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PREGNANCY: GENERAL AND ORAL CONSIDERATIONS

Neeraja Gopan[1], Abhilash R Krishnan[2], Deena C Thomas[3], Alaka Subodh[4], George Jacob[5], Sarika S Kamal[6], Nithin V S[7]

ABSTRACT

Pregnancy is an exquisite physiologicphase in a woman's life.The various physiological and hormonal changes during gestation can cause transitions in the oral cavity.Providing comprehensive dental care in each stages of pregnancy is very essential for the maintenance of the health of both the mother and the fetus.This manuscript confers various physiologic changes that could crop up during the gestational period,itssignificance in dentistry and about the modifications in the management of a pregnant patient while delivering dental care.

Author Affiliations:

[1,2,3,7]Department of Oral Medicine and Radiology,Sri Sankara Dental College, Trivandrum District, Kerala

[4]Department of Public Health Dentistry, Sri Sankara Dental College, Trivandrum Dist,rict Kerala

[5] MadathivilayilDental Care, PathanamthittaDistrict

[6] General Dentist, Tooth Care Dental Clinic, Kollam, Kerala.

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***Corresponding Author:**

Dr. Alaka Subodh,

Senior Lecturer, Department of Public Health Dentistry,

Sri Sankara Dental College, Trivandrum dist, Kerala

Email id: alakasubodh@gmail.com

Ph no: 9986072075

INTRODUCTION

Pregnancy is an ethereal and convoluted phase of transformation in a woman's life. During pregnancy, the interaction of different hormones will bring about physical as well as various physiological changes in mother and these changes exert influence on the dental management of a woman during pregnancy and hence dental management of such patients require special attention and care. A dentist should also have a far-reaching insight about changes specific to pregnancy[1,2,3]. Dental treatments can be performed safely for pregnant women since most pregnant women are generally healthy. Oral health care is an inevitable component in maintaining overall health because oro dental diseases in mothers can affect fetal health. Therefore, pregnant women should not be denied oral health care treatments provided that the risk assessment is done properly for both the mother and the fetus [4,5].The adaptations of the maternal organ systems to various physiological changes necessitate consideration and modifications in dental treatment as well as procedures [4].

Physiological changes during pregnancy

During pregnancy, changes occurs in almost all organ systems that results in multitude of manifestations among which most common complaints are nausea, vomiting, heartburn ,shortness of breath, food cravings and fatigue. These physiological changes pose various challenges in providing dental care for the patient. Therefore a dentist need to understand the physiological changes of the body during pregnancy and the effects due to certain dental treatments ,radiation exposure, medications on fetus for effectively managing a pregnant patient in the dental office [1,6- 9,10].

Cardiovascular system changes

Assorted changes are seen in the cardiovascular system during each stage of pregnancy, including an increase in blood volume and cardiac output which occur due to increased demand from the fetus. In later stages, blood pressure is decreased. The supine hypotensive syndrome occurs at the end of the second trimester. When the patient is in the supine position, fetus compresses inferior venacava and aorta and reduces venous return and causing hypotension, dizziness, nausea, and fainting. To prevent this, the patient's hip should be elevated by 10-12 cm or ask the patient to roll to her left side. This will help to relieve the pressure exerted by the uterus on the inferior venacava and hence hypotension is prevented[1, 6, 9].

Respiratory system changes

Alterations in the respiratory system are mainly manifested as hyperventilation and dyspnea which could be a sign of high oxygen demand and decreased residual capacity of lungs .Increased circulating estrogen leads to engorgement of nasal capillaries and rhinitis which precipitate epistaxis and causes upper respiratory tract infections[6,9].

Gastrointestinal changes

The patient feels very uncomfortable, with the most common symptoms being nausea, heart burn and vomiting. The dentist finds it difficult to make the patient feel at ease to carry out dental procedures[1, 7, 9].

