

A Case Report

Effect of Periodontal Diseases on Pregnancy

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Abstract

Pregnancy is a unique physiological state that affects almost all the organs, because of changes in the hormonal milieu meant to support the pregnancy. These changes generally reversible after delivery, are sometimes not without adverse effects. Recent upsurge in the interest in periodontal disease in pregnancy is attributed to association between periodontitis and adverse pregnancy outcome. Periodontal diseases are a group of infections and conditions that cause inflammation of the gingiva and the surrounding structures, which leads to destruction of the supporting tooth structures. Periodontal infections are predominantly caused by Gram-negative bacteria that induce local and systemic elevations of proinflammatory cytokines. Transient bacteremia that occurs due to high vascularity of the periodontal tissue may lead to direct bacterial invasion of the fetoplacental unit. The release of toxic products incites host's response and triggers an inflammatory response. As a source of subclinical and persistent infection along with the cascade of systemic inflammatory responses and immune-mediated injury, periodontitis puts the pregnancy at high risk. Evidence for and against association between oral diseases and adverse pregnancy outcome comes from cross-sectional studies and a few trials. Like any other association of obstetric outcome with systemic diseases, this one is also a subject of debate. We reviewed the studies providing evidence for and against effect of periodontal diseases on pregnancy. We found that different investigators have used different parameters to define periodontal disease, hence different results. Larger randomized controlled trials with uniform definitions of disease and outcome are needed to arrive at a definite conclusion.

Keywords: Low-birth weight, Periodontal diseases, Periodontitis, Pre-eclampsia, Pregnancy, Preterm labor

INTRODUCTION

Periodontal diseases are a group of infections that cause inflammation of the gingiva and the surrounding structures that leads to destruction of the supporting tooth structures.¹ These infections are predominantly caused by Gram-negative, anaerobic and micro-aerophilic bacteria that induce local and systemic elevations of proinflammatory prostaglandins (PGE2) and cytokines.^{2,3} Periodontitis begins with the accumulation of biofilms on the tooth surface that contain high loads of bacteria at or below the gingival margin.⁴ Toxins that are produced by these bacteria stimulate a chronic inflammatory response and lead to break-down of the periodontium, creating pockets.⁵ This further causes gingival ulcerations, alveolar bone loss and hence, tooth-loss. The release of toxic products from the pathogenic plaque bacteria along with the host's response triggers an inflammatory response, putting the pregnancy at high risk.⁶⁻⁸ Adverse

pregnancy outcomes that have been linked to periodontal diseases include miscarriage or early pregnancy loss, low birth weight, pre-eclampsia and preterm birth (PTB).^{6,8-11}

Literature is abounding with evidence for and against 'periodontitis is an independent risk factor for preterm birth and other adverse outcomes' hypothesis. Like any other hypothesis of association between systemic disease and obstetric outcome, this one is also a subject of debate. In this article, we have reviewed the studies addressing issues pertaining to effect of periodontal diseases on pregnancy.

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Periodontal Disease and Other Systemic Conditions

There is considerable interest in the link between oral and systemic health among dental and medical providers. Current evidence suggests that periodontal disease is associated with an increased risk for cardiovascular disease,^{8,9} diabetes,^{10,11} community and hospital acquired respiratory infections,¹² and adverse pregnancy outcomes.¹³⁻¹⁵

Individuals with periodontal disease have approximately a 1.5 – 1.9 increased odds for developing cardiovascular disease.^{8,16}

There appears to be a bidirectional relationship between periodontal disease and diabetes with a 2- to 3-fold increased risk for diabetes among individuals with tooth loss.

