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Original Research Article

Study of Correlation of Vitamin B12 with Thyroid Hormones in Anemic Pregnant Women

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Abstract:

Background and Objectives: Thyroid hormones are required for normal development as well as regulating metabolism in the adult. A decreased thyroid hormone adversely affects erythropoietic system causes anemia. Our objective was to assess the relationship between serum vitamin B12 levels and thyroid function in anemic pregnant women. The Aim and objective of the study was to compare the vitamin B12 with thyroid hormones in anemic pregnant women.

Materials & Methods: Study consisted of 50 subjects from OPD/ GMCH, Purnea. The study groups were divided into Group I-25 anemic pregnant women and Group II-25 Non – anemic pregnant women. The serum samples were collected from each subject and levels of different biochemical parameters were estimated.

Result: were noted. On comparing values in vitamin B $_{12}$ and thyroid hormones , among two groups, a significant difference($p<0.005$) was found between few of them.

Conclusion: Screening of vitamin B12 levels in first trimester itself will be beneficial to prevent the complications of pregnancy. Further, hypothyroidism also present. So, early diagnosis of these deficiencies will be useful to start giving supplements to avoid unwanted effects in pregnancy.

Keywords: Vit B12, Anemia, Thyroid.

Introduction

Hypothyroidism is a common endocrine disorder with reduced production of thyroid hormones. It is a common disease with different frequency in different countries. It is characterized biochemically by a reduction in serum T3 andT4 levels that result in an increase in serum thyroid stimulating hormone (TSH) concentration. [1,2] Thyroid hormones regulate blood cells metabolism and proliferation as regulate metabolism of all cells in the human body. There is a metabolic deceleration in hypothyroidism. All organ systems are affected. Anemia is defined in 20-60% of the patients with Hypothyroidism. [3,4] Anemia in hypothyroidism can be normocytic normochromic, hypo-chromic microcytic, and macrocytic. Chronic autoimmune thyroiditis is the main cause of hypothyroidism during pregnancy [5,6]. Vitamin B12 maintains normal folate metabolism, which is essential for cell multiplication during pregnancy. Vitamin B12 deficiency is emerging as a growing public health problem, and an increasing number of studies have shown that deficiency is commonly seen in pregnancy [7]. VitaminB12 status during pregnancy is critical as maternal vitamin B12 deficiency can affect the pregnancy outcome for both mother and the offspring. For women who want to get pregnant, a vitamin B12 deficiency means an increased riskof developing intrauterine growth retardation, preeclampsia, and preterm labor [8]. Deficiency of vitamin B12 is highly prevalent among hypothyroid patients. Vitamin B12 deficiency worsens hypothyroidism. Unfortunately, both deficiencies can go unnoticed, and they can be difficult to diagnose [9]. Prevalence of vitamin B12 deficiency increases along with the age. [10] Patients with deficiency of vitamin B12 and hypothyroidism usually have symptoms of fatigue, weakness, poor memory retention, itching and loss of sensation. [11,12] Vitamin B12 maintains normal folate metabolism which is essential for cell multiplication during pregnancy. Vitamin B12 deficiency is emerging as a growing public health problem and an increasing number of studies show that deficiency is commonly seen in pregnancy [13]. Pregnancy has a profound impact on the thyroid gland and thyroid function. The gland increases 10% in size during pregnancy in iodine-replete countries and by 20% – 40% in areas of iodine deficiency. Production of thyroxine (T4) and triiodothyronine (T3) increases by 50%, along with a 50% increase in the daily iodine requirement. These physiological changes may result in hypothyroidism [14].

Material and Method

This study consisted of 25 cases of anemic pregnant women (Group I) and 25 Non – anemic pregnant women (Group II) to the Department of Gynecology, GMCH, Purnea.

Inclusion Criteria

- The patient with anemia during pregnancy
- 1-3rd trimester pregnant women

Exclusion Criteria

- The patient with anemia before pregnancy.
- Thyroid disorder, iron deficient, previous history of anemia, renal disease, heart disease and liver disease, cholesterol lowering patients and malnourished women who are taking antithyroid drugs.

