metabolic needs and hormonal changes during pregnancy results in alteration of biochemical parameters which characterise the thyroid gland changes. Gestational diabetes mellitus (GDM) in women plays a crucial role in increasing prevalence of future diabetes (predominantly T2DM) and obesity.

METHODS: This was a cross sectional prospective study conducted in 209 pregnancy patients of different trimesters. The patients were screened for gestational diabetes and thyroid disorders (hypothyroidism, hyperthyroidism). The blood sugar levels and thyroid profile (TSH) were analysed using unpaired student's t-test.

RESULTS: This study found a prevalence of 45.5% thyroid disorders (hypothyroidism and hyperthyroidism) and 6.6% GDM among the pregnancy patients screened. The pregnancy patients of 1st and 2nd trimester are at more risk of developing thyroid disorders (hypothyroidism in more common) and patients of 2nd and 3rd trimesters are at more risk of developing GDM. The comparison of FBS and PPBS of pregnant patients with and without GDM, comparison of TSH of pregnant patients with and without hypothyroidism were found to be highly significant.

CONCLUSION: The study shows a significant prevalence of hypothyroidism and GDM in pregnancy. So, there is a need of diagnosis in pregnancy for these conditions to avoid fetal complications.

Keywords: Gestational diabetes mellitus, hypothyroidism, hyperthyroidism, pregnancy

INTRODUCTION:

Thyroid and diabetes mellitus are the two most common endocrine disorders in the general population. Among thyroid disorders hypothyroidism is the most common and it is most prone in women than men [1].

The women who are pregnant are at more risk of developing thyroid disorders. The metabolic needs and hormonal changes during pregnancy results in alteration of biochemical parameters which characterise the thyroid gland changes. The complications of pregnancy associated hypothyroidism can lead to abortions, premature delivery, fetal retardation, anemia, intrauterine fetal death. The pathology of thyroid worsens during pregnancy [2].

Thyroid hormone production is augmented during normal pregnancy in order to meet increased physiological demands of growing fetal placental unit. During the first half of gestation, there is a increase in serum estrogen levels upto 500-1000pg/ml, this results in 2 to 3 fold up regulation of hepatic production of Thyroxine Binding Globulin (TBG). This causes temporary reduction in Free T4 levels that in turn leads to increased thyrotropin(TSH) stimulation of thyroid gland to restore Free T4[3].

Adequate nutritional iodine intake is required for synthesis of thyroid hormones, which are crucial for neurodevelopment during early life. The women with iodine deficiency during pregnancy were more likely to have children with lower verbal IQ and reading scores 8 to 9 years of age when compared with children of women with iodine sufficiency [4].

Gestational diabetes mellitus (GDM) in women plays a crucial role in increasing prevalence of future diabetes (predominantly T2DM) and obesity. The cause of GDM can be due to beta cell defects i.e., autoimmune destruction of pancreatic beta cells. Mutations that cause several subtypes of MODY (maturity onset diabetes of the young), with genetic subtypes denoted as

MODY1, MODY2 etc., have been found in women with GDM. Insulin requirements are high during normal late pregnancy. In majority of cases chronic insulin resistance already present before pregnancy [5].

The screening of GDM continues to be contentious issue. The GDM left untreated may lead to neonatal hypoglycaemia, fetal adiposity, preclampsia, birth trauma, shoulder dystocia, increased umbilical cord c-peptide level [6].

MATERIAL AND METHODS

This is a prospective cross-sectional study conducted in South India region. This study was conducted over a period of 6 months, which is from January to June months of 2017 year.

The design was enabled to determine the prevalence of thyroid dysfunction (hypothyroidism, hyperthyroidism) and GDM in pregnancy. And to determine the trimester wise risk.

The study included 209 pregnancy patients of three trimesters. These patients were subjected to biochemical evaluations of thyroid profile (TSH) and diabetic profile (FBS, PLBS).

INCLUSION CRITERIA

Pregnancy patients (of 3 trimesters)

EXCLUSION CRITERIA

Pregnancy patients of other co morbidities (other than thyroid disorders and GDM)

STATISTICAL ANALYSIS

The results were subjected to unpaired student's t-test at 95% confidence interval. At a p value of <0.05 was judged to be statistically significant.

RESULTS

Total number of pregnancy patients are 209.

No. of patients with first ,second and third trimester are 66, 86 and 57 respectively. The percentage distribution of patients based on their trimesters is dipicted in figure 1, with 27%, 41.1%, 31.5% in 1st , 2nd and 3rd trimesters respectively.

