

Periodontitis in Pregnant Women

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Periodontitis develops in 11% of pregnant women, and it is independently linked to severe complications during pregnancy such as preterm birth, low birth weight, and gestational diabetes. Periodontal disease appears to be associated with adverse events in pregnancy due to the transport of biofilm bacteria into the bloodstream and into placental tissue; what would cause adverse events is the body's immune response to infection.

Keywords: periodontitis ; pregnancy ; oral health ; adverse pregnancy outcomes

1. Introduction

Periodontal disease is a chronic and irreversible pathology of the supporting tissues of the tooth that affects between 20% and 50% of the world population; the distribution in adults differs significantly in low (28.7%), lower-middle (10%), upper-middle (42.5%), and high-income countries (43.7%) ^{[1][2]}.

Periodontal disease is one of the risk factors for other systemic diseases, such as pneumonia, diabetes mellitus, arteriosclerosis, and coronary heart disease ^[3]. Numerous studies show that periodontitis sufferers have higher circulating neutrophil granulocyte values and higher systemic inflammatory parameters (such as reactive protein C) compared to healthy people. In particular, the latter parameter is an excellent predictor for the development of ischemic diseases, atherosclerosis, and the imperfect metabolic control of diabetes ^{[4][5]}. In addition, it seems to be one of the risk factors for complications during pregnancy ^[6].

About 14.2 to 54.8% of pregnant women suffer from periodontal disease, and 11% develop periodontitis, which can cause the destruction of periodontal tissue and the distribution of bacteria and other inflammatory mediators ^[7].

Periodontitis is independently linked to severe complications during pregnancy, such as preterm birth, low birth weight, and gestational diabetes. ^{[7][8]}: the reason could be linked to the translocation of pathogenic bacteria to the fetus-placenta unit or the effect of inflammatory mediators such as interleukin-1 (IL-1), IL-6, IL-8, tumor necrosis factor alpha (TNF alpha), or prostaglandin E2 (PGE2) on the fetus-placenta unit ^{[9][10]}.

Bacteremia is the transient or continuous presence of viable bacteria in the bloodstream. In people with periodontal disease, subgingival microflora is contracted with the damaged inner epithelium of periodontal pockets, which allows bacteria to enter the bloodstream ^[11]. This would seem to be the mechanism for the association between periodontal disease and adverse events during pregnancy ^[12].

Two experimental hypotheses support the correlation between periodontitis and pregnancy-related negative events. The first is based on the possibility that women with periodontitis are subject to frequent bacteremia. Bacteria activate a cascade of inflammatory processes at the level of the placenta and the fetus, with the risk of pre-term delivery and/or birth of underweight children ^[13]. The second hypothesis is based on the fact that periodontitis can cause a generalized increase in cytokines, substances with pro-inflammatory activity that cause alterations to the placenta and the fetus ^[14]. The periodontal bacteria (in particular *Porphyromonas Gingivalis*) can in fact enter the bloodstream, reach the placenta, and generate toxins inside the amniotic fluid that result in inflammation, potentially causing premature birth ^[15]. In addition to premature birth, other related adverse events include reduced body weight gain of the unborn child and the development of premature uterine contractions, with the risk of pre-term delivery and/or the birth of underweight children ^[16].

The onset of periodontal disease appears to be linked to a change in the composition of sub-bacterial gingival flora with an increase in the relative amount of pathogenic periodontal anaerobic bacteria associated with increased circulating levels of estrogen and progesterone and these would be a factor promoting the growth of pathogenic periodontal anaerobes; alteration of the local immune response with increased susceptibility to gum inflammation and depression of

the chemotactic and phagocytic response of neutrophil granulocytes and other cellular-immune functions mediated, which contributes to the stimulation of the production of prostaglandins induced by varicose veins; to the pro-inflammatory effects on the gums mainly on vascular proliferation, on the production of collagen, on epithelial keratinization and the fluid content of the connective tissue ^{[17][18][19]}.

2. Periodontitis

Several studies have shown the onset of periodontal problems during the second and third trimesters of pregnancy due to the change and increase in sex hormones and blood flow.

