

# Interrelationship of pregnancy and periodontal disease- A review

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## Abstract:

Periodontal disease in pregnancy is receiving increasingly widespread attention and is rapidly evolving at a multidisciplinary level. Pregnancy increases the risk of periodontitis due to the increase in progesterone and estrogen. Moreover, periodontitis during pregnancy is associated with development of pregnancy and birth related complications. For most women, the composition of the oral microbiome could undergo pathogenic shifts during pregnancy due to hormonal and immunological changes. Thus, pregnancy has been proposed to increase susceptibility to gingival inflammation further. Periodontal disease treatment in pregnant women to reduce the risk of preterm birth and low birth weight.

## 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%).<sup>1,2</sup>

Periodontitis is independently linked to severe complications during pregnancy, such as preterm birth, low birth weight, and gestational diabetes. 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.<sup>3,4</sup>

## Background:

In 1778, *Vernieer* discussed "toothpains" in pregnancy. In 1818, *Pitcarin* described gingival hyperplasia in pregnancy.<sup>5</sup> Despite awareness regarding pregnancy and its effect on periodontal disease, only recently has evidence indicated an inverse relationship to systemic health. Current research implies periodontal disease may alter the systemic health of the patient and adversely affect the well-being of the fetus by elevating the risk for low-birth-weight, preterm infants.<sup>5</sup>

In 1877, *Pinard* recorded the first case of "pregnancy gingivitis."<sup>6</sup> The occurrence of pregnancy gingivitis is extremely common, occurring in 30% to 100% of all pregnant women.<sup>7,8,9</sup> It is characterized by erythema, edema, hyperplasia, and increased bleeding. Histologically, the description is the same as for gingivitis. However, the etiologic factors are different despite clinical and histologic similarities. Cases range from mild to severe inflammation, which can progress to severe hyperplasia, pain, and bleeding.

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Moderate form of pregnancy gingivitis



Pyogenic granuloma of pregnancy (pregnancy tumor)



Moderate gingival enlargement



Severe gingival enlargement

Periodontal status before pregnancy may influence the progression or severity as the circulating hormones fluctuate.<sup>10</sup> The anterior region of the mouth is affected more often, and interproximal sites tend to be most involved. Increased tissue edema may lead to increased pocket depths and may be associated with transient tooth mobility.<sup>11</sup> The gingiva is the most common site involved (approximately 70% of all cases), followed by the tongue and lips, buccal mucosa, and palate.<sup>12</sup> **Pyogenic granulomas** ("pregnancy tumors," pregnancy epulides) occur in 0.2% to 9.6% of pregnancies. Pyogenic granulomas appear most often during the second or third month of pregnancy. Clinically, they bleed easily and become hyperplastic and nodular. When excised, the lesions usually do not leave a large defect. They may be sessile or pedunculated and ulcerated, ranging in color from purplish red to deep blue, depending on the vascularity of the lesion and degree of venous stasis. The lesion classically occurs in an area of gingivitis and is associated with poor oral hygiene and calculus.

**Etiology of Gingival Responses to Elevated Estrogen and Progesterone during Pregnancy:**

**Subgingival Plaque<sup>13</sup>**

- Increase in anaerobic/aerobic ratio
- Higher concentrations of Prevotella intermedia (substitutes sex hormone for vitamin K-growth factor), Bacteroides melaninogenicus and Porphyromonas gingivalis

**Maternal Immunoresponse<sup>14</sup>**

- Depression of cell-mediated immunity
- Decreased neutrophil chemotaxis
- Depression of antibody and T-cell responses : Decrease in ratio of peripheral T helper cells to T suppressor-cytotoxic cells (CD4/CD8 ratio)<sup>13</sup>

Cytotoxicity directed against macrophages and B cells may result in diminished immunoresponsiveness.

Decrease in absolute numbers of CD3+, CD4+, and CD19+ cells in peripheral blood during pregnancy versus postpartum

Stimulation of prostaglandin production<sup>15</sup>

**Sex Hormone Concentration<sup>16,17</sup>**

**Estrogen**

Increases cellular proliferation in blood vessels (known in the endometrium).

Decreases keratinization, while increasing epithelial glycogen. Specific receptors are found in gingival tissues.

**Progesterone**

Increases vascular dilation, and thus increases permeability (resulting in edema and accumulation of inflammatory cells).

Increases proliferation of newly formed capillaries in gingival tissues (increased bleeding tendency).

Alters rate and pattern of collagen production.

Increases metabolic breakdown of folate (folate deficiency can inhibit tissue repair).

Specific receptors are found in gingival tissues.

Decreases plasminogen activator inhibitor type 2, and thus increases tissue proteolysis.

**Estrogen and Progesterone**

Affect ground substance of connective tissue by increasing fluidity.

Concentrations increase in saliva and fluid with increased concentrations in serum.

