

# Pregnancy and Dental Considerations

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## Abstract:

Pregnancy induces dynamic alterations in various physiological aspects of the body, encompassing transient changes within the oral cavity and its associated systems. These can give rise to a range of physical signs and symptoms that have the potential to influence the health, perceptions, and interactions of individuals in their surrounding environment. Special considerations are essential in the dental management of pregnant patients. This review article explores the prevalent dental issues encountered by pregnant women, delving into their associated treatment implications, potential risks of various medications for both the mother and foetus, and the common dental challenges faced during pregnancy. Furthermore, the article addresses the management of dental issues related to pregnancy and provides insights into the appropriate scheduling of dental surgical procedures during this period.

**Keywords:** Pregnancy, Dental considerations, FDA category, Oral care, Drug safety, Management, Teratogenicity.

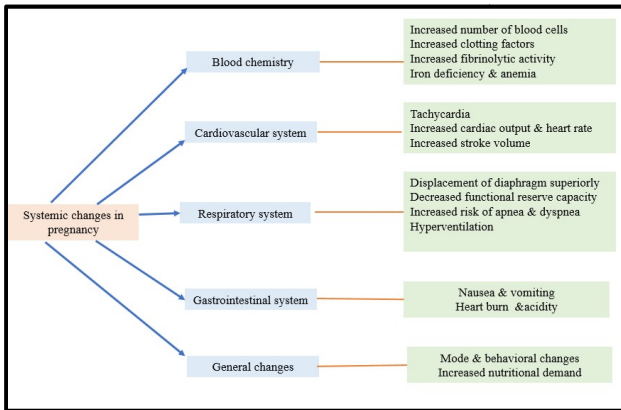
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## INTRODUCTION

Pregnancy is a distinctive and life-changing experience for women. The mother's health is closely linked to the well-being of the fetus throughout pregnancy<sup>1</sup>. Promoting optimal health is essential for a successful gestation period and beneficial outcomes for both the maternal and fetal well-being<sup>2</sup>. Hormonal changes during pregnancy are essential for the correct development of pregnancy and lead to physiological alterations in the maternal body, including the oral cavity<sup>3</sup>. The primary hormones responsible for these modifications are estrogen and progesterone. A significant rise in the synthesis of the female sex hormones, estrogen by a factor of 10 and progesterone by a factor of 30, is essential for the successful progression of a pregnancy<sup>4</sup>. The process of pregnancy elicits a range of systemic, local, physiological, and physical alterations within the female body as a result of increased hormone secretion and the growth of the fetus. These changes

are crucial for aiding the developing fetus and preparing the mother for birthing. Hormonal fluctuations cause numerous alterations in the mouth cavity and other regions of the female body.

Pregnancy can cause oral health changes such as gingival changes including gingivitis, gingival hyperplasia, pyogenic granulomas, and changes in salivary composition, these alterations are commonly observed in pregnant mothers. Elevated levels of estrogen are widely recognized for their strong connection to the increased occurrence of gingivitis and gingival hyperplasia in pregnant individuals<sup>5</sup>. Estrogen, a primary female sex hormone, has a substantial impact on regulating different physiological functions in the body, including those related to the mouth<sup>6</sup>. Progesterone, a crucial female sex hormone, is linked to the onset of melasma, a dermatological condition characterized by the manifestation of brown or Gray-brown patches on the facial region, particularly in the mid-facial region<sup>7</sup>.



**An overview of the physiological alterations on bodily systems that occur during pregnancy is shown in (Fig 1)**

Numerous research has presented empirical data indicating a correlation between poor maternal oral health, pregnancy outcomes, and the dental well-being of the kids. Potential results could involve premature birth, reduced birth weight, and a higher chance of early tooth decay in babies<sup>8</sup>.

