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A Study of Prevalence of Anemia Among Hypothyroid Women During Pregnancy

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Abstract

Background: Hypothyroidism is a common endocrine disorder encountered during pregnancy and has been associated with adverse maternal and fetal outcomes. Anemia is also a frequent complication in pregnancy, and thyroid hormone deficiency may contribute to impaired erythropoiesis. This study is aimed to determine the prevalence, severity, and morphological types of anemia among pregnant women with hypothyroidism.

Methods: A prospective observational study was conducted among 150 pregnant women with hypothyroidism attending the antenatal outpatient department of a tertiary care centre during a period of 2 years. Women with singleton pregnancies in the first trimester were included. Patients with known anemia, multiple gestation, chronic systemic diseases, hemoglobinopathies, malignancies, and threatened abortion were excluded. Complete blood count, peripheral smear examination, and thyroid function assessment were performed.

Results: Among the 150 hypothyroid pregnant women, 104 (69.33%) were anemic. Subclinical hypothyroidism was observed in 116 (77.33%) women, while 34 (22.67%) had overt hypothyroidism. Mild anemia was the most common form overall (50.96%), followed closely by moderate anemia (48.07%), with severe anemia seen in only one patient. Dimorphic anemia was the predominant morphological type (70.19%), followed by microcytic (27.88%) and macrocytic anemia (1.92%). p value was found to be 0.03 which implies that the difference was statistically significant.

Conclusion: Anemia is highly prevalent among pregnant women with hypothyroidism, with dimorphic anemia being the most common morphological pattern. Early identification and appropriate management of both

hypothyroidism and anemia during pregnancy may improve maternal and fetal outcomes. Further studies are required to better understand the relationship between thyroid dysfunction and iron metabolism.

Keywords: Hypothyroidism, Pregnancy, Anemia, Subclinical Hypothyroidism, Overt Hypothyroidism, Dimorphic Anemia, Iron Deficiency Anemia, Antenatal Women, Thyroid Dysfunction

Introduction

Thyroid gland diseases are quite common among general population and its frequency is estimated to be about 5% and predominantly among females[1]. Thyroid gland dysfunction is relatively common during pregnancy as the pregnant state has a profound influence on thyroid gland structure and also its function. Hypothyroidism during pregnancy poses a significant health challenge, as it is associated with adverse maternal and perinatal outcome specifically with an impact on cognitive development of the fetus.[2,3]

Anemia being one of the most commonly encountered medical disorders in pregnancy, is associated with significantly high maternal mortality, and high levels of maternal and fetal morbidity. The regulation of hematopoiesis in bone marrow by the thyroid hormones and the mutual relationship between anemia and hypothyroidism is being studied in large number of studies recently.[4,5,6]

Hypothyroidism causing certain forms of anemia in one hand and hyperproliferation of immature erythroid progenitors cells on the other hand is well known. In contrast, anemia is not frequently observed in patients with hyperthyroidism, whereas erythrocytosis is quite common[7,8]. This study is conducted to find out the prevalence of anemia, and to evaluate the severity and type of anemia in hypothyroid pregnant women.

Aim

The aim of the study is to find out the prevalence of anemia among hypothyroid women during pregnancy.

Objectives

1. Classification of hypothyroid patients into overt hypothyroid and sub clinical hypothyroid.
2. Estimation of complete blood count, peripheral smear study in all the hypothyroid pregnant patients.
3. Classification of severity of anemia among the hypothyroid patients.
4. To study the prevalence of anemia, its severity and type among the hypothyroid patients.

Materials and Methods

This is a prospective observational study conducted in a tertiary care center, comprising of 150 antenatal mothers attending the outpatient department with hypothyroidism in their first trimester during a period of 2 years.

Inclusion Criteria

1. Patients attending antenatal clinic in the first trimester with hypothyroidism.
2. Singleton pregnancy

Exclusion Criteria

1. Known case of anemia
2. Multiple gestation.
3. Any patient with chronic diseases like chronic kidney disease, chronic liver disease, cardiovascular disease, tuberculosis, hypertension, diabetes, hemorrhoids, or other diseases with gastro intestinal bleeding, hemoglobinopathies and malignancy.
4. Threatened abortion

Results

Table 1: Age wise distribution of antenatal mothers included in the study groups

Age (in years)	Frequency (n=150)
<=18	2 (1.33 %)
19-25	57 (38 %)
26-30	65(43.33 %)
31-35	16(10.66 %)
36-40	8(5.33 %)
>40	2(1.33 %)

Table 2: Socio demographic profile of the participants based on modified Kuppuswamy scale

Socio-economic status	n=150
Upper(1)	17 (11.33%)
Upper middle (2)	7 (4.66%)
Lower middle (3)	23(15.33%)
Upper lower (4)	54 (36%)
Lower (5)	49(32.66%)

Table 3: Prevalence of anemia among the study group

Hemoglobin level	n=150
Anemic (Hb<11g/dL)	104(69.33%)
Non-anemic (Hb11g/dL)	46(30.66%)

Table 4: Distribution of overt hypothyroidism and sub - clinical hypothyroidism among the study group

Hypothyroidism severity	Number of participants (n=150)
Overt hypothyroid	34(22.66%)
Subclinical hypothyroid	116(77.33%)

Table 5: Parity wise distribution of the study group

Obstetric code	N=150
Primigravida	67 (44.66%)
G2A1	11(7.33%)
G3A2	9(6%)
Multigravida	63(42%)

