

THE ROLE OF THYROID HORMONES IN THE DEVELOPMENT AND COURSE OF IRON DEFICIENCY ANEMIA

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Abstract. Iron deficiency anemia (IDA) is one of the most prevalent hematological disorders worldwide and is often associated with endocrine diseases, particularly hypothyroidism. Thyroid hormones play a significant role in regulating erythropoiesis, iron metabolism, and overall metabolic activity. Their deficiency can alter the development, progression, and severity of anemia. This review aims to analyze the role of thyroid hormones in the pathogenesis and clinical course of iron deficiency anemia. Special attention is given to the mechanisms linking thyroid dysfunction with impaired iron absorption and utilization. Understanding these interactions is essential for improving diagnostic accuracy and optimizing treatment strategies.

Keywords: Iron deficiency anemia; hypothyroidism; thyroid hormones; iron metabolism; erythropoiesis; comorbidity

Introduction. Iron deficiency anemia (IDA) is a common condition characterized by reduced hemoglobin levels due to insufficient iron availability

for red blood cell production [1]. It is especially prevalent among women and patients with chronic conditions. Thyroid hormones are essential regulators of metabolism and have a significant impact on hematopoiesis. Hypothyroidism, defined as a deficiency of thyroid hormones, is frequently associated with various forms of anemia, including iron deficiency anemia [2].

The interaction between thyroid dysfunction and anemia is complex and involves multiple physiological pathways. Understanding this relationship is important for accurate diagnosis and effective treatment.

Role of thyroid hormones in erythropoiesis. Thyroid hormones stimulate erythropoiesis by increasing erythropoietin production and enhancing the proliferation of erythroid progenitor cells in the bone marrow [3].

In hypothyroidism, reduced levels of thyroid hormones lead to: decreased erythropoietin secretion, suppressed bone marrow activity, reduced red blood cell production.

As a result, anemia develops or becomes more severe.

Influence on iron metabolism. Thyroid hormones play a key role in iron metabolism by regulating its absorption, transport, and utilization.

In hypothyroidism: Gastric acid secretion decreases, impairing iron absorption, intestinal motility slows down, iron bioavailability is reduced.

Additionally, altered expression of hepcidin, a key regulator of iron metabolism, may further limit iron availability [4].

Pathophysiological Mechanisms

The development of iron deficiency anemia in hypothyroidism is multifactorial.

Key mechanisms include: impaired iron absorption, reduced erythropoietin production, chronic inflammation, altered iron transport and storage, these

factors contribute to a more persistent and treatment-resistant form of anemia [5].

Clinical Features. Patients with coexisting hypothyroidism and IDA present with combined symptoms of both conditions: fatigue and weakness, pallor, cold intolerance, weight gain, hair loss. The overlap of symptoms may complicate diagnosis and delay treatment [6].

Diagnostic Considerations. Diagnosis requires evaluation of both hematological and endocrine parameters:

Hemoglobin and red blood cell indices

Serum ferritin and iron levels

Thyroid function tests (TSH, free T4)

Low ferritin confirms iron deficiency, while elevated TSH indicates hypothyroidism [7]. A comprehensive approach is necessary to avoid misdiagnosis.

Treatment Approaches

Effective treatment requires addressing both iron deficiency and thyroid dysfunction.

Iron Therapy. Oral iron supplementation is commonly used but may be less effective due to impaired absorption.

Thyroid Hormone Replacement. Levothyroxine therapy restores thyroid hormone levels and improves erythropoiesis [2,8].

Combined therapy is more effective than treating either condition alone.

Evaluation of Treatment Effectiveness. Treatment effectiveness is assessed by: increase in hemoglobin levels, improvement in symptoms, normalization of iron

stores. Patients receiving combined therapy show faster recovery and better outcomes [9,10].

Discussion. The relationship between thyroid hormones and iron metabolism highlights the importance of an integrated clinical approach. Hypothyroidism significantly alters iron homeostasis and erythropoiesis, leading to more severe anemia. Failure to recognize this interaction may result in inadequate treatment and persistent symptoms.

Conclusion. Thyroid hormones play a crucial role in the development and progression of iron deficiency anemia. Their deficiency leads to impaired erythropoiesis and altered iron metabolism. Early diagnosis and combined treatment strategies are essential for improving patient outcomes.

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