

Association of Hypothyroidism in Pregnant Women with Hyperglycaemia

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ABSTRACT

Background: Globally, prevalence of hyperglycaemia in pregnancy ranges varies widely, from 1% to 28%, hypothyroidism ranges from 4.8-11% in India during pregnancy. An effort is being made to look at both these complications in unification rather than in segregation.

Purpose: Purpose of the study was to determine the association between hypothyroidism and hyperglycemia, as well as the prevalence of hypothyroidism in pregnant women with hyperglycemia. **Materials and methods:** Semistructured interview were conducted with pregnant women (n= 250) attending antenatal OPD at Jawaharlal Nehru Medical College and hospital, Aligarh. The descriptive statistics and Pearson correlation method was performed and data were analysed with IBM SPSS software.

Results: The following results were derived: (1) Prevalence of GDM and hypothyroidism during pregnancy; (2) Association between hypothyroidism and GDM among pregnant women. 57 of the 250 subjects enrolled to take part in the study (22.8%) were diagnosed with GDM, while 193 (77.2%) revealed a normal glucose tolerance. TSH levels were available for all 250 subjects in this study, 38 (15.2%) of whom were diagnosed with hypothyroidism. 19 (19/57 or 33.3%) subjects who were diagnosed with GDM, were also hypothyroid. That showed a significant association existed between TSH levels greater than 2.5 μ IU/L and blood plasma glucose levels greater than 140 mg/dL (p value = 0.01).

Conclusion: There is a considerably squat prevalence (33.3%) of hypothyroidism in pregnant women who have been diagnosed with GDM. This study expands to the growing literature regarding the dual endocrinopathy in pregnant women and makes a case for increased observation of pregnant women diagnosed with either endocrinopathy.

Keywords: Gestational Diabetes Mellitus, Hypothyroidism, WHO, Association.

INTRODUCTION

GDM (Gestational Diabetes Mellitus) may be state as a “carbohydrate intolerance with recognition or onset during pregnancy.”^[1] GDM is characterised through malfunction of pancreatic beta-cell that is caused by a variety of factors including autoimmune disease, insulin resistance and monogenic factors.^[2] It is

well-known that obesity and T2DM are contributing factors of GDM.^[3] The universal hypothyroidism frequency has been expected to be 2-5% among pregnant women.^[4]

In India, a high incidence of subclinical hypothyroidism has been reported among pregnant women, considered by an elevated serum Thyroid-

Stimulating Hormone (TSH) concentration. [5,6] Recent studies have shown that thyroid dysfunction, particularly hypothyroidism, have an effect on glucose intolerance and GDM and the dysfunction of thyroid can have a variety of adverse effects on offspring. [7-15] Childhood intelligence impairment is also a result of overt maternal hypothyroidism. [16] Prasad et al in one of the few studies on GDM and hypothyroidism in India found that GDM was more prevalent in pregnant women with hypothyroidism and that hypothyroidism increased GDM risk. [17] These dual problems can cause short- and long-term harm to the child and mother. Various physiological hormones are estrogen, thyroid-binding globulin, placental lactogen, human chorionic gonadotropin, placental insulin enzyme and cortisol that influenced to maternal blood sugar levels and thyroid function during pregnancy. [18,19] Some studies have suggested that there is an association between hypothyroid and GDM. [20-24] whereas others have not found this association. [25,26]

PURPOSE

The objectives of study were to estimate the hypothyroidism prevalence in pregnant women diagnosed with GDM, and to examine whether or an association exists between GDM and hypothyroidism. It is hoped that this study will improve to the current literature concerning GDM and hypothyroidism and inform clinical practices and guidelines in India.

METHODS

Sample and procedures

Two hundred- fifty pregnant women attended the outpatient clinic for their first antenatal visit in J.N. Medical College & hospital was enrolled in the study. The lead researcher collaborated with the experts of gynaecology at the hospital to identify pregnant women who were eligible for the interview study. The information obtained by each pregnant women through questionnaire cum interview method and the

patients who had pregestational diabetes mellitus and history of thyroid disease, were kept into exclusion criteria.

At first antenatal visit of participants, the lead researcher presented the informed consent which was ethically approved by hospital. The interviews followed a pre-tested questionnaire covered the following topic areas: demographic information, anthropometric measurements, biochemical profile, obstetrics history and previous obstetrics history, dietary information of patents. OGTT (75g. glucose, 2-hour) was performed for the screening of hyperglycemia among pregnant women using WHO criteria. The subjects' obstetricians were aware of the studies and had access to the GDM and hypothyroidism diagnoses. Those subjects who tested positive for GDM or hypothyroidism were placed on a treatment regimen.

Data analysis

This study applied a statistical analysis, where data were individually collected, coded and examined in IBM SPSS software (version 23). For descriptive statistics, the number of subjects, mean, Standard Deviation (SD), minimum and maximum values were calculated for continuous variables and the case number and percentage were computed for categorical values. Pearson correlation test was performed for correlation analysis.

RESULTS

The grouping of hypothyroidism and Diabetes Mellitus is rare. Our study generated the following results.

