

Periodontal Diseases in Pregnancy – The Forgotten Connection

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Abstract

Pregnancy and early childhood are particularly important times to access oral health care. It is because the consequences of poor oral health can have a lifelong impact. Periodontal disease is the inflammation of the gums and supporting structures of teeth. Moreover, periodontitis is defined as a chronic inflammatory disease of the tooth supporting structures triggered against pathogenic bacterial microflora. The subsequent exuberant

inflammatory response leads to alveolar bone loss resulting in loss of tooth.

Maternal periodontal disease is a highly prevalent condition that has been studied extensively in relation to adverse pregnancy outcomes, including preterm delivery, preeclampsia, and low birth weight. Investigators speculate that hematogenous transport of bacteria and/or pro-inflammatory mediators from sites of periodontal infection into the placenta, fetal membranes, and amniotic cavity induces pathological processes that lead to these

adverse outcomes. This review article emphasize on the prevention of periodontal disease and safety of dental care during pregnancy.

Keywords: Pregnancy, Gingivitis, Periodontitis, Inflammation

Introduction

When discussing the well-being of the mother, promoting good oral health during pregnancy is important, as it provides an opportunity for dentists to educate women about preventing dental caries in their babies, which in turn may reduce the incidence of adverse pregnancy outcomes.^[1-2] The inclusion of an assessment of oral health in comprehensive prenatal health care is of great significance, but this is often overlooked.³ Studies have come to the conclusion that only 22 to 34% of women in the United States consult a dentist during pregnancy. Moreover, it has been understood that only one half of pregnant women attend to it, when an oral problem arises.⁴ This difficulty is compounded by a lack of national clinical guidelines for the management of common oral conditions in pregnancy. The American Dental Association and the American College of Obstetricians and Gynecologists provide only advisory brochures on oral health for pregnant patients, and recently New York became the first state to form an evidence based prenatal oral health consensus document.⁵ Needless to say, in the absence of strict practice guidelines to follow, fear of medicolegal action based on negligent or substandard treatment of oral conditions during pregnancy abounds, even when largely unfounded.⁶

Gingival changes observed during pregnancy have been well documented,⁷ and the increase in both the rate of estrogen metabolism and the synthesis of prostaglandins contribute to this.⁸ Also alterations in progesterone and estrogen levels have been shown to affect the immune system and the rate and pattern of collagen production in

the gingiva, thus reducing the body's ability to repair and maintain gingival tissue.^[9-10] Periodontal infections, which can be a reservoir for inflammatory mediators, may pose a potential threat to the placenta and fetus, thereby increasing the likelihood of preterm delivery.¹¹

A recent survey of 55 practicing obstetricians from North Carolina concluded that the majority (84%) of respondents considered periodontal disease to be one of the most important risk factors for adverse pregnancy outcomes, but 49% rarely or never examined patients' mouths.¹² In a 2008 study of obstetricians, only 29% performed an oral exam, though 84% associated poor dental hygiene with preterm delivery.¹³ It is evident that pregnant women are more prone to have compromised oral health due to changes in hormone levels and eating habits¹⁴ making it an important time to receive oral care. In the light of the growing interest in the relationship between oral conditions, particularly periodontal disease, and pregnancy, it calls for increased collaboration among medical and dental professionals.¹⁵

The Diseased Peridontium

Oral infections result in three major clinical conditions: dental caries, gingivitis, and periodontitis. Periodontal disease (PD) is defined as an infection of the gums and bone caused by accumulation of plaque, a sticky film of bacteria that adheres to teeth.¹⁶ Throughout life, plaque forms on teeth and can gather if not removed through daily brushing, flossing, and regular professional cleaning. The bacteria present in plaque produce toxins that cause tooth decay and gum irritation, and this condition is referred to as gingivitis, is the early stage of PD, which causes gums to swell, become red, or bleed. Gingivitis is a reversible condition treated by debridement of dental plaque.¹⁷ If left untreated, the bodily response leads to periodontitis with the gum separating from the tooth and forming pockets, or deepened spaces. As gum disease

progresses, the bone and soft tissues supporting the teeth are destroyed, ultimately leading to loose teeth, tooth loss, or dental extraction. Treatment includes deep cleaning such as scaling and root planing, which are procedures that remove tooth plaque and calculus. Common problems include halitosis, unpleasant mouth taste, bleeding upon brushing, and tooth mobility.¹⁸

