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The Correlation of Thyroid Diseases with Anemia among Iraqi Patients

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Abstract
Objective To assess the relation between types of thyroid diseases with types of anemia.
Methods This prospective study of 123 cases of patients with different thyroid goiters. The blood samples were collected and complete blood count was done for them, each patient with low PCV (<35%) the blood film was done for them to classify the type of anemia. Surgical operation thyroidectomy, paraffin block and hematoxylin and eosin stain was performed, the slides assess and read by pathologist to classify the thyroid goiter to (thyroiditis, thyroid tumor, multinodular goiter) other the causes of anemia are excluded by history like (vaginal bleeding, gastric bleeding, hemorrhoid).
Results Among 123 patients, 84 patients with thyroid diseases without anemia, 39 patients with thyroid diseases had anemia, 21 patients with thyroid diseases had iron deficiency anemia, 18 patients with thyroid diseases had anemia of chronic diseases.
Conclusion Most common type of anaemia in different thyroid diseases is iron deficiency anaemia (IDA), the common age group of anaemia and thyroid diseases is middle age (40–49) years. The female incidence of anemia and thyroid diseases is more in female than male and the multinodular goiter (MNG) is the common thyroid diseases.
Key words Multinodular goiter, Hashimoto thyroiditis, thyroid function test, complete blood count, serum ferritin.

Introduction

Both anemia and thyroid dysfunction are common disorders.[1–2] The peak incidence of anemia is around 10% in the female in child bearing age and elderly.[3,4] In the case of iron deficiency, the positive effect of iodine supplementation on thyroid function abolished.[5] Iron deficiency anemia in women may be become worse by hypermenorrhea or menorrhagia, which are some of clinical manifestations of thyroid hormone deficiency.[6] An important hematological parameter affected by thyroid hormone status and iron deficiency is red blood cell distribution width (RDW), which appears the degree of erythrocyte anisocytosis.[7] Together hyperthyroidism and hypothyroidism were associated with significantly lower mean corpuscular volume (MCV), mean cell hemoglobin, mean corpuscular hemoglobin concentration, and hemoglobin and hematocrit levels, but higher RDW, as compared with euthyroid controls.[8] They found that patients with HT presented with higher RDW values as compared with controls. Thus, the authors observed that increased RDW in patients without iron deficiency needs to assess the thyroid status, particularly in the female patients. Microcytic anemia has been more associated with hyperthyroidism than with other thyroid function states. MCV was lower in hyperthyroidism patients as compared with euthyroid controls.[9,10] There is a connection between thyroid disease and anemia because of a few reasons.[11] All anemia types occur because of autoimmune diseases. Pernicious anemia is another type that happens when the thyroid is underactive. Furthermore, patient with this type of anemia may also have Hashimoto's thyroiditis, which is causing hypothyroidism, also.[12] Statistics show that 1 out of 10 patients who have hypothyroidism and Hashimoto will have pernicious anemia. Additionally, in pernicious anemia, the stomach struggles to absorb any food that has B12 in it.[13] Microcytic anemia is another type of blood anemia. This usually happens when someone is not able to absorb iron into the body.[14] Another blood problem is macrocytic anemia. Absorption of folic acid and vitamin B12 do not happen when an individual has this type of anemia, leading to malnourished symptoms with signs of unhealthy weight loss.[15] With patients who already have thyroid disease. Normocytic anemia has more to do with the metabolism not working, as it should. Erythropoietin levels drop causing normocytic anemia time after time in humans.[16] The aim of study is to assess the relation between types of thyroid diseases with types of anemia.

Method

This study is prospective of 123 patients where admitted in AL-Hilla teaching hospital between July 2019 to February 2020 age group of patients extend from 20 to more than 60 years and planned into five groups 20–29, 30–39, 40–49, 50–59, >60 years old, clinical and laboratory investigations for admitted one sample of blood was taken, put in EDTA tube, then the complete blood count (CBC) by hematological autoanalyzer and blood film were investigated to all patient. Histopathological study was done for all patients including (formalin fixation, processing by alcohol and xylene, wax block sectioning and staining of slide by Hematoxylin (H) and Eosin (E). CBC assay were measured by mindary five differential hematological autoanalyzer. Anemia were arrange into two groups according to blood film study by hematologist: 1-IDA, 2- Anemia of chronic disease. Thyroid diseases arrange into three groups: 1- (MNG), 2- Thyroid tumor, 3- Thyroiditis. Statistical analysis was carried out using SPSS version 21. Categorical variables were presented as frequencies and percentages. Continuous variables were presented as (Mean ± SD). Pearson's chi square (χ^2) and Fisher-exact tests were used to find the association between categorical variables. A *P*-value of ≤ 0.05 was considered as significant.

