

Prevalence of Anaemia in Hypothyroid Patients in a Tertiary Care Hospital

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ABSTRACT

BACKGROUND

Anaemia is one of the most common conditions observed in the clinical practice. Various causative factors have been associated with anaemia. Association of hypothyroidism with anaemia has been studied and it was recognized that prevalence of anaemia is higher in hypothyroid patients compared to normal population. We wanted to identify the prevalence of anaemia in overt hypothyroid patients in our geographical region.

METHODS

This is a cross sectional study conducted at SVS Medical College, Mahbubnagar. All the clinically evident and laboratory confirmed hypothyroid cases during the study period of September 2018 to August 2019 were included. A total of 92 hypothyroid patients were included and were evaluated further for anaemia. Prevalence of anaemia and type of anaemia was studied, and appropriate statistical analysis was used.

RESULTS

Out of 92 hypothyroid patients evaluated, anaemia was found in 34 (36.95%), and females were predominantly affected when compared to males. Most common type of anaemia observed was normochromic and normocytic anaemia. (55.88%) anaemic cases were normocytic followed by microcytic (38.2%); whereas, very few cases were macrocytic (5.8%). The mean age of 39.2 was observed in females whereas in males the mean age was 41.3. None of the males have shown severe anaemia whereas majority of the females were having severe anaemia.

CONCLUSIONS

Hypothyroidism and anaemia are fairly common conditions observed in the clinical practice and also hypothyroidism is one of the factors for causation of anaemia. It is therefore mandatory to do a proper evaluation of thyroid patients.

KEYWORDS

Anaemia, Hypothyroidism

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BACKGROUND

Hypothyroidism is one of the most common endocrine disorders observed in any community. The prevalence of hypothyroidism varies in population and many studies have identified the prevalence of overt hypothyroidism ranging from 0.1% to 2%, though the subclinical hypothyroidism prevalence is much higher in the community.¹⁻⁴ Anaemia is a condition observed very commonly in clinical practice. According to WHO, the prevalence of anaemia is around 24% and is predominantly seen in the underdeveloped countries.⁵ Various causes have been described as causative factors for anaemia including hypothyroidism. Though the exact mechanism of thyroid hormone action on the haematopoiesis is not clearly understood, a decreased basal metabolic rate in association with reduced cellular oxygen consumption may result in decreased erythropoietin which might have been involved in the causation of anaemia. The prevalence of anaemia in hypothyroidism patients varies greatly and correcting hypothyroidism has been shown to decrease the prevalence of anaemia. Various types of anaemias exist in hypothyroid patients. Normocytic anaemia is considered to be the most common type of anaemia observed in hypothyroid patients probably due to the lack of stimulation of erythroid colony development with reduction in the oxygen distribution to tissues and ultimately reduction of erythropoietin level. Other common anaemia observed is microcytic anaemia which is due to the deficiency of iron which is probably due to hormonal imbalance and bleeding tendencies like menorrhagia associated with hypothyroidism. Another type of anaemia which is less commonly observed in hypothyroidism is macrocytic anaemia which is due to the malabsorption associated with vitamin B12 deficiency. Correcting hypothyroidism by thyroxine supplementation has been associated with the increase in haemoglobin concentration thus correcting anaemia.

The present study aims in identifying the prevalence of anaemia in overt hypothyroid patients in our hospital.

METHODS

The present study was a cross sectional study done during the period of September 2018 to August 2019 in the Department of Medicine, SVS medical college and Hospital, Mahbubnagar. A total of 92 clinically evident and laboratory confirmed overt hypothyroid patients aged over 18 years were included in the study. All the study participants had elevated TSH (> 10 mIU/L) and decreased thyroxine levels.

Exclusion Criteria

1. All the Paediatric cases.
2. Patients with pre-existing causes of anaemia and malnutrition including chronic parasitic infections, upper and lower GIT bleeding, malignancies, haemolytic anaemias, patients on certain type of drugs which causes bone marrow suppression etc.

Laboratory confirmation of overt hypothyroid patients was done in the department of biochemistry based on the values of low T3, T4 and high TSH and subclinical hypothyroid patients was based on normal T3, T4 and High TSH values. After noting down all the patient demographics including age, sex, place, occupation, socioeconomic status etc., all the patients were screened for complete blood picture including haemoglobin level, haematocrit, MCV and MCHC and based on the values they have been characterized into normochromic normocytic or microcytic or macrocytic anaemia. Haemoglobin level <13 g/dL in males and < 12 g/dL in females is considered as cut-off for anaemia. Anaemia was classified as mild, moderate, and severe when haemoglobin (Hb) concentration were (10-12 gm/dl), (8-10 gm/dl) and (<8 gm/dl) respectively. On the basis of red cell indices (mean corpuscular volume (MCV)), anaemia has been classified as normocytic normochromic (MCV 80-96 fl), microcytic hypochromic (MCV <80 fl), and macrocytic (MCV >96 fl). Data was analysed using Microsoft Excel and SPSS software and descriptive statistics were used for the interpretation of the results.

