Original Article

Antithyroid Antibody Status During Pregnancy

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Abstract

Background: *Gradual alteration of antithyroid antibody level occurs during different trimesters of gestation. The study finds the type of alteration in Bangladeshi population.* ***Objective:*** *The present study was carried out to find out the alterations of antithyroid antibody levels during each trimester in normal pregnant women in Bangladesh.* ***Materials and Methods:*** *This cross sectional study was carried out in the Department of Physiology, Sir Salimullah Medical College (SSMC), Dhaka from July 2016 to June 2017. Total 90 apparently healthy pregnant women of different trimesters, age ranged from 20 to 35 years were selected as study group (Group I). Again according to gestational age, study group was subdivided into 1st trimester of gestation (Group Ia, n=30), 2nd trimester of gestation (Group Ib, n=30) and 3rd trimester of gestation (Group Ic, n=30) respectively for comparison. For assessment of antithyroid antibody status, serum TPO-Ab and Tg-Ab levels were measured by chemiluminescent microparticle immunoassay (CMIA) method in Bangabandhu Sheikh Mujib Medical University (BSMMU). The statistical analysis was done by ANOVA test and Bonferroni test.* ***Results****: In this study, mean serum TPO-Ab level was significantly ($p \leq 0.05$, $p < 0.001$) lower in 2nd and 3rd trimester in comparison to that of 1st trimester. On the other hand, mean serum Tg-Ab level was significantly ($p < 0.01$, $p < 0.001$) lower in 2nd and 3rd trimester in comparison to that of 1st trimester. Again, this value was significantly ($p \leq 0.05$) lower in 3rd trimester than that of 2nd trimester.* ***Conclusion:*** *Antithyroid antibody titre gradually decreases with the progression of trimesters of gestation.*

Key words: *TPO-Ab, Tg-Ab, Trimester, Pregnancy.*

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Introduction

Pregnancy is the physiologic process of a developing fetus within the maternal body.[1] The continuous physiological adjustments of the body during pregnancy are often grouped by period of gestation in three trimesters of pregnancy.[2] The period of pregnancy can be divided into three calendar months each or three trimesters. 1st trimester considered as [1]st 12 weeks, [2]nd trimester considered as 13-28 weeks & [3]rd trimester considered as 29-40 weeks.[3]

Pregnancy is followed by a series of hormonal and metabolic changes that involve most maternal endocrine systems.[4] This various changes including increase nutritional requirements, increase metabolic demand etc. take place to meet the demand of the growing fetus.[5,6] Among the hormonal changes during pregnancy, thyroid hormone change is a remarkable one.[7] It is an important metabolic hormone necessary for both mother and fetus in which it plays a crucial role during pregnancy both in the development of a healthy baby and in maintaining the health of the mother.[8,9] The proper assessment of thyroid function during pregnancy require the determination of not only the hormone related to the thyroid but also the antibodies raise against the thyroid gland and the iodine requirement of maternal life should be strictly assessed to prevent the thyroid disorder and irreversible side effects of both fetus and mother.[10] For this

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reason, assessment of antithyroid antibodies is very important throughout the pregnancy period.[11] Thyroid peroxidase enzyme is a key enzyme in the formation of thyroid hormone, a major auto antigen in autoimmune thyroid disease.[12] Both thyroid peroxidase and thyroglobulin are essential in the synthesis and secretion of thyroid hormones.[13] Antibody against thyroid peroxidase enzyme is known as TPO antibody that is previously called microsomal antibody. Antibody against thyroglobulin, a glycoprotein is called Tg-Ab which is previously called thyroglobulin haemagglutination antibody (TGHA).[14] Presence of antibody against thyroid peroxidase enzyme (TPO-Ab) and against thyroglobulin (Tg-Ab) in euthyroid subjects causes the increased risk of hypothyroidism.[12]

Materials and Methods

This cross sectional study was carried out in the Department of Physiology, Sir Salimullah Medical College (SSMC), Dhaka from July 2016 to June 2017. The study protocol was approved by the Institutional Ethics Committee of SSMC. For this, 90 apparently healthy pregnant women aged 20-35 years of different trimesters were recruited as study group (group I). On the basis of gestational period, group I was further subdivided into groups 1st trimester of gestation (Ia), 2nd trimester of gestation (Ib) & 3rd trimester of gestation (Ic) for comparison and each group was consisted of 30 different pregnant women of different trimesters. They were selected from Out Patient Department (OPD) of Obstetrics & Gynaecology of SSMC and Mitford Hospital by consecutive purposive sampling. All the subjects were belonged to middle socioeconomic status. Subjects having history of any chronic or systemic diseases (hypertension, diabetes mellitus, cardiac disease, renal disease and tuberculosis), known thyroid abnormalities, other endocrine abnormalities, goitre, hyperemesis gravidarum, twin pregnancy, psychiatric illness etc. were excluded from the study. After selection the aim, benefits, risks and the procedure of the study were explained to each subjects and a written consent was taken. Detailed personal, family, medical and occupational histories were taken and thorough physical examination of all subjects were done and recorded. With all aseptic precautions, seven (7) ml of venous blood was drawn from antecubital vein. Serum TPO-Ab and Tg-Ab levels were measured by chemiluminescent microparticle immunoassay (CMIA) method in the laboratory of Department of Biochemistry, BSMMU, Dhaka. Data were expressed as mean ± SD. The statistical analysis was done by using SPSS version 22. ANOVA test and Bonferroni test were used to compare the data as applicable. p value ≤0.05 was considered as level of significance.

