
**VITAMIN D, SELENIUM, AND CHRONIC INFLAMMATION AS
KEY MODULATORS OF EARLY PREGNANCY NAUSEA AND
VOMITING**

Kayumova D. T.

Fayzullakhojayeva A. O.

Tashkent State Medical University;

City Maternity Complex No. 3, Tashkent, Uzbekistan

Rakhimova Sh. M.

Kimyo International University in Tashkent, Tashkent, Uzbekistan

Abstract

This article analyzes the interrelated pathogenetic mechanisms of nausea and vomiting of pregnancy, particularly hyperemesis gravidarum (HG), with emphasis on chronic inflammation, oxidative stress, and micronutrient deficiencies, including vitamin D and selenium. Early gestational maladaptation is associated with activation of systemic inflammatory responses, which may be reflected by changes in hematological inflammatory indices such as NLR, PLR, SII, and PIV. These processes may contribute to trophoblastic dysfunction, impaired placental signaling, and neuroendocrine dysregulation. Selenium deficiency may reduce the activity of antioxidant selenoproteins and interfere with thyroid hormone metabolism, whereas vitamin D deficiency may enhance pro-inflammatory responses. Reduced nutritional intake caused by severe nausea and vomiting can further aggravate micronutrient deficiencies, creating a vicious cycle that contributes to the progression of clinical manifestations. The study emphasizes the potential importance of comprehensive assessment of inflammatory markers and micronutrient status in pregnant women with severe nausea and vomiting.

Keywords: Hyperemesis gravidarum; nausea and vomiting of pregnancy; vitamin D; selenium; chronic inflammation; NLR; PLR; SII; PIV; oxidative stress; placental dysfunction.



Introduction

Nausea and vomiting of pregnancy is one of the most common conditions during early gestation. Symptoms usually begin during the first trimester and gradually decrease by the second trimester. In severe cases, the condition may progress to hyperemesis gravidarum, accompanied by dehydration, electrolyte disturbances, inadequate nutritional intake, weight loss, and the need for hospitalization.

The pathogenesis of nausea and vomiting of pregnancy remains incompletely understood. Several mechanisms have been proposed, including hormonal changes, particularly alterations in human chorionic gonadotropin and thyroid hormones, immune-inflammatory mechanisms, gastrointestinal dysfunction, *Helicobacter pylori* infection, micronutrient deficiencies, metabolic disturbances, endocrine and autonomic dysfunction, and genetic predisposition.

Current evidence suggests that these mechanisms are closely interconnected and may form a complex pathogenetic cascade. Among the factors potentially contributing to the severity of HG, systemic inflammation, oxidative stress, and deficiencies of essential micronutrients such as vitamin D and selenium have received increasing attention.

Main part

Systemic inflammation is considered one of the important mechanisms potentially involved in the development and severity of HG. Increased levels of pro-inflammatory cytokines, including interleukin-6 and tumor necrosis factor-alpha, have been reported in women with HG. Changes in hematological parameters, including NLR, PLR, SII, and PIV, may additionally reflect systemic inflammatory activity.

The systemic immune-inflammation index (SII) is calculated as $(\text{platelet count} \times \text{neutrophil count}) / \text{lymphocyte count}$, while the pan-immune-inflammation value (PIV) is calculated as $(\text{neutrophil count} \times \text{platelet count} \times \text{monocyte count}) / \text{lymphocyte count}$. These indices are based on routinely available complete blood count parameters and may provide accessible additional information regarding inflammatory status.

Selenium is an essential trace element involved in the synthesis of selenoproteins, including glutathione peroxidases, thioredoxin reductases,

and iodothyronine deiodinases. These enzymes participate in antioxidant defense, redox homeostasis, and thyroid hormone metabolism. Selenium deficiency may therefore increase oxidative stress and potentially impair trophoblastic and placental function.