Pregnant women may encounter obstacles when striving to attain ideal dental health. Pregnant women come across a number of challenges that make it difficult for them to maintain good dental hygiene on their own<sup>9</sup>. Lack of understanding and value, bad experiences with oral health, and negative attitudes towards oral health experts are some of the obstacles that people face while trying to get dental care. Dentists' reluctance to treat pregnant women's teeth is typically due to misconceptions, ignorance, or lack of experience. Preventing diseases, promoting good oral health, identifying problems early, and acting quickly are all crucial for the oral health of mothers and children. It is widely known that, with the right measures taken, many common and preventative dental procedures can be safely performed during pregnancy.

**The following things can make your oral and tooth health worse during pregnancy:**

1. During early pregnancy, some mothers may experience a strong desire for specific foods, especially carbs, which could result in a lack of attention to dental hygiene after eating these items<sup>10</sup>.

2. Pregnant women may suffer heightened bleeding due to pregnancy hormones (oestrogen, progesterone), which may cause them to perhaps refrain from brushing their teeth. This can lead to increased amounts of bacterial plaque, highlighting the significance of taking extra care during pregnancy<sup>9</sup>.

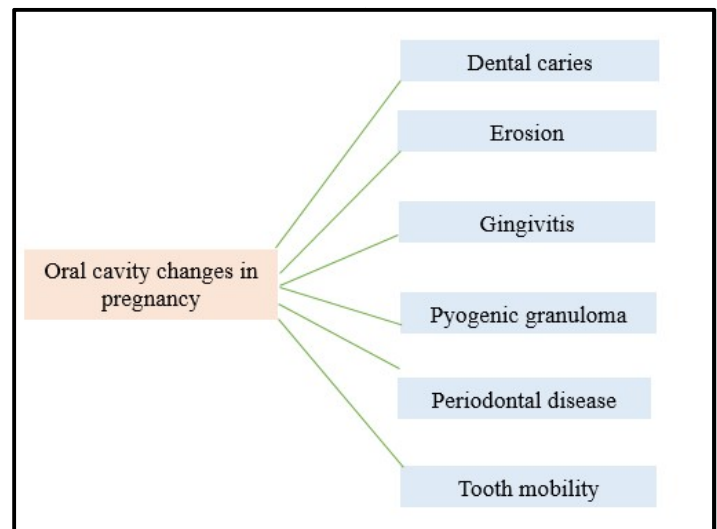
3. The act of vomiting, particularly in the initial phases of pregnancy, leads to an elevation in oral acidity levels. After experiencing vomiting in the early months, mothers may not focus on maintaining proper oral hygiene. Insufficient tooth brushing might result in the formation of an acidic environment in the mouth.

4. Salivary flow reduces. Therefore, caries formation rises throughout this period<sup>10</sup>.

5. Mothers may unintentionally overlook their own oral and dental care while prioritising the baby's health, resulting in a deterioration of their own health.

**Treatment of common oral problems that can arise during gestation**

The oral cavity undergoes several changes during pregnancy and necessitates specific care from dental specialists. (fig.2) Some of the most frequent dental issues that pregnant women encounter is listed below.



**Oral cavity changes during pregnancy (fig.2)**

### 1. DENTAL DECAY:

Increased risk of dental decay is often found during pregnancy. Dental caries is a chronic, complex infection induced by bacterial fermentation of dietary carbohydrates causing tooth damage locally<sup>10</sup>. There is no scientific evidence that foetal calcium needs for intrauterine growth come from the mother's teeth, and the assumption that tooth loss occurs during pregnancy is unfounded. According to research, some types of bacteria, such as Mutans streptococci, Lactobacilli, and Actinomyces, are pivotal in the onset and advancement of dental caries. It is not believed that pregnancy directly affects carcinogenicity or changes tooth structure, making teeth more vulnerable to caries. Increased Mutans streptococci and Lactobacilli levels are observed during late pregnancy and lactation. Regular eating of sugary snacks and drinks during pregnancy can raise the risk of dental caries if oral hygiene is not prioritised. The situation becomes more problematic if the pregnant woman experiences severe nausea and illness, compromising tooth brushing. Untreated carious sores can lead to abscesses and cellulitis.

