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Review Article

Oral Health Care Guidelines for Gestating Patients: A Review

*Prasanna Kumar Rao**

Department of Oral Medicine & Radiology, A.J Institute of Dental Sciences, Karnataka, India

Abstract

Pregnancy is an important milestone in the life of female. Pregnant patients are vulnerable to common oral disease due to hormonal variations in the mother's body. Dentist should always keep in mind that during pregnancy a various physiological and systemic changes will occur in mother's body and also its potential effects on the foetus. The two things always damage the foetus is dental radiograph and drug administration. Dental surgeons should adopt precautions when treating pregnant patients. This article provides an information to oral health care professionals to understand oral health services in pregnant women.

Keywords: Pregnant patient; Organogenesis; Trimester; Teratogenesis

Introduction

Pregnancy is a physiological state which is evidenced by several transient changes. The hormones which are induced during pregnancy can cause several changes in mother's body and oral cavity [1]. There is a increase of female hormone secretions, Oestrogen by ten folds and Progesterone by thirty folds. This is very important for the normal progression of the pregnancy. These increased hormones in the body and foetal growth induce several physiologic, systemic and physical changes in the mother's body [1].

The local physical changes in the body and oral cavity may give rise to various challenges in dental care for pregnant patients. Sometimes dentists avoid treating pregnant women because of confusion or misconceptions about the safety and importance of dental treatment during pregnancy. Proper dental care can prevent long term health problems in mother and child [2].

The purpose of this paper is to provide information and guide general dental practitioners and oral health care professionals to understand oral health services in pregnant women.

Systemic Changes in Pregnancy

A pregnant woman may develop variety of systemic alterations in the body (Table 1). Increased cardiac output, plasma volume and heart rate are common cardiovascular changes seen in pregnancy. Benign systolic ejection murmers are common in around 96% of pregnant women due to increased blood flow which leads to gestational hypertension. The elevation of blood pressure during pregnancy is called preeclampsia or eclampsia in more severe cases [3]. In second and third trimester as the uterus increases in size it causes pressure on the vena cava and aorta which results in decreased cardiac output, venus return and uteroplacental blood flow. These cardiovascular issues may leads to anemia, edema of ankle and shortness of breath. Due to increased oestrogen level in the body causes engorged capillaries of the nasopharynx mucosa leads to edema, nasal congestion and predisposition to epitaxis. Because of this there is a difficulty in nasal breathing leads to snoring and mouth breathing which causes xerostomia and increased tooth decay [4]. In gastrointestinal system, there is a decrease in esophageal tone and gastric and intestinal motility due to higher level of progesterone in the body, gastric emptying will be slowdown. These effects cause increased sensitivity of the gag reflex. In second and third trimester size of the uterus increases which displaces stomach superiorly causes increased intragastric pressure. Some patients may have problems with gastroesophageal reflux and constipation. Wheezing may be a sign of acid reflux in to the trachea and bronchi. Nausea and vomiting seen in 66% of pregnant women which starts at around 5th week and reach maximum at 8th to 12th week [5]. Because of gastric acid vomiting there will be erosion of inner surface of enamel in relation to anterior teeth [60]. Ptyalism (excessive salivary secretion) is a complication of pregnancy that occurs most often in pregnant women suffering from nausea.

The haemodynamic changes are elevation of factor V, VII, VIII, X & XII and also reduction of factor XI and XIII. These changes causes increased fibrinolytic activity in the mother's body to compensate for increased clotting tendency [7]. Increased renal perfusion seen in 2nd half of the pregnancy [5]. Increased blood sugar level is also one of the complication in pregnant women which is called as gestational diabetes. It's seen in 5% of all pregnant women but incidence increases in adolescents. Glucose regulation will return to normal after delivery in a majority of cases. But these patients are at greater risk of developing type 2 diabetes in later life [8].

Oral Findings during Pregnancy

There is an increase in the hormonal level in the mother's body during the pregnancy period which causes several changes in her body as well as oral cavity (Table 2).

Gingivitis & gingival hyperplasia: This is a common oral finding in mother's oral cavity. This is more commonly seen in first trimester of pregnancy. It's due to elevated level of circulating oestrogen which

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***Corresponding author:** Prasanna Kumar Rao, Department of Oral Medicine and Radiology, A.J Institute of Dental Sciences, NH 66, Kuntikana, Mangaluru 575004, Karnataka, India, Tel: +91 9900151108; E-mail: drjpkrao@gmail.com

causes increased capillary permeability. It usually affects marginal gingiva and interdental papilla. It also related to the pre-existing gingivitis. Loosening of pelvis, knee and periodontal ligaments also seen in pregnancy period. Pregnancy also worsens an existing periodontal disease but itself doesn't cause the same [9,10].