Hematological system changes

The upsurge in the RBCs (Red Blood Cells), WBCs (White Blood Cells) and ESR (Erythrocyte Sedimentation Rate) and decrease in Hb brings about anemia. All coagulation factors except Factor XI and XIII are elevated which is responsible for the hypercoagulable state of the patient. Deep vein thrombosis and pulmonary edemacan occur as a complication. To prevent further complications while performing minor oral surgical procedures, the dentist should review the Hb and RBC count of the pregnant patient[6, 9].

Endocrine system changes

Estrogen, progesterone and human gonadotrophin and elevated levels of thyroxin, steroid and insulin trigger the various physiological changes associated with pregnancy. Women with a positive family history of Type II Diabetes mellitus are at high risk of developing Gestational Diabetes. Hence the practitioner should monitor the blood sugar levels before any dental procedures[7].

Oral manifestations in pregnancy

- **Dental Caries:** Increased prevalence of dental caries and dental erosion is seen during pregnancy, which could be due to the increase in cariogenic bacteria produced by nutritional changes, nausea, vomiting and inadequate oral health care. Also, there is a drop in salivary pH and buffer effect. These changes in salivary composition are observed during an advanced stage of pregnancy and during the period of lactation [11 - 14].
- **Gingivitis:** Around 50% of all women with pre-existing gingivitis experience the worsening of the condition during pregnancy, which is attributed to the changing levels of estrogen and progesterone along with changes in oral flora and reduced immune response. It begins in the second month; maximum intensity is seen in the eighth month after which gingivitis decreases. It is characterized by redness, edema and increased tendency for bleeding and inflammation [5, 15- 17].
- **Periodontitis:** Periodontal disease during pregnancy has been identified as a risk factor for premature delivery or low infant birth weight. In the second trimester, anaerobic Gram-negative bacteria increases in the dental plaque which produce cytokines IL-1β (Interleukin-1 beta), TNF-α (Tumor Necrosis Factor alpha),IL-6 (Interleukin-6) and PGE_2 (Prostaglandin E_2) and MMPs (Matrix Metalloproteinase). These compounds through circulation cross the placental barrier and increase the levels of PGE_2 and TNF-α in the amniotic fluid and results in preterm delivery [11- 14].
- **Pyogenic Granuloma**: It is also known as Epulis or Pregnancy tumor or granuloma. It is a benign reactive

inflammatory lesion composed of proliferating capillaries. It occurs during the second trimester. Estrogen and progesterone increase the vascularity of the gingiva already affected by gingivitis or periodontitis. Pyogenic granuloma is developed in the presence of local irritation like trauma or bacterial plaque. Clinically manifested as an asymptomatic, red, smooth or lobulated, sessile or pedunculated mass located on the papillary gingiva or on lips, cheek and tongue. Most commonly seen on the buccal mucosa of maxillary anterior teeth. Progesterone causes inhibition of collagenase resulting in the accumulation of collagen causing enlargement of the mass and its vascularity. Rapid growth is observed and the lesion bleeds easily. It seldom exceeds a dimension larger than 2 cm.It reduces in size after delivery and may disappear completely in some cases [1, 14].

- **Other alterations:** Changes in the composition and pH of saliva, aphthous ulcers, Temporomandibular joint disorders, melasma and hirsutism are some among the other changes seen during pregnancy [12, 13]. (Table 1)

MODIFICATIONS IN THE TREATMENT PLAN:

Dental treatment guidelines for pregnant patients should be considered as general orientations and not as strict rules. Inter-consultation with the obstetrician is essential for assessing her dental needs and to have an idea about any co existing conditions for which the patient is taking medication [18].

1. **Prevention**

   Ensure that pregnant women learn about the need for maintaining good oral hygiene. Use of interproximal brushes, dental floss ,proper brushing technique, etc is recommended. Consumption of refined carbohydrate should be reduced. Prenatal fluoride administration for the prevention of caries in deciduous teeth is a topic under intense debate as the efficacy of fluoride during that period is not known and it may also cause fluorosis [11-14].

2. **Programming of treatment during pregnancy**

   First trimester: Oral hygiene is reinforced with plaque control measures and oral prophylaxis. Infections, pain and emergency situations are to be treated promptly. Avoid elective treatment. Dental erosion may be seen in those with morning sickness since the progesterone levels influence GI smooth muscles. Postural hypotension giving leads to syncope, so sudden movements should be avoided.

