



A Correlative Study of Thyroid Hormones with Serum Iron in Aneamic Pregnant Women

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Abstract

Introduction: Anemia during pregnancy can be a mild condition and easily treated if caught early on. However, it can become dangerous, to both the mother and the baby, if it goes untreated. About 56% of maternal deaths occur due to anemia.[1] the major causes of anemia are inadequate supply of iron, folic acid and vitamin b12. Iron deficiency is the chief contributor of anemia in pregnancy.[2]

Aim: The Aim and objective of the study was to compare the thyroid hormones and serum iron in anemic pregnant women.

Materials & Methods: Study consisted of 100 subjects from OPD/IPD Index Medical College & Research Center, INDORE, MADHYA PRADESH, India. The study groups were divided into Group I-50 anemic pregnant patients and Group II-50 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 thyroid hormones and serum iron , among two groups, a

significant difference ($p < 0.005$) was found between few of them.

Conclusion: From this study, we can conclude that, the serum iron levels are low. Further, hypothyroidism also present and associated with iron deficiency. So, early diagnosis of these deficiencies will be useful to start giving supplements to avoid unwanted effects in pregnancy.

Keywords: Thyroid hormone, serum iron levels, anemic pregnant women.

Introduction

Pregnancy is a physiological condition and induces complex hormonal and immunological changes that modify normal thyroid physiology. It has a profound impact on the thyroid gland and thyroid function. Pregnant women are often iron deficient, and iron deficiency has adverse effects on thyroid metabolism.

Thyroid hormone plays a critical role in fetal development. But, the thyroid physiology is modified during normal pregnancy. These modifications help to prepare the maternal thyroid gland to cope with the metabolic demands of pregnancy. These changes are

usually reversible post-partum and the interpretation of these changes poses a challenge to the treating physician. Hypothyroidism is widely prevalent in pregnant women. Maternal hypothyroidism occurs in 2-5% of women of child-bearing age and is associated with adverse pregnancy outcomes.[1] It is associated with fetal loss, placental abruptions, pre-eclampsia, preterm delivery and reduced intellectual function in the offspring.[2] The risk for miscarriage increased by 15% for each 1 mIU/L elevation of the TSH level on the basis of logistic regression analysis.[3]

Thyroid hormones are crucial for normal development of baby's brain and nervous system. During the first trimester- the first 3 months of pregnancy – baby depends on supply of thyroid hormone, which comes through the placenta. Hypothyroidism in either the mother or fetus frequently result in fetal disease; in human, this includes a high incidence of mental retardation.

Iron requirements are increased in pregnancy, especially in the 3rd trimester when they may be several times higher than at other stages of the life cycle, the net iron requirements for pregnancy are 840 mg approximately.[4]

Body uses iron to make extra blood (hemoglobin) during pregnancy. Iron also helps move oxygen from lungs to the rest of body and baby's.

Anemia is defined as low hemoglobin or hematocrit, anemia during pregnancy continues to be a common clinical problem with high rate prevalence in many developing countries.[5] iron deficiency anemia is the commonest anemia in developed or developing countries, mainly reproductive women are suffering in iron deficiency anemia due to menstruation (heavy blood Loss).

Iron deficiency can be defined as that moment when

body iron stores become depleted and a restricted supply of iron to various tissues becomes apparent. Iron deficiency is one of the most common nutritional deficiencies worldwide.

Deficiency of iron in pregnant women limits oxygen delivery to cell resulting in fatigue, poor work performance and decreased immunity. Iron deficiency anaemia early in a pregnancy can double or even triple the risk of having a premature delivery or a low birth weight baby.[6] Anemia during pregnancy can be a mild condition and easily treated if caught early on. However, it can become dangerous, to both the mother and the baby, if it goes untreated. About 56% of maternal deaths occur due to anemia.[7] the major causes of anemia are inadequate supply of iron, folic acid and vitamin b12. Iron deficiency is the chief contributor of anemia in pregnancy.[8]

Materials & Methods

This study consisted of 50 cases of anemic pregnant women (Group I) and 50 Non – anemic pregnant women (Group II) to the Department of Gynecology IMCHRC INDORE.

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

- 50 anemic pregnant women
- 50 normal pregnant women
- The pregnant women will be consider as anemic in following meant –

- Level of Hb (gm/dl)
 - 8-10 gm/dl – mild anemic
 - 6-8 gm/dl – moderate anemic
 - Less than < 6 – sever anemic

Sample Collection This study will be conduct 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 suffering from anemia during pregnancy

The normal healthy pregnant women will be included in this study as a control group for the comparison with anemic 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 venipuncture 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

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

Table No. 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	T3	97.1 ±17.0309	124.4±25.7524	0.0
2	T4	6.706±1.633	9.4544±1.6159	0.0
3	TSH	1.8856±0.8701	3.5646±1.1384	0.0
4	IRON	31.48±6.566	120.48±31.4625	0.0

(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 pregnant women.

following parameters will be estimated by using different methods :

Determination of Total T3, Total T4, TSH and serum iron Measurements of serum concentrations of Total T3, Total T4, TSH, 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 thyroid hormones and serum iron.

