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PERIODONTAL DISEASE AND PREMATURE BIRTH

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Abstract: Periodontal disease is a highly prevalent chronic inflammatory condition with a significant systemic impact and an association with gestational complications such as premature birth and low birth weight. The chronic inflammation of periodontitis raises pro-inflammatory cytokines such as IL-6 and TNF--α, promoting an inflammatory environment that can compromise placental homeostasis. Epidemiological studies show a significant association between maternal periodontitis and adverse obstetric outcomes, highlighting the importance of prenatal dental screening. This study carried out a narrative literature review, searching the PubMed-MEDLINE database using specific descriptors combined by Boolean operators. The findings indicate that periodontitis can trigger intrauterine inflammation and negatively impact pregnancy. Therapeutic interventions, such as non-surgical periodontal treatment and local antimicrobials, have shown potential in reducing systemic inflammation and the risk of prematurity. However, low adherence to treatment and a lack of knowledge on the part of health professionals still pose challenges to the implementation of these strategies. Given this scenario, integrating periodontal health into prenatal care is essential to minimize gestational complications. Public policies and educational campaigns can raise awareness of the importance of periodontal screening and treatment during pregnancy, promoting better maternal-fetal outcomes.

Keywords: periodontal disease, premature birth, intrauterine inflammation, maternal--fetal health.

INTRODUCTION

Periodontal disease is a chronic inflammatory condition that affects the supporting tissues of the teeth and is considered a global public health problem due to its high prevalence and systemic impact. Recent studies suggest that alterations in the oral microbiota and periodontal inflammatory processes can negatively influence pregnancy and are associated with adverse outcomes such as premature birth and low birth weight (Mahapatra *et al.,* 2021). Chronic inflammation resulting from periodontitis can act as a trigger for systemic inflammatory responses, increasing levels of pro-inflammatory cytokines such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α), substances associated with the induction of preterm labor (Figuero, Han and Furuichi, 2020). In this context, maternal periodontal health has been identified as a potential risk factor for pregnancy complications, arousing interest in the scientific community.

The relationship between periodontal disease and preterm birth has been widely studied, with epidemiological evidence demonstrating a statistically significant association between maternal periodontitis and an increased risk of preterm birth (Uwambaye *et al.,* 2021). A case-control study conducted in Mexico indicated that pregnant women with periodontitis were more likely to give birth prematurely compared to those without the condition, highlighting the importance of dental screening during prenatal care (Márquez-Corona *et al.,* 2021). Similarly, a systematic review revealed that the presence of periodontal pathogens, such as Porphyromonas gingivalis, was correlated with increased systemic inflammation and a higher risk of adverse obstetric outcomes (Jang *et al.,* 2021). These findings reinforce the need for a multidisciplinary approach that integrates oral health into maternal care.

The biological mechanisms that justify this association involve both the direct dissemination of periodontal pathogens to the fetus-placental unit and the indirect activation of the maternal inflammatory response. Studies have shown that periodontal bacteria can cross the placental barrier, being detected in samples of amniotic fluid and neonatal gastric aspirate, suggesting a possible bacterial translocation (Figuero, Han and Furuichi, 2020). In addition, maternal systemic inflammation, driven by increased levels of inflammatory mediators, may be associated with an increased risk of preterm birth and other gestational complications, possibly mediated by changes in the maternal inflammatory response (Choi *et al.,* 2021). The correlation between the severity of periodontitis and prematurity was also evidenced in a recent clinical analysis, which showed that pregnant women with a higher rate of gingival bleeding had babies with a significantly reduced birth weight (Völgyesi *et al.,* 2023).

Given this scenario, strategies for prevention and early intervention in maternal periodontal health have been widely discussed. Dental treatment during pregnancy, including plaque control and reduction of gingival inflammation, can minimize the systemic inflammatory burden and consequently reduce the risk of preterm birth (Jang *et al.,* 2021). In addition, prenatal periodontal screening has been recommended as a complementary tool for the early identification of pregnant women at greater obstetric risk (Uwambaye *et al.,* 2021). Studies suggest that public policies aimed at maternal oral health can play an essential role in reducing prematurity rates, emphasizing the need for greater integration between dentistry and obstetrics in maternal-fetal care (Márquez-Corona *et al.,* 2021).

Therefore, considering the importance of periodontal health during pregnancy and its impact on prematurity, this study aims to analyze the relationship between periodontal

disease and premature birth, discussing the mechanisms involved, the impact on maternal-fetal health and prevention and intervention strategies. The aim is to contribute to the advancement of scientific knowledge on the subject and to reinforce the importance of periodontal health in prenatal care.