### 2. EROSION:

Enamel loss can occur in over 70% of pregnant women who experience hyperemesis gravidarum, a severe nausea and vomiting condition<sup>11</sup>. Acid erosion mostly affects the palatal surfaces of the canines and upper incisors. The woman frequently expresses her discomfort from being exposed to dentine.



**Dental Erosion (fig.3)**

### 3. Gingivitis:

Gingivitis, an inflammation of the oral mucosa surrounding the tooth, is caused by plaque. An elevated inflammatory response to tooth plaque during pregnancy might cause swelling gingival bleed when brushed. Gingivitis worsened by pregnancy hormones is called pregnancy gingivitis, however it is not significantly different histologically from non-pregnant gingivitis<sup>12</sup>. Clinical characteristics of pregnant gingivitis might be localized or generalized. Gingivitis is often attributed to plaque, although Raber-Durlacher et al. found that pregnancy does not increase the amount of plaque in the mouth. Pregnancy may cause gingival inflammation by affecting estrogen and progesterone receptors, but the specific mechanism is uncertain. The gingival changes that occur during pregnancy can be attributed to heightened vascularity, increased blood flow, alterations in the immune system, and changes in connective tissue metabolism.



**Gingivitis (fig.4)**

### 4. Pregnancy Epulis:

Pregnancy epulis is a localised, soft hyperplastic lesion that occurs on the gingiva in up to 5% of pregnancies<sup>13</sup>. A pedunculated, bright red, highly vascularized lesion with minute white specks may be up to 2 cm in diameter. While it can occur anywhere on the gums, interdental papillary gingiva is where it most frequently occurs, especially on the labial aspect and upper jaw more frequently than the lower. Although teeth close to the pregnant epulis may drift and become more mobile, bone damage rarely occurs around the directly affected teeth. Although it can occur at any time, it is most frequent in early pregnancy. This lesion may originate from an irritated gingival papilla, making plaque an essential beginning element. Furthermore, hormonal changes

associated with pregnancy may enhance the gingival response to plaque, resulting in the development of the pregnant epulis. Both in men and in non-pregnant women, it shares histological and clinical similarities with pyogenic granuloma.



**Pregnancy Epulis (fig.5)**

### 5. Periodontal disease:

The destructive processes of periodontal disease, including bone and ligament degeneration, are mostly caused by the host's response to plaque bacteria. To colonize subgingival locations and enter connective tissue, germs must circumvent various host responses. Pregnancy may impact various aspects of the immunological response to the periodontium, resulting in decreased activity and efficiency. Less neutrophils, decreased phagocytosis and chemotaxis, as well as a decline in cell-mediated immunity and antibody responses, are the principal alterations. Because periodontal tissues contain progesterone and oestrogen receptors, the increase in hormone levels during pregnancy affects tissue reactivity. Fibroblasts, gingival vessels, and extracellular matrix are all affected.

In addition to stimulating matrix synthesis, oestrogen plays a role in cellular proliferation, differentiation, and keratinisation. It also enhances the production of localised inflammatory mediators, especially PGE 2, which, in conjunction with progesterone, produces osteoclastic activity. By lowering PAI-2 levels, which stop tissue proteolysis, altering collagen production, and decreasing fibroblast proliferation, progesterone disturbs tissue homeostasis.

Gram-negative anaerobic bacteria cause periodontal disease. *P. intermedia*, *Tannerella forsythensis*, *P. gingivalis*, *Treponema denticola*, and *Actinobacillus actinomycetemcomitans* are examples<sup>14</sup>. While the

cause of pregnancy-related gingivitis remains unclear, increased Gram-negative rods have been linked to gingival bleeding and inflammation. *P. intermedia*, *P. gingivalis*, and *Tannerella* species (previously *Bacteroides*) have been found to grow more selectively in subgingival plaque during pregnant gingivitis. This can be attributed to the species' capacity to utilise pregnancy hormones, particularly progesterone, for sustenance. Pregnancy-induced selective growth can be influenced by immune system alterations, bleeding gingiva, and heightened pocket depths, which create a conducive habitat for anaerobic microorganisms.

