



# Oral Health and Pregnancy: A Comprehensive Review of Interdisciplinary Perspectives and Clinical Implications

Momin ARA<sup>1,\*</sup>, Kinneresh RVSK<sup>2</sup> and Priyanka MS<sup>3</sup>

<sup>1</sup>Registrar, Rainbow children's hospital, Department of Obstetrics and Gynecology, India

<sup>2</sup>Department of Public health dentistry, Asst. RMO, Great Eastern Medical School, India

<sup>3</sup>Dental Surgeon, Amma dental cosmetic & hair transplant hospital, Anakaaplle, India

\*Corresponding author: Momin ARA, Registrar, Rainbow children's hospital, Department of Obstetrics and Gynecology, India; E-mail: [afreen.momin1996@gmail.com](mailto:afreen.momin1996@gmail.com)

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## Abstract

Oral health is intricately linked to pregnancy outcomes, influenced by hormonal fluctuations and systemic physiological changes. Conditions such as pregnancy gingivitis, pyogenic granuloma, and exacerbated periodontal disease frequently arise during pregnancy. Moreover, systemic conditions like polycystic ovarian syndrome (PCOS) and gestational diabetes mellitus (GDM) show significant bidirectional interactions with oral health, while poor oral hygiene has been associated with adverse pregnancy outcomes including preterm birth, low birth weight, and pre-eclampsia. This review explores these relationships and provides evidence-based dental management guidelines tailored to each trimester. It also emphasizes the role of interdisciplinary collaboration between dental and obstetric care providers, future research priorities, and innovative models for improving maternal oral health.

**Keywords:** Oral health; Pregnancy; Granuloma

## Introduction

Oral health during pregnancy is a vital yet under-recognized aspect of maternal well-being. Hormonal fluctuations, immune modulation, and systemic conditions such as PCOS and gestational diabetes uniquely impact the oral cavity, often exacerbating existing dental diseases. Despite mounting evidence of the implications of poor oral health on pregnancy outcomes, oral care is rarely integrated into routine antenatal services. Raising awareness, improving interdisciplinary communication, and implementing evidence-based dental management protocols during pregnancy are crucial steps in advancing maternal and neonatal health outcomes. Pregnancy induces profound hormonal and physiological changes in women that can significantly impact oral health. Despite increasing recognition of the importance of maternal health, oral health often remains neglected. Oral diseases during pregnancy, particularly periodontal disease, are linked to systemic inflammation, which can contribute to obstetric complications. Additionally, conditions like PCOS and gestational diabetes further complicate oral-systemic dynamics. The lack of

integrated dental care in prenatal services contributes to preventable complications for both mother and fetus. This review synthesizes existing evidence on the relationship between pregnancy and oral health, emphasizing clinical implications, trimester-specific dental guidelines, and the need for interdisciplinary collaboration. It also proposes future directions for research, innovation, and global health applications.

## Hormonal Changes and Oral Health

Pregnancy induces elevations in oestrogen and progesterone, particularly in the second and third trimesters. These hormones influence vascular permeability and immune responses, leading to increased gingival inflammation and microbial shifts in the oral cavity.

**Pregnancy gingivitis:** Prevalent in up to 60-75% of pregnant women, characterized by erythema, edema, and bleeding upon probing [1].

**Pyogenic granuloma (Pregnancy tumour):** Localized gingival overgrowth due to heightened inflammatory response to local irritants; resolves postpartum [2].

**Periodontal disease exacerbation:** Existing periodontal conditions may worsen due to impaired immune response and hormonal modulation of the subgingival microbiota [3].

### Systemic Conditions and Oral Health Interactions

#### Polycystic ovarian syndrome (PCOS)

PCOS is characterized by hyperandrogenism, insulin resistance, and ovulatory dysfunction. Women with PCOS show an increased prevalence of periodontal disease due to shared inflammatory pathways and altered hormonal milieu [4]. Insulin resistance contributes to impaired wound healing and increased susceptibility to infections, including periodontal pathogens [5].

#### Gestational diabetes mellitus (GDM)

GDM is associated with hyperglycaemia-induced oxidative stress, increasing inflammatory cytokines such as IL-6 and TNF- $\alpha$  [6]. These factors exacerbate gingival inflammation and periodontal destruction. Periodontal infection, in turn, worsens glycaemic control, creating a vicious cycle [7].

#### Immunological changes

Pregnancy-induced immunosuppression favours increased oral pathogen colonization and altered neutrophil function, which contributes to higher risk of periodontal infection [8].