The Evils of Periodontitis in Women

Periodontitis is observed more commonly in women who show poor oral hygiene, not seeking regular dental care, smoke, have diabetes, and are immunocompromised.¹⁹ As early as puberty, the hormones estrogen and progesterone exaggerate the mechanism of gum tissue reaction to irritants in plaque, making women easy targets for PD.²⁰ The increase in estrogen and progesterone levels just before and during the menstrual cycle make women prone to experience canker sores or swollen and bleeding gums. As the hormonal levels are elevated during pregnancy, they alter gingival connective tissue and its immune response to oral bacteria.²¹ Gingivitis is especially common during the second to eighth month of pregnancy, also known as the period when many women experience red, puffy, or tender gums. A vicious cycle is in place, as once gums swell or become irritated, the very activity designed to prevent PD such as chewing food and brushing teeth can exacerbate the irritation and swelling, in turn increasing bleeding of gums, advancing the disease further.^[22,20] Additional acute gingival irritation may precipitate, thanks to orthodontic appliances such as braces.²³

Periodontal Diseases Affecting Pregnancy

Gingivitis

In a systematic review by Figuero et al. (2013) it was stated that the relationship between pregnancy and gingivitis indicated 'the presence of a significant increase in gingivitis during pregnancy and between pregnant and

postpartum or non-pregnant women.²⁴ In the same year Ehlers et al. compared the dental evaluation and gingival crevicular fluid from 40 pregnant women and 40 age-matched non-pregnant control subjects, and concluded that 80% of pregnant women had gingival inflammation compared with 40% of control subjects.²⁵ Gogeneni et al. in 2015 found that pregnant women with gingivitis, and pregnant women with gingivitis and gestational diabetes mellitus (GDM) had high levels of systemic C-reactive protein. The above mentioned conclusions and findings point towards gingivitis being a growing issue in pregnant women.²⁶

Periodontitis

Recent studies have shown an increasing association between periodontitis during pregnancy and low birth weight (LBW), very low birth weight (VLBW), preeclampsia, and gestational diabetes mellitus.^[27-30] In 2012, Guimaraes et al. showed in their cross sectional study of 1,206 postpartum women that "maternal periodontitis was associated with a decrease in mean birth weight, as well as LBW and VLBW".²⁸ Four years later, Corbella et al. happened to conduct a meta-analysis of studies in which researchers controlled for periodontitis as a risk factor associated with negative pregnancy outcomes. A total of 22 out of 422 studies, which included 17,053 subjects were selected and an association between periodontitis and negative consequences in pregnancy was established; however, this association was found to be weak.²⁷ Xiong et al. in 2009 concluded that periodontitis was associated with GDM (77.4% of pregnant women with GDM had periodontitis) with an adjusted odds ratio of 2.6 and a confidence interval of 95% in their case-control study of 53 pregnant women with GDM and 106 without GDM.³⁰ Five years later, in 2014 Ha et al. found "a significant relationship between periodontitis and preeclampsia in never smokers" in their prospective

cohort study of 283 pregnant women who had never smoked, 67 with periodontitis and 216 without periodontitis.²⁹

The Evils of Periodontal Disease on Maternal and Infant Health

Gum inflammation leads to infection, that in turn adversely affects the overall health of the mother, showing the subsequent increase in possibility of unfortunate pregnancy outcomes such as prematurity, low birth weight infants, gestational diabetes, preeclampsia and cardiovascular disease.^[19,31-34] Discomforts of periodontal disease could interfere with maternal nutritional intake, and it has been found that oral bacterial organisms translocate to placental tissues, affecting the amniotic membranes, amniotic fluid, placenta, fetal lungs, brain, and fetal circulation.^[33,35-36] This bacterial challenge results in increased cytokine expression, which ultimately can impact placental function and precipitate preterm labor.^[37-38] Considered a source of gram negative anaerobic organisms and bacterial components such as lipopolysaccharides, Periodontal infection can trigger the release of immune modulators, which stimulates prostaglandin E2 production^[19,39] leading to elevated levels in the blood inducing uterine contractions.¹⁷ Periodontitis also directly affects the inflammatory system, levels of C-reactive protein in plasma, which are considered markers of systemic inflammation, and it has been concluded that they are higher in women with periodontal disease than in healthy women without periodontal complications.⁴⁰