Teeth and periodontium may serve as a reservoir and may contribute to respiratory infections. Individuals with poor oral hygiene such as dental decay have a 2- to 9-fold increase odds for pneumonia.¹²

Many recent studies have reported that maternal periodontal disease may be an independent contributor to abnormal pregnancy outcomes including preterm birth, low birth weight, risk for preeclampsia, mortality, and growth restriction. However, the causality of how periodontitis influences pregnancy outcomes has not been established.^{14,25}

Treatment of periodontal infection may reduce the risk of other systemic conditions. In a randomized clinical trial to estimate the effect of periodontal therapy on traditional and novel risk factors for cardiovascular disease and on markers of inflammation, D'Aiuto et al found that therapy reduced inflammatory cytokines, blood pressure, and cardiovascular risk scores.²⁶

In a small treatment trial, type 2 diabetic patients showed improved diabetic control (lower HbA1c levels) after periodontal treatment.²⁷

Several investigators have reported similar effects of oral health regimens on reduced risk for nosocomial respiratory infections. Treatment of mechanically ventilated patients with a daily oral hygiene regime consisting of an 0.12% chlorhexidine gluconate wash reduced the risk for nosocomial pneumonia.^{28,29}

Recently, studies have been inconclusive on the effects of periodontal therapy during pregnancy for preventing adverse pregnancy outcomes.³⁰⁻³²

Treatment of oral infections may represent a novel approach to improving general health.

It is estimated that over 50% of pregnant women suffer from some form of gingival disease, either gingivitis or periodontitis,^{20,23} with the reports of prevalence fluctuating between 30%-100% for gingivitis and 5%-20% for periodontitis.³³

The prevalence of periodontal diseases during

pregnancy substantiates the strategy set forth by the surgeon general, in that periodontal treatment during pregnancy may potentially improve maternal and infant health.⁵

Periodontal Disease & Its Impact on Pregnancy

Periodontal infection is one of many infections that have been associated with adverse pregnancy outcomes. The hypothesis that periodontal conditions influence the outcome of a pregnancy is not a new idea. In 1931, Galloway identified that the focal infection found in teeth, tonsils, sinuses, and kidneys pose a risk to the developing fetus. His information dated back to 1916 when pregnant guinea pigs were inoculated with streptococci eluted from human stillborn fetuses. This inoculation resulted in a 100% abortion rate. To show the impact on humans, he obtained a full mouth radiographic series on 242 women presenting for prenatal care. Fifteen percent (n=57) had an apical abscess and the suggested treatment was extraction of the affected tooth.

Of those who were treated, none resulted in a miscarriage or still birth.

Galloway summarized that removal of a known focal infection, which had clearly demonstrated to be a source of danger to any pregnant woman, was more beneficial than allowing the infection to harbor throughout the pregnancy. He went on to suggest that all foci of infection should be removed early in pregnancy.³⁷

It is widely recognized that good oral health maintains the structures within the oral cavity. However, it is not universally accepted that oral health may be an independent contributor to abnormal pregnancy outcomes. Many studies have been conducted and the literature is controversial on the role periodontitis has and its influence on adverse pregnancy outcomes.

Recognition and understanding of the importance of oral health for systemic health has led to significant research into the role of maternal oral health and pregnancy outcomes. During pregnancy, changes in hormone levels promote an inflammatory response that increases the risk of developing gingivitis and periodontitis. As a result of varying hormone levels without any changes in the plaque levels, 50%-70% of all women will develop gingivitis during their pregnancy, commonly referred to as pregnancy gingivitis.

This type of gingivitis is typically seen between the second and eighth month of pregnancy.³⁸

Increased levels of the hormones progesterone and estrogen can have an effect on the small blood vessels of the gingiva, making it more permeable.^{39,40}

This increases the mother's susceptibility to oral infections, allowing pathogenic bacteria to proliferate and contribute to inflammation in the gingiva.

This hyperinflammatory state increases the sensitivity of the gingiva to the pathogenic bacteria found in dental biofilm. Females often see these changes during other periods of their life when hormones are fluctuating, such as puberty, menstruation, pregnancy, and again at menopause.³⁹⁻⁴¹

Recent research suggests that the presence of maternal periodontitis has been associated with adverse pregnancy outcomes, such as preterm birth,^{19,20,23} preeclampsia,²⁵ gestational diabetes,⁴² delivery of a small-for-gestational-age infant,¹⁴ and fetal loss.⁴³

The strength of these associations ranges from a 2-fold to 7-fold increase in risk. The increased risks suggest that periodontitis may be an independent risk factor for adverse pregnancy outcomes.