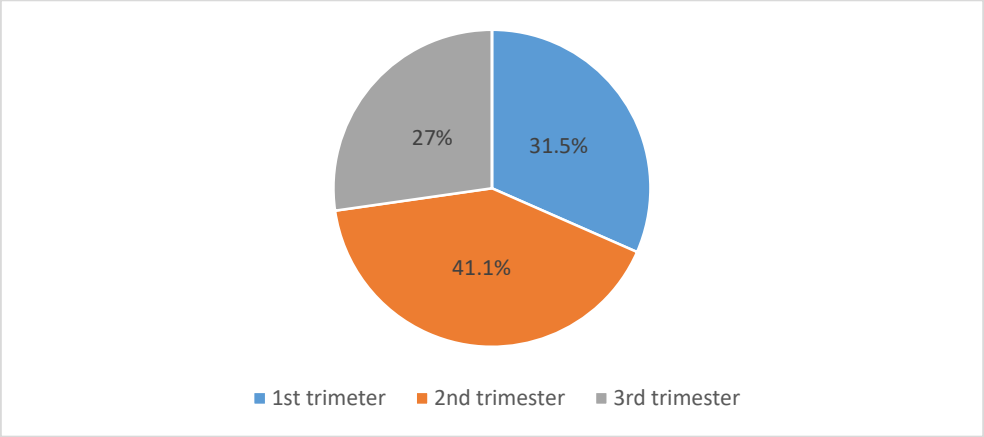


Figure 1: Percentage no.of pregnancy patients attended clinic with different trimesters

THYROID DISORDERS IN PREGNANCY

The screened thyroid disorders in pregnancy are hypothyroidism and hyperthyroidism. The no. of pregnancy patients who developed thyroid disorders are 95(45.5%) among 209 patients. The prevalence of hypothyroidism is more than that of hyperthyroidism in pregnancy, with 84 pregnancy patients are of hypothyroidism and 11 are of hyperthyroidism. And the development of hypothyroidism is mostly seen in 1st trimester, whereas hyperthyroidism in 2nd trimester.

Based on their time (trimester) of occurrence the patients are categorized in to three groups (trimesters of occurrence). This data is shown in table 1.

Table 1: Hypothyroidism and hyperthyroidism in pregnancy

Trimester	No. of patients(n=95)	
	Hypothyroid(n=84)	Hyperthyroid(n=11)
1st trimester	38	3
2nd trimester	30	8
3rd trimester	16	0

The percentage distribution of patients with thyroid disorders is depicted in figure 2, with 40.1% hypothyroid patients and 5.26% hyperthyroid patients among all the pregnancy patients of the study.

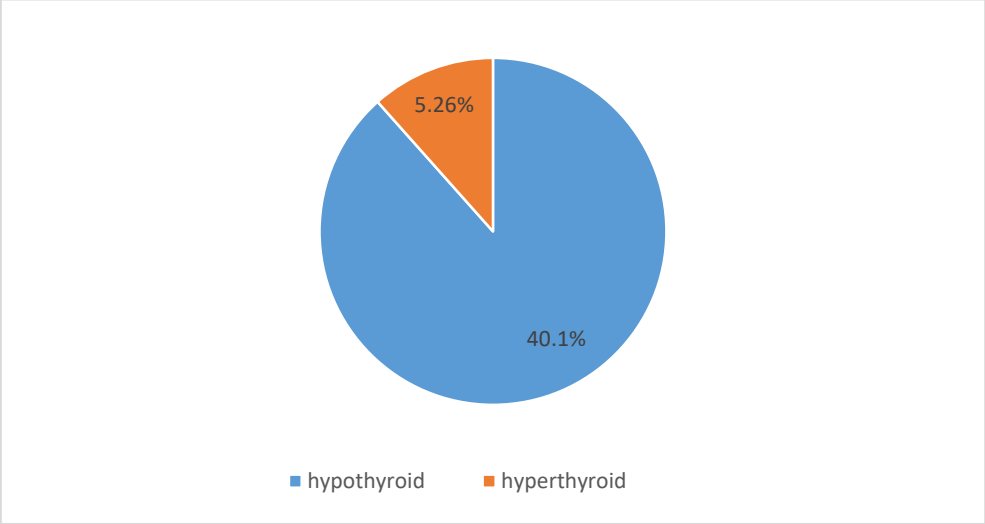


Figure 2: Percentage distribution of hypothyroidism and hyperthyroidism in pregnancy

