

## REVIEW

# Effect of basic periodontal treatment on CRP in elderly pregnant women with periodontal disease

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## ABSTRACT

Periodontal disease is a chronic infectious disease, which is common and frequent disease in pregnant women. It is an infectious disease caused by a variety of microorganisms, and the physiological changes in pregnant women after pregnancy can promote the occurrence and development of periodontal disease. Women no less than 35 years old are at an increased risk of maternal and fetal complications in pregnancy, older pregnant women with periodontal disease are prone to preterm birth, fetal growth retardation, premature rupture of membranes, and the incidence of neonatal low birth weight is significantly higher than that in older women with healthy oral health, i.e., these risks are increased with age. C-reactive protein (CRP) is an acute-phase protein produced by liver organs, which is produced by hepatocytes under the promotion of inflammatory factors, and serves as the most direct and sensitive marker of inflammatory response. Studies have shown that basic periodontal treatment relieve periodontal tissue inflammation in pregnant women with periodontitis, while significantly reducing their serum CRP concentration, thereby decreasing the occurrence of adverse pregnancy outcomes. The objective of this study is to investigate the effect of basic periodontal treatment on CRP in elderly pregnant women with periodontal disease.

**Key Words:** Basic periodontal treatment, Elderly pregnant women, CRP

## 1. INTRODUCTION

Periodontal disease (PD) is a chronic and devastating inflammatory disease that occurs in periodontal supporting tissues (including gingiva, periodontal ligament, alveolar bone and cementum), and the gradual destruction of the tissues around the teeth eventually leads to alveolar bone loss and tooth loss. This destructive process is caused by the formation of plaque biofilms, the release of toxic substances that cause host reactions, and the eventual occurrence of periodontal tissue inflammation.<sup>[1]</sup> Therefore, the most important cause of inflammation in the periodontal tissues is bacterial infection. Periodontal disease, including gingivitis and periodontitis, is the leading cause of tooth loss in adults in China. According to the Fourth National Oral Health Survey,<sup>[2]</sup> the

detection rates of probing bleeding and tartar in people aged 35-44 in China were 87.4% and 96.7%, respectively, and these proportions were increased with age. With the rapid development of China's economic level and the change of people's concept of fertility, the number of elderly (over 35 years old) pregnant women in China is also increasing year by year. With the rapid development of Chinese economic level and the change of people's concept of fertility, the number of elderly (over 35 years old) pregnant women in China is also increasing year by year. However, it is well known that women over the age of 35 are at increased risk of maternal and neonatal complications in pregnancy, including: stillbirth, preterm birth, preeclampsia and maternal mortality, with preeclampsia and preterm birth being the leading causes

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of maternal and perinatal morbidity and mortality.<sup>[3,4]</sup> These risks increase with age, and as a potential risk factor, the relationship between periodontal disease and adverse events in pregnancy has been a cause for concern.

## 2. ORAL DISEASES IN PREGNANT WOMEN

Periodontal disease, a chronic infectious disease, which is a common and frequently-occurring disease in pregnant women, is caused by a variety of microorganisms, and the physiological changes in pregnant women after pregnancy can promote the occurrence and development of periodontal disease. Physiological changes and hormonal differences in pregnant women increase their susceptibility to oral diseases such as periodontal disease, gingivitis, tooth sensitivity, and tooth loss.<sup>[5]</sup>

Gingivitis is the most common dental problem, affecting 60%-70% of pregnant women.<sup>[6]</sup> Gingiva is one of the target organs of sex hormones. When the progesterone level increases during pregnancy, mast cells in gingiva release the proteolytic enzymes and histamines under the influence of hormones, causing inflammation such as red swelling and tooth bleeding; hormones also dilate gingival capillaries and weaken the elasticity, increase the permeability of blood vessel walls, and increase the exudation of interstitial fluid, which aggravates the local inflammatory response and reduces the first barrier function of the periodontal; elevated hormone levels are conducive to the reproduction of bacterial groups in dental plaque, with the blood volume increased during pregnancy, and platelets and coagulation factors relatively decreased. The gums bleed more easily than during non-pregnancy, affecting the chewing function. In pregnant women, the gastrointestinal smooth muscle tone is reduced, the cardia sphincter is relaxed, the gastric emptying capacity is reduced, morning sickness refluxes the acidic contents from the stomach, and the acid-base balance of the oral cavity is disrupted and imbalanced, which further aggravates the inflammation.<sup>[7]</sup>