Results

Figure 1 shows the distribution of patients according to age. Highest percentage (42.3%) of patients presented with age group (40–49 years). Mean age of patients was (42.93 ± 8.59), range was (21–67) years.

Figure 2 shows the distribution of patients according to gender. Highest percentage (85.4%) of patients was female.

Figure 3 shows the distribution of patients according to type of thyroid disease. Highest percentage (67.5%) of patients presented with multi-nodular goiter.

Table 1 shows the distribution of patients according to history and type of anemia. The percentage of anemia among patients with thyroid diseases was (31.7%).

Table 2 shows the association between types of thyroid diseases including (multi-nodular goiter, thyroid tumor and thyroiditis) and study variables including (age, gender, history of anemia and type of anemia). There was significant association between type of thyroid diseases and age and gender of patients.

Table 3 shows the association between history of anemia and study variables including (age and gender). There was no significant association between history of anemia and age and gender of patients.

Table 4 shows the association between type of anemia and study variables including (age and gender). There was no significant association between type of anemia and age and gender of patients.

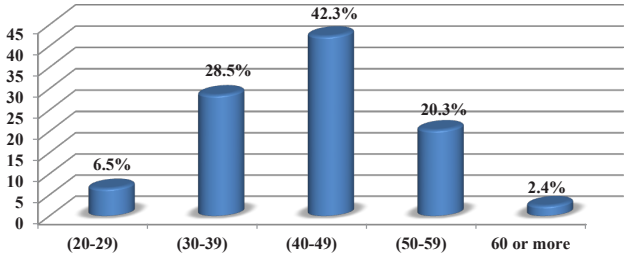

Fig. 1 **Distribution of patients according to age.**

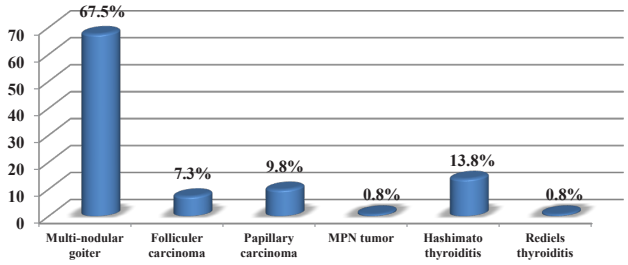

Fig. 2 **Distribution of patients according to gender.**

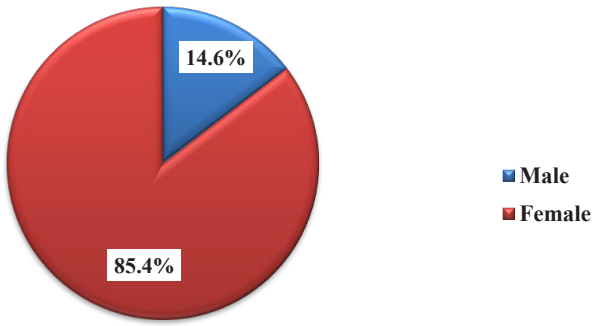

Fig. 3 **Distribution of patients according to type of thyroid disease.**

Table 1. **Distribution of patients according to history and type of anemia**

Study variables	Number	%
History of anemia		
Present	39	31.7%
Absent	84	68.3%
Total	123	100.0%
Type of anemia		
Iron deficiency anemia	21	53.8%
Anemia of chronic diseases	18	46.2%
Total	39	100.0%

