CORRELATION OF VITAMIN B12 WITH THYROID HORMONES IN ANEMIC PREGNANT WOMEN
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Abstract
Introduction: 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.

Aim: 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/IPD Index Medical College & Research Center, INDORE, MADHYA PRADESH, India. 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.

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 and T4 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]. Vitamin B12 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 risk of 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 & 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 Index Medical College & Research Center, Indore, Madhya Pradesh, India.

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 considered as anemic in following mean –
- Level of Hb (gm/dl)
  - 8-10 gm/dl – mild anemic
  - 6-8 gm/dl – moderate anemic
  - Less than 6 – severe anemic

Sample Collection:
This study will be conducted in the department of Biochemistry, IMCHRC INDORE in association with Department of Gynecology IMCHRC INDORE. The patient/subjects will be selected who are attending the OPD of gynecology department Index Medical College & Research Center, INDORE, MADHYA PRADESH, India. and they suffer from anemia during pregnancy.

Sample Collection:
This study will be carried out in the department of Biochemistry, IMCHRC INDORE in association with Department of Gynecology IMCHRC INDORE. The patient/subjects will be selected who are attending the OPD of gynecology department Index Medical College & Research Center, INDORE, MADHYA PRADESH, India. and they suffer from anemia during pregnancy.

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

<table>
<thead>
<tr>
<th>SN</th>
<th>Parameter</th>
<th>Anemic pregnant women Mean ± SD</th>
<th>Non-anemic pregnant women Mean ± SD</th>
<th>&quot;P&quot; Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vitamin B&lt;sub&gt;12&lt;/sub&gt;</td>
<td>175.72±30.2772</td>
<td>279.28±77.6694</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>T3</td>
<td>96.88±19.23824</td>
<td>128.12±26.39021</td>
<td>0.0</td>
</tr>
<tr>
<td>3</td>
<td>T4</td>
<td>7.888±2.27785</td>
<td>9.224±1.838541</td>
<td>0.027</td>
</tr>
<tr>
<td>4</td>
<td>TSH</td>
<td>1.954±0.9968</td>
<td>3.269±1.2783</td>
<td>0.0018</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>SN</th>
<th>Parameter</th>
<th>Anemic pregnant women (20-30) Mean ± SD</th>
<th>Anemic pregnant women(30 &amp; above) Mean ± SD</th>
<th>Non-Anemic pregnant women (20-30) Mean ± SD</th>
<th>Non-Anemic pregnant women(30 &amp; above) Mean ± SD</th>
<th>&quot;P&quot; Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vitamin B&lt;sub&gt;12&lt;/sub&gt;</td>
<td>177.36±830.934</td>
<td>170.5±30.204</td>
<td>335.05±69.048</td>
<td>262.85±61.769</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>T3</td>
<td>98.43±18.410</td>
<td>91.83±22.719</td>
<td>129.55±628.3885</td>
<td>124.42±21.915</td>
<td>0.0003</td>
</tr>
<tr>
<td>3</td>
<td>T4</td>
<td>6.49±41.6825</td>
<td>7.76±1.6825</td>
<td>9.04±41.755</td>
<td>9.68±2.1075</td>
<td>0.0002</td>
</tr>
<tr>
<td>4</td>
<td>TSH</td>
<td>2.17±10.9879</td>
<td>1.26±0.7113</td>
<td>3.26±1.0839</td>
<td>3.28±1.791</td>
<td>0.0009</td>
</tr>
</tbody>
</table>

(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 and non-anemic pregnant women.

Table 3: Comparison of diet in anemic pregnant women

<table>
<thead>
<tr>
<th>SN</th>
<th>Parameter</th>
<th>Anemic pregnant women (veg)</th>
<th>Anemic pregnant women (non-veg)</th>
<th>Non-Anemic pregnant women (veg)</th>
<th>Non-Anemic pregnant women (non-veg)</th>
<th>“P” Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vitamin B12</td>
<td>175.222±33.82964</td>
<td>176.2±29.25976</td>
<td>316.444±76.55408</td>
<td>313.937±64.0411</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>T3</td>
<td>96.222±18.70012</td>
<td>97.25±120.13124</td>
<td>121.333±19.15072</td>
<td>131.937±29.58934</td>
<td>0.00024</td>
</tr>
<tr>
<td>3</td>
<td>T4</td>
<td>6.733±2.1954</td>
<td>6.837±1.7316</td>
<td>9.4±2.182888</td>
<td>9.125±1.684636</td>
<td>0.0062</td>
</tr>
<tr>
<td>4</td>
<td>TSH</td>
<td>1.524±0.8441</td>
<td>2.195±1.0182</td>
<td>3.38±1.2694</td>
<td>3.206±1.3205</td>
<td>0.0013</td>
</tr>
</tbody>
</table>

(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. 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 increased production of proteins by the liver. As a result, hypatocytes increases their production of thyroid binding globulin, the protein that transports 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 thyroid during 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 their pregnancy.

Conclusion:

From this study, we can conclude that, the vitamin B12 levels 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:

11. Snow CF. Laboratory diagnosis of vitamin B12 deficiency. Arch Inter Medicine 1999; 159; 1289-98.