If gingivitis is not treated in time, inflammation can spread from the gums to the deep tissues, the periodontal ligament, alveolar bone and cementum, thus developing periodontitis.<sup>[8]</sup> The incidence of gingivitis and periodontitis during pregnancy was found to be high. Among 4,227 pregnant women, the prevalence of gingivitis during pregnancy was 71%;<sup>[9]</sup> more than 65.59% of pregnant women had dental calculus, 69.60% of pregnant women had soft scale, 35.81% of pregnant women already showed symptoms of swollen gums, 2.81% of pregnant women had loose teeth.<sup>[10]</sup> According to Lieff, 40% of 1,224 pregnant women have a certain type of periodontal disease, and the prevalence of gingivitis and periodontitis increase with the gestational age. If the

patient has a history of gingivitis and periodontitis before pregnancy, the pre-existing condition will be exacerbated during pregnancy.<sup>[11]</sup> Therefore, aggressive dental treatment is necessary for pregnant women.

## 3. PERIODONTAL DISEASE AND ADVERSE PREGNANCY OUTCOMES

During pregnancy, due to changes in hormone levels in the body, the gingival blood vessels are dilated, which often leads to the aggravation of the original periodontal infection; in addition, thanks to the changes in lifestyle habits and the neglect of oral hygiene maintenance, gum infection is easy to further develop into periodontitis during pregnancy, which brings great trouble to pregnant women's health care and daily life. Pregnant women with periodontitis are more likely to develop more severe bacteremia than pregnant women with periodontal health, and once these pathogenic bacteria, metabolites and inflammatory mediators pass through the blood circulation and placental barrier, they can easily lead to changes in maternal inflammatory immune response, triggering changes in inflammatory factors in the uterine cavity, and then affecting pregnancy outcomes.<sup>[12]</sup>

A cohort analysis of 2,724 pregnant women by Tomasz Konopka and Aneta Zakrzewska<sup>[13]</sup> showed that periodontitis may lead to an increased risk of developing preeclampsia PE, and periodontal treatment may play an important role in preventing this pregnancy complication. Researchers in Mexico found that gingivitis, periodontitis and tooth loss were associated with preterm birth PTB, and it was necessary to take measures aimed at maintaining pregnant women's oral health to avoid adverse consequences.<sup>[14]</sup> Periodontal disease is a potential risk factor for pregnant women born prematurely, with low birthweight (LBW) infants,<sup>[15]</sup> and the main periodontal pathogen has been found in women with prematurity/low birth weight. Periodontal disease is a potential risk factor for pregnant women who are born prematurely, and babies with low birthweight (LBW). It has been reported that, in United Kingdom, the proportion of pregnant women aged 35 years and older is increased from 6.2% in 1980 to 22.3% in 2016, and these women are at increased risk of maternal and infant complications in pregnancy, including stillbirth, preterm birth, preeclampsia and maternal death, which are increasing with age.<sup>[16]</sup> Pang Aihui et al. found that elderly pregnant women with periodontal disease are prone to preterm birth, fetal growth retardation and premature rupture of fetal membranes, in addition, the incidence of neonatal low weight is significantly higher than that of elderly pregnant women with oral health,<sup>[17]</sup> periodontal care and oral care should be strengthened before and during pregnancy in order to improve perinatal quality.

#### 4. C-REACTIVE PROTEIN AND PERIODONTAL BASIC THERAPY

Periodontitis affects the level of inflammation in the whole body, and the overgrowth of periodontal pathogens can induce inflammation at the site of infection and in local tissues, affecting serum levels of inflammatory markers such as IL-6, prostaglandins and C-reactive protein (CRP).<sup>[18]</sup> In the course of periodontitis, periodontal tissue inflammation can lead to increased levels of inflammatory mediators in the circulation, and high levels of systemic CRP have been shown to be associated with periodontitis.<sup>[19]</sup> CRP is an acute-phase protein produced by liver, which is produced by hepatocytes under the promotion of inflammatory factors, and serves as the most direct and sensitive marker of inflammatory response. Inflammatory stimulation can lead to an increase in the level of hypersensitive C-reactive protein (hs-CRP) in the patient's blood.<sup>[20]</sup> Because CRP detection is simple, economical and fast, it is particularly convenient to promote its clinical use in primary hospitals.