RESULTS

A total of 92 hypothyroid patients were included in the study out of which 72 were females and 20 were males with male to female ratio of 1:3.6. Out of 92 patients, anaemia was observed in 34 cases (36.9%). Anaemia was observed predominantly in female patients. 31 out of 72 (43%) female patients were identified as anemic whereas only 3 out of 20 (15%) male patients were anemic. Majority of the patients were in the age group of 35 to 45 years with the mean age of 39.2 in females whereas in males the mean age was 41.3 which is slightly higher than in females. Normochromic and normocytic anaemia was the most commonly observed anaemia followed by microcytic anaemia. 19 out of the 34 (55.88%) anemic cases were normocytic followed by microcytic (38.2%) whereas only very few cases were macrocytic (5.8%) (2 out of 34). Majority of the patients were having severe anaemia with hemoglobin <8 gm/dl. 19 out of 34 (55.8%) patients were having severe anaemia followed by moderate anaemia in 11 patients (32.3%). None of the males have shown severe anaemia whereas majority of the females were identified having severe anaemia. The mean TSH value was significantly higher in females when compared to males with the overall mean TSH value of 29.38 mIU/ml.

Gender	Total	Anaemic	Percentage
Male	20	3	15%
Female	72	31	43%

Table 1. Gender Wise Distribution of Anaemia Cases

Gender	Normochromic Normocytic	Microcytic	Macrocytic	Total
Male	1	2	0	3
Female	18	11	2	31
Total	19	13	2	34

Table 2. Gender Wise Distribution of Different Types of Anaemia

Gender	No. of Cases	Mild	Moderate	Severe	Total
Female		3	9	19	31
Male		1	2	-	3
Total		4	11	19	34

Table 3. Distribution of Anaemia Cases Based on the Severity

	Male	Female
Mean TSH value	24.56	34.2

Table 4. Mean TSH Value According to Sex

Severe anaemia was seen in only female patients in the present study where all the patients were also having very high levels of TSH values compared to mean TSH value probably indicating the correlation of severity of hypothyroidism with severity of anaemia. But multiple factors including duration of hypothyroidism and other associated diseases also might have played a role.

DISCUSSION

Multiple factors play role in the aetiology of anaemia including the age-related factors, nutritional factors, stress factors, chronic diseases. The role of thyroid hormone deficiency in the causation of anaemia has been studied by many researchers and it has been documented that large proportion of patients with hypothyroidism were affected with anaemia.⁶⁻⁹ Anaemia has been reported as one of the first presenting sign in hypothyroid patients in some studies.¹⁰ Significant increase in the hemoglobin level has been observed by many researchers with the supplementation of thyroxine in refractory and recurrent anaemia cases.^{10,11} In the present study the prevalence of anaemia was 36.9%. In a systematic review and meta-analysis by Alqahtani et al¹² it was observed that the overall prevalence of anaemia in hypothyroid patients was 33.77% which is similar to our study. In contrary Anand et al study⁶ has observed a prevalence rate of 62.14% and in Das et al study it was 73.2% in overt hypothyroid cases which is comparatively higher than in our study. WHO data has estimated a prevalence of 24.8% of anaemia throughout the world.⁵

In the present study Normochromic normocytic anaemia was most commonly observed followed by microcytic anaemia. Macrocytic anaemia had the lowest prevalence rate. Discrepancies exist with the type of anaemia in various studies. Many studies have identified Normochromic normocytic anaemia as the most prevalent type followed by microcytic anaemia.⁶⁻⁹ Similarly, there are studies which have shown that microcytic anaemia was the most common among the hypothyroid patients.¹³ Others have also reported Macrocytic as the most common¹⁴ Irrespective of the type of anaemia it is to be noted that hypothyroidism directly or indirectly acts on the erythropoietin secretion and thus involved in the causation of anaemia.¹⁵

In a study by Das C et al in eastern India, among the anaemic patients with hypothyroidism majority of the patients (51.6%) had normocytic anaemia, followed by iron

deficiency microcytic anaemia (43.2%). Among the anaemic patients in their study, 51.6% of the hypothyroid patients had mild anaemia, 25% had moderate while 20% of the hypothyroid patients had severe anaemia.⁸

The mean age in the present study was of 39.2 in females whereas in males the mean age was 41.3. Our study results are comparable with many other studies conducted by various researchers. According to a study by Das C et al in hypothyroid patients with anaemia, the mean age of the patients was 36.5 years.⁸ In a study by Mehmet E et al,¹⁶ where they have studied both test and control population, it was found that the mean age of the subjects in the hypothyroid and control groups was 44.5 and 45.3 years, respectively and the ages of the two groups were comparable. In an another study by Dorgalaleh A et al the mean age of the patients in the control and hypothyroid groups was 15.2 and 14.1 years respectively.¹⁷ Our study is limited by testing only the overt hypothyroid population unlike many other studies where they have considered both subclinical and overt hypothyroid cases in their studies and many of them have also included healthy control population which is lacking in the present study.