Table 2. **Association between type of thyroid diseases and study variables**

Study variables	Type of thyroid diseases			χ^2	*P*-value
	MNG	Thyroid tumor	Thyroiditis		
Age (years)					
20–29	0 (0.0)	3 (13.6)	5 (27.8)		
30–39	28 (33.7)	3 (13.6)	4 (22.2)		
40–49	36 (43.4)	11 (50.0)	5 (27.8)		<0.001* f
50–59	18 (21.7)	3 (13.6)	4 (22.2)		
60 or more	1 (1.2)	2 (9.1)	0 (0.0)		
Total	83 (100.0)	22 (100.0)	18 (100.0)		
Gender					
Male	12 (14.5)	6 (27.3)	0 (0.0)		0.038* f
Female	71 (85.5)	16 (72.7)	18 (100.0)		
Total	83 (100.0)	22 (100.0)	18 (100.0)		
History of anaemia					
Present	29 (34.9)	8 (36.4)	2 (11.1)	4.147	0.126
Absent	54 (65.1)	14 (63.6)	16 (88.9)		
Total	83 (100.0)	22 (100.0)	18 (100.0)		
Type of anaemia					
Iron deficiency anaemia	18 (62.1)	1 (12.5)	2 (100.0)		0.01* f
Anaemia of chronic diseases	11 (37.9)	7 (87.5)	0 (0.0)		
Total	29 (100.0)	8 (100.0)	2 (100.0)		

*P value ≤ 0.05 was significant. f, Fisher-exact test.

Table 3. **Association between history of anemia and age and gender of patients**

Study variables	History of anemia		χ^2	*P*-value
	Present	Absent		
Age (years)				
20–29	4 (10.3)	4 (4.8)		
30–39	11 (28.2)	24 (28.6)		
40–49	13 (33.3)	39 (46.4)		0.473 f
50–59	10 (25.6)	15 (17.9)		
60 or more	1 (2.6)	2 (2.4)		
Total	39 (100.0)	84 (100.0)		
Gender				
Male	5 (12.8)	13 (15.5)	0.15	0.698
Female	34 (87.2)	71 (84.5)		
Total	39 (100.0)	84 (100.0)		

*P value ≤ 0.05 was significant. f, Fisher-exact test.

Table 4. **Association between type of anemia and age and gender of patients**

Study variables	Type of anemia		*P*-value
	Iron deficiency anemia	Anemia of chronic diseases	
Age (years)			
20–29	2 (9.5)	2 (11.1)	
30–39	9 (42.9)	2 (11.1)	
40–49	5 (23.8)	8 (44.4)	0.145 f
50–59	4 (19.0)	6 (33.4)	
60 or more	1 (4.8)	0 (0.0)	
Total	21 (100.0)	18 (100.0)	
Gender			
Male	3 (14.3)	2 (11.1)	
Female	18 (85.7)	16 (88.9)	1.000 f
Total	21 (100.0)	18 (100.0)	

*P value ≤ 0.05 was significant. f, Fisher-exact test.

Discussion

In the present study, the percent of patients with thyroid disorders and anemia are 31.7% the (Omar et al.) result is 22.3%,[17] while the study of Erdogan is 39%,[18] this different in the number of cases may be due to the variability in sample sizes. In current study the iron defiance anemia is the first one 53% and this is different from study by Das et al,[19] where the iron deficiency anemia is second one following normochromic normocytic anemia 43.3% while in our study the anemia of chronic disease is second one and this is may be due to geographic distribution between two studies. In present study, the peak of incidence of iron deficiency anemia is 30–39 years in female and this may be due to childbearing age in association with thyroid disease while the second age group is 50–59 years and this is may be due to gynecological disorder in association with thyroid disease. While in anemia of chronic disease the most common age group is 40–49 years and this my opinion due to present long-term thyroid diseases. In present, study the correlation between different age group and the type of thyroid disease with type of anemia. We find the first one is age-group between 40–49 years in multinodular goiter with iron deficiency anemia while the second type of thyroid diseases is thyroid tumor is also in 40–49 years with iron deficiency anemia, My opinion this due to incidence of thyroid tumor specially common papillary and follicular carcinoma in this age group with iron deficiency anemia. In present study the thyroid diseases and IDA is more in female than male 105:18 and this may due to increased incidence of thyroid diseases and anemia in female than male, specially MNG and association with gynecological disorder leading to bleeding.

