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Mini Review

Oral Health Changes During Pregnancy: The Role of Hormonal, Salivary, and Psychological Factors: A Mini Review

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Abstract

Although pregnancy is frequently viewed as a happy and eagerly awaited stage of a woman's life, it is not without difficulties as it involves a number key hormonal and physical changes. Among those changes that are commonly experienced during pregnancy are oral alterations. This calls for sufficient research on the frequency of those oral changes in various groups, their potential causes, their impact on pregnant women's quality of life, and the potential for salivary cortisol changes to affect the oral cavity.

Keywords: Oral Changes; Pregnant Women; Salivary Changes; Quality of Life; Oral Mucosal Lesions; Periodontal Changes

Abbreviations

ECC: Early Childhood Caries; FN: Fusobacterium Nucleautum; GDM: Gestational Diabetes Mellitus; MS: Mutans Streptococci; PD: Periodontal Disease; PG: Porphyromonas Gingivalis; PI: Prevotella Intermedia

Background

Individuals who are exposed to physical, psychological, cognitive, and/or social risk factors without sufficient support or coping mechanisms to counteract the potential negative impacts of these risk factors, are said to be vulnerable groups. These groups are more prone to health problems and oral diseases. Pregnancy is considered a state of vulnerability because of the major physiological changes that happen to the body in that period [1,2].

Pregnant women's general health and wellbeing are greatly influenced by their perinatal oral health. Additionally, it is crucial for their newborns' health and wellbeing. Many pregnant women choose not to seek dental care due to persisting misconceptions on how pregnancy affects oral health and worries about the safety of the fetus while receiving dental care, and those who do frequently encounter dentists' reluctance to provide it due to caution. However, pregnant women could be more inclined to make healthful adjustments during this time [4].

The effect of oral changes on the pregnant mother and her fetus

- **Pre-term Birth and Low Birth Weight:** Inflammatory mediators such as interleukin-6 (IL-6), IL-8, and tumor necrosis factor alpha (TNF-α) produced during periodontal inflammation may cause an acute inflammatory response that enters the systemic circulation and seem to affect placental function and probably affect the onset of labor and subsequent fetal health outcomes. Another biological mechanism supporting this association between periodontal diseases and adverse pregnancy outcomes is the systemic dissemination of periodontal pathogens, mostly Gram-negative anaerobes that may produce endotoxins and lipopolysaccharides, that may cross the placenta into the amniotic fluid and fetal circulation [4,5].
- **Pre-eclampsia:** Preeclampsia is characterized by the beginning of pregnancy-related hypertension disease and proteinuria. There are several theories explaining how periodontitis and preeclampsia are related. One theory postulates that the placentas of preeclamptic pregnant females have higher concentrations of some periodontal pathogens, including *Porphyoromonas Gingivalis* (PG) and *Fusobacterium Nucleatum* (FN). The other theory states that preeclampsia may also be exacerbated by inflammatory reactions, such as the transition of Th2 toward Th1, elevated oxidative stress, anti-angiogenic proteins, vascular endothelial growth factor receptor 1, and complement C5a [6].
- **Gestational Diabetes:** Pregnant women are frequently at risk of developing periodontal disease (PD) and gestational diabetes mellitus (GDM), at the same time. A few risk factors, including age, sedentary lifestyle, poor dietary habits, and obesity, have been hypothesized to be shared by the development of both GDM and periodontal disease [7].
- **Early Childhood Caries (ECC):** The main objective of perinatal oral health care is to reduce the quantity of cariogenic bacteria in the mouth of a pregnant mother to postpone the infant's colonization by Mutans streptococci (MS) for as long as possible, which in turn shows a positive outcome on controlling the incidence of early childhood caries (ECC) [8].

Causes of oral changes during pregnancy

- **Pregnancy hormones:** The mouth cavity is not an exception to the changes in the mother's body brought on by the hormonal storm that occurs during pregnancy. For example, pregnant women are at risk for gingivitis and gingival hyperplasia due to elevated amounts of circulating estrogen, which enhance capillary permeability**.** Certain anaerobic bacteria linked to periodontal disease, like PG and *Prevotella Intermedia* (PI), are encouraged to flourish by elevated progesterone. Pregnancy-related hormonal changes allow these bacteria to proliferate, escalating inflammation and causing gingivitis and periodontal problems [9,10].
- **Dietary changes:** Cravings for sugary food hit during pregnancy, causing an increase in the bacterial load and ultimately leading to dental caries. Therefore, it's crucial that pregnant females take extra care of their oral health to reduce the risk of caries. Moreover, a healthy diet during pregnancy has a positive impact on lowering gingival and periodontal inflammation [11].
- **Oral Hygiene:** Oral Hygiene isn't performed correctly or efficiently by pregnant females due to several reasons. An increased interest and carving to carbohydrates not followed by proper toothbrushing is one of the reasons. Another reason could be discomfort during tooth brushing caused by bleeding gums due to increased levels of estrogen and progesterone, contributing to the increased biofilm level and deterioration of oral health [12].
- **Nausea and vomiting:** Teeth erosion and alterations in the macroscopic structure of the oral mucosa appear to be symptoms mostly brought on by prolonged, severe vomiting. These alterations could pose a significant risk to the patient's appearance as well as their health. The patient with severe and persistent vomiting needs comprehensive medical care, which includes a systematic dental examination [13].
- **Stress:** Anxiety and depression disorders are common in expectant women, and many are vulnerable to various stressors throughout pregnancy. Allostatic overload, a long-term imbalance in mediators of homeostasis, can be brought on by both acute and chronic stress. This imbalance can affect the immunological and endocrine responses of the mother, placenta, and fetus. Homeostasis disturbances during pregnancy may raise the risk of preterm birth and preeclampsia [14].

