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Periodontal disease and its relationship with pregnancy problems: is everything clear?

Abstract

Periodontal disease is the result of an interactive process between dental biofilm and periodontal tissues through cellular and vascular responses in which the primary etiologic factor of periodontal diseases is bacterial infection. Periodontitis has been associated with systemic changes, such as pregnancy complications such as preterm birth and low birth weight. The birth of low body weight babies remains the main cause of perinatal morbidity and mortality, affecting about 10% of all births. The objective of this literature review, narrative, was to show the relationship between periodontal disease and pregnant women with premature birth and / or low birth weight baby. Articles published between 1996 and 2020, in English and Portuguese, were evaluated in the following databases: Pumed, Lilacs, Scielo, Cochrane Library, Scopus, Web of Science, Embase and Bireme. Research indicates that gingivitis and periodontitis can promote gestational changes such as premature birth and / or low weight of the baby, several studies have evaluated these conditions, but there is a variability in the methodology used and characterization of periodontal disease. Elevated levels of cytokines produced by periodontal disease, induce the body to go into early labor. For this, the levels of cytokines are similar to those produced by the uterus and placenta in the ninth month of pregnancy. The increase in pregnancy hormones seems to aggravate gingival and periodontal disease, with an interrelation between pregnancy and periodontal conditions. Current evidence has pointed out that women in gestational periods need dental intervention to control periodontal disease, as these strategies serve to reduce preterm labor. The investigators concluded that there are clinical changes that are related to the accumulation of dental biofilm and its interference in the course of the gestational period, however, there is a need for further studies for this relationship to be definitively confirmed.

Keywords: Periodontal disease, pregnancy, pre-term birth, low birth weight

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Introduction

Low birth weight and prematurity represent the main determinants in the occurrence of infant death and are associated with approximately four million deaths annually in the neonatal period, mainly concentrated in developing countries. About 70% of perinatal deaths result from prematurity, which involves 5 to 11% of pregnancies and represents a determining factor for neonatal morbidity and mortality. The worldwide prevalence of preterm birth has remained relatively stable, however in recent years it has shown an important growth.[1] In the United States of America, premature births represent 10% of total births, constituting the main cause of neonatal morbidity and mortality. The prevalence of prematurity in Europe ranges from 6 to 10%. In Brazil, the prevalence rate of prematurity is approximately 8%, with a variation in relation to different regions and capitals.[2]

In the last 25 years there has been progress in understanding periodontal disease, the etiological concept, its pathogenesis and treatment are very different today compared to 1970. All this new knowledge has led to the emergence of a new paradigm of periodontal disease, pointing out ways for new ones. methods of diagnosis, prevention, rapid intervention and new treatment strategies. Periodontics is currently found, with a large number of researchers concentrating on studying the changes that periodontal disease can cause in the human body, leading to the appearance of a new line of research called "Periodontal Medicine" that according to the proposed concept corresponds to a broad definition attributed to an emerging branch of periodontics, concerned with extolling scientific data that point to a bidirectional relationship of periodontal diseases and general conditions of individuals, where one can negatively affect the other and vice versa.[3]

In a classic and pioneer case-control study of 124 pregnant or postpartum women, periodontal indexes were evaluated. Mothers who had premature or low birth weight babies (case group) had significantly worse periodontal conditions when compared to pregnant women who had children in normal time (control group). To reduce the influence of known associated risk factors (cigarette, alcohol, drugs, genitourinary infections, prenatal care, parity, among others), the authors used statistical methods to avoid the interference of confounding variables.[4]

Based on evidence of blood dissemination of cytokines and / or bacteria from periodontal infection, it is believed that there is an association between oral disease and other changes that are proven to be related to the presence and increase of these same cytokines, such as premature and recently delivered - low birth weight. Full-term pregnancies are those between 37 complete weeks and less than 42 complete weeks, with low birth weight newborns those who weigh less than 2,500g at birth.[5]

Within this new line of research, a series of studies has emerged showing significant evidence of the role of periodontal disease as a predisposing factor for the development of systemic problems, such as respiratory and cardiovascular diseases, eventual difficulties in controlling diabetes and the birth of premature babies. low weight.[6] It is commonly accepted that the sudden increase in circulating female hormones during pregnancy is responsible for the exacerbation of the inflammatory gingival reaction, mainly for its vasodilator action. Although pregnancy intensifies the inflammatory reaction in the gingival tissue, the accumulation of dental biofilm is of fundamental importance for the development of periodontal disease.[7]