Conclusion

Most common type of anaemia in different thyroid diseases is iron deficiency anaemia (IDA), the common age group of anaemia and thyroid diseases is middle age (40–49) years. The female incidence of anemia and thyroid diseases is more in female than male and the multinodular goiter (MNG) is the common thyroid diseases. ■

References

1. den Elzen WP, de Craen AJ Mooijaart SP, Gussekloo J. Low thyroid function and anemia in old age: the Leiden 85-plus study. J Am Geriatr Soc.2015; 63: 407-409.
2. Vitale G, Fatti LM, Prolo S, et al. screening for hypothyroidism in older hospitalized patients with anemia: a new insight into an old disease. J Am Geriatr Soc. 2010; 58: 1825-1827.
3. Konduracka E, Gajos G. Clinical characteristics of elderly patients with heart failure: what else do we need to know? Pol Arch Med Wewn. 2016; 126: 463-464.
4. Taylor S, Rampton D. Treatment of iron deficiency anemia: practical considerations. Pol Arch Med Wewn. 2015; 125: 452-460.

5. Zimmermann MB, J. The impact of iron and selenium deficiencies on iodine and thyroid metabolism: biochemistry and relevance to public health. Thyroid. 2002; 12: 867-878.
6. Potaczek DP, Jankowska EA, Wypasek E, Undas A. Iron deficiency: a novel risk factor of recurrence in patients after unprovoked venous thromboembolism. Pol Arch Med Wewn. 2016; 126: 159-165.
7. Aktas G, Sit M, Dikbas O, et al. Could red blood cell distribution width be a marker in Hashimoto's thyroiditis? Exp Clin Endocrinol Diabetes. 2014; 122: 572-574.
8. Dorgalaleh A, Mahmoodi M, Varmaghani B, et al. Effect of thyroid dysfunctions on blood cell count and red blood indice. Iran J Ped Hematol Oncol. 2013; 3: 73-77.
9. Lippi G, Montagnana M, Salvagno GL, Guidi GC. Should women with abnormal serum thyroid stimulating hormone undergo screening for anemia? Arch Pathol Lab Med. 2008; 132: 321-322.
10. Jafarzadeh A, Poorgholami M, Izadi N, et al. Immunological and hematological changes in patients with hyperthyroidism or hypothyroidism. Clin Invest Med. 2010; 33: E271-279.
11. Nekrasova TA, Strongin LG, Ledentsova OV. [Hematological disturbances in subclinical hypothyroidism and their dynamics during substitution therapy]. Klin Med (Mosk). 2013; 91: 29-33. Russian.
12. Wang YP, Lin HP, Chen HM, et al. Hemoglobin, iron, and vitamin B12 deficiencies and high blood homocysteine levels in patients with anti-thyroid autoantibodies. J Formos Med Assoc. 2014; 113: 155-160.
13. Collins AB, Pawlak R. Prevalence of vitamin B-12 deficiency among patients with thyroid dysfunction. Asia Pac J Clin Nutr. 2016; 25: 221-226.
14. Khatiwada S, Gelal B, Baral N, Lamsal M. Association between iron status and thyroid function in Nepalese children. Thyroid Res. 2016; 9: 2.
15. Caplan RH, Davis K, Bengston B, Smith MJ. Serum folate and vitamin B12 levels in hypothyroid and hyperthyroid patients. Arch Intem Med. 1975; 135: 701-704.
16. Dominguez Ruiz de Leon P, Morcillo Cebolla V, Gutierrez Parres B, et al. [Macrocytosis without anaemia in an urban population]. Aten Primaria. 2011; 43: 183-189. Spanish.
17. Omar S, Hadj Taeib S, Kanoun F, et al. [Erythrocyte abnormalities in thyroid dysfunction]. Tunis Med. 2010; 88: 783-788. French.
18. Erdogan M, Kosenli A, Ganidagli S, Kulaksizoglu M. Characteristics of anemia in subclinical and overt hypothyroid patients. Endocr J. 2012; 59: 213-220.
19. Das KC, Mukherjee M, Sarkar TK, et al. Erythropoiesis and erythropoietin in hypo- and hyperthyroidism. J Clin Endocrinol Metab. 1975; 40: 211-220.