### Adverse Pregnancy Outcomes Linked to Poor Oral Health

Multiple studies demonstrate associations between periodontal disease and:

**Preterm birth:** Inflammatory mediators like prostaglandin E2 and TNF- $\alpha$  can trigger uterine contractions [9].

**Low birth weight:** Maternal inflammation and vascular dysfunction impair fetal nutrient transfer [10].

**Preeclampsia:** Elevated levels of systemic inflammation and endothelial dysfunction are common denominators [11].

**Stillbirth and miscarriage:** Though less established, chronic maternal infection and systemic inflammatory burden are implicated [12].

### Dental Management Guidelines during Pregnancy

#### First trimester (0-12 Weeks)

- Elective procedures are preferably deferred [13].
- Emphasis on preventive care and oral hygiene counseling [14].
- Avoid radiographs unless essential (with lead shielding) [15].

#### Second trimester (13-27 Weeks)

- Safest period for routine dental treatment [16].
- Scaling and root planning can be safely performed [17].
- Use of local anesthesia (e.g., lidocaine with epinephrine) is generally considered safe [18].

#### Third trimester (28-40 Weeks)

- Minimize prolonged supine positioning to prevent supine hypotensive syndrome [19].
- Complete necessary treatments to avoid perinatal infections [20].

### Interdisciplinary Collaboration: Dentist-Gynecologist Interface

**Referral systems:** Early dental referral during the first antenatal visit should be institutionalized [21].

**Integrated training:** Obstetricians should be trained to recognize oral health indicators; dentists should be trained in antenatal care precautions [22].

**Health education:** Joint counselling sessions can enhance adherence to oral hygiene [23].

**Electronic Medical Record (EMR) Integration:** Linking obstetric and dental records can improve communication and follow-up [24]. (Tables 1-4).

*Table 1: Hormonal changes during pregnancy and their oral health impact.*

Hormonal Change	Period of Peak	Oral Manifestations	Mechanism
Increased Estrogen	2nd Trimester	Gingival inflammation, pregnancy gingivitis	Increased vascular permeability
Elevated Progesterone	3rd Trimester	Pyogenic granuloma, gingival bleeding	Suppressed neutrophil chemotaxis
Altered Cortisol Levels	Throughout	Delayed wound healing, increased inflammation	Immunomodulation and oxidative stress

**Table 2:** Systemic conditions in pregnancy with oral health correlations.

Condition	Oral Health Link	Pathophysiology	Clinical Consideration
PCOS	Increased periodontitis	Hyperandrogenism, insulin resistance	Regular periodontal screening
GDM	Exacerbated gingivitis, delayed healing	Hyperglycaemia-induced oxidative stress	Emphasis on glycaemic control
Anemia	Glossitis, angular cheilitis	Reduced oxygen transport, mucosal atrophy	Iron supplementation recommended

**Table 3:** Adverse pregnancy outcomes associated with poor oral health.

Outcome	Associated Oral Condition	Possible Mechanism	Supporting Evidence
Preterm birth	Periodontal disease	Increased prostaglandin E2, cytokine release	Meta-analyses of cohort studies
Low birth weight	Periodontitis, dental caries	Chronic inflammation, placental dysfunction	Observational studies
Preeclampsia	Chronic periodontitis	Systemic inflammation, endothelial dysfunction	Inflammatory biomarker studies

**Table 4:** Trimester-wise Dental Guidelines and Contraindications.

Trimester	Recommended Care	Contraindications	Special Notes
First	Oral hygiene education, scaling if urgent	Elective procedures, radiographs	Emphasis on patient comfort, nausea common
Second	Routine dental treatments	None (if medically indicated)	Safest period for procedures
Third	Completion of essential procedures only	Long chair time, elective surgery	Positioning precautions due to vena cava compression

## Future Directions

### Research priorities

- Comparative effectiveness studies on periodontal therapy and pregnancy outcomes [25].
- Implementation science to translate evidence into practice [26].
- Long-term maternal-child cohort studies to assess oral health influence on neonatal health and cognitive outcomes [27].

### Innovation opportunities

- Blockchain-based referral systems to ensure continuity of care [28].
- Virtual reality training for interdisciplinary teams in oral-systemic disease management [29].
- Microbiome-based therapeutics (e.g., targeted probiotics) for pregnancy gingivitis [30].

### Global health applications

- Community health worker-led oral health promotion in low-resource settings [31].

- Culturally adapted oral health education addressing pregnancy-related myths [32].
- Inclusion of oral care in maternal health insurance schemes and universal health coverage [33].

## Conclusion

Oral health is a critical yet often overlooked aspect of maternal well-being. Hormonal and systemic changes during pregnancy increase susceptibility to various oral conditions, which in turn have demonstrable links to adverse pregnancy outcomes. Effective interdisciplinary collaboration, trimester-specific clinical protocols, and targeted public health initiatives are essential to bridge this gap. Investment in research and innovation will further enable context-sensitive, culturally competent, and scalable interventions.

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