**ORAL MANIFESTATIONS OF PREGNANCY**

Perimyolysis (acid erosion of teeth) may occur if "morning sickness" or esophageal reflux is severe and involves

repeated vomiting of the gastric contents. Severe reflux susceptible to environmental influences. In the **last half** of pregnancy may cause scarring of the esophageal sphincter, and **the third trimester**, a hazard of premature delivery exists. The patient may become a more likely candidate for GERD because the uterus is very sensitive to external stimuli.

later in life. Xerostomia is a frequent complaint among pregnant women. One study found this persistent dryness procedures should be delayed until the postpartum period. in 44% of pregnant participants.<sup>17,18</sup>

Appointments should be short, and the patient should be comfortable. A rare finding in pregnancy is ptyalism, or sialorrhea. This allowed to change positions frequently. Prolonged chair time may need to be avoided because the woman is most of gestation and may abate at the end of the first trimester.

Further, supine hypotensive syndrome may occur. In a identified, but it may result from the inability of reclining or supine position, the great vessels, nauseated gravid women to swallow normal amounts of particularly the inferior vena cava, are compressed by the saliva, rather than from a true increase in salivary production. As the uterus increases in size during the production.<sup>19</sup>

Because pregnancy places the woman in an and aorta may occur it the patient is placed in a supine immunocompromised state, the clinician must be aware of position. By interfering with venous return, this the patient's total health. Gestational diabetes, leukemia, compression will cause maternal hypotension with and other medical conditions may appear during placental perfusion decreased blood pressure and cardiac pregnancy. output, syncope and eventual loss of consciousness may occur.

#### CLINICAL MANAGEMENT

A thorough medical history is an imperative component of pregnancy. Supine hypotensive syndrome can usually be reversed by the periodontal examination, especially in the pregnant turning the patient on her **left side** or simply by elevating patient. Because of immunologic alterations, increased the right hip 5 to 6 inches during treatment, thereby blood volume and fetal interactions, the clinician must removing pressure on the vena cava and allowing blood to diligently and consistently monitor the patient's medical return from the lower extremities and pelvic area. A fully and periodontal stability. Medical history dialog should reclined position should be avoided if possible. A include pregnancy complications, previous miscarriages, preventive 6-inch soft wedge (rolled towel) should be and recent history of cramping, spotting, or pernicious placed on the patient's right side when she is reclined for vomiting. The patient's obstetrician should be contacted to clinical treatment.

discuss her medical status, periodontal or dental needs, **The second trimester is the safest period for providing** and the proposed treatment plan.<sup>18</sup> A preventive **routine dental care**. Major oral or periodontal surgery periodontal program consisting of nutritional counseling should be postponed until after delivery. "Pregnancy and rigorous plaque control measures in the dental office tumors" that are painful, interfere with mastication, or and at home should be reinforced.

#### Plaque Control

Scaling, polishing, and root planing may be performed delivery. The American Academy of Periodontology whenever necessary during pregnancy. Some practitioners (www.perio.org) has developed a position statement avoid the use of high alcohol-content antimicrobial rinses in regarding the need for providing proper periodontal pregnant women and prefer to use non-alcohol-based oral therapy for pregnant patients.<sup>18</sup>

rinses.<sup>19</sup>

#### Dental Radiographs

#### Prenatal Fluoride

The prescribing of prenatal fluoride supplements has been well established, however, it is most desirable not to an area of controversy. Although two studies have claimed have an irradiation during pregnancy, especially during the beneficial results, others suggest that the clinical efficacy first trimester, because the developing fetus is particularly of prenatal fluoride supplements is uncertain, and that the susceptible to radiation damage. When radiographs are mechanism by which prenatal fluorides might impart needed for diagnosis, the most important aid for the carious is unclear.<sup>20</sup> The American Dental Association patient is the protective **lead apron**. Studies have shown (ADA) does not recommend the use of prenatal fluoride that when an apron is used during contemporary dental because its efficacy has not been demonstrated. The radiography, gonadal and fetal radiation is virtually American Academy of Pediatric Dentistry supports this immeasurable.<sup>21</sup> Even with the obvious safety of dental position as well. The American Academy of Pediatrics has radiography, x-ray films should be taken selectively during no stated position on prescribing prenatal fluorides.

#### TREATMENT

The aim of periodontal therapy for the pregnant patient is panoramic, or selected periapical films are indicated.<sup>21</sup> to minimize the potential exaggerated inflammatory response related to pregnancy-associated hormonal alterations.

Drug therapy in the pregnant patient is controversial because drugs can affect the fetus by diffusion across the alterations.

#### Elective Dental Treatment

Other than good plaque control, it is prudent to avoid references such as *Briggs et al.'s Drugs in Pregnancy* and elective dental care if possible during the first trimester *Lactation*<sup>22</sup> and *Olin's Drug Facts and Comparison*<sup>23</sup> for and the last half of the third trimester. The **first trimester** information on the FDA pregnancy risk factor associated is the period of organogenesis, when the fetus is highly with prescription drugs. Ideally, no drug should be

administered during pregnancy, especially the first trimester. The effect of a particular medication on the fetus depends on the type of antimicrobial, dosage, and duration of the course of therapy.<sup>24,25</sup> However, it is sometimes impossible to adhere to this rule. In particular, antibiotics are often needed during pregnancy, and duration or the course of therapy.