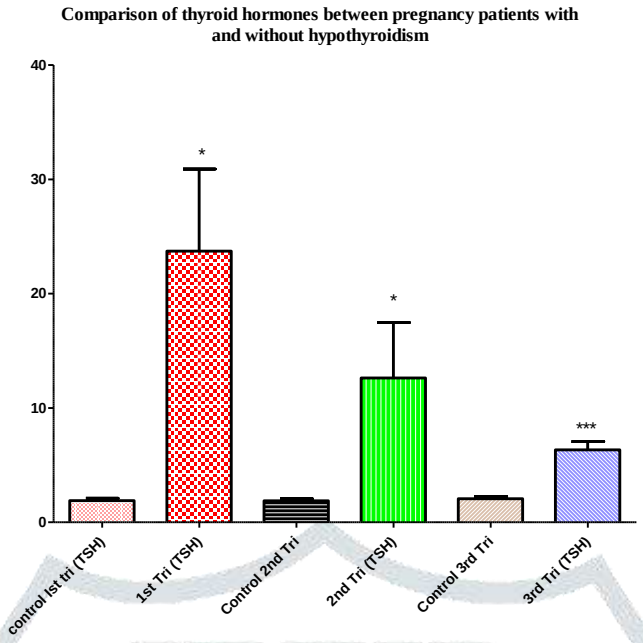
The thyroid profile of the normal pregnancy patients is compared with the thyroid profile of hypothyroid pregnant patients. The TSH levels are subjected to unpaired t-test at 95% confidence interval. This data is shown in table 2.

Table 2: Trimester wise comparison of thyroid hormones between normal pregnancy patients and pregnancy patients with hypothyroidism using unpaired t- test (values are mean ±SEM)

Trimester	TSH		P value
	Control	Cases	
1st	1.896±0.2100	23.72±7.186	0.0192*
2nd	1.881±0.175	12.63±4.840	0.0104*
3rd	2.065±0.196	6.341±0.7261	<0.0001***

*significant, **highly significant

The thyroid hormone (TSH) levels varied significantly during 3 trimesters and the 3rd trimester showed high level of significance. The mean levels of TSH in control group with respect to 1ST, 2ND, 3RD trimesters respectively (1.896±0.2100, 1.881±0.175, 2.065±0.196) are less than that of case group (23.72±7.186, 12.63±4.840, 6.341±0.7261). This comparison results are depicted in figure 3.



*significant, *** highly significant

Figure 3

GESTATIONAL DIABETES

No. of pregnancy patients who developed gestational diabetes are 14(6.69%) out of 209 total patients. The development of GDM was mostly seen in 2nd and 3rd trimesters when compared to 1st trimester.

Based on their time (trimester) of occurrence the patients are categorised in to three groups. This data is shown in table 3.

Table 3: Gestational diabetes in pregnancy

Trimester	No. of patients (14)
1st trimester	01
2nd trimester	06
3rd trimester	07

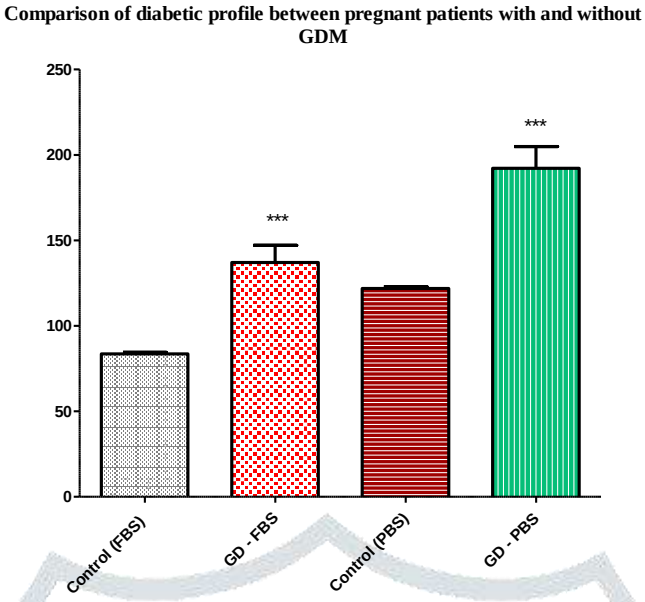
The diabetic profile (FBS, PPBS) of normal pregnant patients are compared with that of gestational diabetic patients. These are subjected to unpaired t -test for statistical significance. This data is shown in table 4.

Table 4: Comparison of diabetic profile between pregnancy patients with and without GDM using unpaired t-test (values are mean ±SEM)

Test	Control (n=100)	Cases(n=14)	P value
FBS	83.56±0.941	137±10.04	<0.0001***
PPBS	121.8±0.9195	192±12.70	<0.0001***

***highly significant

The blood sugar levels between normal pregnancy patients and patients with GDM varied significantly at 95%confidence interval. The mean FBS, PPBS of control group (83.56±0.941, 121.8±0.9195) are less than that of case group (137±10.04, 192±12.70). This comparison results are depicted in figure 4.



***highly significant

Figure 4

DISCUSSION

This study was conducted with the purpose to evaluate the prevalence of GDM and thyroid disorders (hypothyroidism, hyperthyroidism) in pregnancy patients. The study showed impressive significant relation between GDM and thyroid disorders**. Many studies have showed relation between pregnancy and thyroid disorders but there are fewer studies on GDM and also there are no studies including both the thyroid disorders and GDM. Our study also included trimesters wise risk of developing GDM and thyroid disorders.**

Of total 209 patients screened, 45.5% (n=95) are affected with thyroid disorders (hypothyroidism, hyperthyroidism) and 6.69% (n=14) affected with GDM. The prevalence of thyroid disorders and GDM among total number of pregnancy patients screened is depicted in figure 5.

