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PROPER SELECTION OF VITAMINS DURING PREGNANCY.

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Abstract: Pregnancy is a crucial physiological period characterized by profound hormonal, metabolic, and systemic changes in a woman's body. During this stage, it is essential to ensure optimal conditions not only for the mother's health but also for the proper formation and development of the fetus. In this regard, maintaining a balanced diet, particularly one adequately enriched with vitamins and minerals, is of paramount importance.

Vitamins are biologically active substances that regulate key biochemical processes in the body. They play a vital role in metabolism, cellular growth, and differentiation. During pregnancy, the demand for vitamins significantly increases compared to the normal physiological state, as they must meet the needs of both the mother and the developing fetus.

Modern research indicates that deficiencies of certain vitamins—especially folic acid, vitamin D, and iodine—can increase the risk of fetal developmental abnormalities as well as perinatal complications. At the same time, excessive and uncontrolled intake of vitamins may also lead to adverse effects. Therefore, the appropriate selection of vitamins, along with accurate determination of their dosage and duration of intake, remains one of the key issues in both scientific and practical medicine.

This article aims to analyze the requirements for vitamins during pregnancy, the principles of their proper selection, and their impact on maternal and fetal health from a scientific perspective.

Main Part:

1. Physiological basis of increased requirements for vitamins and micronutrients during pregnancy

During pregnancy, metabolic processes in the maternal body become significantly more active. The formation of the placenta, fetal organogenesis, and subsequent growth stages require a high level of energy and plastic (building) materials. Therefore, the daily requirements for vitamins and micronutrients increase.

Hormonal changes, particularly the rise in estrogen and progesterone levels, influence the absorption and distribution of nutrients. In addition, the increase in blood volume (hemodilution) further elevates the demand for iron and other micronutrients.

2. Key vitamins and their molecular-biological significance:

Folic acid (Vitamin B9)

Folic acid plays a crucial role in DNA synthesis, methylation processes, and cellular proliferation. Its deficiency increases the risk of neural tube defects in the fetus, such as spina bifida and anencephaly. According to scientific studies, an intake of 400–800 µg of folic acid is recommended before pregnancy and during the first trimester.

Iron

Iron is a component of hemoglobin and myoglobin and is essential for oxygen transport. During pregnancy, the demand for iron approximately doubles. Iron deficiency can lead to anemia, placental insufficiency, and perinatal complications.

Calcium

Calcium is necessary for the formation of the fetal skeletal system. If calcium intake is insufficient, it is mobilized from the mother's bone tissue, which increases the risk of osteoporosis.

Vitamin D

Vitamin D regulates calcium-phosphorus metabolism and participates in immune system function. Its deficiency may lead to rickets and immune disorders.

Iodine

Iodine is essential for the synthesis of thyroid hormones and plays a key role in the development of the fetal central nervous system. Iodine deficiency can result in impaired intellectual development.

3. Principles of Vitamin Selection and Dosing: Expanded Clinical Perspective:

The selection and dosing of vitamin and micronutrient supplementation during pregnancy require an evidence-based, individualized approach that accounts for physiological changes, nutritional status, and potential risk factors. Rational supplementation aims to ensure adequate maternal stores, support fetal development, and prevent both deficiency and toxicity.

3.1. Individualized (patient-centered) approach

Vitamin supplementation should be tailored to the individual, considering:

Gestational age (trimester): Requirements vary across trimesters, with higher demands during periods of rapid fetal growth

Maternal age and baseline health status

Nutritional intake and dietary patterns

Comorbidities: e.g., anemia, thyroid disorders, gastrointestinal malabsorption

History of pregnancy complications: neural tube defects, preeclampsia, preterm birth

A baseline assessment may include clinical evaluation and, when indicated, laboratory tests (e.g., hemoglobin, ferritin, serum vitamin D, thyroid function).

3.2. Evidence-based dosing and guideline adherence

Dosing should align with international clinical guidelines (e.g., WHO, ACOG, EFSA). Key principles include:

Prophylactic vs. therapeutic dosing:

Prophylactic doses are used in low-risk pregnancies

Therapeutic doses are indicated in confirmed deficiencies

Avoidance of megadoses: Excess intake, particularly of fat-soluble vitamins (A, D, E, K), may lead to toxicity

Critical windows of supplementation:

Folic acid is most critical in the preconception period and first trimester

Iron requirements increase notably in the second and third trimesters

3.3. Selection of appropriate formulations

Prenatal multivitamin complexes are commonly used due to balanced composition

Bioavailability considerations:

For example, ferrous salts vs. ferric forms of iron

Vitamin D3 (cholecalciferol) preferred over D2

Combination vs. monotherapy:

