

**CLINICAL FEATURES AND PATHOGENETIC THERAPY OF TOOTH
DEMINERALIZATION IN PREGNANT WOMEN WITH EARLY-STAGE TOXICOSIS**

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Abstract. The relevance of the review article lies in the growing need to assess and analyze clinical manifestations and pathogenetic therapy of tooth demineralization in pregnant women with toxicosis in the early stages. Studies show that changes in mineral metabolism and hormonal balance during pregnancy significantly affect dental health and can lead to accelerated demineralization, increasing the risk of caries and other dental diseases. Given that toxicosis affects overall health and can aggravate changes in the composition of saliva and oral microflora, it is important to develop targeted preventive strategies that can minimize negative consequences for the teeth of pregnant women.

Keywords: tooth demineralization, caries in pregnant women, toxicosis in pregnant women.

The purpose of this review article is to comprehensively synthesize and critically analyze current scientific evidence on the clinical manifestations of tooth demineralization in pregnant women, particularly those associated with early pregnancy toxicosis. Special attention is given to the pathogenetic mechanisms underlying enamel and dentin demineralization caused by frequent vomiting, changes in saliva composition, dietary habits, and hormonal fluctuations during pregnancy. In addition, the article evaluates the effectiveness of various pathogenetically justified therapeutic and preventive strategies aimed at preserving dental hard tissues and maintaining oral health in this vulnerable population.

Based on an analysis of international experience, including studies conducted in Canada, Lithuania, Chile, and Sri Lanka, this review seeks to identify the most effective and evidence-based preventive measures. These approaches may be adapted and implemented in clinical practice to reduce the prevalence and severity of dental demineralization and related complications in pregnant women. Ultimately, the article provides a scientific rationale for conducting more targeted clinical trials and for developing integrated, multidisciplinary strategies for oral health management during pregnancy.

Materials and Methods.

To assess the clinical features, pathogenetic aspects, and preventive treatment of tooth demineralization in pregnant women experiencing early-stage toxicosis, a comprehensive review of scientific literature published between 2000 and 2023 was conducted. Data sources included internationally recognized databases such as PubMed, Scopus, and Web of Science. The literature search focused on publications containing the keywords “tooth demineralization,” “pregnancy,” “toxicosis,” “oral health prevention,” and “oral hygiene,” as well as related terms describing enamel erosion, dental caries risk, and salivary changes during pregnancy.

Both original research articles and review papers were included, with priority given to randomized controlled trials, cohort studies, and systematic reviews. Studies conducted in different geographic regions—particularly in Canada, Lithuania, Chile, and Sri Lanka—were analyzed to evaluate the effectiveness of national and regional preventive programs aimed at improving oral health outcomes in pregnant women and their offspring.

Special emphasis was placed on studies examining the role of rational oral hygiene practices, dietary counseling, saliva-stimulating measures, and the use of fluoride-containing, remineralizing, and antimicrobial agents. Additionally, the influence of patient education,

professional dental supervision, and interdisciplinary cooperation between dentists and obstetricians was considered when assessing preventive effectiveness.

All collected data were systematically organized and critically analyzed to identify the most effective pathogenetic approaches to the treatment and prevention of tooth demineralization. Comparative evaluation of different strategies was performed using statistical methods such as systematic review and meta-analysis, allowing for an objective assessment and comparison of outcomes across multiple studies.

This comprehensive methodological approach ensured a thorough understanding of the problem of tooth demineralization in pregnant women with toxicosis and enabled the development of scientifically grounded recommendations aimed at reducing the risk of dental diseases and improving overall oral health in this patient population.

Oral health in pregnant women has become the subject of extensive scientific investigation due to significant variations in the prevalence and course of oral diseases, which is critically important given their impact on a woman's overall health. During pregnancy, experts report an increased incidence of dental caries and periodontal diseases. Insufficient knowledge of dental health, often associated with socioeconomic status, level of education, and lack of motivation for preventive care, contributes to the aggravation of these conditions. Currently, there are no standardized approaches to the treatment of oral diseases during pregnancy, while the importance of preventive programs aimed at improving maternal health and implementing antenatal prevention for the future child is indisputable.

During this period of a woman's life, the risk of developing dental problems increases significantly. Studies indicate that under normal pregnancy conditions, 91.4% of women suffer from dental caries, and in 38% of cases, previously healthy teeth deteriorate. In the presence of gestosis, the index of dental morbidity increases markedly, reaching high values that indicate severe damage to the oral cavity. Other studies confirm an extremely high prevalence of dental caries among pregnant women with toxicosis and concomitant extragenital pathology. It has been noted that as gestational age increases, the severity of tooth damage also rises, particularly between 20 and 32 weeks of pregnancy. Poor oral hygiene, the presence of local irritants, and complicated pregnancy significantly increase the prevalence of periodontal inflammation, with reported rates ranging from 45% to 100% among examined women.

