ORIGINAL ARTICLE

FREQUENCY OF THYROID DYSFUNCTION IN PREGNANT WOMEN WITH DIABETES

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ABSTRACT

Objective: To determine the frequency of thyroid dysfunction in pregnant women with diabetes.

Material and Methods: This study was conducted at the Department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar - Pakistan. The study design was descriptive cross sectional. 150 patients were observed during the study and the duration of the study was from January 2016 to June 2016, after the approval of research topic from research committee. The sample size was calculated using WHO formula using confidence level 95%, and margin of error 5. Moreover, for sample collection consecutive sampling technique was used which is non-probability technique.

Results: Among 150 subjects 75 (50%) were gestational and 75 (50%) were pre gestational diabetes. Mean age was 33.1 ± 4.5 years. The mean duration of gestational amenorrhea was 27.03± SD 1.2. The mean gravidity and parity was noted to be 3.9± SD 1.3 and 2.7 ± SD 1.2 respectively. Regarding biochemical profile mean random blood sugar as 237.8 ± SD 28.7, mean TSH was 13.5 ± SD 5.1, mean serum free T4 was 2.9 ± SD 2.1. The most predominant thyroid dysfunction was Subclinical Hypothyroidism when stratified according to age gravidity, parity, and gestational amenorrhea duration.

Conclusion: The prevalence of thyroid dysfunction and specifically hypothyroidism is high with pre-gestational and gestational diabetes mellitus in women. To reduce the maternal and fetal complications it is therefore essential to do the screening and treatment of hypothyroidism in these patients.

Keywords: Gestational, Pre-gestational, diabetes, thyroid dysfunction, pregnant women.

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INTRODUCTION

During pregnancy glucose tolerance and abnormal thyroid function have been both reported. During first trimester thyroid hormones levels increase but decline slowly over the rest of pregnancy due to steady rise of HCG (Human Chorionic gonadotropin). TSH level increases while T3 and T4 levels decrease during the second and third trimester following HCG with draw [1]. In last half of pregnancy there is high thyroid hormones transport proteins concentration induced by placental estrogens. The elevated levels of diabetogenic hormones, decreased physical activity, higher carbohydrates consumption and stresses of pregnancy increase the insulin requirement of pregnant women[2]. This leads to gestational diabetes development in susceptible pregnant women.

Approximately 1.1- 14.3% of pregnant women suffer from GDM and hypothyroidism affect 2.5-6.47% of the subclinical hypothyroidism make a major contribution of thyroid dysfunction. Subclinical hypothyroidism is an elevated serum TSH concentration however normal serum free thyroxin level. It is necessary to mention that GDM is carbohydrate intolerance through recognition or onset throughout pregnancy while pre-gestational diabetes exists prior to conception[3].

Maternal hypothyroidism increases the risk of miscarriage, pre eclampsia, placental abruption, preterm delivery, intrauterine fetal death, fetal neurological disorders, mental illness and lower than average IQ later i life[4]. Because of these maternal and fetal morbidities it is suggested to consider screening and treatment of hypothyroidism in patients with diabetes.

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MATERIAL AND METHODS

This study was conducted at the Department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar - Pakistan. The study design was descriptive cross sectional study conducted from 1st January 2016 to 30th June 2016. Study was conducted duration 6 months using 150 patients which were calculated by using WHO formula for sample size calculation. In the study 15-45 years old female were included. All patients who were diagnosed with thyroid disorder or were under treatment for thyroid disorder were excluded from the study. However this condition may act as a confounder and introduce bias in the study results.

Ethical approval was taken from hospital research and ethical committee. Informed consent was taken from the patients meeting the inclusion criteria. Detailed clinical history was taken from all patients, which is then followed by complete usual examination. Pregnant women who were diagnosed with gestational or pregestational diabetes were subjected to thyroid dysfunction tests including serum TSH, free T4, and T3. Thyroid testing was done at 12 weeks and then at 20 weeks and onward period of gestation.pre- designed proforma was used for all the above- mentioned information including demographic features. To control confounders and bias strict exclusion criteria were followed in the study results.