Pyogenic granuloma: Around 5% of cases report with pyogenic granuloma. It is also called as pregnancy tumor. Due to elevated levels of sex hormones in the mother's body angiogenesis will increase. It coupled with gingival irritation due to local irritants like plaque and calculus there is a growth of soft tissue which is called as Pyogenic granuloma [11].

Salivary changes: Salivary Flow, composition, pH and hormonal levels in saliva will alter during pregnancy. Decrease in sodium concentration, pH and increased potassium, protein and oestrogen level in the saliva results in pregnancy. Because of these salivary changes there is a desquamation of gingiva and oral mucosa which provides good environments for bacterial growth. Due to these bacterial growth and decreased salivary flow and composition, dental caries incidence increases. This condition also worsens gingival and periodontal health of patients and causes mobility and loss of teeth [12,13].

Facial Pigmentation: Melasma or Mask of Pregnancy is a condition which causes facial pigmentation during pregnancy period. It resolves after childs birth. It is a bilateral brownish patch seen in the midface. Its a common finding in first trimester affects around 70% of the patients. It is mainly due to the increased levels of oestrogen and progesterone in the mother's body [14].

Slight osteoporosis in the jaw bones: If mother do not consume enough calcium to sustain the needs of her developing baby, her body will take calcium from bones, decreasing bone mass and putting mother at risk for osteoporosis. It can cause thinning of the bone, resulting in weak, brittle bones that can easily be broken. Some evidence suggests that the more times a woman has been pregnant (for at least 28 weeks), the greater her bone density and the lower her risk of fracture. In many cases, women who develop slight osteoporosis during pregnancy or breastfeeding will recover lost bone after childbirth or after they stop breast feeding [15].

Burning sensation: During pregnancy changing hormone levels in the mothers body slow down the digestive system, weaken the stomach sphincter, and also uterus can crowd stomach, pushing stomach acids upward. Because of this burning feeling that starts in the stomach and seems to rise up to the throat [16].

Tongue changes: Pregnant women most commonly experience change in taste in the first trimester of pregnancy. The taste occurs even when women are not eating. To alleviate the taste, pregnant women can try brushing their tongue with a soft tooth brush and rinsing their mouth with a mild salt solution and also [17],

- Taking sugar-free mints or chewing sugarless gum.
- Eating colder items such as ice chips and ice pops.
- Snacking on saltine crackers to dull any metal tastes.
- Eating spicy foods to numb weird tastes.
- Consuming sour foods and beverages, such as pickles and green apples.
- Drinking citrus juices.

Teratogenesis in Pregnancy

Teratogens are substances that may produce physical or functional defects in the human embryo or fetus after the pregnant woman is exposed to the substance. A teratogen can be either a physical substance or a condition in the mother. The resulting defect can be either a physical abnormality or a functional defect. Additionally, teratogens may also affect pregnancies and cause complications such as preterm labors, spontaneous abortions, or miscarriages. They are in the form of drugs, chemicals, or even infections that can cause abnormal fetal development. There are billions of potential teratogens, but only a few agents are proven to have teratogenic effects. These effects can result in a baby being born with a birth defect [18].

The whole pregnancy occurs in three main period. The first two weeks after conception are known as the Ovum period, the third through the eighth week is known as the embryonic period, and the time from the ninth week until birth is known as the fetal period (Table 3). The embryonic period is the most important for teratogenesis. During this time organogenesis takes place. A teratogenic exposure after organogenesis usually does not cause any alterations in the foetal development. But few teratogenic drugs like tetracycline can cause teeth discoloration if taken even after second half of the pregnancy [19,20].

Table 1: Systemic changes in pregnancy.

Cardiovascular Alterations:	· Increased cardiac output · Increased blood volume · Increased heart rate · Gestational Hypertension · Supine Hypotension
Endocrinal Alterations:	· Oestrogen, progesterone & gonadotrophine increases · Increased thyroxin, steroid & insulin · Gestational Diabetes
Respiratory Alterations:	· Difficulty in breathing · Diaphragm rises · Decreased residual volume · Nose bleeding · Upper respiratory infection
Haemodynamic Alterations:	· Alteration in coagulation factor · Increased fibrinolytic activity · Increased RBC, WBC & ESR · Decreased haemoglobin · Anemia
GIT Alterations:	· Increased Gag reflux& heartburn · Nausea & vomiting · Delayed gastric emptying · Increased intragastric pressure
Renal Alterations:	· Increased renal perfusion · Increased drug excretion · Reduced bladder capacity
Other Changes:	· Mood and behavioural changes · Increased neutritional demands

Table 2: Oral manifestations in pregnancy.