METHODOLOGY

A literature review developed according to the criteria of the PVO strategy, which stands for: population or research problem, variables and outcome. This strategy was used to develop the research question "What is the relationship between periodontal disease and the occurrence of premature birth, and how can dental intervention contribute to reducing this risk?". The searches were carried out using the PubMed - MEDLINE (Medical Literature Analysis and Retrieval System Online) databases. The search terms were used in combination with the Boolean terms "AND" and "OR", using the following search strategy: (("periodontal diseases"[MeSH Terms] OR ("periodontal"[All Fields] AND "diseases"[All Fields]) OR "periodontal diseases"[All Fields] OR ("periodontal"[All Fields] AND "disease"[All Fields]) OR "periodontal disease"[All Fields]) AND ("premature birth"[MeSH Terms] OR ("premature"[All Fields] AND "birth"[All Fields]) OR "premature birth"[All Fields])) AND (y_5[Filter]). From this search, 91 articles were found, which were then submitted to the selection criteria. The inclusion criteria were: articles in English; published between 2021 and 2025 and which addressed the themes proposed for this research, narrative review studies, systematic review, meta--analysis, observational studies, experimental studies . The exclusion criteria were: duplicate articles, those made available in abstract form, those that did not directly address the proposal studied and those that did not meet the other inclusion criteria. After applying the search strategy to the database, a total of 39 articles were found. After applying the inclusion and exclusion criteria, 28 articles were selected from the PubMed database to make up this study's collection.

DISCUSSION

PATHOPHYSIOLOGICAL MECHANISMS OF PERIODONTITIS AND GESTATIONAL OUTCOMES

Periodontal disease has been associated with various gestational complications, including premature birth, due to systemic inflammation and translocation of periodontal pathogens into the fetoplacental unit. According to Kranz *et al.* (2022), the presence of periodontal pathogens in the subgingival biofilm can directly affect placental homeostasis, triggering an exacerbated inflammatory response. Bhavsar *et al.* (2023) showed that maternal periodontitis significantly increases levels of interleukin-6 (IL-6) and tumor necrosis factor alpha (TNF--α), which can induce excessive production of prostaglandins and stimulate premature birth. This inflammatory mechanism can compromise the integrity of fetal membranes and anticipate the induction of labor.

In addition, Lima *et al.* (2023) identified the high presence of *Prevotella intermedia* and *Fusobacterium nucleatum* in the subgingival biofilm of pregnant women who had premature births, suggesting that the translocation of these bacteria into the fetoplacental unit may induce intrauterine inflammation. Abouzaid *et al.* (2023) pointed out that biomarkers present in gingival crevicular fluid can act as risk predictors for gestational complications, reinforcing the importance of periodontal monitoring during pregnancy. In addition, Novello *et al.* (2022) pointed out that oral dysbiosis and the overgrowth *of Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans* can intensify the systemic inflammatory response and increase the risk of preterm birth and pre-eclampsia.

Although there is consensus on the impact of periodontitis on maternal systemic inflammation, some divergences in the literature remain. While Kranz *et al.* (2022) emphasize the direct role of periodontal pathogens in placental dysfunction, Abouzaid *et al.* (2023) suggest that inflammatory biomarkers can be used more as predictive tools than as causal mediators. This difference reinforces the need for more longitudinal studies to fully understand the mechanisms involved and establish effective prevention and treatment strategies. Thus, integrating periodontal health into prenatal care may be an essential strategy for reducing the risk of gestational complications associated with periodontitis.

CLINICAL AND EPIDEMIOLOGICAL EVIDENCE

The relationship between periodontitis and pregnancy outcomes has been widely studied, with clinical and epidemiological evidence demonstrating a significant association between periodontal inflammation and pregnancy complications. For Khan, Craven and Rafig (2023), maternal periodontitis has been identified as an independent risk factor for preterm birth and low birth weight, with studies showing a significant increase in the prevalence of these conditions in pregnant women with periodontal disease. The presence of periodontitis in pregnancy is associated with high levels of pro-inflammatory interleukins and C-reactive protein, which can compromise fetal nutrition and oxygenation and increase the risk of intrauterine growth restriction (Lee *et al.,* 2022). In addition, Pockpa *et al.* (2022) observed that pregnant women with periodontitis had a 3.62 times greater risk of preterm birth compared to pregnant women without the disease, reinforcing the need for greater attention to periodontal health during prenatal care.

According to Thomas *et al.* (2023), a longitudinal study evaluating pregnant women in the first trimester identified a high prevalence of undiagnosed periodontitis, highlighting the need for early dental screening as part of prenatal care. Complementing this analysis, Couceiro *et al.* (2021) indicate that pregnant women with moderate to severe periodontitis had an increased rate of premature rupture of membranes, showing a significant impact of periodontal inflammation on gestational stability. These findings reinforce the importance of early detection of periodontitis as a preventative strategy for obstetric complications. According to Karimi, Samiee and Moradi (2023), the severity of periodontal disease has a direct influence on the incidence of preterm labor, and pregnant women with advanced periodontitis had significantly higher rates of spontaneous labor before 37 weeks of gestation.