Results

All the groups (subjects) were age matched. Whereas, mean (±SD) body weight and BMI were increased during different trimesters (Table-I).

In this study, the mean (±SD) serum TPO-Ab level was significantly ($p \leq 0.05$, $p < 0.01$) lower in group Ib and Ic in comparison to that of group Ia. Again, this value was lower in group Ic as compared to that of group Ib but it was not statistically significant (Table-II).

On the other hand, the mean (±SD) serum Tg-Ab level was significantly ($p < 0.01$, $p < 0.001$) lower in group Ib and Ic in comparison to that of group Ia and also significantly ($p \leq 0.05$) lower in group Ic as compared to that of group Ib (Table-II).

Table-I: Age, body weight and BMI of the study subjects (n=90)

Parameters	Groups		
	Ia (n=30)	Ib (n=30)	Ic (n=30)
Age (years)	24.70 ± 2.34 (21-31)	24.03 ± 1.71 (22-29)	24.50 ± 2.05 (21-30)
Weight (kg)	55.77 ± 2.56 (52-62)	61.87 ± 1.74 (59-67)	71.80 ± 2.68 (68-78)
BMI (kg/m^2)	21.42 ± 1.11 (19.85–24.22)	23.60 ± 0.79 (21.99-25.18)	28.14 ± 0.82 (25.94-29.32)

Data expressed as mean ± SD. Figure in parentheses indicate ranges. Group I: Study group, Group Ia: 1st trimester of gestation, Group Ib: 2nd trimester of gestation, Group Ic: 3rd trimester of gestation, n= total number of subjects.

Table-II: Serum TPO-Ab & Tg-Ab levels of the study subjects (n=90)

Parameters	Groups		
	Ia (n=30)	Ib (n=30)	Ic (n=30)
TPO-Ab (IU/ml)	2.62 ± 2.16 (0.58-9.34)	1.53 ± 1.55 (0.47-7.12)	0.95 ± 1.27 (0.27-5.77)
Tg-Ab (IU/ml)	2.45 ± 1.28 (0.73-6.43)	1.58 ± 1.04 (0.65-4.76)	1.05 ± 0.93 (0.35-4.54)
Statistical analysis			
Groups	p value		
	TPO-Ab	Tg-Ab	
Ia vs Ib vs Ic	0.001**	<0.001***	
Ia vs Ib	0.046*	0.009**	
Ia vs Ic	<0.001***	<0.001***	
Ib vs Ic	0.357 ns	0.044*	

Data expressed as mean ± SD. For statistical analysis, ANOVA test performed for comparison among the groups and then Bonferroni test to compare between two groups. Figure in parentheses indicate ranges.
Group Ia: 1st trimester of gestation
Group Ib: 2nd trimester of gestation
Group Ic: 3rd trimester of gestation
***= Significant at p<0.001, **= Significant at p<0.01, *= Significant at p≤0.05
ns = not significant, n= total number of subjects

Discussion

In this study, the mean (±SD) serum TPO-Ab level was lower in 2nd and 3rd trimester in comparison to that of 1st trimester and the difference was statistically significant ($p \leq 0.05$, $p < 0.001$). Again, this value was lower in 3rd trimester than that of 2nd trimester but the difference was not statistically significant. Almost similar finding was also reported by some other researchers of different countries.[15,16] In this study, the mean (±SD) serum Tg-Ab level was lower in 2nd and 3rd trimester in

comparison to that of 1st trimester and the difference was statistically significant ($p<0.01$, $p<0.001$). Again, this value was significantly ($p\leq0.05$) lower in 3rd trimester than that of 2nd trimester. Almost similar findings were also reported by different researchers.[16,17] The exact mechanism that is involved in alteration of serum TPO-Ab and Tg-Ab levels during different trimesters of pregnant women are not yet clearly established. However, several investigators of different countries proposed various suggestions on these aspects. It has been stated that, thyroid antibody levels decreased with advancing gestation due to immune-suppressive effect of pregnancy. Important adaptations of maternal immune system occur during pregnancy. Placental trophoblast cells express HLA-G (a non-classical MH1b molecule) which is a ligand for natural killer (NK) cell receptor, thereby inhibits both NK cell function and maturation of dendritic cells and it also activate CD8+ T-cells that exerts suppressor activity. Again, trophoblast expresses another immunomodulatory molecule like Fas ligand (Fas-L) abundantly which contributes to immune privilege by mediating apoptosis on fetal antigen reactive maternal lymphocytes.[18,19]

Conclusion

Gradual alteration of serum TPO-Ab & Tg-Ab levels were observed during different trimesters in pregnant Bangladeshi women. Both serum TPO-Ab and Tg-Ab levels were gradually lower from 1st to 3rd trimesters of gestation. To establish standard data further studies should be done on this aspect.

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