Statistical package for the social sciences software (SPSS 20.0) were used for data analysis. For numerical variables like age, serum, TSH, serum FT4, serum T3 and duration of gestational amenorrhea mean ± Standard deviation were calculated. While for categorical variables like gravidity, parity, history of diabetes mellitus (gestational and pre-gestational diabetes mellitus), thyroid dysfunctions(hyperthyroidism, hypothyroidism) frequencies and percentages were calculated. Thyroid disorders were stratified among baseline characteristics like age, history of diabetes mellitus (gestational and pregestational) and duration of gestational amenorrhea. Study results were displayed in the form of tables.

RESULTS

Total 150 pregnant women with diabetes both gestational 75 (50%) and pregestational 75 (50%) were included in the study. Age distribution was analyzed as 02 (1.4%) were in the age range 15-25 years, 92 (61.4%) were in the age range (26-35 years) and 56 (37.5%) were in the age range 36-45. Mean age was 33.1 with SD ± 4.5 as shown in Table 1. Regarding obstetric history, the mean duration of gestational amenorrhea was 27.03 with SD ± 3.6 the mean gravidity and parity among the selected patients was 3.9 with SD ± 1.3 and 2.7 ± SD 1.2 respectively as shown in Table 1 and 2.

Regarding biochemical profile among 150 patients the mean random blood sugar was 240 mg ± 28.3 SD and fasting blood sugar 155.5 mg ± 18.3 SD. Thyroid functions were analyzed using TSH, Free T4, T3.

The mean value for free T4, TSH and T3 were 2.98 ± SD 2.15, 13.5 ± SD 4.02 and 3.2 ± SD 0.91. Thyroid dysfunction (hypothyroidism, hyperthyroidism, subclinical hypothyroidism and subclinical hyperthyroidism) was stratified according to gestational and pregestational diabetes. Hypothyroidism was the most predominant thyroid dysfunction in both gestational and pregestational diabetes 6 (8) and 15 (20%) respectively. Thyroid dysfunction status stratification according to various parameters i.e. Age, Gravidity, parity, gestational amenorrhea, duration of diabetes mellitus

DISCUSSION

During pregnancy diabetes and hypothyroidism are the two most common endocrinopathies that coexist. Several studies have reported prevalence rates ranging from 2.7-30% of hypothyroidism in patients with diabetes [5].There is causal relationship between gestational diabetes mellitus and hypothyroidism and it is well known that maternal thyroxine and triodothyronin have an effect on glucose metabolism.

Approximately 1.1- 14.3% of pregnant women suf-

Table 1: Baseline characteristics of patients

Baseline Characteristics	Mean Value ± SD
Age (Years)	33.1 ± 4.5
Gestational amenorrhea in weeks	27.03 ± 3.7
Gravidity	3.94 ± 1.4
Parity	2.7 ± 1.2
Fasting Blood Sugar	155.4 ± 18.3
Random Blood Sugar	240 ± 28.6
Serum thyroid stimulating hormone MIU/L	13.5_+ 5.1
Serum Free T4 PicoMol/L	2.9 +_ 2.1
Serum T3 PicoMol/L	3.1 ± 0.91

Table 2a: Subclinical Hypothyroidism Stratification

Age	15-25 yrs	26-35 yrs	36-46	Total	% Age
	1	9	10	20	13.3
Gravidity	1-3	4-6	7-9	Total	% Age
	5	13	2	20	13.3
Parity	0-3	4-6	7-9	Total	%Age
	13	7	0	20	13.3
Gestational Amenorrhea	20-25 weeks	26-30 weeks	31-35 weeks	36-40 weeks	Total
	7	7	6	0	20
Duration of Diabetes Mellitus	Pregestational		GDM	Total	% Age
	15		5	20	13.3

