

A Study of the Types of Anaemia in Elderly Hypothyroidism

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ABSTRACT

BACKGROUND

Anaemia is a very frequently occurring disorder associated with hypothyroidism especially in the elderly age group. Both conditions have similar presentations and are often confused with the nonspecific symptoms of old age. Although there is abundant data regarding relationships between hypothyroidism and anaemia in the general population, studies on the association between anaemia in hypothyroidism in the elderly population and the types of anaemia associated with elderly hypothyroidism are limited. In view of these considerations the current study, conducted at Gauhati Medical College, Guwahati, Assam, aims to seek the morphological types of anaemia associated with elderly hypothyroid patients.

METHODS

In the study, a total of 125 hypothyroid patients aged 60 years and above attending the outpatient and inpatient ward of the Department of Medicine, GMCH were examined clinically and through necessary investigations and the morphological types of anaemia associated with hypothyroidism were determined.

RESULTS

It was found that out of 125 elderly hypothyroid patients, the most common morphological type of anaemia was found to be normocytic normochromic type (59.4%) followed by macrocytic anaemia (21.6%) and microcytic hypochromic anaemia (19%).

CONCLUSIONS

Normocytic normochromic anaemia is the most common morphological type of anaemia associated in elderly hypothyroid patients, followed by macrocytic anaemia and microcytic anaemia.

KEYWORDS

Hypothyroidism, Anaemia, Elderly

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BACKGROUND

One of the most common endocrine conditions all over the world is Hypothyroidism. It is the result of inadequate production of thyroid hormones or inadequate action of thyroid hormone in target tissues.¹ Hypothyroidism can arise from a number of diseases of the thyroid gland itself (termed as Primary Hypothyroidism), or from any disease of the pituitary gland or the hypothalamus (termed as Secondary Hypothyroidism). The thyroid gland secretes mainly two hormones, Thyroxine or T4 and Triiodothyronine or T3, both of which play a vital role in the metabolism, growth and development of the body.

These effects mediated by the thyroid hormones act on nearly every cell in the body. They act to increase the basal metabolic rate (BMR), affect protein synthesis, help regulate long bone growth (synergy with growth hormone) and neural maturation, and increase the body's sensitivity to catecholamines (such as adrenaline). The thyroid hormones are essential to proper development and differentiation of all cells of the human body. These hormones also help in regulation of protein, fat, carbohydrate and vitamin metabolism. Thus, hypothyroidism leads to slow metabolism and decreased growth and development of the body which has widespread effects on the body. Hypothyroidism first manifests biochemically as a rise in serum level of Thyroid Stimulating Hormone (TSH) associated with normal serum T3 and T4 concentrations (termed as subclinical hypothyroidism), later followed by a fall in serum T4, at which stage most patients have symptoms (termed as overt hypothyroidism). Patients with overt hypothyroidism manifest a broad spectrum of signs and symptoms ranging from mild symptoms at one end to myxedema coma at the other whereas patients with subclinical hypothyroidism have few or no signs and symptoms of hypothyroidism.

It has been found recently that some healthy older individuals may have serum TSH levels that exceed the upper limit of normal for the younger population making the diagnosis of subclinical hypothyroidism problematic in the elderly.² The prevalence of hypothyroidism differs from country to country, however according to recent Indian Literature, the overall prevalence of hypothyroidism was approximately 10.95% which rises to around 20% after the age of 60 years.^{3, 4} Anaemia is a very frequently occurring disorder associated with hypothyroidism with a prevalence ranging from 20-60% as suggested by various studies around the world.^{5, 6} Anaemia in hypothyroidism can result from numerous mechanisms some of which are bone marrow depression, decreased erythropoietin production or concomitant iron, vitamin B12 or folate deficiency. The symptoms and signs of anaemia are very similar to those of hypothyroidism. Hence there exists a problem in the diagnosis of both conditions which is especially difficult in the elderly population. The type of anaemia associated with hypothyroidism are mainly of three types, namely normocytic normochromic, macrocytic and microcytic hypochromic type of anaemia.⁷

Though there is no dearth of literature showing relationship between hypothyroidism and anaemia, only a few studies showing this relationship between hypothyroidism and anaemia have been reported in the elderly population. In view of these considerations the current study, conducted at Gauhati Medical College and Hospital was done to seek the types of anaemia in elderly hypothyroid patients.

METHODS

This is a hospital based, observational study, conducted at Gauhati Medical College and Hospital, Guwahati, during the period 1st June, 2018 to 31st May 2019. A total of 125 patients were included in the study. Data was collected by interviewing the patients, thorough clinical examination and through relevant investigations. In all patients a detailed hemogram including haemoglobin, Mean Corpuscular Volume (MCV) (normal range: 76 – 98 fL), Mean Corpuscular Haemoglobin (MCH) (normal range: 27 – 32 pg), Mean Corpuscular Haemoglobin Concentration (MCHC) (normal range: 32-36 g/dL), peripheral blood smear study, and reticulocyte count (normal Range: 2-2.5%) was done.

According to the World Health Organization (WHO) 2011 guidelines, anaemia is defined as haemoglobin (Hb) levels <12.0 g/dL in women and <13.0 g/dL in men.⁸

Inclusion Criteria

All patients of either sex of age 60 years and above diagnosed with hypothyroidism.

Exclusion Criteria

1. Patients with age below 60 years of age.
2. Patients with Chronic Kidney Disease.
3. Patients with Chronic Liver Disease.
4. Patients having Malignancy (Current or Past).
5. Patients on Chemotherapy and/or Radiotherapy (Current or Past).
6. Other systemic illness other than hypothyroidism.
7. Patients with secondary causes of hypothyroidism.