There are several inflammatory cytokines found in the periodontal pocket, especially interleukin 1-beta (IL-1β), prostaglandin E2 (PGE2), interleukin 6 (IL-6) and the tumor necrosis factor alpha (TNF-α). If these cytokines, or even the infective agents, remained exclusively inside the periodontal pocket without reaching the bloodstream, concerns would not be justified looking for relationships between periodontal disease and systemic changes. However, it is known that this spread can occur, it is known that their blood levels may be increased in patients with periodontal disease and this increase could be explained in two ways: by the spread of cytokines during scraping of infected tissue or by circulating action of the bacteria themselves, inducing production of cytokines systemically.[8,9]

Periodontal disease is one of the most prevalent oral infections in humans, being characterized by inflammation and bleeding gums. When the causative agents are not removed correctly and periodically, they tend to reach the supporting tissue of the teeth and the alveolar bone, in addition to stimulating their resorption through an inflammatory reaction.[3]In the periodontal pockets several bacterial species can be isolated, some characterized by high pathogenicity. When the human organism recognizes the presence of these bacteria, the innate immunity reaction begins, the first line of defense against aggressive agents. In addition to the action of phagocytic macrophages, there is the release of some inflammatory cytokines, proteins that regulate and coordinate many activities of cells responsible for innate immunity.[6]

t is estimated that six million perinatal deaths occur each year worldwide, with premature birth being the main cause. Scientific evidence has shown that there is an association between periodontal health during pregnancy and adverse outcomes from labor, although interventional studies based on the treatment of periodontitis have not documented an impact in reducing the incidence of premature birth or low birth weight. Two pathogenic mechanisms have been proposed to explain this association. The direct route is based on the presence of gram-negative anaerobic bacteremia originating in the gingival biofilm, while the indirect route involves the production of pro-inflammatory markers that enter the bloodstream from the gingival submucosa. The result is the same: the development of an inflammatory immune response and/or the local suppression of growth factors in the fetal-placental unit, which in turn triggers labor.[10]

Periodontal disease is often suggested as a possible causative factor for premature birth. The link between periodontal disease and premature birth is a possible translocation of pathogenic bacteria to the placenta and amniotic fluid, as well as a systemic response to this chronic inflammatory disease. However, there is a lack of information on whether there is an association between clinical periodontal status in women with pre-partum rupture of membranes and the presence of microbial invasion of the amniotic cavity and intra-amniotic inflammation. Therefore, the main objective of this study was to assess the incidence and severity of periodontal disease in women with prepartum rupture.[11]

Systematic reviews in pregnant women with periodontal disease consistently demonstrated positive associations between periodontal disease and premature birth (relative risk, 1.6; 95% confidence interval, 1.3 to 2.0; 17 studies, 6,741 participants), low birth weight birth (LBW; relative risk 1.7 95% CI, 1.3 to 2.1, 10 studies, 5,693 participants), pre-eclampsia (odds ratio, 2.2; 95% CI, 1.4 to 3.4 ; 15 studies, 5,111 participants) and low birth weight (relative risk 3.4; 95% CI 1.3 to 8.8; 4 studies, 2,263 participants). Consistent evidence from systematic reviews with a low risk of bias indicates that pregnant women with periodontal disease are at increased risk of developing pre-eclampsia and delivering a premature baby and/or LBW.[6]

Periodontal diseases are highly prevalent worldwide. Existing evidence supports the concept that gingivitis and periodontitis are potentially infectious and have inflammatory reservoirs that can be threatening to the fetoplacental unit. In a study that evaluated periodontal disease in pregnant women, it was found that women with periodontitis are statistically 3.2 times more likely to give birth to a child with low weight, and 3.4 times more likely to give birth prematurely, in comparison with women without periodontitis. Women with premature babies with low birth weight had deeper periodontal pockets (2.49mm±0.49mm) than women with normal birth (2.26 mm±0.49 mm). Periodontal disease in pregnant women with a reservoir of organisms and their products can be considered a risk factor for adverse pregnancy outcomes.[12] Periodontal disease and allergic response have been linked to adverse pregnancy outcomes, premature infants, pre-eclampsia and low weight at birth. These cytokines, in particular IL-2, IL-10 and TNF-α, were higher in patients at risk for premature delivery. Patients at increased risk for prematurity are IL-2, IL-4, IL-6, IL-10, TNF-α and TNF-γ.[13]

