Original Article

Frequency of Thyroid Dysfunction in Patients with Gestational Diabetes

Thyroid Dysfunction in Gestational Diabetes

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ABSTRACT

Objective: To determine the frequency of thyroid dysfunction in patients with gestational diabetes.
Study Design: Cross sectional study
Place and Duration of Study: This study was conducted at the Department of Obstetrics and Gynaecology, Dow International Medical College from June 2023-December 2023.
Methods: Informed consent was taken. All pregnant women who visited to OPD during 24-28 weeks gestation with gestational diabetes confirmed from 75gm oral glucose tolerance test(OGTT), fasting ≥ 5.1 mmol/l (92 mg/dl); 1-h ≥ 10.0 mmol/l (180 mg/dl); or 2-h ≥ 8.5 mmol/l (153 mg/dl) were subjected for the assessment of serum TSH level for thyroid dysfunction. If patient with serum TSH levels < 0.3 was considered as hyperthyroidism. Patients with serum TSH levels > 4.0 was considered as hypothyroidism. In both cases patient were categorized for thyroid dysfunction. Patients demographic information, such as age, BMI and socioeconomic status were recorded in a self-designed proforma. Women with preexisting diabetes and thyroid dysfunction were excluded.
Results: This study was conducted on 213 pregnant patients presenting with gestational diabetes. The mean age of the patients recorded was 29.60±5.93 years. The mean height of the patients was 1.65±0.03 meter. The mean weight of the patients was 72.60±441 kg and the mean BMI recorded was 26.70±20.01 kg/m^2. In our study there were 113 (53.1%) patients in the age group of 20 to 30 years and there were 100 (46.9%) patients in the age group of 31 to 40 years. The frequency of thyroid dysfunction in patients with gestational diabetes in our study was 30 (14.1%)
Conclusion: The prevalence of thyroid dysfunction in gestational diabetes was 14.08%, therefore screening should be offered to high risk pregnant women.
Key Words: Gestational diabetes, Pregnancy, Thyroid dysfunction, Third trimester, maternal outcome

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INTRODUCTION

"Gestational diabetes (GDM) is defined as any degree of glucose intolerance that begins or is first detected during pregnancy". Previously, screening for gestational diabetes was done via history and examination. Personal or family history of type 2 diabetes, obstetrics history such as recurrent pregnancy losses, overweight baby and anomalous baby. Sedentary lifestyle and presence of obesity all were included in the screening of gestational diabetes. This screening strategy was not effective despite it's proper use, about half of the pregnant women with GDM were missed by this screening strategy. [1, 2]

The thyroid is an endocrine gland that sits underneath the inferior half of the larynx at the superior segment of the trachea in the anterior midline of the neck. It is made up of two oval lobes joined by an isthmus .[3]The thyroid gland is made up of spherical follicles that are surrounded by follicular cells and contain a material known as colloid, which is thyroglobulin. This thyroglobulin, along with the circulating iodine forms monoiodotyrosine and diiodotyrosine, are precursors of the thyroid hormones tetraiodothyronine (T4) and triiodothyronine (T3), respectively.[4]

In general population, thyroid dysfunction is fairly common, predominantly among women; additionally, it has been proposed that the total of undetected cases of thyroid dysfunction may be twice as high as the sum of detected cases. Thyroid dysfunction is typically categorized as hyperthyroidism or hypothyroidism. Hypothyroidism is a condition characterized by a lessening in thyroid gland function and thyroid hormone secretion while Hyperthyroidism is a condition characterized by surplus of thyroid hormone production. [5, 6]

Testing for thyroid dysfunction in diabetic pregnant patients is of great value in detecting thyroid disorders, and the screening for thyroid dysfunction in pregnancy remains a contentious issue.[7] Hypothyroidism in pregnancy increases the risks of miscarriage, preeclampsia, placental abruption, preterm delivery, intrauterine fetal death, fetal neurological disorders,

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mental illness and lower than average IQ later in life.[7] It is therefore suggested to increase the screening range for thyroid disorders so that various maternal and fetal morbidities could be timely prevented.[7] A study reported in India showed the prevalence of hypothyroidism in patients with GDM was 87.2%, which is considerably very higher. Another study conducted in Iran showed the prevalence of thyroid dysfunction 16.6% in women with GDM.[8]

Thyroid dysfunction in pregnancy could lead to serious complications and pose risks to mother and neonate lives. Therefore, in time diagnosis of thyroid dysfunction would help in preventing unfavorable situations related to feto-maternal outcome. The primary aim of the study is to determine the frequency of thyroid dysfunction in patients with gestational diabetes in our local setup. The outcome of this study will be shared with health care professionals in understanding the risks associated with this condition and adopting effective approach to counter unfavorable outcomes.

