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Original Research Article

Prevalence of Anemia and Its Effects on Thyroid Function in Pregnant Women

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ABSTRACT

Background: Anemia and thyroid disorders, both are common public health problems with pregnant women being the most vulnerable group. Therefore, we aimed this study to find out the prevalence the prevalence of anemia and thyroid disorder among the pregnant women.

Materials & Methods: This study was carried out in Hind Institute of Medical Sciences, Ataria, UP. 120 pregnant women were included and examined for the prevalence of anemia and its effect on thyroid profile.

Results: We found that 47.5% of pregnant women were anemic of which 15.83% had mild, 21.67% had moderate and 10% had severe anemia. Prevalence of hypothyroidism was high in both non anemic and anemic pregnant women with the rate much higher in case of anemic females. 21.05%, 30.76% and 33.33% of pregnant women with mild, moderate and severe anemia respectively had the hypothyroidism while subclinical hypothyroidism was observed in 31.57%, 23.07% and 16.7% of those with mild, moderate and severe anemia respectively.

Conclusion: Anemia is one of the major causes of maternal mortality during pregnancy and the situation is further worsened by the presence of thyroid abnormality. Therefore early diagnosis and treatment may aid in preventing the adverse maternofoetal outcomes.

Key words: Anemia, Pregnancy, Thyroid Disorder.

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INTRODUCTION

Anemia, a state characterized by lower hemoglobin concentration than normal, is common condition in pregnant women, mainly in developing countries.[1] According to WHO, Asia ranks on top in the incidence of anemia with about half of the anemic women to be present in Indian subcontinent only, among which 88% are seen in pregnancy.

About 56% of maternal deaths occur due to anemia.[2] The major causes of anemia are inadequate supply of iron, folic acid and vitamin B_{12}. To some extent, proteins, amino acids, B complex vitamins, vitamins A and C are also responsible as they are required for maintenance of hemoglobin level.[3] Among the various etiologies, iron deficiency is the chief contributor of anemia in pregnancy.[4] Studies of Karim et al and Baig Ansari et al, have shown iron deficiency to be the chief cause of anemia in pregnancy.[5,6]

Iron deficiency is regarded as one of the major public health problems with the prevalence of 14% in developed countries while it accounts for 51% in the developing countries.[7] Anemia causes a number of maternofoetal complications including the decreased ability of mother to cope up with bleeding that occur during delivery, low birth weight of fetus, growth retardation and increased perinatal mortality.[8] A meta-analysis study has shown that risk of maternal mortality decreases by 20% for every 1 gm/dl rise in hemoglobin level.[9]

Nutrient requirement of pregnant women is higher and they are at increased risk of iron deficiency. Previous studies have reported that iron deficiency hampers thyroid function.[10] The thyroid hormones are very important for both foetal and maternal well-being.[11] Zimmermann et al illustrated that lower maternal iron level causes increase in TSH and decrease in total T4 level.[12] Similarly Yu et al showed significant decrease in free T4 levels in pregnant women with iron deficiency anemia as compared to controls.[13]

The prevalence of thyroid disorder in pregnancy is around 2-5%, with hypothyroidism being more common, about 6.47-14.32%.[14] During the initial phase of gestation, the fetus is solely dependent on thyroid hormones from mother until, its own thyroid gland is developed. Inadequate supply of thyroid hormones at this stage can cause fetal brain damage, miscarriage or premature growth of fetus.[15]

Therefore this study was conducted to find out the prevalence of iron deficiency anemia in pregnant women and its effect on the thyroid function.

MATERIALS AND METHODS

This study was conducted at Hind Institute of Medical Sciences, Ataria, Sitapur UP. 120 pregnant women were included in the study. Obsteric and clinical history in detail were taken from the pregnant women. About 5 ml of blood sample was collected, and analyzed for hemoglobin, T3, T4 and TSH levels. The women were categorized into 4 groups depending upon the hemoglobin level as recommended by ICMR.[16]

i. Normal: >11 gm/dl
ii. Mild Anemia: 10.10.9g/dl
iii. Moderate Anemia: 7-9.9 g/dl
iv. Severe Anemia: <7g/dl

Hemoglobin level was measured using acid Hematin method (Sahli's method) and the levels of thyroid hormones were analyzed by ELISA.

RESULTS

Overall prevalence of anemia in pregnant females was 47.5 % of which 15.83 % were mild anemia, 21.67% were moderately anemic while 10% were presented with severe anemia. Among the non-anemic pregnant females we found that 12.22% and 17.54% had hypothyroidism and subclinical hypothyroidism while 7.01% and 1.75% had hyperthyroidism and subclinical hyperthyroidism respectively.