Pregnancy Gingivitis should be managed by debridement, chlorhexidine mouthwash and vitamin supplements. Medications should be used sensibly since drugs with teratogenic effect should not be given as 1st trimester is the period of organogenesis and placenta formation

Second trimester: This is the safest trimester to carry out dental treatment. Management of oral infections postponed from first trimester can be done during this period. Radiography should be carried out with proper radiation protection measures in unavoidable situations. Increased frequency of urination, nausea and heartburn are common in 2nd trimester. Postpone major surgical procedures until after delivery.

The first part of third trimester: Elective procedures can be carried out.

Second half of third trimester – All elective dental treatments are avoided.The chair position should be semi-reclining. Increased risk of preterm labor[7, 19- 20].

Drugs used in pregnancy

The major concern while prescribing medication to a pregnant woman is the risk of teratogenicity. The US Food and Drug Administration has defined categories of risks of pregnancy associated with various drugs.

Analgesics - Acetaminophen(category B) is the safest analgesic to use in pregnancy. The maximum recommended daily dose is 4 g/day.

Antibiotics - Category B drugs are commonly prescribed. Ciprofloxacin (category C) is used to treat periodontal disease. The risk-benefit ratio for the patient is to be evaluated before prescribing the drug.

Local anesthetics - Relatively safer when administered properly during pregnancy. Category B and C drugs are used. 1:100,000 concentration of epinephrine is used as a vasoconstrictor for a healthy pregnant patient and the LA dose is limited to the minimal.

Steroids -When used systemically can harm the mother and the fetus, so it is avoided while topical use is safe.

Fluoride- A category C drug used for severe gastric reflux caused by nausea and vomiting which causes erosion of teeth. It diminishes the dentin sensitivity. Fluoride varnishes are recommended.

Sedatives and Anxiolytics - Category D drugs like the barbiturates and benzodiazepines are avoided[21- 24]. (Table 2 & 3)

Dental Radiographs

Radiation exposures less than 0.05 – 0.1 Gyis considered to be safe as it does not cause any gross congenital abnormalities. Radiation protection methods including rectangular collimators, high speed films, lead aprons, lead screens and thyroid collars are mandatory while taking dental x rays. The risk of reaching teratogenic radiation dose while taking a dental radiograph is less than 0.1%.The practitioner should follow ALARA (As Low As Reasonably Achievable)principle and the patient should be reassured that only radiographs required for diagnosis shall be obtained. The fetus is sensitive to neurogenic effects of radiation between 8th and 15th week after conception [7, 8, 21- 23].

Amalgam Restorations

Mercury vapors released from dental amalgam restorations can cross the placental barrier through circulation.ADA (American Dental Association), FDI (World Dental Federation), WHO (World Health Organization) consider amalgam to be safer to use during pregnancy as there is no relations established between amalgam restorations and complications during pregnancy. Alternatively, restorative materials such asa glass ionomer, composite resins, gold and porcelain restorations are considered to be safe in comparison to amalgam restoration. Patient should be informed about the all restorative materials that can be used, and the dentist should decide the best material to use according to the need of the patient [7, 19, 20,24].

ORTHODONTIC TREATMENT

Pregnancy shouldn't be a hindrance for the patient to receive orthodontic treatment.There is certain factors that need to be considered before planning orthodontic treatment for a pregnant woman,

- Pregnancy gingivitis and monitoring of gingival health
- Orthopantomograph and lateral cephalograms are avoided unless absolutely necessary
- Hormonal changes affect tooth movement
- Food cravings has its effect on the treatment
- Effect of drugs taken by the patient [24, 25]

Table 1: FDA pregnancy risk factor definitions [5]

