



Oral Health Implications: Maternal and Fetal Outcomes

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Abstract

According to the National Vital Statistics Report published by the Center for Disease Control (CDC) in 2023, the number of births recorded in the United States in 2021 was 3,664,292 which was up by 1% from 2020. The general fertility rate also rose amongst all ethnic groups, which was the first time it happened since 2014. While 78.3% availed prenatal healthcare in the first trimester, the percentage of women beginning prenatal healthcare late or opting out of any prenatal healthcare also increased from 2020. There was also a simultaneous increase in the number of infants born with low birthweight. National Institute of Cranial and Dentofacial research states that dental caries still remains the most prevalent disease among infants. By the age of 8, 52% of children develop some form of dental or oral disease. It's also known that children from low-income families are twice as likely to have caries. This review focuses on defining the stages of pregnancy and the need for pre-natal screenings. The importance of dental health in the pregnant woman and how it may have an impact on the developing fetus is also discussed. The dental considerations for a pregnant individual including patient positioning, modes of anesthesia, medications, radiographic technique are mentioned in detail. Because a pregnant individual may have only selective dental treatments especially in the first trimester of pregnancy, the need to educate women about home oral healthcare and build a strong interdisciplinary team as has been demonstrated by the Oral Health Campaign Toolkit is of utmost importance. Not only does maternal oral health screenings prevent dental diseases in pregnant women, it also educates them about the need for dental checkups in their children. Thus, educating an expectant mother may ultimately lead to lesser number of adult individuals suffering from dental diseases.

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Introduction

According to the Center for Disease Control and Prevention, the pregnancy rate for women in the U.S. is just slightly higher than 100 per 1000 annually, with the highest rate among women aged 25-29 years [1]. Pregnancy is medically defined as the period when a fetus is developing in a woman's uterus [2]. Pregnancy can be divided into trimesters to describe major developmental events of the fetus and body changes noted by the mother. The first trimester, which ranges from week 1 through week 12, begins upon conception, noted when the sperm penetrates the egg. After conception, the zygote, or fertilized egg, moves from the fallopian tube where insemination typically occurs, to the uterus, implanting upon the wall of the uterus [2]. The zygote continues to develop, forming the embryo and placenta [3]. The placenta serves to provide nutrients and oxygen to the forming embryo and eventually fetus, as well as removing waste products [3]. The second trimester, ranging from week 13 to week 28, notes dramatic growth in the fetus, enabling the mother to feel movement, as the fetus continues to develop [2]. During the second trimester, the fetus begins developing reflexes and can respond to stimuli [4]. Additionally, the fetal brain development continues to evolve, fostering chest muscle and diaphragm contractions [5]. The third trimester notes the nearly fully formed fetal skeleton, fetal weight gain and movement, growth of fingernails and toenails [5]. The third trimester ends with the delivery of the infant.

Prenatal healthcare

Receiving consistent prenatal healthcare is vital to maximizing health of the mother and fetus. Optimally, prenatal healthcare begins prior to conception, so any health deficits are addressed that can positively impact the mother's ability to conceive, carry the fetus to term, and promote an ideal environment for fetal growth and development. Women who do not receive prenatal healthcare are more likely to deliver babies of low birth weight or experience fetal death [6].

Assess pregnant women's oral health status

Regular prenatal healthcare will allow the health care provider to routinely assess not only the growth and development of the fetus, but the mother's health as well. Oral health status is best assessed on the pregnant women by completion of an oral examination by the health care provider as well as routine dental care by a dentist [7]. Poor oral health of the mother is linked to poor health outcomes for the fetus [7]. Pregnancy can exacerbate existing oral conditions due to the rapidly changing maternal hormones [7]. Assessment of the oral cavity begins with visual inspection, looking for any swelling, color of oral mucosa, changes in texture, tooth decay or abnormal lesions [8]. Any abnormal areas should be noted in the patient's chart. Additional assessment includes questioning the patient about their oral care habits, any oral areas of concern, changes in eating habits related to oral pain or jaw or ear pain [8].