The basic treatment of periodontal disease is the first stage of periodontal treatment. The aim is to eliminate the causative factors of periodontal disease, thereby controlling inflammation and stopping the progression of the disease. Basic periodontal treatment, also known as non-surgical treatment, includes oral hygiene guidance, supragingival cleaning, subgingival scaling, root leveling, medication, elimination of bad habits, etc. In 2012, the United States issued a national consensus statement on the treatment of dental care during pregnancy, stating that the optimal time for dental treatment is in the second trimester (17 to 28 weeks), and if necessary, the use of x-rays, analgesics, and local anesthetics is safe even during pregnancy.<sup>[21]</sup> Studies have shown that routine prophylactic, diagnostic and restorative dental treatment during pregnancy, including periodontal treatment, will not increase adverse pregnancy outcomes, and that emergency oral care is possible throughout pregnancy.<sup>[22]</sup> Basic periodontal therapy improves periodontal tissue inflammation in pregnant women with periodontitis while significantly reducing their serum CRP concentrations<sup>[23]</sup> and reducing the occurrence of adverse pregnancy outcomes.<sup>[24]</sup> However, Queija et al. performed nonsurgical periodontal treatment in 40 Caucasian patients with stage II B periodontitis and found that non-surgical periodontal treatment did not significantly reduce the risk of preterm birth and low birth weight;<sup>[25]</sup> a significant association between periodontitis and adverse pregnancy outcomes has also been suggested, but not gingivitis.<sup>[26]</sup> Dental treatment for expectant pregnant women can have a beneficial effect on prolonging pregnancy by reducing the rate of preterm birth and perinatal complications.<sup>[27]</sup>

#### 5. CONCLUSION

With the change of concepts and birth policies, the number of elderly pregnant women has gradually increased in recent years, and the premature birth, stunted growth and low birth weight have also shown an upward trend. Periodontal disease is a common oral disease in pregnant women, which has a great change in the physiological structure in elderly pregnant women, which plays a role in promoting the development of periodontal disease and the occurrence of adverse pregnancy outcomes. A history of infection during pregnancy is an important factor in poor pregnancy outcomes, and chronic oral infections such as periodontitis may spread bacteria and inflammatory mediators to the placenta and cause pregnancy complications,<sup>[28]</sup> the overgrowth of periodontal pathogens can induce inflammation at the site of infection and in local tissues, and inflammatory markers such as C-reactive protein in serum are found to be associated with the development of periodontitis. High levels of systemic CRP are associated with periodontitis.<sup>[19]</sup> Basic periodontal treatment improves periodontal tissue inflammation in pregnant women with periodontitis while significantly reducing serum CRP concentrations and adverse pregnancy outcomes,<sup>[24]</sup> so CRP may be a credible mediator of the relationship between periodontal disease and adverse pregnancy outcomes. It has also been found that plasma CRP levels in pregnant women with periodontal disease have been significantly reduced after non-surgical periodontal treatment. However, it showed no association between the CRP level and adverse pregnancy outcomes.<sup>[19]</sup> Therefore, a large and well-designed study may be needed to confirm the exact association of periodontal basic therapy with adverse pregnancy outcomes.

What we do know, however, is that as our awareness of the potential link between periodontal disease and adverse pregnancy outcomes has been increasing, dentists should offer periodontal treatment to pregnant women, which is beneficial for both the pregnant women and their unborn children. Although there is insufficient evidence that the anti-infective therapy can change pregnancy outcomes, it can improve periodontal health, which in turn promotes overall health and risk factor control.<sup>[12]</sup> Researchers have shown that pregnant women who take good care of their oral cavity have better birth outcomes than those who do not.<sup>[29]</sup>

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