LATENT IRON DEFICIENCY IN WOMEN OF REPRODUCTIVE AGE: EARLY DIAGNOSIS, CLINICAL CONSEQUENCES, AND IMPACT ON QUALITY OF LIFE

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ABSTRACT. Latent iron deficiency is a common condition among women of reproductive age and may develop before the appearance of iron-deficiency anemia. During this stage, iron stores are reduced while hemoglobin levels may remain within the normal range. Menstrual blood loss, increased iron requirements during pregnancy, inadequate dietary intake, and chronic blood loss are important risk factors. Early identification is important because iron deficiency may be associated with fatigue, weakness, reduced physical performance, impaired concentration, and decreased quality of life even before anemia develops. This article examines the importance of early diagnosis of latent iron deficiency, its clinical consequences, and its potential impact on quality of life in women of reproductive age. Particular attention is given to serum ferritin, transferrin saturation, and complete blood count as diagnostic indicators. Early recognition of iron depletion and identification of its underlying cause may help prevent progression to iron-deficiency anemia and improve women's health.

Keywords: iron deficiency, latent iron deficiency, reproductive age, ferritin, hemoglobin, anemia, early diagnosis, quality of life.

INTRODUCTION

Iron is an essential micronutrient required for hemoglobin synthesis, oxygen transport, energy metabolism, and numerous enzymatic processes. Women of reproductive age have an increased risk of iron deficiency because of regular menstrual blood loss, pregnancy, increased physiological iron requirements, and, in some cases, inadequate dietary intake or chronic blood loss. Iron deficiency usually develops gradually, beginning with depletion of iron stores before significant changes in hemoglobin occur. Therefore, a woman may have normal hemoglobin levels while already having reduced iron reserves. This early stage is often referred to as latent or non-anemic iron deficiency. Clinical manifestations may be nonspecific and can include fatigue, weakness, headaches, reduced concentration, decreased exercise tolerance, and impaired general well-being. Because these symptoms can be attributed to stress, insufficient sleep, or other conditions, early diagnosis may be delayed. Serum ferritin is an important laboratory marker of iron stores, although its interpretation may be affected by inflammation and other clinical conditions. The aim of this article is to examine the role of early diagnosis of latent iron deficiency, its clinical consequences, and its impact on the quality of life of women of reproductive age.

METHODS

A narrative review of scientific literature and clinical recommendations concerning iron deficiency in women of reproductive age was conducted. Publications addressing iron metabolism, laboratory diagnosis, clinical manifestations, and consequences of iron deficiency were analyzed. Particular attention was given to serum ferritin, transferrin saturation, hemoglobin, mean corpuscular volume, and mean corpuscular hemoglobin as laboratory indicators. Major risk factors, including heavy menstrual bleeding, pregnancy, inadequate dietary iron intake, impaired intestinal absorption, and chronic blood loss, were also considered. The relationship between iron deficiency and symptoms such as fatigue, reduced physical capacity, impaired concentration, and decreased quality of life was evaluated. The collected information was summarized to determine the clinical importance of detecting iron deficiency before the development of anemia.

RESULTS

The analysis showed that iron deficiency may occur before a significant reduction in hemoglobin. Serum ferritin is particularly useful for assessing iron stores, while transferrin saturation and red blood cell indices provide additional information about iron availability and erythropoiesis. As iron deficiency progresses, microcytosis, hypochromia, and reduced hemoglobin may develop. Women with depleted iron stores may experience fatigue, weakness, reduced exercise tolerance, headaches, difficulty concentrating, and decreased work capacity even in the absence of established anemia. These symptoms can negatively affect daily activities and overall quality of life. Early laboratory assessment is particularly relevant for women with heavy menstrual bleeding, pregnancy, previous anemia, inadequate dietary iron intake, or other potential sources of chronic blood loss.

Table 1. Main indicators of iron deficiency

Indicator	Clinical significance
Hemoglobin	Detects anemia
Serum ferritin	Reflects iron stores
Transferrin saturation	Assesses available iron
MCV/MCH	Evaluates red blood cell characteristics

The findings indicate that relying only on hemoglobin may fail to identify early iron depletion. Ferritin should therefore be considered together with clinical findings and other laboratory parameters. Because ferritin can increase during inflammation, its interpretation requires appropriate clinical context.

DISCUSSION

The results demonstrate that latent iron deficiency is clinically relevant even when anemia has not yet developed. The nonspecific nature of early symptoms may contribute to delayed diagnosis, particularly when fatigue or reduced concentration is attributed to lifestyle factors. In women of reproductive age, heavy menstrual bleeding is an important potential source of iron loss, while pregnancy increases physiological iron requirements. If iron deficiency persists, it may progress to iron-deficiency anemia, which can further impair physical capacity, cognitive functioning, and general well-being. Therefore, identifying depleted iron stores at an early stage may be important for preventing progression and addressing the underlying cause. Ferritin is a valuable marker for this purpose, but it should not be interpreted independently because inflammatory conditions can increase ferritin concentrations. A comprehensive assessment including medical history, complete blood count, ferritin, and other iron parameters can provide a more accurate evaluation of iron status. Early identification is particularly important in women with recurrent menstrual blood loss, pregnancy, previous iron deficiency, or other risk factors.

CONCLUSION

Latent iron deficiency is an important health problem among women of reproductive age and may occur before the development of anemia. Normal hemoglobin does not necessarily indicate adequate iron stores, making ferritin and other iron-related parameters important for early detection. Persistent iron deficiency may contribute to fatigue, reduced physical performance, impaired concentration, and decreased quality of life and may eventually progress to iron-deficiency anemia. Early identification of risk factors, appropriate laboratory assessment, and management of the underlying cause are therefore important components of prevention. A comprehensive approach to iron status assessment can help identify iron depletion at an earlier stage and support better health outcomes in women of reproductive age.

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