Patients with periodontal disease had higher levels of cytokines (IL-2, IL-6, IL-10 and TNF-α) and PGE2. Patients at high risk for preterm delivery had higher levels of IL compared to patients at low risk for preterm delivery. PGE2 increased with the severity of periodontal disease. PGE2 was higher in patients at low risk of premature birth, although this difference was not significant. Periodontal disease can increase the systemic inflammatory response, as well as PGE2 and cytokine levels.[14]

As a result of current publications that relate important gestational complications to the presence of inflammatory mediators produced in the sick periodontium, this review sought to assess whether the available literature supports such a risk relationship. The severity of maternal periodontal disease can positively influence risk associations with pregnancy complications, as it plays an important role in the pathogenesis of prematurity, including premature birth, low birth weight, restricted intrauterine growth and preeclampsia.[13]

The objective of this review was to verify, in the literature, if there is evidence of an association between periodontal disease in pregnant women and PPT and LBW, as well as the possible mechanisms involved in this association, evaluating studies on periodontal disease as a possible risk factor for pregnancy.

Materials and methods

The present study is a narrative review of literature, that is, it seeks to comprehensively understand the existing literature in the scientific environment.

Initially, 453 abstracts of articles published between 1996 and 2020, in English and Portuguese, were evaluated in the following databases: Pubmed, Lilacs, Scielo, Scopus, Embase, Web of Science and Cochrane Library. The search terms were: periodontal disease and pre-term birth; periodontitis and pre-term birth; gingivitis and pre-term birth; periodontal disease and pregnancy; periodontitis and pregnancy; gingivitis and pregnancy; periodontal disease and low birth weight; periodontitis and low birth weight; gingivitis and low birth weight. Studies that evaluated the periodontal condition in pregnant women and its outcome, systematic reviews and literature reviews in English and Portuguese were included.

The exclusion criteria for the evaluated abstracts were: duplicate productions, abstracts that did not specifically cover Dentistry, articles that did not relate the state of pregnancy with the periodontal tissues. The process of reviewing the references was developed by all authors, thus allowing for better processing and choice of references to be used in the construction of this research.

Initially, 453 abstracts of published scientific articles were evaluated. When adopting the eligibility criteria, 31 articles were included in this narrative review(Figure 1). There are many studies related to the theme, but which deal with pregnancies and periodontal disease, the studies show great methodological heterogeneity. Classification criteria, characteristics of the evaluated populations, evaluation criteria and types of applied therapeutics hinder the discussion on the subject.