METHODS

This cross sectional study was carried out in the department of Obstetrics and Gynaecology, Dow International Medical College from June 2023-December 2023 after receiving approval from the hospital's ethics board and the research unit of the College of Physicians and Surgeons of Pakistan. Informed consent taken. All pregnant women who visited to OPD during 24-28 weeks gestation with gestational diabetes confirmed from 75gm oral glucose tolerance test(OGTT), fasting ≥ 5.1 mmol/l (92 mg/dl); 1-h ≥ 10.0 mmol/l (180 mg/dl); or 2-h ≥ 8.5 mmol/l (153 mg/dl) were subjected for the assessment of serum TSH level for thyroid dysfunction. If patient with serum TSH levels < 0.3 was considered as hyperthyroidism. Patients with serum TSH levels > 4.0 was considered as hypothyroidism. In both cases patient were categorized for thyroid dysfunction. Patients demographic information, such as age, BMI and socioeconomic status were recorded in a self designed proforma. Women with preexisting diabetes and thyroid dysfunction were excluded.

RESULTS

This study was conducted on 213 pregnant patients presenting with gestational diabetes. The mean age of the patients recorded was 29.60±5.93 years. The mean height of the patients was 1.65±0.03 meter. The mean weight of the patients was 72.60±441 kg and the mean BMI recorded was 26.70±20.01 kg/m^2. In our study there were 113 (53.1%) patients in the age group of 20 to 30 years and there were 100 (46.9%) patients in the age group of 31 to 40 years. The frequency of thyroid dysfunction in patients with gestational diabetes in our study was 30 (14.1%). Regarding the socioeconomic status, there were 44 (20.7%) patients having income between 10000 to 20000 Rs/month. There were 137 (64.3%) patients having income between 20000 to 50000 Rs/month and there were 32 (15%) patients having income > 50000 Rs/month as shown in table 1.

Table No.1: Sociodemographic characteristics and presence or absence of Thyroid dysfunction

Age distribution	Frequency (n)	Percent (%)
20 to 30 years	113	53.1
31 to 40 years	100	46.9
Socioeconomic status 10000 to 20000 Rs/Month	44	20.7
20000 to 50000 Rs/Month	137	64.3
> 50000 Rs/Month)	32	15.0
Thyroid dysfunction Yes	30	14.1
No	183	85.9

Table No.2: Stratification of thyroid dysfunction with Age, BMI and Socioeconomic status.

Age	Yes	No	Total	P value
20-30 years	12(5.6%)	101(47.5%)	113(53.1%)	0.12
31-40years	18(8.4%)	82(38.5%)	100(46.9%)	
BMI				
22 to 24.9 kg/m^2	5(2.3%)	42(19.7%)	47(22.1%)	
25 to 30 kg/m^2	21(9.8%)	130(61.0%)	151(71.0%)	0.29
> 30 kg/m^2	4(1.8%)	11(5.16.%)	15(7.0%)	
Socioeconomic status				
10000-20000	10(4.69%)	34(15.96%)	44(20.65%)	
20000-50000	16(7.51%)	121(56.8%)	137(64.31%)	0.17
>50000	4(1.8%)	28(13.14%)	32(14.94%)	

DISCUSSION

Thyroid dysfunction and gestational diabetes during pregnancy are two most common illnesses that affect pregnancy outcomes. Diabetes, which has a frequency of 3.5–5% during pregnancy, is one of the most prevalent metabolic illnesses and is characterised by high blood glucose levels and metabolic changes in lipids, carbohydrates, and proteins. Preeclampsia, premature labour, miscarriage, congenital malformations, shoulder dystocia, and stillbirth for the foetus are among its known prenatal problems. As a result, it poses a significant risk for unfavourable pregnancy outcomes. About 40% of women with GDM will develop overt diabetes during the next 20 years since the consequences of diabetes persist even after childbirth. It has been established that thyroid malfunction during pregnancy has negative consequences on the development of the foetus.