In 1996, Offenbacher et al reported a potential association between maternal periodontal infection and delivery of a preterm or low-birthweight infant.¹⁹

In a case-control study of 124 pregnant women, observations suggested that women who delivered at less than 37 weeks gestation or an infant weighed less than 2500 g had significantly worse periodontal infection than control women.

Two recent meta-analyses of the association between maternal periodontal disease and preterm birth have been published. Vergnes et al examined 17 studies and reported a pooled estimate odds ratio for preterm birth of 2.83 (95%CI:1.95-4.10, P < .0001).⁵²

Xiong et al performed a systematic review and meta-analysis of 44 studies (26 case control, 13 cohort, and 5 controlled trials) to examine the relationship between maternal periodontal disease and adverse pregnancy outcome.⁵³

The meta-analysis showed that maternal treatment of periodontal disease reduced the rate of preterm low birth weight infants as a group (pooled RR 0.53, 95% CI: 0.30-0.95,

Guidelines

Turning to the guidelines that have been produced by the Oral Health and Pregnancy Project, Prof Madianos says that oral-health professionals should be aware of six key factors:

- The importance of preserving and establishing periodontal and dental health during pregnancy, and should inform and educate their patients accordingly.
- That non-surgical periodontal therapy and dental treatment, including restorations and extractions, are safe during pregnancy and especially during the second trimester of gestation.
- That dental x-rays can be taken when needed, with the appropriate protection, and local anaesthesia can be delivered without additional risk for the foetus or the pregnant woman.
- That the use of common painkillers and systemic

antibiotics is generally safe, although tetracyclines should be avoided.

- That, as a general rule, medication should be prescribed to the pregnant woman after communication with her obstetrician.
- That all women should receive, at the start of pregnancy, a thorough evaluation of their dental and periodontal status. When gingivitis or periodontitis are diagnosed, periodontal treatment should be provided. Periodontal therapy will improve the periodontal condition and therefore the overall health of pregnant women.

Meanwhile, obstetricians are advised to be aware of the gum changes associated with pregnancy and that periodontal disease is associated with adverse pregnancy outcomes and that they should inform pregnant women accordingly.

CONCLUSION

Table 1. Summary of Relevant on Association between Maternal Periodontal Disease and Adverse Pregnancy Outcomes by Study Design