Prevalence of GDM and hypothyroidism among pregnant women:

Data from a total of 250 subjects were examined in this study; the mean values of blood glucose concentrations and TSH were 115.75 mg/dL and 2.11 μ IU/L, respectively. Fifty-seven subjects (22.8%) were detected with GDM, while 193(77.2%) revealed a normal glucose tolerance (Table 1).

The frequency of GDM in pregnant women prone to increase with maternal age,

increasing pre-pregnancy BMI and a family history of diabetes. In this study; thirty-eight subjects (15.2%) were diagnosed with hypothyroidism, while 212 (84.8%) were euthyroid (Table 1). Of the 250 subjects for whom both TSH and blood glucose data were available, only 57 had GDM (22.8%). Of the 57 subjects who were diagnosed with GDM, 19 (33.3%) were also hypothyroid. The prevalence of hypothyroidism in the subjects with normal glucose tolerance was found to be 9.8% (19/193).

Table 1. Prevalence of GDM and Hypothyroidism

Variables	Subjects
Plasma blood glucose, mg/dl	
Mean	115.75
>140 (GDM)	57 (22.8%)
≤140 (normal glucose tolerance)	193 (77.2%)
TSH, μIU/L	
Mean	2.11
>2.5 (hypothyroid)	38 (15.2%)
≤2.5 (euthyroid)	212 (84.8%)

Association between hypothyroidism and GDM among pregnant women:

As shown in Table 2, a very highly significant association was found between TSH levels greater than 2.5 μIU/L and blood plasma glucose levels greater than 140 mg/dL (p = 0.000). Hypothyroidism and diabetes, this dual endocrinological combination is associated with increased ratio of pregnancy complications such as high infertility rate, preeclampsia, caesarean deliveries and preterm labour among women than the rest of the population. A bivariate correlation test was conducted to evaluate the association between hypothyroidism and GDM.

Table 2. Association between TSH Values Greater than 2.5 μIU/L and Glucose Tolerance Test Plasma Glucose Concentration above 140 mg/dL

Variable TSH	GDM (n=57)	P	Non-GDM (n=193)
>2.5 (hypothyroid)	19 (33.3%)	<0.0001	19 (9.8%)
≤2.5 (euthyroid)	38 (66.6%)		174 (90%)

*TSH levels and blood glucose values were available for 250 subjects.

DISCUSSION

In recent years, the incidence of diabetes has increased annually, especially in Asia. [27] According to one survey, the

incidence of diabetes in China increased from 1% in 1980 to approximately 9.7% in 2008. [28] The studies have shown that the prevalence rates of hypothyroidism in patients with diabetes ranging from 2.7 to 30%. In this study, 33.3% prevalence of hypothyroidism was reported among the subjects with GDM considerably higher than the values recorded in the literature. However, an increased incidence and risk of subclinical hypothyroidism in pregnant women with GDM has also been recorded.

Hypothyroidism and GDM are common complications of pregnancy. Individually, they have been shown to contribute to adverse obstetric outcomes. In grouping, they have been shown to increases of placental abruption, first trimester abortions, polyhydramnios, preeclampsia, caesarean sections, preterm deliveries, intrauterine foetal deaths and postpartum haemorrhage. This study suggests that women with GDM should be considered as high risk for hypothyroidism and thus should have their TSH levels monitored closely during pregnancy. Our study was aimed primarily at identifying the prevalence of hypothyroidism in pregnant women with GDM as well as the association between hypothyroidism and GDM. Furthermore, the sample size in this study was quite small, and we believe this might explain, in part, the strong association we found between hypothyroidism and GDM.

Montaner P. et al. guessed, GDM would be the reason of thyroid dysfunctioning and found 10% hypothyroidism positivity. [28] In a research by Agarwal et al., studied 300 pregnant women and shown that there is not any association between GDM and the presence of thyroid autoimmunity. [29]

On the other hand Olivieri et al., considered 181 pregnant women and revealed that during pregnancy women with increased risk of GDM had an increased risk of being thyroid dysfunction. [30,31] Sharif et al. and Chang et al., also found a positive association between thyroid dysfunction and Type 1 diabetes mellitus. [32,33] In this field

more studies are required to be performed with larger sample size.

CONCLUSION

During pregnancy the most common endocrinopathies are gestational diabetes and hypothyroidism. The relationship of both these disorders have evaluated by many studies, perhaps the results are often conflicting because some reports found such an association while other failed to demonstrate this connection. In recent years diabetes prevalence has increased annually especially in Asia. Our study found the incidence rate of GDM has gradually increased as pregnancy BMI has increased. We found that the incidence rate of GDM is approximate 22.8% which is significantly higher than the rate in European and American women.

In India the prevalence of hypothyroidism among expectant women who have been diagnosed with GDM is significantly high. As a dual endocrinopathy of hypothyroidism and GDM during pregnancy has the potential to result in harmful obstetric outcomes, women diagnosed with GDM should be screened for hypothyroidism and vice versa. This study shows, GDM women were not different from non GDM women in respect by thyroid function tests and thyroid autoimmunity. This study expands to the growing literature regarding the dual endocrinopathy in pregnant women and makes a case for increased observation of pregnant women diagnosed with either endocrinopathy. A pivotal relationship should be evaluated by further studies with large sample size.

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