General guidelines for anesthetic, analgesic, sedative-hypnotic and antibiotic drugs (Table 1, 2, and 3)

Local Anesthetic and Analgesic Administration during Pregnancy		
Drug	FDA Category (Prescription Drug)	During Pregnancy
<b>Local Anesthetics*</b>		
Lidocaine	B	Yes
Mepivacaine	C	Use with caution; consult physician.
Prilocaine	B	Yes
Bupivacaine	C	Use with caution; consult physician.
Etidocaine	B	Yes
Procaine	C	Use with caution; consult physician.
Articaine	B	Yes; no blocks
<b>Analgesics</b>		
Aspirin	C/D, third trimester	Caution; avoid in third trimester.
Acetaminophen	B	Yes
Ibuprofen	B/D, third trimester	Caution; avoid in third trimester.
Codeine†	C	Use with caution; consult physician.
Hydrocodone†	B	Use with caution; consult physician.
Oxycodone†	B	Use with caution; consult physician.
Propoxyphene	C	Use with caution; consult physician.

\*Can use vasoconstrictors if necessary.  
 †Avoid prolonged use.  
 FDA, U.S. Food and Drug Administration.

(Table 1)

Sedative-Hypnotic Drug Administration during Pregnancy		
Drug(s)	FDA Category	During Pregnancy
Benzodiazepines	D	Avoid.
Barbiturates	D	Avoid.
Nitrous oxide	Not assigned	Avoid in first trimester; otherwise use with caution; consult physician.

(Table 2)

Antibiotic Administration during Pregnancy			
Drug(s)	FDA Category (Prescription Drug)	During Pregnancy	Risks
Penicillins	B	Yes	Diarrhea
Erythromycin	B	Yes; avoid estolate form.	Intrahepatic jaundice in mother
Clindamycin	B	Yes, with caution	Drug concentrated in fetal bone, spleen, lung, and liver
Cephalosporins	B	Yes	Limited information
Tetracycline	D	Avoid.	Depression of bone growth, enamel hypoplasia, gray-brown tooth discoloration
Ciprofloxacin	C	Avoid.	Possible developing cartilage erosion
Metronidazole	B	Avoid; controversial.	Theoretic carcinogenic data in animals
Gentamicin	C	Caution; consult physician.	Limited information Ototoxicity
Vancomycin	C	Caution; consult physician.	Limited information
Clarithromycin	D	Avoid; use only if potential benefit justifies risk to fetus.	Limited information Adverse effects on pregnancy, outcome, and embryo/fetal development in animals

(Table 3)

**Breast feeding**

Usually, there is a risk that the drug can enter breast milk usually not more than 1% to 2% of the maternal dose; and be transferred to the nursing infant, in whom exposure therefore it is highly unlikely that most drugs have any adverse effects (Tables 4). Unfortunately, pharmacologic significance for the infant. The mother there is little conclusive information about drug dosages should take prescribed drugs just after breastfeeding and and effects through breast milk; however, retrospectively then avoid nursing for 4 hours or more, if possible, to clinical studies and empiric observations coupled with decrease the drug concentration in breast milk.<sup>10,26</sup> known pharmacologic pathways allow recommendations to

Local Anesthetic and Analgesic Administration during Breastfeeding		Antibiotic and Sedative-Hypnotic Administration during Breastfeeding	
Drug	During Breastfeeding	Drug(s)	During Breastfeeding
<i>Local Anesthetics</i>		<i>Antibiotics*</i>	
Lidocaine	Yes	Penicillins	Yes
Mepivacaine	Yes	Erythromycin	Yes
Prilocaine	Yes	Clindamycin	Yes, with caution
Bupivacaine	Yes	Cephalosporins	Yes
Etidocaine	Yes	Tetracycline	Avoid.
Procaine	Yes	Ciprofloxacin	Avoid.
		Metronidazole	Avoid.
		Gentamicin	Avoid.
		Vancomycin	Avoid.
<i>Atull: Analgesics</i>		<i>Sed Sedatives-Hypnotics</i>	
Aspirin	Avoid.	Benzodiazepines	Avoid.
Acetaminophen	Yes	Barbiturates	Avoid.
Ibuprofen	Yes	Nitrous oxide	Yes
Codeine	Yes		
Hydrocodone	No data		
Oxycodone	Yes		
Propoxyphene	Yes		

\*Antibiotics have the risk of diarrhea and sensitization in the mother and infant.

(Table 4)

**Conclusion:**

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. Pregnant women are highly susceptible to periodontal disease due to changes in hormonal and immune levels, which places a huge burden on the healthcare system and requires multidisciplinary interventions. A meta-analysis found that periodontal treatment during pregnancy decreased the incidence of preterm birth and could significantly improve the birthweight of infants.<sup>27</sup> Hence, it is important to assess the oral health of pregnant women in order to intercept any risky situations.

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