Authors/Year Journal	Country	Study Design	Definition of Periodontal Disease	Summary	Findings
Studies that found association or relationship between periodontitis and pregnancy outcomes					
Kunnen/2007 J Clin Periodontol	Netherlands	Case Control	Healthy PD: Pocket Depths <4mm Mild PD: 1-15 tooth sites with pocket depths >4mm and BOP Present Severe PD: > 15 tooth sites with pocket depths >4mm and BOP present	52 woman cases: preeclampsia < 34	periodontal disease more prevalent among cases vs. controls (82% vs. 37%)
Novak/2006 J Public Health Dent	US	Case Control	Periodontal Disease (PD) was defined as one or more teeth with one or more sites with probing depth > or = 4mm, loss of attachment > or = 2 mm, and bleeding on probing	NHANES III: role of gestational diabetes (GDM) in periodontal disease	Women with history of GdM twice as likely to have periodontal disease
Xiong/2006 Am J Obstet Gynecol	US	Case Control	Periodontal Disease (PD) was defined as one or more teeth with one or more sites with probing depth > or = 4mm, loss of attachment > or = 2 mm, and bleeding on probing	NHANES III: role of periodontal disease in GDM	Women with periodontal disease 3x more likely to develop GDM
Cota/2006 J Periodontol	Brazil	Case Control	Periodontal Disease was 4 or more teeth with one or more sites with pocket depths > 4mm and CAL > 3mm at the same site	588 women Cases: PTB/LBW	Women with periodontal disease at 1.8-fold increased risk for preeclampsia
Jarjoura/2005 Am J Obstet Gynecol	US	Case Control	Presence of 5 or more sites per subject with CAL of 3mm or greater	203 women Cases: PTB/LBW	Periodontal disease associated with PTB/LBW
Geopfert/2005 Am J Obstet Gynecol	US	Case Control	Periodontal Health-no attachment loss or gingival inflammation Gingivitis- gingival inflammation and no attachment loss Mild Periodontitis- 3-5mm of attachment loss in any one sextant Severe periodontitis- >5 mm of attachment loss in any one sextant	103 women Cases: spontaneous PTB < 32 weeks	Periodontal disease more common among vs controls
Cankeci/2004 Aust N Z J Obstet Gynecol	Turkey	Case Control	The Presence of four or more teeth with one or more sites with PD ≥4mm that bled on probing, and with a clinical attachment loss ≥ 3mm at the same site, was diagnosed as periodontal disease.	82 women Cases: preeclampsia	Periodontal disease associated with increased risk of preeclampsia, OR 3.5 (1.1-11.9)
Dasanayake/1998 Ann Periodontol	Thailand	Case Control	Periodontal health was defined using CPITN and DMFT scores	100 women Cases: LBW	Periodontal disease associated with LBW, OR 3.0 (1.39-8.33)
Offenbacher/1996 J Periodontol	US	Case Control	Extent of sites with clinical attachment level > 2.3 or 4 mm	124 women Cases: PTB/LBW	Periodontal disease associated with PTB/LBW, OR 7.5 (1.9-28.8)
Santo-Pereira/2007 J Clin Periodontol	Brazil	Cross-sectional	Periodontitis was classified as Early- CAL < 3mm Moderate CAL > 3mm and <5mm Severe CAL > 5mm and as localized (CAL <30%) or generalized (CAL > 30%)	124 women preterm labor defined as < 37 weeks	Periodontal disease more prevalent in women with preterm vs term labor (62% vs 27%)
Offenbacher/2006 Am J Obstet Gynecol	US	Prospective	Health PD : pocket depths ≤ 3mm without BOP Mild PD: 1-15 sites with pocket depths > 4mm or 1 or more sites with BOP Moderate/Severe PD: 15 or more sites with pocket depths > 4mm	1020 women received an antepartum and postpartum periodontal exam.	Women with periodontal disease at increased risk for PTB < 32 weeks
Bogges/2005 Am J Obstet Gynecol	US	Prospective	Health PD : pocket depths ≤ 3mm without BOP Mild PD: 1-15 sites with pocket depths > 4mm or 1 or more sites with BOP Moderate/Severe PD: 15 or more sites with pocket depths > 4mm	640 Umbilical Cord Blood Samples	Fetal inflammation and immune response to oral pathogens increased preterm birth (PTB) risk

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Authors/Year Journal	Country	Study Design	Definition of Periodontal Disease	Summary	Findings
Piiphat/2006 J Periodontol	US	Prospective	Self reported periodontitis validated by radiographs taken prior to pregnancy	101 Women	Periodontal disease may increase C-Reactive Protein levels during pregnancy
Bogges/2003 Obstet Gynecol	US	Prospective	Healthy PD: pocket depths <4mm Mild PD: 1-15 tooth sites with pocket depths >4mm and BOP present Severe PD: > 15 tooth sites with pocket depths > 4mm and BOP present	850 Women	Periodontal disease may be associated with preeclampsia, OR 2.4 (1.1-5.3)
Lopez/2002 J Dent Res	Chile	Prospective Intervention Study	Presence of 4 or more teeth showing one or more sites with probing depth 4 mm or higher, and with clinical attachment loss 3 mm or higher at the same site	639 Women	Periodontal disease may be associated with PTB/LBW, RR 3.5(1.5-7.9)
Jeffcoat/2001 J Am Dent Assoc	US	Prospective Observational	Periodontitis - > 3 sites with attachment loss of 3 mm or more; generalized periodontal disease - 90 or more sites with attachment loss of 3 mm or more Healthy periodontium <3 sites with 3 mm of attachment loss	1313 Women	Periodontal disease may be associated with PTB OR 4.5(2.2-9.2)
Mitchell-Lewis/2001 Eur J Oral Sci	US	Prospective Intervention Study	Not defined	Prospective Intervention Study 164 Women	Women with PTB had higher levels of oral pathogens in mouth; PTB rate less among treated women
Lopez/2005 J Periodontol	Chile	Randomized Clinical Trial Intervention Study	Gingival Inflammation with > 25% of sites with bleeding on probing, and no sites with clinical attachment loss > 2mm	Randomized Clinical Trial of periodontal treatment among women 870 with gingivitis	Treatment significantly reduced PTB/LBW (6% among untreated vs 2% treated)
Lopez/2002 J Periodontol	Chile	Randomized Clinical Trial Intervention Study	Periodontal disease -> teeth with pocket depths > 4mm and CAL > 3mm at the same site	Randomized Clinical Trial of antepartum vs. delay periodontal treatment to reduce PTB 400 women	Periodontitis was a risk factor for PTB/LBW and thereby reduced the rates of PTB/LBW