Category	Definition
A	Controlled studies in women fail to demonstrate a risk to the fetus in the first trimester (and there is no evidence of risk in the later trimesters)and the possibility of fetal harm appears remote.
B	Either animal reproduction studies have not demonstrated a fetal risk but there are no controlled studies in pregnant women or animal reproduction studies have shown an adverse effect (other than a decrease in fertility)that wasn't confirmed in controlled studies in women in the first trimester(and there is no evidence of risk in later trimesters).
C	Either studies in animals have revealed adverse effects on the fetus (teratogenic, embryocidal or other)and there are no controlled studies in women or studies in women and animals are not available. Drugs should be given only if the potential benefit justifies the potential risk to the fetus.
D	There is positive evidence of human fetal risk, but the benefits of use in pregnant women may be acceptable despite the risk(for example, if the drug is needed in a life-threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective).
X	Studies in animals and human beings have demonstrated fetal abnormalities or there is evidence of fetal risk based on human experience, or both and the risk of the use of the drug in pregnant women clearly outweighs any possible benefits. The drug is contraindicated in women who are or may become pregnant.

TABLE 2: List of Drugs most used in dental practice according to the fetal risk categories of the united states FDA [5]

Drug	FDA Category	Use in pregnancy
LA-Injectable		
Articaine	C	Yes
Bupivacaine	B	Yes
Lidocaine	B	Yes
Mepivacaine	C	Yes
Prilocaine	B	Yes
LA- Topical		
Benzocaine	C	Yes
Dyclonine	C	Yes
Lidocaine	B	Yes
Tetracaine	C	Yes
Analgesics		
Acetaminophen	B	Yes
Aspirin	C/D*	Don't use in 3rd trimester
Diflunisal	C/D*	Don't use in 3rd trimester
Etodolac	B/D*	Don't use in 3rd trimester
Flurbiprofen	B/D*	Don't use in 3rd trimester
Ibuprofen	B/D*	Don't use in 3rd trimester
Ketorolac	B/D*	Don't use in 3rd trimester
Ketoprofen	B/D*	Don't use in 3rd trimester

Naproxen	B/D*	Don't use in 3rd trimester
Codeine	C	Low dose,short duration acceptable
Oxycodone	B	Low dose,short duration acceptable
Meperidine	B	Low dose,short duration acceptable
Propoxyphene	C	Low dose,short duration acceptable
Antimicrobials		
Penicillin	B	Yes
Amoxycillin	B	Yes
Amoxycillin +Clavulinic acid	B	Yes
Cloxacillin	B	Yes
Cephalosporins	B	Yes
Erythromycins	B	Yes
Clindamycin	B	Yes
Clarithromycin	C	Use cautiously
Azithromycin	B	yes
Tetracycline	D	No
Doxycycline	D	No
Metronidazole	B	Use cautiously
Nystatin	B	Yes
Ketoconazole	C	Use cautiously
Fluconazole	C	Use cautiously
Chlorhexidine rinse	B	Yes

TABLE 3: Teratogens and their effects on foetus [24]

Teratogens	Effects on foetus
Ethyl alcohol	Foetal alcohol syndrome
Tobacco	Low birth rate,cleft lip and palate
Cocaine	Cognitive delay,placental abruption
Thalidomide	Phocomelia
Methyl mercury	Microcephaly,brain damage
Anticonvulsant	Orofacial cleft,cardiac malformation
Carbamazepine	Spina bifida
Valproic acid	Neural tube defect
Lamotrigine	Neural tube defect
Phenobarbitone	Urinary malformation
Topiramate	Abnormalities in all subjects
Warfarin	Warfarin embryopathy,spontaneousabortion
ACE Inhibitor	Oliguria, renal dysgenesis, lung limb abnormalities
Retinoid	Sponataneous abortion, multiple malformation

Conclusion

Pregnancy has significant dental implications since myriad of changes happens during the period of pregnancy, which demands the dentist to have inter consultation with the obstetrician to provide comprehensive dental care at every stage of pregnancy. The dentist should follow certain protocol in the management of the pregnant patient to eliminate complications that may arise. Proper diagnosis and treatment are essential to maintain the health of the mother and the fetus. It is vital that the health professionals collaborate to ensure that the pregnant woman receives proper oral assessment, intervention and oral health education because the consequences of poor oral health and inappropriate treatment may have a lifelong impact.

Conflict of Interest Statement-
There is no conflict of interest.

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