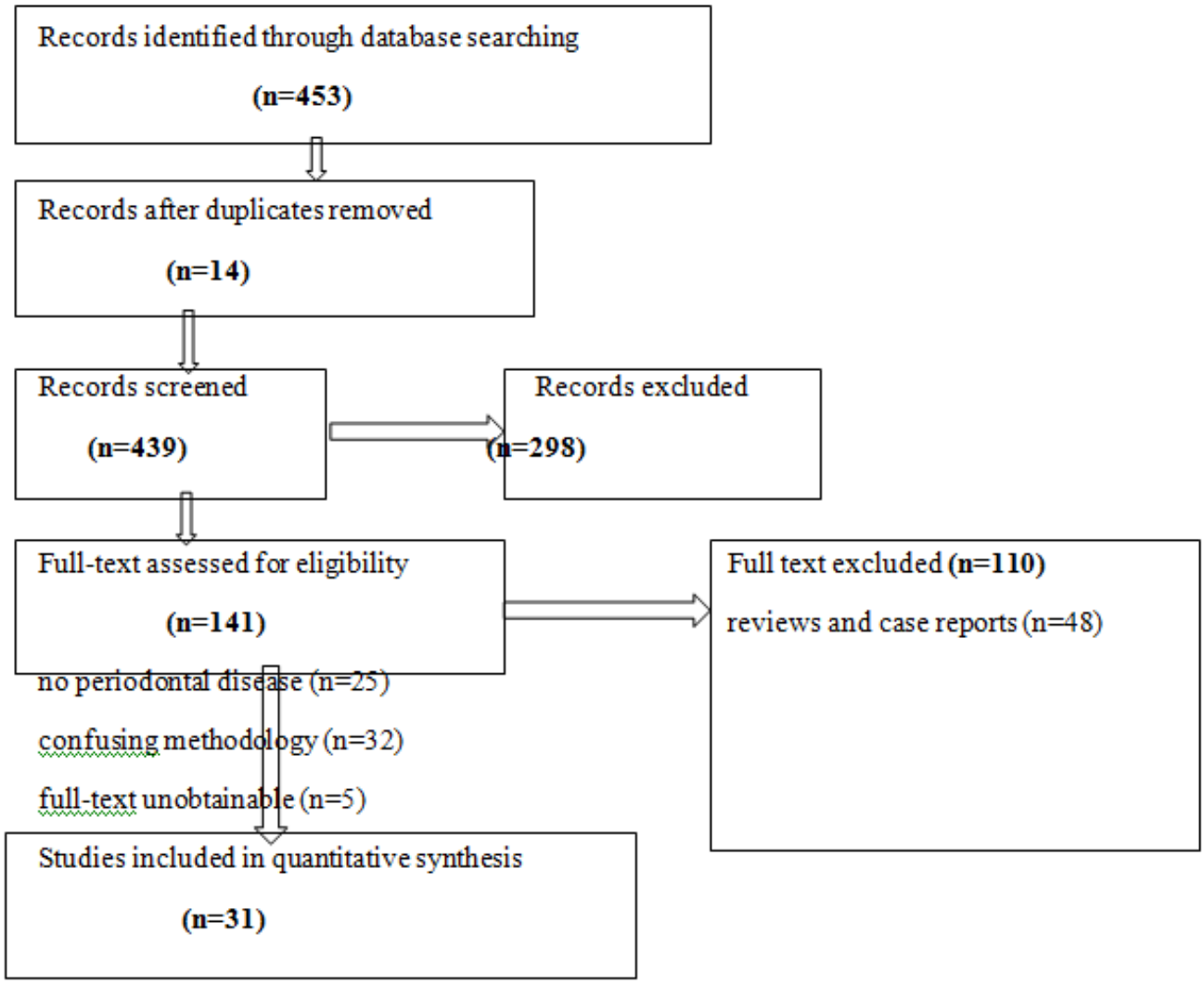

Figure 1 Flow diagram of study selection.

Discussion

In recent decades, several studies have proven the association of periodontal disease with premature birth and birth of low birth weight children. Birth considered premature is defined by the World Health Organization - WHO as a gestational age of less than 37 weeks. The international definition of low birth weight, dictated by the WHO, includes a weight of less than 2,500g, whether or not it is related to prematurity [5]. Government agencies and international organizations, such as the Brazilian Ministry of Health, the World Health Organization and UNICEF, has promoted actions to protect the health of the mother and child in order to intensify care for this risk group, but unfortunately the role of the dental surgeon has not yet been properly valued.

The etiology of prematurity and low birth weight is complex. Many preterm births are clearly associated with specific causes or situations in which multiple factors are involved, but the vast majority of prematurity occurrences still remain without a defined cause. Among the risk factors associated with the occurrence of undesirable episodes during pregnancy, several studies and clinical evidence

support the important role that maternal infections have on premature birth and the birth of low birth weight babies.[4,11,15,16]The occurrence of clinically detectable maternal infections, through the action of microorganisms or their endotoxins, can provoke an exacerbated tissue inflammatory response associated with the release of interleukin-1 (IL-1), prostaglandin (PG) and tumor necrosis factor alpha (TNF-α), chemical mediators also involved in triggering childbirth.[14]

Several studies on the pathogenesis of periodontal disease demonstrate that the presence of periodontopathogenic bacteria, through their bacterial components (lipopolysaccharides and endotoxins), can trigger an immunoinflammatory response characterized by the release of inflammatory mediators, these being the main factors associated with tissue destruction periodontal.[8,9]Thus, considering that periodontal tissues, in the face of microbial colonization of tooth surfaces, can promote an inflammatory response, and act as a reservoir of chemical mediators in high concentrations, the presence of periodontal infection may represent an additional path of infectious / inflammatory exposure for the fetoplacental unit.[6]

The studies that proposed to measure the levels of inflammatory mediators, such as PGE2 and IL, in the gingival fluid or maternal serum showed that mothers of premature and / or low weight babies have higher levels of PGE2,[15,17]when compared to mothers of babies with gestational age and normal weight. These studies reinforce the relationship between PD and prematurity and / or low birth weight, which is attributed to the action of bacterial products (in this case, periodontopathogenic bacteria) and the consequent trigger of an inflammatory reaction. During pregnancy, the increase in the levels of progesterone and estrogens, important for the maintenance of the conceptus, can contribute to the increase in the concentration of PGE2 in the gums of pregnant women with PD and worsen a pre-existing infectious condition.