The Study Group

- 25 anemic pregnant women
- 25 normal pregnant women
- The pregnant women will be consider as aneamic infollowing meant –
- Level of Hb (gm/dl)
  - 8-10 gm/dl – mild aneamic
  - 6-8 gm/dl – moderate aneamic
  - Less than < 6 – sever aneamic

The normal healthy pregnant women will be included in this study as a control group for the comparison with aneamic pregnant women. The general performa will be taken as consent of the patient for the present study. The blood sample will be collected in the plain vial through venipucture of the patient and control group as well. The serum will be separated from the blood through centrifugation at 3000 rmp for 15 min. and the serum will store at 2-8° C for the biochemical estimation. The following parameters will be estimated by using different methods: Determination of Total T3, Total T4, TSH, and Vitamin B12Measurements of serum concentrations of Total T3, Total T4, TSH, Vitamin B12 were done using Chemiluminiscence Immunosorbant Assay

Statistical Analysis

Statistical analysis was done with the help of ANOVA TEST. The values thus obtained were tabulated and subjected to statistical analysis .The paired and unpaired t-test and Pearson Coefficient correlation (p-value) was determined between vitamin B_{12} and thyroid hormone.

Result

In the present study, 50 subjects were investigated out of which 25 were anemic pregnant women and 25 were non- anemic pregnant women. The significant correlation was found between both groups ($p<0.005$).

Table 1: The table 1 shows that there was significant correlation in between all parameters.

Table 1: Comparison of parameters in anemic and non-anemic pregnant women

SN	Parameter	Anemic pregnant women Mean ±SD	Non-anemic pregnant women Mean ± SD	"P" Value
1	Vitamin B12	175.72±30.2772	279.28±77.6694	0.0
2	T3	96.88±19.23824	128.12±26.39021	0.0
3	T4	7.888±2.27785	9.224±1.838541	0.027
4	TSH	1.954±0.9968	3.2692±1.2783	0.00018

(NS: p>0.05; Not Significant; *p<0.05; Significant; **p<0.001; Highly Significant; r=Pearson Correlation Coefficient)

Table 2: The table 2 shows that there was significant correlation in between age group in anemic and non-anemic pregnantwomen.

Table 2: Comparison of age group in anemic and non-anemic pregnangt women

SN	Parameter	Anemic pregnant women (20-30) Mean ± SD	Anemic pregnant women(30& above) Mean ±SD	Non-Anemic pregnantwomen (20-30) Mean ± SD	Non-Anemic pregnant women(30& above) Mean ±SD	"P" Value
1	Vitamin B12	177.368±30.934	170.5±30.204	335.056±59.0488	262.8571±61.7695	0.0
2	T3	98.473±18.410	91.833±22.719	129.5556±28.3885	124.4286±21.9154	0.0003
3	T4	6.4947±1.6825	7.767±1.682	9.0444±1.7557	9.6857±2.1075	0.0002
4	TSH	2.1716±0.9879	1.265±0.7113	3.2644±1.0839	3.2814±1.791	0.0009

(NS: p>0.05; Not Significant; *p<0.05; Significant; **p<0.001; Highly Significant; r=Pearson Correlation Coefficient

Table 3: The table 3 shows that there was significant correlation in between veg. and non-vegetarian diet in anemic andnon-anemic pregnant women.

Table 3: Comparison of diet in anemic pregnant women

SN	Parameter	Anemic pregnant women (veg) Mean ± SD	Anemic pregnant women (non-veg) Mean ±SD	Non-Anemic pregnantwomen (veg) Mean ± SD	Non-Anemic pregnant women (non-veg) Mean ±SD	"P" Value
1	Vitamin B12	175.2222±33.82964	176±29.25976	316.4444±76.55408	313.9375±64.0411	0.0
2	T3	96.22222±18.70012	97.25±20.13124	121.333±19.15072	131.9375±29.58934	0.00024
3	T4	6.7333±2.1954	6.8375±1.7316	9.4±2.182888	9.125±1.684636	0.00062
4	TSH	1.5244±0.8441	2.1956±1.0182	3.38±1.2694	3.2069±1.3205	0.0013

(NS: p>0.05; Not Significant; *p<0.05; Significant; **p<0.001; Highly Significant; r=Pearson Correlation Coefficient) The present study shows the significant correlation of vitamin B12 and thyroid hormone in anemic pregnant women.