Advise about the importance of oral healthcare

Because pregnant women are more prone to cavities and gum disease, it is essential routine healthcare assess the pregnant woman's oral health [7]. The Center for Disease Control and Prevention share that 25% of women in childbearing age have untreated cavities, which increases their risk for tooth loss [7].

Collaborate with health professionals

Because oral care for the fetus begins with good oral health of the mother, the American Academy of Pediatrics promotes the use of the Oral Health Campaign Toolkit [9]. This toolkit is designed to be used across health care specialties with the common goal to begin babies on a lifetime of wellness connected to optimal oral health [9]. This campaign, entitled Protect Tiny Teeth, integrates health care of the mother through medical and dental health care delivery integration [10]. This practice, of fostering oral health among pregnant mothers, utilizes access to an interdisciplinary team during routine obstetrical visits and promotes dental referrals when needed [10]. The process allows the obstetric team to regularly evaluate the woman's assessment of her oral health and escalate her to an urgent dental visit opportunity when needed [10]. This regular, intentional assessment of the oral health of the pregnant mother results in more timely intervention by the oral care team, resulting in positive oral health for the mother.

Dental considerations

According to the American Dental Association (ADA), diagnostic and restorative dental treatment is safe throughout pregnancy, in fact, preventive care is recommended [11]. During the first trimester, it is advisable to defer elective treatment, although if an emergency arises, the pregnant mother should consult with their physician to clarify treatment [12]. The second trimester is the safest time to perform treatment, including elimination of problems that could arise later in pregnancy. Early in the third trimester, routine dental care is still advisable [12]. Oral healthcare providers, including dental hygienists, are in a position to educate and encourage patients on best practices that are safe and effective [9].

Patient positioning

As a pregnant woman, laying in the dental chair can be uncomfortable. During the third trimester, the uterus may press on the inferior vena cava, decreasing the venous return and oxygen to the brain and heart [12][13]. This can lead to dizziness or nausea for the pregnant woman. By placing a pillow under the right hip or having the pregnant woman lay on her left side, the uterus is moved off the vena cava. Additionally, the head should not be lower than the feet when performing dental procedures [12].

X-Rays

Dental imaging (x-rays) during pregnancy frequently causes apprehension and may hinder women from seeking dental treatment. Delaying routine x-rays until birth is acceptable, however if the mother has a potential dental infection that could cause poor pregnancy outcomes, it should be diagnosed immediately. Dental x-rays may be performed safely with the use of several precautions including shielding over the pregnant mother's abdomen, using a properly collimated beam, and using a high-speed film [14][15][16].

Anesthesia/Nitrous

Dental local anesthetics, as well as dental treatment during pregnancy, do not represent a major teratogenic risk [17]. Lidocaine and prilocaine administered with epinephrine are generally considered safe for use during pregnancy [18]. Nitrous oxide is classified as a pregnancy risk group Category C medication, meaning that there is a risk of fetal harm if administered during pregnancy [11].

Medication

While prescribing any medication for dental infection or dental pain management, the practitioner needs to take into consideration the benefit for the mother versus the risk to the fetus. Penicillin, clindamycin, and cephalosporins are safe antibiotics and should be prescribed when indicated. Tetracyclines of any type should be avoided during pregnancy and breastfeeding to avoid any discoloration of the teeth [19].

Oral homecare education

To help maintain a healthy periodontium, the ADA recommends pregnant women eat a balanced diet, brush thoroughly with a fluoridated toothpaste twice a day and floss daily [11]. Lack of proper oral home care may exacerbate poor periodontal conditions. Counseling should include reinforcing proper nutritional habits, brushing twice daily with a fluoridated toothpaste, flossing, or using dental aids once daily and visiting the dentist a minimum of two times per year. To help decrease bacteria, hygienists may recommend fluoridated rinses, chlorhexidine rinse or using products containing xylitol.

Pregnancy and the oral cavity

A swift change of hormones including estrogen and progesterone caused from pregnancy alters the mother's body, including the oral cavity [14]. Changes in the female sex hormone cause an increase in oral vasculature permeability and decrease in the most immunity, making pregnant women more prone to oral infections [20].