· Gingivitis / Gingival Hyperplasia
· Periodontitis
· Slight osteoporosis in the jaw bones
· Pyogenic Granuloma
· Salivary Changes
· Halitosis
· Taste Alteration
· Tooth Erosion/ Perimylolysis
· Burning Sensation
· Tongue Changes
· Angular Chelitis
· Facial Pigmentation

Dental Management

Dentists should follow the proper guidelines before planning the treatment of pregnant women (Table 4). When a pregnant women visits a dental clinics, after examining the patients dentist should inform them regarding the changes that they should expect during their pregnancy period. Also explain the patients about how to avoid these problems that may arise from these changes. In pregnant women only emergency dental needs should be considered. There are chances that several emergency situations encounter in a dental clinic while treating pregnant patient (Table 5). As a dentist we should know how to diagnose these emergency conditions and its management.

Table 3: Stages in pregnancy.

Ovum Period	· From conception to implantation period · 16 days period
Embryonic Period	· 17 th to 56th day (2nd to 8th Week) · Organogenesis
Foetal Period	· 57th day until term (After 8th Week)

Table 4: General guidelines for the treatment of pregnant patients.

1. An accurate history
2. Take physicians consent
3. Treatment in hospital setting
4. Reinforcement about diet
5. Consideration for morning sickness
6. Avoid early Morning appointments
7. Short appointments at patient's convenience
8. Check glucose level
9. Continuous verbal contact with patients
10. Patients Position
11. Monitor pulse, respiration & BP
12. Preventive oral hygiene measures
13. Oral prophylaxis and topical fluoride application regularly.
14. Preventive, restorative & rehabilitative procedures should continue
15. Defer any minor surgical procedures

Table 5: Complications of pregnant patients in dental office.

Syncope	· Hypotension · Hypoglycemia · Anemia · Dehydration · Neurogenic disorders
Morning Sickness	· Nausea and vomiting · Object lodged in airway due to vomiting
Hyperventilation	· Difficulty in breathing
Seizures	· Signs of Eclampsia · Generalized edema · Elevated blood pressure · Head ache · Blurred vision · Abdominal pain
Bleeding & Cramping	· Vaginal bleeding
Vena Cava Syndrome	· Weakness · Light-headedness · Restlessness · Sweating, pallor & tinnitus · unconsciousness

The whole pregnancy period was divided in to three stages depending on the foetal development in the mothers body. All dental treatments should be based on these three stages (Table 6). During first trimester, the baby'sorgan development takes place. It is called as organogenesis. This time is more sensitive to radiation and chemicals. Malformation and spontaneous abortions are the complications during this period. Second trimester and the first half of the third trimester is a safest time for dental treatment. Simple periodontal treatment, preventive care and simple restorative procedures will help to control further any active infections. Better to avoid any complex and elective dental treatment till after delivery (Table 7) [21].

Table 6: Current recommendations in each trimester.

Trimester	Period	Current Recommendations
1st Trimester	1st to 12th week	· Organogenesis takes place · Risk of spontaneous abortions · Patient education about changes · Strict oral hygiene instructions recommended · Oral prophylaxis · Emergency treatments only · Avoid routine radiographs · Prescription by consulting gynaecologist
2nd Trimester	13th to 24th week	· Organogenesis completes · Risk to foetus is low · Oral hygiene & plaque control · Control of active oral disease · Elective dental care · Only emergency radiographs
3rd Trimester	25th to 40th week	· Risk to the upcoming birth process · Patients chair position · Avoid drugs which affect bleeding time · Treatment in early 3rd Trimester · Avoid routine treatment · Oral hygiene instruction · Curettage if necessary

Table 7: Dental considerations of pregnant patients during treatment.

Treatment	Dental Consideration
Oral Medicine	· Check for FDA Category of Drugs while prescribing
Oral Radiographs	· Avoid Radiographs in Ovum and Embryonic period · Follow all preventive measures in case of Emergency
Orthodontic Treatment	· Short appointments · Avoid long time supine positions · Light continuous force used
	· Use steel ligatures instead of elastics · Regular oral hygiene maintenance · Patient education and awareness
Oral Surgical Procedures	· Avoid minor surgical procedures · 2nd and 1st half of 3rd Trimester is safe · Consult patients gynaecologist
Periodontal Treatment	· Gingivectomy can be done with caution · May lead to bacteraemia / Infective endocarditis · Require prophylactic antibiotic coverage · Periodontal therapy during safe period · Supragingival scaling and polishing · Consult patients gynaecologist
Endodontic Treatment	· Extensive procedures can be postponed · Avoid silver amalgam restoration · Mercury vapors release in oral cavity while chewing will cross placental barrier. · Use rubber dam for restoration · Composite and glass ionomer can be used
Prosthodontic Treatment	· Avoid morning appointments · Gagging reflux during impression · Postpone after delivery · Not an emergency