Discussion

Thyroid function tests change during pregnancy due to the influence of two main hormones: human chorionic gonadotropin (hCG), the hormone that is measured in the pregnancy test and estrogen, the main female hormone. [15] In addition, in pregnancy, the stimulatory effect of serum hCG of placental origin, increased metabolic demand, and mental stress may play increase overall thyroid activity and elevate thyroid hormone levels. During pregnancy, increased estrogen levels cause increasedproduction of proteins by the liver. As a result, hypatocytesincreases their production of thyroid binding globulin, the protein that tranaports T4 in the circulation. High estrogen,on the other hand, due to oligosaccharide modification, reduces peripheral degradation of thyroid binding globulin.As a result, the content of thyroid binding globulin in the serum is increased. In our study correlation was observed between all parameters of thyroid hormones and vitamin B12 in anemic pregnant women. It has been observed that positive correlation is seen in thyroid hormones and vitamin B12 in anemic pregnant women which is statistically significant P-value (0.000). The American Association of clinical Endocrinologist (AACE)recommended thyroid function screening all pregnant women during the first trimester of pregnancy. [16]

Many studies have been reported that altered thyroid levels were due to hypothyroidism which plays an important role in pathogenesis of pregnancy induced hypertension. Early recognition of moderate rise of thyroidduring early pregnancy can predict the pregnancy related complications. From the present study it is recommended that all pregnant women should be measured serum TSH, FT4, FT3 and vitamin B12 in the first trimester of theirpregnancy.

Conclusion

From this study, we can conclude that, the vitamin B12levels are low in first trimester itself. Further hypothyroidism also present. So, early diagnosis of these deficiencies will be useful to start giving supplements to avoid unwanted effects in pregnancy.

Reference

1. Guerrero A, Pamplona R, Postero-Otin M, López- Torres M. Effect of thyroid status on lipid composition and peroxidation in the mouse liver.Free Rad Biol Med. 1999; 26(1-2): 73-80.
2. Lingidi JL, Mohapatra E, Zephy D, Kumari S. Serum Lipids and Oxidative Stress in Hyporthyrodism. Journal of Advance Research in Biological Sciences 2013;5 (1):63 -66.
3. Antonijević N., Nesović M., Trbojević B., Milosević R. Med. Pregl., 1999; 52(3-5),136 - 140.
4. Christ-Crain M., Meier C., Huber P., Zulewski H., StaubJ.J., Müller B. Hormones, 2003; 2: 237-242.
5. Mclean E, Benoist B, Allen LH. Review of the magnitude of folate and vitamin B12 deficiencies worldwide. Food Nutr Bull. 2008; 29 (2):38-51.
6. De Groot L, Abalovich M, Alexander EK, Amino N, Barbour L, *et al.* Management of thyroid dysfunction during pregnancy and postpartum: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab 2012;* 97:2543–2565.
7. Spremovic-Radjenovic S, Gudovic A, Lazovic G, Marinkovic J, Radunovic N, *et al.* Fetal free thyroxine concentrations in pregnant women with autoimmune thyroid disease. *J Clin Endocrinol Metab. 2012;* 97: 4014–40 21.
8. Sande HV, Jacquemyn Y, Karepouan N, Ajaji M. Vitamin B12 in pregnancy: maternal andfetal/neonatal effects—a review. Open J Obstet Gynecol. 2013; 03:599.
9. Allen LH. How common is vitamin B-12 deficiency?Am J Clin Nutr. 2009; 89:693S–6 96S.
10. Bashetti S, Suhasini D, Krishnakumari M, Kundoor N, Vijayaraghavan R, Varma BA. Association of vitamin B12 and folic acid with thyroid hormones in pregnant women with hypothyroidism. Res J Pharm Biol Chem Sci. 2016; 7:2478–2484.
11. Snow CF. Laboratory diagnosis of vitamin B12 deficiency. Arch Inter Medicine. 1999; 159; 1289-98.

12. Green R, Kinsella LJ. Current concepts in diagnosis of cobalamin deficiency. Neurol. 1995; 45:435-40.
13. Sande HV, Jacquemyn Y, Karepouan N, Ajaji M. Vitamin B12 in pregnancy: Maternal and fetal/neonatal effects—A review. Open J Obstet Gynecol. 2013;03(07):599.
14. Stagnaro-Green A, Abalovich M, Alexander E, Azizi F, Mestman J, Negro R, et al. Guidelines of the AmericanThyroid Association for the Diagnosis and and Postpartum. Thyroid. 2011; 21(10):1081–125.
15. Glinver D. The regulation of thyroid function in pregnancy: pathways of endocrine adaptation from physiology to pathology. 1997;18: 404-433.
16. Saltar N, Greer IA, Louden J, Lindsay G, Mc Connell M, et al. Lipoprotein subfraction change in normal pregnancy threshold effect of plasma triglycerides on appearance of small dense low density lipoprotein. J Clin Endocrinol Metab. 1997; 82:2483-2491.