### 6. Tooth mobility:

Pregnancy has been found to result in increased tooth movement; even in women with normal periodontal health. The mobility of the upper incisors is highest during the final month of pregnancy. The observed increase in mobility may be attributed to mineral displacements inside the lamina dura, rather than alterations in the alveolar bone. The observed mobility is thought to be affected by the severity of periodontal disease and the disruption of the tissues that support the attachment. This movement often resolves after child birth.

### Suitable timings and Pregnancy Dental Care Guidelines:

#### The first trimester (1-12 weeks):

The process of cell division and organogenesis reaches its maximum during the second to eight weeks following conception. Higher vulnerability to stress and teratogens develops during this period, accounting for 50-75% of spontaneous abortions. Drugs and infections during this time can disrupt the process and cause severe birth abnormalities. Patients should arrange dental assessments in the first trimester to examine their present dental health, discuss expected changes, and prevent any dental issues during pregnancy. Performing the operations now is not advised. Two concerns arise while considering procedures during the first trimester. First, teratogens represent the highest risk to growing children during organogenesis. Additionally, one in five first-trimester pregnancies result in spontaneous abortions. Dental operations near the period of spontaneous abortion may be suspected, raising



worries for both patient and practitioner about potential prevention<sup>15</sup>.

**The Current suggestions are:**

1. To provide patients with information regarding the oral changes that takes place in mothers during pregnancy.
2. To emphasize the importance of adhering to rigorous oral hygiene guidelines and, consequently, managing plaque.
3. To limit dental intervention to emergency care and periodontal prophylaxis only.
4. To circumvent unnecessary radiography. They should be taken selectively and only when necessary.

**The second trimester (13-24 weeks):**

The process of organogenesis is completed, resulting in a little risk to the fetus. This is the most secure timeframe for administering dental treatment while pregnant. Proper posture is crucial for pregnant patients, particularly in the third trimester. The expanding fetus and placenta cause the uterus to directly cover the inferior vena cava, femoral arteries, and aorta. When a mother lies supine during procedures, the weight of the uterus might block blood flow via major vessels, causing supine hypotension. In this state, insufficient blood flow produces a drop in blood pressure, leading to syncope or near-syncope episodes. Simply putting the patient on their left side and elevating the chair head can prevent compression of major blood arteries. Dental practitioners should communicate with obstetricians if there are concerns regarding the safety of a procedure, especially if there are unusual conditions related to pregnancy<sup>16</sup>.

**The Current suggestions are:**

1. Instructions for maintaining oral hygiene and controlling plaque.
2. Scaling, polishing, and curettage can be carried out if deemed necessary.
3. The management of any current oral health conditions.
4. Elective dental care is considered to be safe.
5. Minimize the use of regular radiography. Use only when required

**The third trimester (25-40 weeks):**

The parturient's blood volume peaks about the thirtieth week and remains increased till delivery.

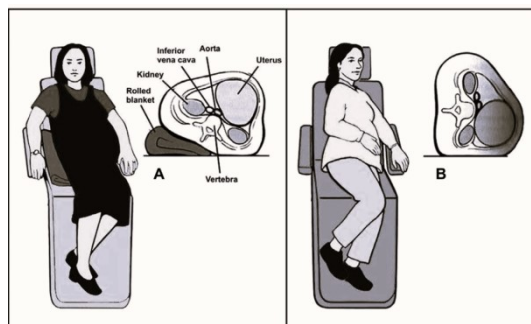
The fetus is not at risk during this trimester, but the expectant woman may feel increased discomfort. Schedule short dentist sessions with proper chair placement to avoid supine hypotension. While basic dental treatment is safe in the early third trimester, it should be avoided in the middle of the trimester.

**The Current suggestions are:**

1. Instructions on oral hygiene and plaque management.
2. If necessary, scaling, polishing, and curetting can be done.
3. In the latter half of the third trimester, refrain from getting elective dental care.
4. Avoid routine radiographs. Use selectively and when they are needed.