The Safety of Dental Care in Pregnancy

Studies have confirmed the effectiveness of providing oral healthcare in pregnancy, including prophylaxis, restorations, extractions, and periodontal treatment.^[19,41] X-ray diagnosis may be required during pregnancy, but every possible precaution should be taken to minimize

exposure to the mother and fetus.⁴² The use of a protective thyroid collar and abdominal apron is recommended, and elective dental treatment is avoided during the first trimester whenever possible, as it is considered as the time of greatest risk to the fetus from any chemical exposure.¹⁹ Most medications for common diseases prescribed in pregnancy can be used with relative safety as there have been few adverse reports; however, consultation with the obstetrical team is recommended for drugs used in dentistry. The use of nitrous oxide is advised as limited to cases where local anesthetics are ineffective. A semi-seated position is recommended to avoid aspiration and orthostatic hypotension, and conscious sedation should be the last possible alternative in the third trimester, and general anesthesia in a hospital setting is suggested.⁴¹

Emerging Issues and Future Directions In Oral Health Care For Pregnant Women

In 2004, the American Academy of Periodontology released recommendations that included all women who are pregnant or planning a pregnancy should undergo periodontal examination, and that appropriate preventive or therapeutic services, if indicated, should be provided.⁴³ In several studies of periodontal treatment during pregnancy, oral health parameters were seen to have improved after therapy^[44-45] Despite this benefit, periodontal infection in women of childbearing age remains highly prevalent, particularly among low-income women and members of racial and ethnic minority groups. Socioeconomic factors, lack of resources to pay for care, barriers to access to care, and lack of public understanding of the importance of oral health and effective self-care practices all represent reasons cited for observed inadequacies in oral health.⁴⁶ Future oral health study orientations will concentrate on oral health treatment before, during and after delivery. Studies that use the Centers for Disease Control and

Prevention's Pregnancy Risk Assessment Monitoring System report that only 23–43% of pregnant women receive dental care during pregnancy,⁴⁷ a rate that is only half to two thirds the overall use of dental services among U.S. women. In addition, there is a lack of data explaining the racial and ethnic disparities in oral health among pregnant women. Pregnant women's perceptions of oral health and the barriers to and motivations for their seeking dental care must be assessed to adequately introduce preventive information on oral health into their prenatal care, which is one of the first steps in reducing health disparities. Further studies to better understand the mechanism of periodontal disease-associated preterm birth are needed if we are to tailor treatment to those women who might benefit the most. Confirmation of periodontal infection as an independent risk factor for adverse pregnancy outcomes and identification of those at greatest risk would be of significant public health importance because periodontal infection is both preventable and curable. At present, however, there is insufficient evidence for health care policy recommendations to provide maternal periodontal treatments for the purpose of reducing the risk of adverse pregnancy outcome, regardless of its other benefits.⁴⁸

Conclusion

Oral health in pregnancy is a critical, and significant component of nursing assessment, and the relation between periodontal disease and adverse pregnancy outcomes has been supported by the majority of clinical research in this field. However, the efficacy of periodontal treatment in preventing adverse pregnancy outcomes is still deemed inconclusive. There is a general agreement that oral screening and oral health education should be maintained as part of every maternal and infant assessment, and nurses should be well positioned to positively impact maternal health by promoting oral health

by counseling women on the importance of periodontal health for themselves and their families. Expectant mothers aware of the benefits of oral health for their overall health and the health of their infants shall be more receptive to maintaining proper oral hygiene and dental care, and the opportunity nurses have to positively impact maternal and infant health by influencing public health policy to incorporate preventive dental care within perinatal services can never be overstated.¹⁸

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