Vitamin D also has important immunomodulatory functions. Its deficiency may be associated with enhanced pro-inflammatory responses and altered regulation of cytokine production. Preliminary studies have reported lower vitamin D levels in women with HG, while genetic epidemiological studies have suggested a possible causal relationship between vitamin D status and the risk of HG.

An important feature of the proposed pathogenetic mechanism is the interaction between severe vomiting, nutritional deficiency, inflammation, and oxidative stress. Progressive reduction in food intake may decrease the supply of vitamin D, selenium, and other essential nutrients. This can weaken antioxidant defense and potentially intensify inflammatory processes. Thus, a vicious cycle may develop:

Hyperemesis gravidarum → reduced nutritional intake → micronutrient deficiency → increased inflammation and oxidative stress → placental and neuroendocrine dysfunction → worsening of nausea and vomiting. Digital and laboratory biomarkers that can be obtained through routine clinical assessment may be useful for identifying patients at increased risk of severe disease. In particular, NLR, PLR, SII, and PIV may serve as additional indicators of systemic inflammatory activity. However, their specific diagnostic and prognostic value in HG requires further clinical validation.

Comprehensive assessment of micronutrient status may also be clinically relevant. Evaluation of vitamin D and selenium levels, together with nutritional status and inflammatory parameters, may provide a more complete understanding of the factors contributing to disease severity.

Conclusion

Hyperemesis gravidarum is a multifactorial condition involving hormonal, inflammatory, metabolic, nutritional, and neuroendocrine mechanisms. Current evidence indicates that systemic inflammation, oxidative stress,

vitamin D deficiency, and selenium deficiency may interact and contribute to the progression of severe nausea and vomiting during pregnancy.

NLR, PLR, SII, and PIV may represent accessible additional markers for assessing systemic inflammatory activity, while evaluation of vitamin D and selenium status may help identify potentially modifiable nutritional factors. A comprehensive approach combining assessment of inflammatory markers, micronutrient status, nutritional intake, and clinical severity may contribute to improved understanding and management of HG.

Further prospective and clinical studies are required to determine the diagnostic and prognostic value of these biomarkers and to clarify whether correction of vitamin D and selenium deficiency can influence the clinical course and outcomes of hyperemesis gravidarum.

References

1. Einarson T.R., Piwko C., Koren G. Quantifying the global rates of nausea and vomiting of pregnancy: a meta-analysis. *Journal of Population Therapeutics and Clinical Pharmacology*. 2013;20:e171–e183.
2. Engin-Ustun Y., Tonguç E., Var T. et al. Vaspın and C-reactive protein levels in hyperemesis gravidarum. *European Review for Medical and Pharmacological Sciences*. 2013;17:138–140.
3. Kurt R.K., Güler A., Silfeler D.B. et al. Relation of inflammatory markers with both presence and severity of hyperemesis gravidarum. *Ginekologia Polska*. 2014;85(8):589–593.
4. Kusu N.K., Yildirim Y., Koyuncu F. et al. Interleukin-6 levels in hyperemesis gravidarum. *Archives of Gynecology and Obstetrics*. 2003;269:13–15.
5. London V., Grube S., Sherer D.M., Abulafia O. Hyperemesis gravidarum: a review of recent literature. *Pharmacology*. 2017.
6. Maslin K. et al. Nutritional consequences and management of hyperemesis gravidarum: a narrative review. *Nutrition Research Reviews*. 2022.
7. Nording H.M., Seizer P., Langer H.F. Platelets in inflammation and atherogenesis. *Frontiers in Immunology*. 2015;6:98.
8. Rayman M.P. The possible role of selenium status in adverse pregnancy outcomes. *Nutrients*. 2012;4(12):135–152.

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9. Fuca G., Guarini V., Antoniotti C. et al. The Pan-Immune-Inflammation Value is a new prognostic biomarker in metastatic colorectal cancer. *British Journal of Cancer*. 2020;123(3):403–409.

10. Zhao R. et al. Effect of maternal vitamin D status on risk of adverse birth outcomes: a systematic review and dose-response meta-analysis. *European Journal of Nutrition*. 2022.