**Dental chair positioning and pregnancy**

When doing chair side activities, it is essential to make sure that expectant patients are seated in a safe and appropriate position. By implementing this approach, the occurrence of complications such as supine hypertensive syndrome in the dentist chair can be mitigated. For instance, if a pregnant woman is lying on her stomach, there is a high likelihood of her developing moderate hypoxemia and an irregular arterial oxygen gradient. Likewise, the presence of a pregnant uterus poses a potential hazard of vena cava and aorta compression, which can result in postural hypotension. Hence, it is crucial for the dentist to ensure that the patient is seated in the correct posture. This can be achieved by either elevating the right hip by 10-12 cm to alleviate pressure on the vena cava, or by tilting the patient's left side by 5-15%. If the hypotension persists, it is recommended that the patient assume a complete left lateral position. However, it is advisable to make these alterations during the third trimester.



**Dental chair positioning and pregnancy (Fig 6)**

### **Radiographs, pregnancy and the foetus:**

The electromagnetic radiation known as X-rays can ionize the substance it passes through. Ionizing living materials damages cells and DNA. Damage to the foetus cells depends on radiation dose and pregnancy stage may cause miscarriages, birth abnormalities, or mental illness. Radiation teratogeneity varies by fetal age and dose. The greatest risk of foetal teratogeneity and death occurs in the first 10 days following conception. Fetal development is most pivotal between 4-18 weeks post-conception<sup>17</sup>. The foetus receives little dental radiation. As embryos and fetuses are more radiosensitive than adults, they are more susceptible to negative effects from radiography exposure. In the first two weeks after fertilization, physicians should inquire about the patient's last menstrual period before obtaining a radiographic imaging, as the patient may not be aware of being pregnant. General inquiry cannot provide a reliable pregnancy status diagnosis, hence lead shielding is recommended for all women in their childbearing years. Mutations and bad consequences are directly linked to radiation dose, which increases when excessive radiation is utilized to compensate for poor processing quality. Depending on the view, exposure might be increased. Radiation from maxillary anterior views can penetrate the abdomen area, both from the original beam and scatter/radiation. A comparable exposure may also occur with posterior views, depending on head position. Precautions can be made to minimize fetal exposure during radiography. To minimize fetal exposure, use a lead shield over the patient's abdomen, carefully collimated beam, and high-speed film.

The National Commission for Radiation Protection (NCRP) recommends limiting cumulative fetal radiation exposure to 0.20 Gy to prevent microcephaly and mental retardation<sup>18</sup>. CT is the preferred modality for locating deep-seated infections and imaging lateral pharyngeal infections. Compared to routine film radiographs, internal anatomy is better defined and bony changes are evident. CT dosages are higher than simple radiography but lower than polytomography's many slices. CT doses vary based on scanner type, technique, exposure settings, number of slices, and

slice thickness. CT machines typically produce skin doses between 2.5 and 4.7 rads, ranging from 0.4 to 4.7 rads. Combining axial and coronal pictures requires 3.5 to 5.0 rads. However, the gonadal dose for a whole scan is lower, ranging from 0.1 to 0.3mrad. To reduce foetal exposure, use shielding devices judiciously. Diagnostic irradiation can provide vital information for maintaining maternal and fetal viability, outweighing the dangers of exposure. Consider MRI as an alternative to CT for fetal irradiation. MRI has superior soft tissue sensitivity and contrast compared to CT, perhaps aiding with challenging infections. MRI creates images using magnetic field-assisted nuclear alignment without ionizing radiation.

However, the dangers of fetal exposure to intense magnetic fields remain unclear. Fetus radiation exposure exceeding 10 rads is dangerous and can cause mutation, mental retardation, and eye abnormalities. X-rays rarely exceed 5 rads in a single or multiple investigations. A baby's exposure to radiation from a mother's dental X-ray is only 0.01 millirads. For a baby to receive one rad, it would require 100,000 dental X-rays, as one rad is 1000 millirads.

