THE ROLE OF IRON DEFICIENCY AND SERUM FERRITIN IN THE DEVELOPMENT OF GINGIVITIS DURING PREGNANCY

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Abstract: This thesis analyzes the relationship between iron-deficiency conditions and the development of gingivitis in pregnant women, as well as the diagnostic and prognostic significance of serum ferritin levels. During pregnancy, increased iron requirements, depletion of iron stores, and changes in hematological parameters may affect inflammatory processes in the oral mucosa and periodontal tissues. Ferritin is an important laboratory marker for assessing the body's iron stores. However, because it also behaves as an acute-phase reactant during inflammation, its results require comprehensive interpretation. Assessing ferritin together with hemoglobin, transferrin saturation, and C-reactive protein may improve the early detection of iron deficiency and the evaluation of gingivitis risk in pregnant women.
Keywords: pregnancy, gingivitis, iron deficiency, ferritin, iron-deficiency anemia, transferrin saturation, C-reactive protein, periodontal tissues.

Introduction

Hormonal, metabolic, and immunological changes occurring in a woman's body during pregnancy significantly affect the physiological condition of oral tissues. In particular, increased levels of estrogen and progesterone may intensify the inflammatory response of gingival tissues to microbial biofilm. Consequently, pregnancy-associated gingivitis may develop, manifesting clinically as gingival swelling, redness, and bleeding on probing.

The physiological increase in iron requirements during pregnancy may lead to depletion of the body's iron stores. Iron deficiency may develop at an early stage even while hemoglobin levels remain within the reference range. Therefore, measuring serum ferritin is important for identifying the initial stages of iron deficiency.

Although ferritin is one of the principal laboratory indicators reflecting iron stores, its concentration may also increase during inflammatory processes. Accordingly, ferritin should not be interpreted in isolation but should be analyzed alongside other hematological and inflammatory markers.

Aim of the study

To analyze, on the basis of the scientific literature, the relationship between iron-deficiency conditions and the clinical course of gingivitis in pregnant women, and to identify the potential diagnostic and prognostic significance of serum ferritin.

Materials and methods

In accordance with the aim of the study, scientific literature, dissertation research, and international clinical recommendations concerning iron-deficiency anemia, periodontal diseases during pregnancy, ferritin metabolism, and oral health were reviewed.

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The analysis included World Health Organization recommendations for the assessment of ferritin and hemoglobin, clinical studies investigating the relationship between iron deficiency and oral diseases in pregnant women, and research on the mechanisms of periodontal inflammation.

The importance of hemoglobin, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), red cell distribution width (RDW), ferritin, transferrin saturation (TSAT), and C-reactive protein (CRP) was considered in the comprehensive assessment of iron status.

Results and discussion

The analysis of the scientific literature indicates a possible association between iron deficiency and inflammatory processes in periodontal tissues. In particular, a study by Slavinsky reported that, among patients with chronic catarrhal gingivitis and iron-deficiency anemia, the PMA index was 29.1% higher and the papillary bleeding index (PBI) was 49.7% higher than in comparable patients without anemia. Reduced neutrophil myeloperoxidase and NADPH oxidase activity was also reported. However, these findings were obtained in a non-pregnant population and therefore cannot be directly extrapolated to all pregnant women.

In a study by Denisenko et al., oral disorders, including periodontal and mucosal lesions, were observed more frequently in pregnant women with iron-deficiency anemia. These findings indicate the clinical relevance of iron deficiency to oral health during pregnancy; however, they do not establish an independent effect of ferritin on gingivitis severity.

The diagnostic value of ferritin is primarily associated with its ability to identify depletion of iron stores before hemoglobin levels decline. Nevertheless, ferritin concentrations may appear normal or elevated during inflammatory processes. For this reason, ferritin should be interpreted together with CRP and transferrin saturation.

The trimester of pregnancy is also an important factor in interpreting laboratory parameters. According to the WHO's 2024 recommendations, the hemoglobin thresholds for anemia are below 110 g/L in the first trimester, below 105 g/L in the second trimester, and below 110 g/L in the third trimester. These thresholds are used to define anemia and do not independently confirm iron deficiency.

From this perspective, it is appropriate to study iron status in pregnant women across three principal groups: women with likely adequate iron stores, women with iron deficiency without anemia, and women with iron-deficiency anemia.

The clinical course of gingivitis can be assessed using bleeding on probing (BOP), the Silness–Löe plaque index, the Löe–Silness gingival index, and the Simplified Oral Hygiene Index (OHI-S). Consideration of local microbial biofilm burden, pregnancy trimester, and inflammatory markers is important when determining the independent prognostic value of ferritin.

Current scientific evidence has not yet established ferritin as a validated independent biomarker for predicting pregnancy-associated gingivitis. Nevertheless, studying ferritin together with hematological and clinical parameters represents a promising research direction for improving individualized dental risk assessment.

Conclusion

1. Iron-deficiency conditions during pregnancy may be associated with inflammatory processes in the oral cavity and periodontal tissues. Therefore, it is important to integrate dental examinations of pregnant women with an assessment of their general hematological status.

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2. Serum ferritin is an important diagnostic indicator of iron stores and may help identify iron deficiency before the development of anemia. However, because its concentration may change during inflammatory processes, ferritin should be assessed together with hemoglobin, transferrin saturation, and CRP.

3. The role of ferritin as an independent prognostic marker for pregnancy-associated gingivitis has not been sufficiently established. Prospective clinical studies accounting for pregnancy trimester, oral hygiene, microbial biofilm, and inflammatory markers are required to determine its clinical significance.

4. Including ferritin in a comprehensive laboratory and clinical assessment may expand opportunities for the early detection of iron deficiency and individualized evaluation of gingivitis risk in pregnant women.

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