Table 2b: Hypothyroidism Stratification

Age	15 - 25 yrs	26-35 yrs	36-46 yrs	Total	% Age
	0	1	0	1	0.67
Gravidity	1-3	4-6	7-9	Total	% Age
	0	1	0	1	1.3
Parity	0-3	4-6	7-9	Total	%Age
	1	1	0	2	1.3
Gestational Amenorrhea	20-25 weeks	26-30 weeks	31-35 weeks	36-40 weeks	Total
	0	0	1	0	1
Duration of Diabetes Mellitus	Pregestational		GDM	Total	% Age
	15		5	20	13.3

fer from GDM and hypothyroidism affects 2.5% - 6.47%.[6-7] In our study of 150 pregnant diabetes patients thyroid dysfunction was seen in 15.67% patients. Among these subclinical hypothyroidism accounted for 13.3%, hyper-thyrodism 0.67% , hypothyroidism accounted for 1.3% and sub clinical hyper thyrodism 0.67%. In our study, the most predominant thyroid dysfunction was subclinical hypothyroidism in both gestational 6 (%8) and pre gestational diabetes 15 (20%). Our results are comparable to those by Shahbazian where the prevalence of thyroid dysfunctionin gestational is 4.5% and in pre gestational diabetes 25.6%[8].

In a study by Syeda Sana Fatima, 61.5% GDM patients had sub clinical hypothyroidism with regular circulating T4 and T3 versus 6% healthy control[9]. Mahmood Parham found out that among patients with GDM 17% had subclinical hypothyroidism and 10.48% had clinical hypothyroidism. Several studies have reported prevalence rates ranging from 2.7% -30% of hypothyroidism in patients with diabetes. Mohammad Umar Khan who conducted a one year study in Dow hospital Karachi, observed that hyperthyroidism was present in 13.9% patients and subclinical hypothyroidism was seen in 6.59% patient[10]. A study conducted in India showed that prevalence of hypothyroidism in patients with gestational diabetes mellitus was 87.2 which is considerably higher than the values reported in literature[11]. Such differences in the studies mentioned are due to different sample sizes, regional differences, race and iodine deficiency.

Haddow and colleagues studied the various maternal, fetal and neonatal adverse out comes and stressed upon thyroid screening in high risk pregnancies[12]. Several studies found a higher prevalence of thyroid auto immunity in GDM compared to healthy controls. Anti-thyroid anti bodies can cross the placenta and therefore can influence brain and neuro development. Recent studies have reported increased incidence of thyroid auto immunity in type 2 diabetes, thus implying that diabetes can trigger the onset of thyroid immunity[13,14].

At present in pregnant women the requirement for universal thyroid screening is controversial. Some associations divide patients in low risk and high risk groups

of thyroid disorder American college of gynecologists recommend thyroid testing only in symptomatic high risk pregnant women or women with thyroid disorders, type 1 diabetes or other auto immune disorders[15,16,17,18]. The endocrine society recommends screening of pregnant women or those who wish to conceive with symptoms and signs that are suggestive of goiter or hypothyroidism, patients with personal or family history of thyroid disease, history of recurrent miscarriages, history of infertility or previous head or neck irradiation.[19]

In another studues 2.6%, 2.9% of women had a TSH above 4.2 mi iu /l. However 30% of the women with an elevated TSH were in low risk population suggesting that this screening would miss one third of pregnant women with hypothyroidism[20-22]. It is therefore suggested that we should increase the screening range for thyroid disorders so that the various maternal and fetal morbidities could be prevented and timely dealt with.

CONCLUSION

Testing for thyroid function in diabetic patients is of great value in detection of thyroid disorders in significant proportion of cases.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Arif R: Concept and Design, Data Analysis.

Mazhar T: Drafting of manuscript, Bibliography, Proof reading.

Bukhari N: Critical analysis & proof reading.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.