The mean serum TSH levels in our study were 29.38 mIU/ml which is comparable to other studies. In a study by Kulkarni et al the mean serum TSH levels were 45.49 mIU/ml in cases and 3.81 mIU/ml in the controls.¹¹ The serum TSH levels were significantly higher in the hypothyroid patients compared to the controls. These findings were comparable to findings of the study by Mehmet E et al. In a study by Mehmet E et al¹⁶ it was found that the mean serum TSH levels in the hypothyroid group and control group was 43.1 and 1.7 mIU/mL respectively and the serum TSH levels were higher in the hypothyroid group compared to the control group.¹⁰ In the study by Dorgalaleh A et al the mean serum TSH levels were 4.97 and 2.6 mIU/ml, respectively in the hypothyroid and control groups respectively.¹¹ In our study there was negative correlation between TSH levels and haemoglobin levels in cases. Such findings were also seen in a study conducted by Dorgaleh et al where a decreased level of haemoglobin was seen in hypothyroid population with raised TSH as compared to the total population.¹⁷

In the present study females were predominantly affected with male to female ratio of 1:3.6. 43% of female patients were identified as anaemic whereas only 3 out of 20 (15%) male patients were anaemic. Gender wise distribution in our study was similar to other studies conducted by many researchers. In a study by Mehmet E et al sex distribution revealed that the proportion of males and females in the test group (hypothyroid group) was 12% and 88% respectively while in the control group the proportion was 16% and 84% respectively.¹⁶ According to the study by Das C et al it was found that 70% of the subjects were females.⁸ The proportion of males in the study by Dorgalaleh A et al was 38% and 39% in the hypothyroid and control groups, respectively while the proportion of females was 62% and 61% respectively.¹⁷ In accordance with the previous studies it can be concluded that the prevalence of anaemia in hypothyroid patients is higher in the female

population compared to males. Many factors influence this gender-based prevalence of hypothyroidism and anaemia including under nutrition as well as monthly menstrual blood loss in the females.

In our study majority of the patients had moderate to severe anaemia (55.8%) followed by moderate anaemia (35.3%). Females were predominantly affected with severe anaemia. Many other studies have shown variable results based on the type of study population and whether they have included subclinical hypothyroid patients in their study or not. In Das et al, study mild anaemia (51.6%) was the most basic type of anaemia depending on severity among the hypothyroid patients, while moderate (25%) and severe (20%) anaemias were also seen.

In Peraka et al study the most common type depending on severity was found to be mild anaemia (372 patients out of 627 patients with anaemia - 59.34%), while moderate anaemia (249 patients out of 627 patients - 39.71%) and severe anaemia (6 patients out of 627 patients - 0.95%) were also seen.¹⁸ In contrast to the study by Das et al, they also tried to correlate the severity of anaemia with deficient levels in thyroid profile in the hypothyroid patients, Peraka et al observed that, the predominance of mild anaemia in overt hypothyroid patients was 20.33%, while in subclinical hypothyroid patients, it was 24.94%. The percentage of moderate anaemia was 13.55% and 16.7% in overt and subclinical hypothyroidism individually. Severe anaemia was additionally observed in subclinical hypothyroid patients with a prevalence of 0.4%. On the whole it was observed that mild, moderate and severe anaemias were more prevalent in subclinical hypothyroidism. In another study by Mehmet E et al, which was done in turkey, the anaemia recurrence in overt hypothyroidism was 43% while in subclinical hypothyroidism it was found to be 39%. In that review, it was presumed that the recurrence of anaemia in subclinical hypothyroidism can be as high as that in overt hypothyroidism.

Different types of anaemia may develop in the course of thyroid pathology. Thyroid hormones activate the proliferation of erythrocyte precursors both directly and through increase in erythropoietin production, whereas iron-deficiency anaemia negatively influences the activity of thyroid gland. The danger of anaemia in autoimmune thyroid disease (AITD) may be associated with pernicious anaemia and atrophic gastritis, autoimmune haemolytic syndrome, celiac disease or rheumatic disorders

Prevalence of anaemia and type of anaemia may vary between studies because many subjective factors are involved. Many studies have included subclinical thyroid patients, overt thyroid or a mixture of both. Though it has been shown that the prevalence of anaemia in subclinical hypothyroid cases is comparatively higher than normal population, It is always difficult to understand the real prevalence of anaemia in subclinical thyroid patients as they may have normal or marginally decreased hemoglobin levels at the time of testing and in the course of time they may develop overt hypothyroidism and severe anaemia which may bias the prevalence studies. Nevertheless, it is to

be observed that there is statistically significant difference in the prevalence of anaemia in hypothyroid patients when compared to normal healthy population, physicians should thoroughly investigate for hypothyroidism in anaemia cases.

CONCLUSIONS

Hypothyroidism and anaemia are fairly common conditions observed in the clinical practice. Both these conditions need to be corrected for the wellbeing of an individual. As hypothyroidism is one of the factors for causation of anaemia, it is necessary to evaluate anemic patients thoroughly especially when associated with thyroid abnormalities. The best practice may be screening for anaemia in all hypothyroid patients and vice versa, which will eventually help in correcting the underlying hypothyroidism and thus indirectly anaemia.

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