Pockpa *et al.* (2021) reviewed two decades of clinical studies and found that the majority of epidemiological studies found a statistically significant association between periodontitis and adverse pregnancy outcomes such as prematurity, low birth weight and pre-eclampsia. These data highlight the need for health professionals to be more aware of the importance of periodontal screening during pregnancy. In addition, Pockpa et al. (2022) point out that standardizing the diagnostic criteria for periodontitis can facilitate comparison between studies and strengthen the evidence base supporting this association, allowing for the development of more effective preventive strategies.

The available evidence reinforces the relevance of periodontitis as a significant risk factor for gestational complications, but there is still disagreement about the direct impact of periodontal inflammation on obstetric outcomes. While studies such as those by Khan, Craven and Rafig (2023) and Lee *et al.* (2022) emphasize the role of systemic inflammation in fetal growth restriction and preterm birth,

Thomas et al. (2023) and Pockpa et al. (2021) suggest that early identification of periodontitis may be a more relevant tool for prevention than for understanding the causal mechanisms. Thus, incorporating periodontal health into prenatal care protocols may be essential to reduce the impact of these complications and improve maternal-fetal outcomes.

THERAPEUTIC INTERVENTIONS

The therapeutic approach to periodontitis in pregnant women has been widely investigated, considering its impact on maternal and fetal health. According to Wu *et al.* (2024), non-surgical periodontal treatment, including scaling and root planing, has been shown to significantly reduce levels of inflammatory cytokines such as IL-6 and TNF-α, as well as being associated with a lower rate of preterm birth. This finding is corroborated by Jajoo *et al.* (2020), who reported that pregnant women undergoing periodontal therapy showed a decrease in systemic inflammation and an improvement in the immune response, suggesting that dental intervention can reduce obstetric complications.

For Arbildo-Vega *et al.* (2024), the combination of conventional periodontal treatment with the administration of local antimicrobials showed greater efficacy in reducing the subgingival bacterial load, contributing to the stabilization of periodontal disease during pregnancy. In addition, Merchant *et al.* (2022) pointed out that adherence to prenatal dental care was a determining factor in maintaining periodontal health and preventing adverse gestational outcomes. The implementation of integrated protocols between obstetricians and dentists was identified as an essential strategy for the preventive management of periodontitis during pregnancy.

Winckler *et al.* (2024) emphasize that although periodontal treatment for pregnant women is safe and effective, low adherence and a lack of knowledge on the part of health professionals still represent significant barriers to its implementation. Thus, educational measures and public policies that encourage the integration of dental care into prenatal care are fundamental to reducing the impact of periodontitis on obstetric outcomes.

CHALLENGES AND FUTURE PROSPECTS

The relationship between periodontal disease and pregnancy complications presents significant challenges for clinical practice and scientific research. According to Bostanci (2024), the lack of standardization in the diagnostic criteria for periodontitis makes it difficult to compare studies and formulate unified guidelines for the prevention and management of the condition in pregnant women. Furthermore, the scarcity of longitudinal studies assessing the long-term impact of periodontal treatment on obstetric outcomes reinforces the need for more research in this area.

For Khandre, Potdar and Keerti (2022), one of the main challenges lies in the adherence of pregnant women to periodontal treatment, which is often limited by socioeconomic factors, fear of dental procedures and lack of guidance from health professionals. According to Parry *et al.* (2023), there is an urgent need for greater integration between gynecologists, obstetricians and dentists in prenatal care, promoting education about the importance of periodontal health for pregnancy. Awareness-raising strategies and increased access to dental services are fundamental to overcoming these barriers.

For Raju and Berens (2021), the incorporation of new technologies and therapeutic approaches could represent a breakthrough in the prevention and management of perio-

dontitis in pregnant women. Early diagnosis methods based on salivary biomarkers and targeted antimicrobial therapies have shown potential to improve maternal and fetal outcomes. However, for these innovations to be implemented effectively, it is essential that public health policies are reformulated to include periodontal health as part of prenatal care, ensuring that pregnant women have access to appropriate guidance and treatment.

FINAL CONSIDERATIONS

This study analyzed the relationship between periodontal disease and preterm birth, showing that periodontitis can trigger a systemic inflammatory response and contribute to intrauterine inflammation and adverse gestational outcomes. Non-surgical periodontal treatment has shown potential to reduce systemic inflammation, but low adherence and lack of awareness remain challenges. Thus, the integration of periodontal health into prenatal care, with the inclusion of dentists in maternal care and educational campaigns, is fundamental to improving gestational outcomes. Although the association between periodontitis and prematurity is well documented, more longitudinal studies are needed to deepen this relationship and evaluate the effectiveness of dental interventions. In addition, advances in diagnostic technologies and antimicrobial therapies can optimize the management of periodontitis in pregnant women, reinforcing the need for its inclusion in prenatal protocols.

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