The manufacture and release of foetal thyroid hormones do not start until the 20th week of pregnancy, so foetal growth in the first trimester is entirely dependent on the thyroxine supplied by the mother. The foetus needs thyroxine for appropriate growth, particularly for brain development. Maternal thyroid function and pregnancy outcomes are closely correlated, and it has been noted that early pregnancy foetal death increases when thyroid autoantibodies are present in the mother's blood. Negative pregnancy outcomes are associated with both hypothyroidism and untreated thyrotoxicosis. Subclinical hypothyroidism has been linked to an increased risk of pregnancy problems, including placental abruption (which increased three times), preterm labour (which increased twice), and low birth weight babies (increased twice)[9]. Additionally, a number of studies showed a correlation between elevated thyroid peroxidase antibodies (TPO) in euthyroid pregnant women and an increase in pregnancy problems, such as prelabor ruprure of membranes (PROM), miscarriages and preterm labour. It has been estimated that 6–19% of pregnant women who are asymptomatic have thyroid peroxidase antibodies and that 10% of pregnant women in the 16th week of pregnancy have TPO-Ab, which may be associated to hyperthyroidism. Pregnant women with type 1 diabetes have a prevalence of thyroid dysfunction that is almost three times higher than that of the general population. Even in other studies, 40% of pregnant women also had thyroid disease and type 1 diabetes concurrently.

Subclinical hypothyroidism is more common among thyroid disorders than other disorders. Like GDM, clinical and subclinical hyperthyroidism of the thyroid is an insulin resistance condition that may point to a connection between the two illnesses. According to several studies, maternal diabetes during pregnancy may have an impact on the fetus's active T4 to T3 conversion or T3 secretion. This supports the connection between thyroid problems and diabetes. According to reports, Iran's GDM prevalence ranges from 4.7 to 7.4%. Ten to fifteen percent of expectant mothers' experience thyroid dysfunction throughout the first part of their pregnancies. According to certain research, women with GDM had significant rates of anti-TPO and hypothyroxinaemia. Despite of several studies the true link between thyroid dysfunction and diabetes has not yet been established. Because the research of this link includes a wide range of additional explanations such as racial differences, genetics, ethnicity, environmental factors, underlying disorders, diabetes diagnostic criteria and thyroid dysfunction.

In our study the mean age of the participants was 29.60±5.93 years which is similar to the study conducted by M Alan et al, mean age was 30.9±5.0 years[10]. Another study conducted by Rizwana Arif et al showed mean age was 33.1±4.5 years[11]. Mean BMI of our study was 26.70±20.01 kg/m^2 whereas another research showed mean BMI was 26.96±4.55 kg/m^2 which is similar to our study.

In our study the prevalence of thyroid dysfunction was 14.08%, while the study conducted by Mahmood et al observed subclinical hypothyroidism 17% and clinical hypothyroidism 10.48% in gestational diabetes[12]. Our results are in agreement with a study[8] which reported a prevalence of 16.6% of thyroid dysfunction in women presenting with gestational diabetes. However, the study conducted by researcher where prevalence of thyroid dysfunction in type 1 diabetes patients were 26%. Another study conducted by Gallas PR[13] showed thyroid dysfunction in pregnant women with type 1 diabetes was 40% and 40.9% respectively; which is higher than our study. The reason for this difference is that all of our patients had gestational diabetes, whereas the patients in Gallas PR had type 1 diabetes. Another study showed hyperthyroidism was in 13.9% and hypothyroidism was observed in 6.59%.

Another study conducted by Fatima Sana et al[14] demonstrated prevalence of subclinical hypothyroidism in gestational diabetes versus healthy control was 61.5% vs 6%. A study conducted in India showed that prevalence of thyroid dysfunction was 87.2% which is much higher than other studies[15]. Different sample size, ethnicity, race, nutritional deficiency specifically iodine deficiency and regional differences are main factors which leads to such differences in studies.

Haddow and colleagues observed various maternal, fetal and neonatal adverse outcomes and recommend thyroid screening in high risk patients.[16] Several studies observed association of thyroid antibodies in gestational diabetes. Antithyroid antibodies can cross the placenta and affects neurodevelopment of fetus. The levels of anti-TPO, TSH, T3 and T4 were assessed in 61 patients with GDM and 35 healthy women in a study conducted by Fouyang Ouyang et al observed that thyroid

dysfunction was comparable between the GDM group and the control group.[17]

South Korean study conducted by Bian observed that thyroid dysfuction cause metabolic abnormalities and unfavourable pregnancy outcomes, therefore; women with gestational diabetes should be checked for thyroid dysfunction.[18]

CONCLUSION

The prevalence of thyroid dysfunction in gestational diabetes was 14.08%, therefore screening should be offered to high risk pregnant women.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Nazia Hakeem, Wajiha Karim, Rabia Jamil
Drafting or Revising Critically:	Afshan Shahid, Pooja Seetlani, Kanwal Jan Memon
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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