Result

In the present study, 100 subjects were investigated out of which 50 were anemic pregnant women and 50 were non-anemic pregnant women.. The significant correlation was found between both groups (p<0.005).

Table 2: Comparison Of Age Group In Anemic And Non-Anemic Pregnant Women

Sn.	Parameter	Anemic pregnant women (20-30) Mean ± SD	Anemic pregnant women(30& above) Mean ±SD	Non-Anemic pregnant women (20-30) Mean ± SD	Non-Anemic pregnant women(30& above) Mean ±SD	“P” Value
1	T3	99.4063 ±16.498	93 ±17.6602	121.1875 ±27.2698	130.1111 ±22.3946	0.0
2	T4	6.5125±1.7333	7.05±1.446	9.2913±1.6238	9.7444±1.606	0.0
3	TSH	2.0837±0.9218	1.5333±0.6538	3.6269±1.0205	3.4539±1.3476	0.0
4	IRON	31.7813±5.977	30.9444 ±7.6579	121.9688 ±28.2814	117.8333±37.189 9	0.0

(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

Sn.	Parameter	Anemic pregnant women (veg) Mean ± SD	Anemic pregnant women (non-veg) Mean ±SD	Non-Anemic pregnant women (veg) Mean ± SD	Non-Anemic pregnant women (non-veg) Mean ±SD	“P” Value
1	T3	98.5455±16.7324	95.9643±17.4812	119.5556±20.3621	127.125±28.2771	0.0
2	T4	6.6364±1.76	6.7607±1.5725	9.55±1.8231	9.4006±1.5153	0.0
3	TSH	1.4718±0.6256	2.2107±0.9058	3.5122±1.0641	3.5941±1.1938	0.0
4	IRON	29.3636±5.2874	33.1429±7.0696	125.8333±36.2236	117.4688±28.6198	0.0

(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 thyroid hormones and serum iron in anemic pregnant women.

Discussion: About 2 to 5% of pregnant woman suffer from any variety of thyroid disorders and timely intervention can be done if detected early.(1)

Women with hypothyroidism have decreased fertility; even if they conceive, risk of abortion is increased, and risk of gestational hypertension, anemia, abruptio placenta and postpartum hemorrhage is increased.(2)

Thyroid disease has multiple deleterious impacts on pregnancy, the postpartum period, and the developing fetus. Complications include miscarriage, decreased intelligence quotient, visual-motor deficiencies in the

offspring, preterm delivery, and postpartum thyroiditis.(5-14)

The prevalence of hypothyroidism in pregnancy is around 2.5% according to the Western literature.(16) In a community-based large study involving over 500,000 pregnant women from the USA showed a 15.5% prevalence of hypothyroidism.(17) There are a few reports of hypothyroidism during pregnancy from India with prevalence rates ranging from 4.8% to 11%.18,19 Previous studies conducted in Delhi reported a 14.3% prevalence of hypothyroidism during the first trimester.(20) In a recent Indian study, the prevalence of hypothyroidism in pregnancy was 36.07% using trimester specific S.TSH values.(21) In another recent study from India it was found that 49% of cases had S.TSH levels above the recommended guidelines in the first trimester.(22) Newer studies have higher prevalence of hypothyroidism. It has been stated that lowering the threshold of S.TSH to 2.5 mIU/L would result in a nearly five-fold increase in the number of women being classified as hypothyroid.(23) Whereas, a message from the study of Vaidya et al commented that 30% women with thyroid dysfunction remain undiagnosed

There is a metabolic deceleration in hypothyroidism. All organ systems are affected. Hematopoietic system is the primary one among these affected systems resulting in anemia. Anemia in hypothyroidism can be normochromic normocytic, hypochromic microcytic, and macrocytic. Hypocellular structure of the bone marrow gives rise to thought that thyroid hormones play a role in hematopoiesis. The most frequent reason of this is the bone marrow repression due to thyroid hormone deficiency as well as lack of erythropoietin production arising from the reduction in need of O₂.(28)

Iron repletion may reverse this hypothyroidism. Malabsorption and iron deficiency anemia are observed in hypothyroidism. In a study carried out by Cinemre H and colleagues, they showed that the efficacy and absorption of oral iron treatment in women with subclinical hypothyroidism improved after levothyroxine replacement.(31)

Conclusion

Anemia in pregnancy is common occurrence in our country. Presence of thyroid dysfunction in the form of hypothyroidism may affect the incidence and severity of anemia in pregnancy adversely. More work is needed to elucidate a link between anemia, iodine deficiency, thyroid disease, and adverse outcomes in the mother and the fetus. From this study, we can conclude that, the serum iron levels are low. Further, hypothyroidism also present and associated with iron deficiency. So, early diagnosis of these deficiencies will be useful to start giving supplements to avoid unwanted effects in pregnancy.

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