Periodontal diseases appear to be a potential risk factor for preterm birth. As well as other modifiable risk factors, these diseases must be taken in charge. Cooperation between obstetricians or general practitioners and periodontists should be developed. The promotion of the early detection and treatments of periodontal disease in young women before and during pregnancy will be beneficial especially for women at risk.

The mechanism by which these steroid hormones during pregnancy increase gingival inflammation is not known. They may have dual effects: enhancing expression of angiogenic factors and decreasing apoptosis of granuloma cells. Systemic inflammation plays a major role in the pathogenesis of preterm delivery, including pre-eclampsia, intrauterine growth restriction, and preterm delivery. Chronic infections like intrauterine infection and chorioamnionitis are linked to both preterm birth and elevated CRP levels. Furthermore, periodontal disease has been associated with increased risk of preterm low birth weight, low birth weight, and preterm birth. Periodontal intervention results in a significantly decreased incidence for preterm delivery.

REFERENCES

- American Academy of Periodontology: Parameters of care. Chicago: The American Academy of Periodontology; 1995. p. 9-18.
- Page RC. The role of inflammatory mediators in the pathogenesis of periodontal disease. J Periodontol Res 1991;26:230-242.
- Page RC, Kornman KS. The pathogenesis of human periodontitis. Periodontol 1997;14:9-11.
- Gibbons RJ, van Houte J. Bacterial adherence and the formation of dental plaques. In: Bachey EH, editor. Bacterial Adherence. London: Chapman and Hall; 1980:62-104.
- Kumar J, Samelson R, editors. Oral healthcare during pregnancy and early childhood: practice guidelines. New York, NY: New York State

Department of Health; 2006. Available at: <http://www.health.state.ny.us/publications/0824.pdf>.