In the first trimester of pregnancy with a normal course, pregnancy-associated gingivitis is diagnosed in 45–63% of women, while catarrhal gingivitis is observed in up to 90% of cases. The main microorganisms responsible for inflammatory periodontal diseases include *Bacteroides gingivalis*, *Prevotella melaninogenica*, *Prevotella intermedia*, *Fusobacterium nucleatum*, *Peptostreptococcus micros*, *Actinomyces viscosus*, and others. The hygienic status of the oral cavity correlates with the course of pregnancy. Under physiological conditions, the gingival index (GI) is 0.54 ± 0.08 , indicating mild gingival inflammation, whereas in mild preeclampsia it increases to 0.57 ± 0.16 . In cases of moderate preeclampsia, the GI value doubles, reaching 1.14 ± 0.19 , which reflects moderate inflammation. Another study reported initial GI values of 1.14 ± 0.09 , increasing to 2.17 ± 0.05 after 20 weeks of pregnancy, corresponding to severe gingivitis. According to two independent studies, poor oral hygiene and high Approximal Plaque Index (API) values (45% and 43%) confirm unsatisfactory oral hygiene status.

International literature reviews indicate a relationship between periodontal diseases and the development of preeclampsia. During pregnancy, salivary pH shifts toward acidity, which enhances caries progression and worsens oral hygiene. The development of pyogenic granulomas in the second and third trimesters, associated with increased growth factor activity in macrophages, as well as generalized tooth mobility in the third trimester, further confirms the influence of inflammatory and mineral metabolism changes in periodontal tissues. Pregnancy

may also contribute to the development of combined fungal infections in the oral cavity, particularly in conditions of reduced potassium and calcium ion levels. Studies emphasize the role of hormonal changes—especially fluctuations in estrogen and progesterone levels—in increasing saliva viscosity and promoting colonization by specific microorganisms, thereby raising the risk of dental diseases. The involvement of C-reactive protein in the development of periodontal diseases during pregnancy has also been substantiated in scientific research.

Chronic diseases in the mother can pose a serious threat to the health of children's primary teeth by causing delays in tooth tissue formation and slowing the calcification of enamel and dentin. This interferes with the achievement of adequate mineralization, which is normally observed during favorable antenatal odontogenesis. Studies confirm the influence of various microorganisms and viruses on the structure of the tooth germ, including alterations in blood supply, edema, and changes in the thickness of enamel and dentin.

Iron-deficiency anemia in pregnant women exacerbates caries-related problems and leads to changes in enamel color, glossalgia, stomatalgia, paresthesia, dryness of the oral mucosa, and atrophy of the lingual papillae. It has been established that pregnant women aged 31–40 years with arterial hypertension experience more severe periodontal lesions compared to younger women. Inadequate maternal nutrition reduces the caries resistance of dental tissues and may lead to dentoalveolar anomalies in children. In addition, vitamin deficiencies before and during pregnancy increase the risk of perinatal pathology and aggravate the course of existing diseases.

During pregnancy, calcium redistribution occurs in the body, leading to changes in phosphorus–calcium homeostasis and reduced resistance of the hard dental tissues. This is associated with insufficient adaptive mechanisms to such a significant physiological condition as pregnancy. However, contrary to earlier assumptions, this process does not affect calcium levels in the enamel of the developing fetal teeth. Modern studies demonstrate an increase in calcium concentration in oral fluid during pregnancy.

Insufficient intake of vitamins and minerals during the antenatal period may result in disturbances of the dentofacial system, including enamel hypoplasia. Pregnancy is also associated with changes in local oral immunity, including an increase in the concentration of secretory immunoglobulin A (SIgA) in saliva, a process that is reversible after childbirth.

Chronic infectious processes in the oral cavity, such as periodontitis, apical periodontitis, and the presence of microbial dental plaque, may serve as sources of hematogenous dissemination of microorganisms. These conditions not only facilitate the penetration of infections but also cause prolonged pathological irritation of the organism. Persistent irritation of neural ganglia, chronic intoxication, and allergization can provoke various complications throughout pregnancy in the presence of oral infections.