RESULTS

In this study, a total of one hundred and twenty five patients of the age of 60 years and above diagnosed with hypothyroidism were studied. Among the 125 elderly hypothyroid patients, majority were in the age group of 60-69 years (62.4%), 33 patients (26.4%) were in the age group 70-79 years, 11 patients (8.8%) were in the age group 80-89 years and 3 patients (2.4%) were in the age group 90 years and above. 33 (26.4%) were males and 92 (73.6%) were females. Among them 37 patients were detected to have anaemia. In these patients, the cut off level of haemoglobin was taken as <13 g/dL for males and <12 g/dL for female patients as per WHO guidelines, 2011.⁸ The

prevalence of the morphological types of anaemia in the study population was studied. Among the 37 anaemic hypothyroid patients, 22 (59.4%) were found to have normocytic normochromic anaemia, 8 (21.6%) had macrocytic anaemia and 7 (19%) had microcytic hypochromic anaemia.

Sl. No.	Age Group in Years	Number of Patients	%
1.	60-69	78	62.4%
2.	70-79	33	26.4%
3.	80-89	11	8.8%
4.	90 years and above	3	2.4%
5.	Total	125	100%

Table 1. Age Distribution

Gender	Number of Patients	%
Male	33	26.4%
Female	92	73.6%
Total	125	100%

Table 2. Gender Distribution

Type of Anaemia	Number of Patients	%
Normocytic Normochromic	22	59.4%
Macrocytic	8	21.6%
Microcytic Hypochromic	7	19%
Total	37	100%

Table 3. Morphological Types of Anaemia in the Study Population

DISCUSSION

In this study the prevalence of the various types of anaemia among the elderly hypothyroid population was observed with the most common anaemia being normocytic normochromic anaemia with a prevalence of 59.4% followed by macrocytic anaemia with a prevalence of 21.6% and lastly microcytic hypochromic anaemia with a prevalence of 19%. The findings were similar to the studies conducted by Horton et al (1976), Kazemi-Jahromi et al (2010). Horton et al (1976) in his study found that the most common anaemia in hypothyroidism was normocytic normochromic with a prevalence of 56.1% followed by macrocytic anaemia with a prevalence of 28.1% and lastly microcytic hypochromic anaemia with a prevalence of 15.8%.⁷ Kazemi-Jahromi et al (2010) in his study found that the most common anaemia in hypothyroidism was normocytic normochromic with a prevalence of 72.1%.⁹

Anaemia in hypothyroidism occurs as a physiological response to a decrease in oxygen requirement resulting in a decrease in erythropoietin levels.¹⁰ Diminution of erythropoietin levels in the absence of thyroid hormones leads to normocytic normochromic type of anaemia,¹¹ which was the most common type of anaemia found in this study. This is supported by the observation of Christ-Crain and colleagues who found that erythropoietin levels increased in subclinical hypothyroid patients as a result of levothyroxine treatment.¹² Vitamin B₁₂ and folic acid deficiency can occur in elderly hypothyroidism which leads to macrocytic type of anaemia. Vitamin B₁₂ deficiency in hypothyroidism can occur as a result of malabsorption due to pernicious anaemia, insufficient intake, decrease in intestinal motility, intestinal wall oedema and bacterial infiltration.¹³ Hypothyroidism also

causes folic acid deficiency by decreasing the hepatic level of dihydrofolate reductase.¹⁴ It can be a result of decreased intestinal absorption. It was found from this study that macrocytic anaemia was the second most common type of anaemia found among elderly hypothyroid patients with a prevalence of 21.6%.

The third type of anaemia seen in elderly hypothyroidism is microcytic anaemia which is the least common type of anaemia among elderly hypothyroid patients with a prevalence of 19% as found in this study. It most often occurs due to iron deficiency. In a study by Cinemre H and colleagues, it was shown that efficacy and absorption of oral iron treatment in women with subclinical hypothyroidism improved after levothyroxine replacement.¹⁵

Thus, from this study we have inferred that the most common type of anaemia in hypothyroidism is normocytic normochromic type, which can be attributed to low erythropoietin levels. The other types of anaemia namely macrocytic anaemia and microcytic hypochromic anaemia can be attributed to folate deficiency, vitamin B₁₂ deficiency and iron deficiency respectively.

CONCLUSIONS

Hypothyroidism is a common problem in the elderly age group. More often than not, anaemia which is frequently associated with it remains underdiagnosed. Various studies were conducted across the world to study the association of anaemia with hypothyroidism. The current study has attempted to determine the morphological types of anaemia in the elderly hypothyroid patients in this part of the country. The results and observations that were made in this study were comparable to the observations by previous workers. It was found from the study that the most prevalent morphological type of anaemia was normocytic normochromic anaemia. The second most common type of anaemia was macrocytic anaemia followed by microcytic hypochromic anaemia. The present study was conducted on a limited number of patients over a short period of time. Hence, a population-based study with a larger population and longer period of study is warranted, which will provide more information on the current topic. Signs and symptoms of hypothyroidism are also found in patients with anaemia. Hence achievement of a euthyroid state in an elderly hypothyroid patient may not completely alleviate symptoms of hypothyroidism if the patient also has concomitant uncorrected anaemia. Therefore, all patients above 60 years with hypothyroidism should have a thorough check up for evaluation of the cause of anaemia and corrected promptly.

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