- Bobetsis YA, Barros SP, Offenbacher S. Exploring the relationship between periodontal disease and pregnancy complications. J Am Dent Association 2006;137(Suppl 10):7S-13S.
- Shub A, Swain JR, Newnham JP. Periodontal disease and adverse pregnancy outcomes. J Maternal-Fetal and Neonatal Med 2006;19:521-528.
- Xiong X, Buekens P, Fraser WD, Beck J, Offenbacher S. Periodontal disease and adverse pregnancy outcomes: a systematic review. BJOG 2006;113:135-143.
- Bogges KA, Lief S, Murtha AP, Moss K, Beck J, Offenbacher S. Maternal periodontal disease is associated with an increased risk for preeclampsia. Obstetrics and Gynecol 2003;101: 227-231.
- Buduneli N, Baylas H, Buduneli E, Türkoğlu O, Köse T, Dahlen G. Periodontal infections and preterm low birth weight: a case-control study. J Clinical Periodontol 2005;32:174-181.
- Canakci V, Canakci CF, Canakci H, Canakci E, Cicek Y, Ingec M, et al. Periodontal disease as a risk factor for preeclampsia: a case-control study. Australian and New Zealand J Obstet and Gynaecol 2004;44:568-573.
- Agueda A, Ramon JM, Manau C, et al. Periodontal disease as a risk factor for adverse pregnancy outcomes: a prospective cohort study. J Clin Periodontol 2008;35:16-22.
- Xiong X, Buekens P, Goldenberg RL, Offenbacher S, Qian X. Optimal timing of periodontal disease treatment for prevention of adverse pregnancy outcomes: before or during pregnancy? Am J Obstet Gynecol. 2011;205:111 e1-6.
- Wei BJ, Chen YJ, Yu L, Wu B. Periodontal disease and risk of preeclampsia: a meta-analysis of observational studies. PLoS One. 2013;8:e70901.
- Chambrone L, Guglielmetti MR, Pannuti CM, Chambrone LA. Evidence grade associating periodontitis to preterm birth and/or low birth weight: I. A systematic review of prospective cohort studies. J Clin Periodontol. 2011;38:795-808.
- Kunnen A, van Doormaal JJ, Abbas F, Aarnoudse JG, van Pampus MG, Faas MM. Periodontal disease and pre-eclampsia: a systematic review. J Clin Periodontol. 2010;37:1075-87.
- Kim AJ, Lo AJ, Pullin DA, Thornton-Johnson DS, Karimbux NY. Scaling and root planing treatment for periodontitis to reduce preterm birth and low birth weight: a systematic review and meta-analysis of randomized controlled trials. J Periodontol. 2012;83:1508-19.
- Schwendicke F, Karimbux N, Allareddy V, Gluud C. Periodontal treatment for preventing adverse pregnancy outcomes: a meta- and trial sequential analysis. PLoS One. 2015;10:e0129060.
- Meynardi F, Pasqualini ME, Rossi F, Dal Carlo L, Biancotti P, Carinci F. Correlation between dysfunctional occlusion and periodontal bacterial profile. J Biol Regul Homeost Agents. 2016;30:115-21.
- Lombardo L, Carinci F, Martini M, Gemmati D, Nardone M, Siciliani G. Quantitative evaluation of dentin sialoprotein (DSP) using microbeads - A potential early marker of root resorption. ORAL and Implantology. 2016;9:132-42.
- Lauritano D, Cura F, Candotto V, Gaudio RM, Mucchi D, Carinci F. Evaluation of the Efficacy of Titanium Dioxide with Monovalent Silver Ions Covalently Linked (Tiab) as an Adjunct to Scaling and Root Planing in the Management of Chronic Periodontitis Using Per Analysis: A Microbiological Study. J Biol Regul Homeost Agents. 2015;29:127-30.
- Scapoli L, Girardi A, Palmieri A, Martinelli M, Cura F, Lauritano D, Carinci F. Quantitative Analysis of Periodontal Pathogens in Periodontitis and Gingivitis. J Biol Regul Homeost Agents. 2015;29:101-10.
- Lauritano D, Cura F, Candotto V, Gaudio RM, Mucchi D, Carinci F. Periodontal Pockets as a Reservoir of Helicobacter Pylori Causing Relapse of Gastric Ulcer: A Review of the Literature. J Biol Regul Homeost Agents. 2015;29:123-6.
- Scapoli L, Girardi A, Palmieri A, et al. Interleukin-6 Gene Polymorphism Modulates the Risk of Periodontal Diseases. J Biol Regul Homeost Agents. 2015;29: 111-6.
- Carinci F, Girardi A, Palmieri A, et al. LAB®-Test 1: Peri-Implantitis and bacteriological analysis. European Journal of Inflammation. 2012;10:91-93.
- Carinci F, Girardi A, Palmieri A, et al. LAB®-test 2: Microflora and periodontal disease. European Journal of Inflammation. 2012;10:95-98.
- Carinci F, Girardi A, Palmieri A, et al. Lab®-test 3: Genetic susceptibility in periodontal disease. European Journal of Inflammation. 2012;10:99-101.
- Scapoli L, Girardi A, Palmieri A, et al. IL6 and IL10 are genetic susceptibility factors of periodontal disease. Dent Res J (Isfahan). 2012;9:S197-201.
- Scapoli L, Girardi A, Palmieri A, et al. Microflora and periodontal disease. Dent Res J (Isfahan). 2012;9:S202-6.

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