High levels of estrogen can cause gingival hypersensitivity to local factors, including bacterial plaque. This can lead to an increase in gingival volume, often associated with bleeding, or even the onset of periodontal disease, which usually regresses at the end of pregnancy; this is due to the growth of anaerobic bacteria, associated with increased circulating levels of estrogen but also progesterone ^{[20][21]}.

Moreover, during gestation, the alteration of the vascular permeability of the gums can facilitate the transport of biofilm bacteria into the bloodstream until they reach the placental tissue ^[20].

In this tissue, the slow venous circulation and the invasive ability of microorganisms promote possible penetration into the fetus and into the amniotic fluid. Here, an immune response is triggered that could lead to the release of pro-inflammatory cytokines. If the body is able to fight the infection, there will be no consequence; otherwise, membrane rupture and premature birth may occur. These inflammatory compounds can negatively regulate the expression of genes essential for the growth of the fetus, causing a low birth weight, and generating structural damage to the placental circulation that increases the blood pressure of the mother ^{[13][14][15][16]}.

Periodontal disease in pregnant women would appear to develop unexpected and adverse results, such as preterm birth ^{[22][23][24][25][26][27][28][29]}, low birth weight ^{[22][25][26][28][29][30][31][32]}, and pre-eclampsia ^[33]. The objective of the review was to research and highlight possible adverse events in pregnancy in women with periodontal disease. Preterm birth and low birth weight appear to be the most common events, at least according to this analysis. Preterm birth was found in 50% of the studies analysed, a result similar to that obtained by Manrique-Corredor et al. in a systematic and meta-analytical review, the authors evaluated 31 studies, and 60% of them saw an association between periodontal disease and preterm birth; Chambrone et al. also showed a positive association with preterm birth and low birth weight in 81.8% of the studies involved in the review ^{[34][35]}.

The analyzed studies support these results: 50% of the studies showed an association between periodontal disease and preterm birth, and 50% had an association with low birth weight.

Periodontal diseases are associated with an increased risk of premature and/or underweight births ^[36]. Today, it is known that some acute inflammatory processes in the mother, even if localized far from the genitourinary tract, can play a secondary role in the appearance of pathological alterations in pregnancy ^[37]. Other studies, however, have not shown a clear association between periodontal disease and any adverse events ^{[38][39][40][41]}.

However, although these events have often been associated, there is no clear evidence or correlation between periodontal disease and pregnancy. A predisposition can be affirmed due to the migration of bacteria present at the periodontal pockets through the bloodstream to the placenta and the fetus, which could cause muscular contractions of the uterus, cervical dilation, and premature rupture of the amniotic sac ^[42]. Numerous clinical studies would be needed to establish a positive association between periodontal disease and adverse events during pregnancy.

So, based on these considerations, pregnant women and women planning a pregnancy should be aware that there may be a link between their periodontal condition, general health, and possible complications of pregnancy. For this reason, periodontal treatment may be necessary, which in this case should be performed before conception; however, it could also be performed during pregnancy ^[43]. In addition, as negative pregnancy outcomes and periodontitis have in common some important risk factors (e.g., smoking), pregnant women should be aware of the importance of healthy habits and lifestyles ^[44]. It has been shown that periodontal treatment carried out in pregnancy is safe and helps to reduce the level of gingival inflammation, allowing oral health to be maintained in this delicate period. In addition, current scientific knowledge suggests that periodontal therapy before conception may reduce the risk of the related adverse effects mentioned above ^{[8][43]}.

Unfortunately, very often treatments are carried out late; the ideal would be to start before pregnancy to obtain a positive outcome on the clinical result of gestation. In fact, non-surgical periodontal treatment in pregnant women would seem not to achieve an improvement of the unfavorable, probably also because the available studies are very heterogeneous. The result is mixed opinions [45][46][47][48][49][50].

However, action should be taken against dysbiosis caused by periodontal disease, perhaps by supplementing the use of probiotics in pregnant women, which seem to have positive effects on gum bleeding indices, together with the correct oral hygiene methods for the removal of bacterial biofilm [20][51][52].

The studies involved present some limitations. Although most of them have validated the association between periodontal disease and some adverse events in pregnancy, this statement cannot be generalized. The results of the individual studies are influenced by some variables such as ethnicity, socio-economic status, age, the period of pregnancy, and systemic pathologies related to the mother. It would be useful to standardize the sample taken from the studies, trying to eliminate any variable that could influence the results.

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