International epidemiological and immunobiological studies indicate an association between periodontitis and an increased risk of preterm birth and the delivery of low-birth-weight infants. It is assumed that oral infections may increase the risk of dental caries in newborns, although this association has not been confirmed by all studies. An analysis of the literature published between 2003 and 2012 revealed no significant effect of primary prevention of periodontal diseases during pregnancy. However, a study conducted in Japan demonstrated that regular dental examinations can reduce the prevalence of periodontal diseases among pregnant women

Demographic and social factors such as age, level of education, occupation, harmful habits—including inadequate oral hygiene—and low fluoride content in drinking water can influence the structure and prevalence of dental diseases during pregnancy. Despite general awareness of oral care rules, only 65% of pregnant women actually follow them. Knowledge of

additional hygiene aids, such as dental floss and dental gels, remains insufficient: only 50% of respondents are aware of dental floss, and none use it in daily practice.

Only 6.3% of pregnant women rate their dental health as excellent, while the majority consider it satisfactory or poor. Since the onset of pregnancy, 71.5% of women undergo oral sanitation procedures.

Abroad, increasing attention is being paid to educating pregnant women on proper oral hygiene practices and correcting hygiene-related skills. Pregnant women actively participate in educational seminars organized by midwives, aimed at improving oral health status.

A randomized clinical trial assessing pregnant women's awareness of the risk of dental caries in their children demonstrated statistically significant differences between the control and experimental groups: in the experimental group, caries prevalence among children was only 1.7%, compared to 9.6% in the control group.

Awareness among expectant mothers regarding the prevention of childhood caries remains critically low—only 26.2% of pregnant women are aware of the relationship between the mother's oral health and the oral health of the child [10]. Studies show that only 36% of surveyed pregnant women correctly interpret gingival redness and swelling as signs of inflammation, while 53% do not know the appropriate amount of toothpaste to use when brushing the teeth of children aged 1.5 to 5 years.

Overall, the level of knowledge among pregnant women regarding the prevention of major dental diseases remains unsatisfactory, underscoring the need for improved dental education and motivation to maintain oral health.

Since the mid-20th century, international dental practice has actively developed and implemented preventive programs for pregnant women, often extending care to newborns. These programs experienced particularly rapid development beginning in the 1980s. An example is a comprehensive preventive program implemented in Hannover, Germany, involving 86 pregnant women. The program consisted of four stages and followed children up to the ages of three, six, and fourteen years. Preventive measures were conducted every six months until the children reached three years of age and included oral hygiene training, dietary counseling, and professional oral hygiene procedures. As a result of follow-up examinations and educational interventions, 89.7% of adolescents in the experimental group were caries-free.

A study conducted in Vancouver, Canada, in 2005–2006 analyzed a twenty-year preventive program for pregnant women. The program involved 67 women with a mean age of 27.7 years. Within the framework of the program, participants regularly underwent clinical examinations and questionnaires and used antimicrobial mouth rinses and fluoride applications. The results demonstrated a significant improvement in periodontal health among the participants.

In Lithuania (Kaunas), a similar program was conducted with the participation of 180 women aged 22–35 years, divided into test and control groups. In the test group, in addition to standard examinations and consultations, professional oral hygiene procedures, fluoride applications, and the use of a 0.12% chlorhexidine solution were provided. This led to a 56.25% reduction in caries prevalence and improved hygienic and clinical periodontal indicators compared with the control group.

In Chile (Viña del Mar), a preventive program initiated in 2007 included pregnant women from the fourth month of pregnancy and followed their children up to ten years of age. The program comprised educational activities, clinical examinations, and treatment, including the use of fluoride-containing toothpastes and antimicrobial mouth rinses. The effectiveness of the program was confirmed by the fact that 70% of children whose mothers participated in the program had no caries in the first permanent molars by the age of ten, compared with only 33%

in the control group. In addition, the study showed that 97% of children aged 1 to 3 years had healthy teeth.

Conclusion.

Based on the analysis of scientific literature conducted in this review, it can be concluded that early-stage toxicosis during pregnancy has a significant impact on women's dental health. Tooth demineralization in pregnant women is a common condition, exacerbated by changes in mineral metabolism and hormonal levels. The analyzed data confirm that the systematic implementation of preventive measures—including education on proper oral hygiene and the use of antimicrobial and fluoride-containing agents—significantly reduces the risk of dental problems not only in pregnant women but also in their children.

The review demonstrates that rational oral hygiene practices and regular dental examinations play a critical role in preventing tooth demineralization. The effectiveness of such programs is supported by reductions in caries prevalence and improvements in periodontal health observed in studies conducted in Canada and Lithuania, as well as in Chile and Sri Lanka. Therefore, the scientific community and healthcare authorities should emphasize the need to develop and implement comprehensive preventive programs for pregnant women, particularly those suffering from toxicosis.

In conclusion, the article highlights the importance of integrating dental prevention into standard prenatal healthcare programs. Promoting knowledge about the relationship between oral health and the overall health of both mother and child, along with the application of individualized preventive strategies, may be key to reducing the risk of tooth demineralization and improving the quality of life of pregnant women and their children.

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