Combined formulations improve adherence

Monotherapy may be required in specific deficiencies

3.4. Safety and monitoring

Continuous monitoring is essential to ensure efficacy and prevent adverse effects:

Clinical monitoring: improvement in symptoms (e.g., fatigue, anemia signs)

Laboratory monitoring: hemoglobin, ferritin, calcium, vitamin levels when necessary

Adverse effect surveillance: gastrointestinal intolerance (iron), hypercalcemia (vitamin D excess), teratogenic risk (vitamin A excess)

3.5. Drug–nutrient and nutrient–nutrient interactions

Iron absorption may be reduced by calcium or enhanced by vitamin C

Excess zinc may interfere with copper absorption

Thyroid function may be influenced by iodine intake levels

Understanding these interactions is critical for optimizing supplementation strategies.

3.6. Patient education and adherence

Educating pregnant women on:

Proper timing of intake (e.g., iron on an empty stomach if tolerated)

Avoiding self-medication and over-the-counter misuse

Importance of adherence to prescribed regimens.

Conclusion:

Adequate and balanced intake of vitamins and micronutrients during pregnancy plays a crucial role in maintaining maternal physiological homeostasis and ensuring normal morpho-functional development of the fetus. The hormonal, hemodynamic, and metabolic changes occurring during this period significantly increase nutritional demands, which necessitates an evidence-based and individualized approach to vitamin supplementation.

Scientific studies indicate that deficiencies of essential micronutrients such as folic acid, iron, calcium, vitamin D, and iodine are associated with an increased risk of congenital anomalies, neurodevelopmental disorders, anemia, skeletal abnormalities, and endocrine dysfunctions in the fetus. At the same time, excessive and uncontrolled vitamin intake may also lead to teratogenic effects, metabolic disturbances, and toxic reactions.

Therefore, vitamin prescription should be based on a controlled, stepwise, and clinically monitored approach. This requires consideration of international clinical guidelines (such as WHO and ACOG recommendations), laboratory findings, and the individual characteristics of the patient.

In conclusion, the rational use of vitamins and micronutrients during pregnancy represents an essential component of modern obstetric practice. It plays a key preventive role in maintaining maternal and fetal health, reducing perinatal complications, and ensuring the birth of a healthy generation.

References:

1. World Health Organization (WHO). WHO recommendations on antenatal care for a positive pregnancy experience. Geneva: WHO; 2016.

2. World Health Organization (WHO). Guideline: Daily iron and folic acid supplementation in pregnant women. Geneva: WHO; 2012.

3. American College of Obstetricians and Gynecologists (ACOG). Nutrition during pregnancy. Practice Bulletin. Washington, DC: ACOG; latest updates.

4. Institute of Medicine (IOM). Dietary Reference Intakes for Calcium, Vitamin D, Iron and Folate. National Academies Press; 2006.

5. Cunningham FG, Leveno KJ, Bloom SL, et al. Williams Obstetrics. 26th ed. New York: McGraw-Hill Education; 2022.

6. Gabbe SG, Niebyl JR, Simpson JL, et al. Obstetrics: Normal and Problem Pregnancies. 8th ed. Elsevier; 2020.

7. Guyton AC, Hall JE. Textbook of Medical Physiology. 14th ed. Philadelphia: Elsevier; 2021.

8. Murray RK, Bender DA, Botham KM, et al. Harper's Illustrated Biochemistry. 32nd ed. New York: McGraw-Hill; 2021.

9. Nelson WE, Behrman RE, Kliegman RM. Nelson Textbook of Pediatrics. 21st ed. Elsevier; 2020.

10. Brent RL. Folic acid in the prevention of neural tube defects. Pediatrics. 2009;124(6): 1237–1243.

11. Peña-Rosas JP, et al. Daily oral iron supplementation during pregnancy. Cochrane Database of Systematic Reviews. 2015.

12. De-Regil LM, et al. Vitamin D supplementation for women during pregnancy. BMJ. 2016.

13. Zimmermann MB. Iodine deficiency and pregnancy outcomes. Thyroid Research. 2012.

14. Black RE. Micronutrient deficiencies and pregnancy outcomes. Journal of Nutrition. 2003.

15. Allen LH. Multiple micronutrients in pregnancy: safety and efficacy. Food and Nutrition Bulletin. 2005.

16. King JC. Physiology of pregnancy and nutrient metabolism. American Journal of Clinical Nutrition. 2000.

17. Kozlowski K, et al. Maternal nutrition and fetal development. Clinical Obstetrics and Gynecology. 2018.

18. Picciano MF. Pregnancy nutrition: micronutrients and fetal growth. Annual Review of Nutrition. 2003.