The diagnostic X-ray risk is modest. Many specialists advise postponing radiation exposure until birth. Dentists must ensure that X-rays for specific conditions are safe for the growing fetus. To minimize radiation exposure, use protective thyroid collars and aprons whenever possible.

### **Pharmacodynamics and pregnancy**

Another contentious aspect of treating pregnant dental patients is medication administration. Toxic or teratogenic drugs may reach the placenta, posing a major problem. Furthermore, any medication that depresses breathing might induce hypoxia in the mother, which can harm to the foetus. Avoid administering drugs during pregnancy, especially in the first trimester. Sometimes this guideline is impossible.

The FDA provides clear criteria for prescription medications during pregnancy by classifying the probability that a medicine may result in birth abnormalities. They are listed as follows:

*FDA risk categories of drug used during pregnancy and their potential risk factors.*

Category	Risk factors	Antibiotics	Analgesics	Sedative Hypnotics	Local Anaesthetics
A	Satisfactory well controlled studies on humans showing no hazard to the fetus				
B	Studies on animals demonstrating no fetal risk whereas no well controlled and adequate studies done on pregnant women	Amoxicillin Cephalexin Chlorhexidine Clindamycin Erythromycin Metronidazole Penicillin	Acetaminophen Ibuprofen		Lidocaine  Prilocaine  Prednisolone
C	Studies on animals establishing fetal hazards no controlled studies on human beings	Ciprofloxacin	Codeine with acetaminophen Hydrocodone+ acetaminophen Propoxyphene		Mepivacaine
D	Evidence of risk to the fetus, can be used in exceptional cases or circumstances	Doxycycline Tetracycline	Ibuprofen	Barbiturates Benzodiazepines	
X	The hazards of using the drug in pregnant women far more than the benefits	Nitrous oxide (avoided in the first trimester as it may result in neonatal depression and spontaneous abortion)			

**FDA risk categories of drug used and their potential risk factor during pregnancy (Fig 7)**

**Teratogenicity**

Teratogens are agents that permanently affect offspring's form or function after exposure to the foetus. Numerous drugs can produce teratogenic effects including functional and structural birth abnormalities. Alcohol, smoke, cocaine, thalidomide, methyl mercury, anticonvulsants, warfarin compounds, ACE inhibitors, some antimicrobials, retinoids, penicillamine tetracycline, trimethadione, valproic acid, and phenytoin may be Potential teratogenic medications. First trimester embryos are especially susceptible to teratogens. Tetracycline can discolour deciduous teeth even in the second half of pregnancy, whereas other teratogens do not hurt when venerable structures mature.

Drugs	Known side-effects
<b>Drugs teratogens</b>	
Alcohol	Cranio-facial abnormalities, fetal alcoholic syndrome
Tobacco	Brain damage, cleft lip and palate Placental abruption, cognitive delay
Cocaine	Placental abruption, cognitive delay
Thalidomide	Malformation of extremities of new born
Methyl mercury	Brain damage, microcephaly
ACE inhibitors	Cranio-facial abnormalities
Valproic acid	Mental retardation, neural tube effects
Tetracycline	Maternal toxicity and discoloration of tooth
Phenytoin	Hypoplastic nails, typical facies
Warfarin	Facial dysmorphism, chondrodysplasia
Benzodiazepines/ barbiturates	Cleft lip and palate deformities
<b>Maternal teratogens</b>	
Toxoplasmosis	Spinal abnormalities, brain dysfunction
Chlamydia	Conjunctivitis, pneumonia
Hepatitis B	Liver damage
Parvovirus	Anemia
Chicken pox	Eyes damage

**Drugs and maternal teratogens and possible undesired effects (Fig 8)**

**CONCLUSION**

Dental care should not be delayed due to pregnancy. Patients, dentists, and doctors must work together to provide oral health throughout pregnancy. Pregnant patients must learn about oral hygiene, oral cavity changes, and routine dental appointments. Dental professionals must be aware of pregnancy-related disorders and how to treat them without injuring patients or foetuses.

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