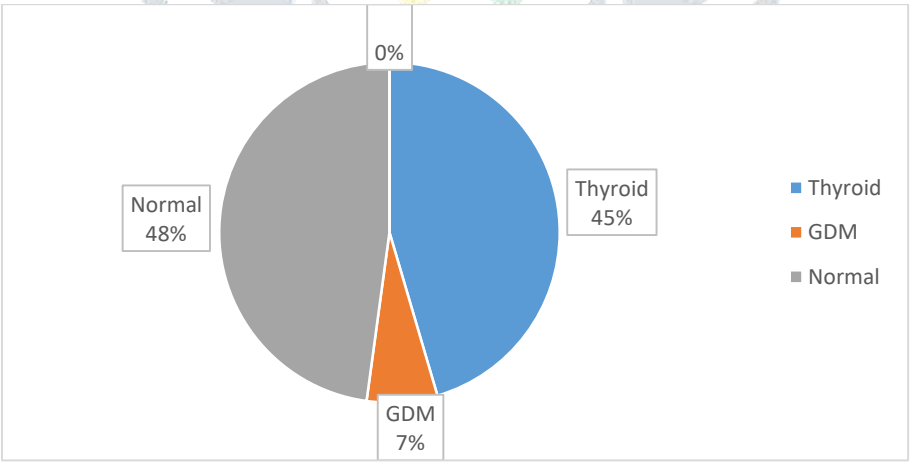


Figure 5: Prevalence of thyroid and GDM in pregnancy patients

The normal population indicated in the figure 5, are pregnancy patients without GDM or thyroid disorders.

Rodica TUDOSA et al., conducted a study on maternal and fetal complications of the hypothyroidism related pregnancy. The study was conducted in Bucharest University Emergency Hospital with selected group of 60 pregnant women with premature delivery diagnosis and a control group of 40 pregnant women with on term delivery diagnosis. They noticed a clear prevalence of the maternal and fetal complications during labor and childbed with in the first group as compared to the group on term child

birth. The appropriate, early administered treatment and maintenance of a normal level of thyroid hormones minimize the risk of maternal and fetal complications and make it possible that the pregnancy may be carried to term without severe complications [2]

Jane Cleary-Goldman et al., conducted a study on maternal thyroid hypofunction and pregnancy outcome. The study was conducted on 10990 pregnancy patients of Boston with first and second trimester serum assayed for TSH, FT4 and antithyroglobulin and antithyroid peroxidase antibodies. Subclinical hypothyroidism was documented in 2.2% in the first and 2.2% in second trimester. Hypothyroxinemia was documented in 2.1/% in the first and 2.3% in the second trimester. Hypothyroxinemia was associated with preterm labor, in the second trimester, it was associated with gestational diabetes [7]

Rajesh Rajput et al., conducted a study on prevalence of gestational diabetes mellitus and associated risk factors at a tertiary care hospital in Haryana. The study enrolled 607 pregnant women. Out of them GDM was diagnosed in 43(7.1%) women. On bivariate analysis risk factors found to be significantly associated with GDM were age, educational level, socio economic status, prepregnancy weight and BMI, weight gain, family history of diabetes or hypertension and past history of GDM but on multivariate analysis only upper middle class and presence of acanthosis nigricans were found to be significantly associated with GDM [8]

The study included the pregnancy cases to evaluate the risk of biochemical changes in pregnancy based on their trimesters. The biochemical evaluations done in this study are assessing the FBS, PPBS, TSH to evaluate the GDM and thyroid disorders (hypo, hyper). The data is categorized based on trimesters to evaluate the effects of maternal trimester changes affecting the biochemical levels of body. The risk of having thyroid disorder is more than the GDM in pregnancy patients. The most presenting thyroid disorder is hypothyroidism than the hyperthyroidism. The risk of getting thyroid disorders is more in 1st and 2nd trimesters and that of GDM is in 2nd and 3rd trimesters. The data collected is subjected to unpaired t- test and analyzed between 100 control pregnancy patients among total 209 total patients. The TSH, FBS, PPBS level of cases (GDM, thyroid disorders) showed highly significance with that of controls.

CONCLUSION

This study has shown that there is a high prevalence of GDM and thyroid disorders (hypothyroidism, hyperthyroidism) in pregnancy. This shows that the pregnancy is a risk factor for developing thyroid disorders and GDM. So, there is a need of diagnosis for GDM and thyroid profiles during pregnancy to avoid fetal, maternal complications. Early diagnosis can help in accurate treatment and help in good maternal, fetal health.

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