In addition to these other studies, it has been clinically demonstrated that women with poor periodontal health are at increased risk of having premature birth and low birth weight babies.[18–25]On the other hand, some studies have shown a modest association between periodontal disease and adverse pregnancy outcomes,[26,27]or no association.[5,28,29]Based on this concept, a series of intervention studies were carried out in order to decrease adverse pregnancy outcomes and the rate of premature birth and low birth weight babies, and it was concluded that periodontal disease appears to be an independent risk for premature birth/low weight and that periodontal treatment in pregnant women with periodontitis significantly reduces this risk.[30]

Despite the large number of clinical studies found in this review, there is a lack of methodological standardization, a fact that limits definitive conclusions in this regard. On the other hand, the fact that periodontal disease is not yet proven to be a risk factor for obstetric complications does not diminish the importance of maintaining the oral health of pregnant women, who must have oral conditions that provide adequate nutrition, without pain and bleeding, and so on maintain their adequate nutritional supply.

Following the evidence, periodontal treatment should be performed at any time during pregnancy, as it reduces periodontal inflammation. Thus, it is extremely important that the dentist and the pregnant woman agree on the therapeutic process in order to guarantee the best possible result and reduce the risk of negative outcomes.[12]

In a recent study it was reported that despite being a controlled study and with more spontaneous or stillborn abortions in the control group, no correlation was found between periodontal disease and premature birth.[31] Unlike other studies that state that mothers who had premature babies had worse periodontal conditions compared to mothers who had their babies at the right time during a pregnancy, this increased risk reaching 3.2 times more chances of having a baby with underweight and 3.4 times of having a premature birth.[4,12]The increase in inflammatory cytokines can be observed in pregnant patients with periodontal disease and, consequently, a higher incidence of premature birth and low birth weight can be observed in these conditions.[11]this inflammatory response and premature birth is confirmed by both routes, one direct and one indirect.[7]Although systemic dissemination of cytokines may occur, it is believed that cytokines are found only in periodontal pockets. It is believed that this dissemination of cytokines can occur if there is scraping during the gestation period.[9] It is also added that this increase in the amount of cytokines also occurs through the translocation of periopathogenic bacteria to the placenta and amniotic fluid in response to periodontal disease.[11]

Periodontal disease and its adverse effects are related to outcomes in pregnancy, such as prematurity, low birth weight and pre-eclampsia, associated with greater amounts of inflammatory cytokines found in patients with chronic periodontitis, especially IL-2, IL10 and TNF-α.[13] Patients with periodontal disease and a high risk of premature birth have elevated levels of cytokines IL when compared to patients who did not present any periodontal changes and that PGE2 increased with the severity of periodontal disease.[14]

Despite the large number of clinical studies found in this review, there is a lack of methodological standardization, a fact that limits definitive conclusions in this regard. On the other hand, the fact that periodontal disease is not yet proven to be a risk factor for obstetric complications does not diminish the importance of maintaining the oral health of pregnant women, who must have oral conditions that provide adequate nutrition, without pain and bleeding, and so on. maintain their adequate nutritional supply. Non-surgical periodontal treatment, provided that with the consent of the physician accompanying the pregnant woman, can be performed at any time during pregnancy, as it reduces periodontal inflammation. Thus, it is extremely important that the dentist and the pregnant woman agree on the therapeutic process in order to guarantee the best possible result and reduce the risk of negative outcomes. The pregnant woman's awareness that correct daily hygiene is decisive for the condition of gingival inflammation is mandatory for a successful outcome.

Conclusion

The authors conclude that there are clinical changes that are related to the accumulation of dental biofilm in pregnancy and, as a consequence, it is possible to observe interference in the course of the gestational period, however, there is a need for further studies for this relationship to be definitively confirmed.

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Conflicts of interest

The author declares that there is no conflict of interest.

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