When prevalence of thyroid disorder among anemic pregnant females were determined. It was found that hypothyroidism was more common among the pregnant females with moderate and severe (30.76%) anemia (33.33%) while subclinical hypothyroidism was were more frequent in those with mild anemia (31.57%). The prevalence much higher than in cases on non-anemic pregnant women.

Table 1: Prevalence of anemia in pregnant females

State	Hb (mean± SD)	No of women	Percentage (%)
Normal	14.6± 1.34	63	52.5
Mild Anemic	10.4± 0.96	19	15.83
Moderate Anemic	8.5± 1.68	26	21.67
Severe Anemic	6.5 ±1.21	12	10
Total		120	100

Table 2: Prevalence of thyroid disorder non-anemic pregnant females

State	n (63)	Percentage (%)
Normal	38	61.9
Hypothyroidism	9	12.22
Hyperthyroidism	3	7.01
Subclinical Hypothyroidism	12	17.54
Subclinical Hyperthyroidism	1	1.75

Table 3: Prevalence of thyroid disorder in anemic pregnant females

State	No.	No Disorder	Hypo	Hyper	SCHypo	SCHyper
Mild Anemic	19	8 (42.01%)	4 (21.05%)	-	6 (31.57%)	1 (5.26%)
Moderate Anemic	26	9 (34.6%)	8 (30.76%)	2 (7.69%)	6 (23.07%)	1 (3.84%)
Severe Anemic	12	5(41.67%)	4(33.33%)	-	2(16.7%)	1 (8.3%)

DISCUSSION

In this present study we determined the prevalence of anemia in pregnant females and studied its effect on the thyroid profile. The overall prevalence was found to be 47.5% with 15.83%, 21.67% and 10% of pregnant females to be mild, moderate and severely anemic. Anemia is the major risk factor for maternal mortality and morbidity.

In a study of Khan et al, 80%of pregnant females were identified to be anemia.[17] Similarly study of Anjum A et al showed 24%, 33% and 18% of the pregnant to be anemic moderately anemic and severely anemic respectively.[18] Likewise Mangla M et al reported the prevalence to be 98% in India while it was found to be 63.5% and 65% respectively in Indonesia and Nepal.[19] A DLHS-3 survey reported the prevalence of anemia in pregnancy to be 97% of which 41% had mild anemia, 53% had moderate and 3% had severe anemia.[20]

Recent studies elucidated the iron deficiency either with presence or absence of anemia affects thyroid function. Anemia especially iron deficiency anemia affects about the 60% of patients with hypothyroidism.[21] There is decrease in plasma T3 and T4 with increase in TSH levels. Iron deficiency anemia can impair thyroid profile by number of mechanisms such as:

- Causing alternations in hypothalamic pituitary thyroid axis.[22]
- Preventing binding of T3 to nuclear receptors in hepatocytes.[23]
- Inducing thyroid impairment due to hypoxia.[24]
- Impairing the activity of T4-5 deiodinase activity, an enzyme that converts T4 to T3.[25]
- Decreasing the activity of heme containing enzyme thyroid peroxidase that is required for thyroid hormones synthesis. In contrast supplementation of iron improves the thyroid function. Moreover deficiency of thyroid hormones can also lead to anemia due to decreased intestinal absorption of iron associated with thyroid hormone deficiency.[26]
- Lack of thyroid hormones also impairs hematopoiesis due to repression of bone marrow.[27]

In our study hypothyroidism was common among the pregnant females with anemia. 21.05% and 31.57% of mild anemic pregnant women had hypothyroidism and subclinical

hypothyroidism respectively. In those women with moderate anemia, 30.76% had hypothyroidism and 23.07% had subclinical hypothyroidism while 33.33% of females with severe anemia had the hypothyroidism. We also studied the thyroid profile among non-anemic pregnant women and we found hypothyroidism to be the common thyroid disorder among them. However when the prevalence of the thyroid disorder was compared among the pregnant women with and without anemia, the prevalence rate was found to be much higher in the pregnant anemic women which suggests that iron deficiency associated anemia further aggravates the condition.

Study of Agrawal U et al showed 42.86% cases of hypothyroidism in pregnant anemic females.[21] Shuxiang Li et al also demonstrated lower FT4 levels and higher TSH levels in the patients with anemia.[26] These studies suggest that hypothyroidism is a common outcome in the gestational stage associated with iron deficiency.

CONCLUSION

Anemia is the common health problem, especially in rural India. It, especially iron deficiency anemia affects the thyroid function, the outcome which is observed in the form of hypothyroidism that further increases the severity of anemia in pregnant women. Therefore, 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 foetus so as to achieve normal pregnancy outcome.

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