Table 6: Parity wise distribution of overt and sub clinical hypothyroid patients

Obstetric Code	Overt hypothyroid N=23	Subclinical hypothyroid N=83
Primi (including G2A1 and G3A2)	3	53
Multi	20	28

Table 7: **Distribution of severity of anemia among the anemic patients in the study groups**

Severity of anemia	**Frequency (n=104)**
Mild(10-10.9)	53(50.96%)
Moderate(7.0 - 9.9)	50(48.07 %)
Severe (4.0 - 6.9)	1(0.71%)
Very severe (<4)	-

Table 8: Grading of severity of anemia among the overt and sub clinical hypothyroid patients

Grade of anemia (g)/dL)	Overt hypothyroid (N=23)	Subclinical hypothyroid (N=81)	Total N=104	
Mild	15 (65.21%)	38 (46.91%)	53(50.96%)	
Moderate	7 (30.43%)	43(53.08%)	50(48.07%)	p=0.03
Severe	1 (4.34 %)	-	1(0.96%)	

In the study, after classifying the anemic patients according to the ICMR classification, mild anemia was seen in most of the patients with overt hypothyroidism -15 patients (65. 21%), moderate anemia in 7 patients i.e. (30.43%) while moderate anemia was seen in subclinical hypothyroid patients' group - 43 patients (53.08%) followed by mild anemia in 38 patients (46.91%). P value was found to be 0.03 which implies that the difference was statistically significant.

Table 9: Type of anemia in hypothyroid antenatal patients in the study group

Type of anemia	Overt hypothyroid (n=23)	Subclinical hypothyroid (n=81)	Total(n=104)
Microcytic	10 (43.47%)	19 (23.45%)	29 (27.88 %)
Macrocytic	1 (4.34%)	1 (1.23%)	2(1.92%)
Dimorphic	12 (52.17%)	61 (75.30%)	73 (70.19%)

Discussion

Charcot conducted a study in 18th century which showed an association between Graves' disease and anaemia. Another study was conducted by Kocher who observed that a decrease in number of red blood corpuscles (RBCs) of patients who had undergone thyroidectomy. It has also been found that all haematological parameters return to normal when the thyroid hormone levels are corrected and an euthyroid state is achieved. It has also been postulated that the thyroid hormones increase the production of erythropoietin and thus influence the hematopoiesis[21,22]. As seen above in this study, 150 patients with hypothyroidism were included and out of them 104 patients had anemia, (excluding the other common causes of anemia in exclusion criteria) hence prevalence

of anemia in hypothyroid antenatal patients was found to be 69.33%.

It has been found that anemia affecting upto 60% of patients with hypothyroidism is not related either to severity or duration of thyroid insufficiency. As the overall metabolism of the human body is decreased in hypothyroidism, hematopoietic system being the primary one among all other affected organ systems results in anemia. Hypo cellular structure of the bone marrow in hypothyroidism can substantiate the fact that thyroid hormones play an important role in hematopoiesis. This hypo cellular bone marrow structure and also the lack of erythropoietin production can cause variety of blood picture of anemia including normocytic normochromic, microcytic, macrocytic and dimorphic.[23]

In the study, mild anemia was seen in most of the patients with overt hypothyroidism -15 patients (65. 21%), moderate anemia in 7 patients i.e. (30.43%) while moderate anemia was seen in subclinical hypothyroid patients group – 43 patients (53.08%) followed by mild anemia in 38 patients (46.91%). Similar study was conducted by Mamatha S, in which the study has shown significant association between uncontrolled hypothyroidism and adverse fetomaternal outcome. There was a significant correlation between the thyroid status and prevalence of hypertension, diabetes, anemia in the study[24]. As seen in this present study, 12 of the patients in overt hypothyroidism had dimorphic anemia (52.17%), 10 patients had microcytic anemia (43.47%) and 1 patient had macrocytic anemia (4.34%).

And also, in sub-clinical hypothyroid group, 61 patients were found to have dimorphic anemia (75. 30%), 19 of them had microcytic anemia (23.45%) and one patient had macrocytic anemia (1.23%). These results are in accordance with the previous studies by Mehmet and Agrawal U, who also had dimorphic anemia as the commonest type in peripheral blood picture of patients of anemia of chronic disease[25,26].

Conclusion

Iron deficiency anemia is one of the most frequently seen diseases in our population. Malabsorption and iron deficiency anemia occurring as a result of various hormonal instability are observed in hypothyroidism. As shown in a study conducted by Cinemre H. and colleagues, the correction of hypothyroidism with levothyroxine has significantly improved the efficacy and absorption of oral iron treatment done for anemia. This necessitates the correction of hypothyroidism if present in patients with anemia. Hypothyroidism being a common endocrine disorder encountered in our population, can lead to anemia as a result of various causes stated above. An increase of anemia frequency in hypothyroidism is found in our study. More researches are needed to be conducted so that a clear link associated with thyroid function and iron status can be ruled out in order to prevent the adverse effects of the disorder to both mother and fetus so as to achieve normal pregnancy outcome.

Limitations of The Study

- Majority of the Indian women have nutritional iron deficiency. It is highly difficult to differentiate nutritional iron deficiency among them.
- In the absence of nutritional iron deficiency, the exact mechanism of IDA in hypothyroidism is not understood. Further studies on the enzyme thyroid peroxidase may provide more information

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