Common problems noted in pregnancy include pregnancy gingivitis, pregnancy tumor (pyogenic granuloma), periodontal infections, changes in salivary flow and enamel erosion [20] [21]. Increased facial pigmentation is also noted [14].

Pregnancy gingivitis

Increased gingival inflammation is a well-documented phenomenon occurring during pregnancy [21]. Pregnancy gingivitis is related to the preexisting gingival condition, displaying characteristics of inflamed tissue including enlargement around the gingival margins and interdental spaces, redness, smooth and shiny appearance, and bleeding on probing [14]. There is an exaggerated response of the tissues to dental biofilm and local irritants, such as calculus build-up or a fractured tooth. Good oral hygiene can help to prevent or lessen the severity of the hormone mediated response. Additionally, poor self-care exacerbates the oral condition. Gingival changes typically occur in the first trimester and can continue throughout the pregnancy if the patient's self-care is not improved [21]. If left untreated, gingival inflammation continues as the hormones rise, and typically peaks by the eighth month [21]. After the child is birthed, complete health may not result. Gingival inflammation may continue after birth, particularly if the mother is breastfeeding [21].

Pregnancy tumor

Granuloma gravidarium, also referred to as a pyogenic granuloma or pregnancy tumor is seen in about 1-5% of pregnant women [20] [22]. It is a benign, inflammatory lesion, that rapidly grows to a variety of stimuli such as plaque [21]. Bleeding readily, although painless, the lesion will typically appear as a soft, round enlargement in the anterior interdental spaces [21]. This type of granuloma typically appears in the second trimester, appearing as a proliferative purple-red to deep blue mush-

room-like shape with a smooth surface [22]. Because they grow in the presence of plaque, pyogenic granulomas can interfere with mastication contributing to inadequate nutrition for the mother and baby. Because of size, they can provide a site for bacterial growth leading to development of periodontal disease in that specific cite [21].

Periodontal infections

Periodontal disease is the result of infection and inflammation of the gums and bone that surround and support the teeth [7]. Pregnancy does not cause periodontal disease, but it does worsen an existing condition [14][23]. Pregnancy-associated immunologic changes cause a suppression of the mother's cell mediated immune response, specifically the neutrophil function [21]. While it is noted that periodontitis is associated with poor pregnancy outcomes including preterm birth and low birth weight, how it leads to adverse pregnancy outcomes is not fully understood [7][13].

Caries

One in four women childbearing age have untreated caries [7]. Increased craving for sweets changes oral factors such as acidity in the mouth and reduced saliva production in combination with fear of dental treatment, places pregnant women at high risk [24]. Change in the composition of the oral cavity includes a decrease in salivary flow and pH and with increased levels of potassium, protein, and estrogen [12][14] [25]. The increase in subgingival crevicular fluid and salivary estrogen causes desquamation and proliferation of the oral mucosa facilitating a suitable environment for bacterial growth. This bacterial growth predisposes the pregnant woman to dental caries [12][14]. Women with oral health problems such as caries, have an increased risk of transferring bacteria from mother to infant [13].

Enamel erosion

Morning sickness with emesis over a period of time can lead to demineralization and acid erosion [21]. The gastric acids erode the enamel, predominately on the maxillary lingual surfaces. Erosion of the enamel can be easily controlled by advising the mother to swish with a solution containing sodium bicarbonate: one cup of water to one teaspoon of sodium bicarbonate after sickness to neutralize the acid and prevent further damage [14][21]. Good oral hygiene along with a soft toothbrush and low-abrasive toothpaste will help to prevent damage and reduce the severity of the hormone-mediated inflammatory changes [12].

Conclusion

The review focused on the dental considerations in pregnancy. Previous studies have shown that there is an increased incidence of oral and dental diseases during pregnancy due to hormonal changes. Thus, proper oral care is necessary during this time. The developing fetus must also be considered whenever a treatment plan is formulated as radiation from X-rays and medications can negatively impact their health. Lastly, by educating the need for a healthy oral cavity to an expecting mother, the disease prevalence of dental diseases in infants and children can also be lowered.

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