In third trimester mothers position in the dental chair may cause emergency in dental clinics. Dental chair position should be controlled and monitored while working. Supine position may cause the fetus to occlude the blood supply from returning to the heart leading to loss of consciousness. It is due to during supine position, gravid uterus lies right over the dorsal aorta and vena cava and these may get compressed leads to decreased cardiac output, venus return and uteroplacental blood flow. This leads to hypotension. This condition is also called as Supine Hypotension Syndrome or Vena Cava Syndrome. In third trimester, repeated scaling and oral prophylaxis will minimize hormonal gingival changes [22].

Medications to Pregnant Patients

Although some medicines are considered safe during pregnancy, the effects of other medicines on unborn baby are unknown. Certain medicines can be most harmful to a developing baby when taken during the first three months of pregnancy, often before a woman even knows she is pregnant. Illegal drugs are dangerous, and patients should check with their healthcare provider regarding prescriptions (Table 8). During pregnancy there is reduced concentration of serum plasma and low plasma half life and higher lipid solubility, the drugs will be easily absorbed, distributed and cleared from the system compared to non pregnant patients. These drugs will be easily transferred from mother to baby through placenta. This can cause miscarriage, low birth weight or developmental changes of foetus.

FDA has classified drugs on the basis of risk to mother - foetus during pregnancy in to various category (Table 9) [23]. So while prescribing the medicines to any pregnant women it's important that we should check the FDA category of that particular drugs (Table 10) [21].

Guidelines for Dental Radiography

Most dentists do not recommend routine radiographs during pregnancy period. In case of intraoral radiographs X-rays are directed to the mouth not the abdomen. Dental radiographs with proper protective measures like abdominal and thyroid shielding by lead apron and thyroid collar and also using high speed E films are considered safe for pregnant patients. No fetal abnormalities have been reported due to dental radiographs. Usually greater risk to the foetus of teratogenicity and death is during the ovum period, first 16 days after conception. It has been recommended that the pregnant patients should be reassured that in case of imaging, As Low As Reasonably Achievable principle will be practiced and also imaging will be advised only for emergency cases and diagnostic radiographs should not be withheld during this period [24].

Conclusion

Dentist -Obstetrician-Patient interface is well established during treatment plan for pregnant women so that chances of complications in the dental clinic can be minimised. The dentist should know the basic knowledge of physiological changes which occur during pregnancy in mother's body and effects and side effects of certain medications and dental radiographs on the mother's body. During pregnancy most changes in oral tissues can be avoided with good oral hygiene maintenance.

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Table 8: Teratogenic drugs & its effects.

Drugs	Effects
Alcohol	Fetal Alcohol Syndrome
Androgens	Multiple Congenital Defects
Antineoplastic Agents	Multiple Congenital Defects
Carbimazole	Aplasia Cutis
Corticosteroids	Cleft Palate
Fibrinolytic Drugs	Placental Separation
Tetracycline	Discoloration of Teeth & Inhibition of Bone Growth
Valproate	Neural Tube Defect
Vitamin A –Analogues	Congenital Defects
Warfarin	Multiple Congenital Defects

Table 9: Drugs classification.

Category	Evidence
A	No fetal risk in controlled study
B	No risks to human fetus despite possible animal risk or no risks in animal studies but human studies lacking
C	Human risks cannot be ruled out. Animal studies may or may not show risk.
D	Evidence of risks to human fetus
X	Contraindicated in pregnancy

Table 10: Teratogenic risks of drugs.

Drugs	Names	FDA Category	Use in Pregnancy
Analgesics	Acetaminophen Morphine Fentanyl	B	Yes
	Ibuprofen Oxycodone	B/C	Avoid in 3rd Trimester
	Cox 2 Inhibitors Codeine	C	Avoid
	Naproxen	B/D	Avoid in 2nd half of 3rd Trimester
	Aspirin	C/D	No
Antibiotics	Amoxicillin Cephalexin Chlorhexidine Penicillin Clindamycin Erythromycin Metronidazole	B	Yes
	Ciprofloxacin Gentamycin	C	Yes - with Caution
	Tetracyclin Doxycycline	D	No
Antifungal	Nystatin Clotrimazole	B	Yes
	Fluconazole ketconazole	C	with Caution
Local Anesthetics	Lidocaine Prilocaine	B	Yes
	Epinephrine Articaine Bupivacaine Mepivicaine	C	Yes - with Caution
Anxiolytics	Barbiturates Benzodiazepines	D	No
	N_2O	Not Designated	Controversial
Corticosteroids	Prednisolone	B	Yes

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