Oral changes during pregnancy

Hard tissue changes

- **Caries:** Pregnant women are more likely to develop dental caries throughout the third trimester and the postpartum period, due to lower salivary pH levels and lower salivary calcium levels which lead to favorable oral conditions for the colonization of MS and eventually leading to dental caries. In addition to, delay or lack of access to competent oral health care [15].
- **Erosion:** Tooth erosion is often associated with hyperemesis gravidarum, or severe morning sickness, which can cause tooth sensitivity. Any tooth damage caused by erosion can be repaired using pregnancy-safe dental restorations [16].
- **Tooth Mobility:** Even in the absence of gingival disease, teeth might become mobile during pregnancy due to the periodontium being impacted by elevated progesterone and estrogen levels.[3]

Soft tissue changes

- **The gingiva and periodontium:** Between 1.5 and 8% of pregnancies result in localized gingival hyperplasia, including pyogenic granulomas (also known as pregnancy tumor), and gingival polyps. It frequently shows up in the second or third month of pregnancy, manifesting clinically as a tumor-like gingival growth because of an overreaction to a small trauma. It appears as an ulcerated lesion that is painless, sessile or pedunculated, a few millimeters to several centimeters in size, smooth or lobulated, and purple red to deep blue in color depending on the vascularity. These lesions result from changes in vascular permeability brought on by pregnancy hormone fluctuations, which also cause gingival oedema [17].
- Increased gingival swelling and a tendency for bleeding are clinical characteristics of the marked tissue response during pregnancy. Pregnant women who have higher levels of female sex hormones appear to be more vulnerable to gingival inflammation and the development of gram-negative anaerobes, particularly *Prevotella Nigrescens*. Moreover, the degree of gingival inflammation is, in fact, correlated with high levels of salivary estrogen during pregnancy; those with high amounts of estradiol were more likely to develop gingivitis than those with low levels [18].
- **Oral Mucosal changes:** The oral acidic environment created by the metabolic and hormonal changes during pregnancy can promote candidiasis, which in turn causes a shift in the typical oral microbiome, which permits the yeasts to proliferate [19]. Various risk factors have been proposed for geographic tongue, including diabetes mellitus, pregnancy, hormonal changes, oral contraceptive pills, genetic variables, and psychiatric results. However, the correlation between higher female sex hormones and incidence of geographic tongue hasn't been established.[20] There has been evidence linking the menstrual cycle to the development of recurrent aphthous ulcers. However, ulcers are less common during pregnancy and in women using hormonal contraception, and more common during the luteal phase or menopause [21]. Cheek biting, is a term used to describe persistent cheek chewing and mucosal habit. This was the most prevalent oral mucosal disorder among pregnant women in a previous study. Pregnancy-related stress, anxiety, and weight gain can be the causes of these increased occurrences [22].
- **Salivary Changes:** Saliva's usefulness as a diagnostic tool for disorders of the mouth and body has been a field of study for many researchers, aiming to expand its use as a diagnostic aid [23].
- **Salivary flow rate:** There are conflicting findings in the literature about whether or not the quantity and quality of saliva changes during pregnancy, how these changes occur in the several trimesters, and how these changes impact periodontal and dental tissues.

According to some research, pregnancy affects the salivary glands just like it does in other exocrine glands, although other studies have found no noticeable alterations in the quantity or flow rate of saliva during this time [24].

- **Salivary pH:** Pregnant women's salivary pH was found to be lower (6.7) than that of non-pregnant women (7.5) in a study by Rockenbach*., et al.* 2006 [25]. Salivary pH was also found to be associated with periodontal changes during pregnancy. This is most likely because the amount of dental biofilm, which readily forms at lower pH levels, influences periodontal disease [26].

- **Salivary cortisol:** Numerous research has used longitudinal measurements of salivary cortisol in study participants' daily lives due to technological advancements that allow data to be evaluated in ecologically realistic settings. This research has the potential to shed light on the actual relationships between cortisol and psychological characteristics, states, and health factors.[27] The mean salivary cortisol levels increase from the 25th to the 28th week of pregnancy, reaching concentrations in late pregnancy that were more than twice as high as those of non-pregnant controls. After delivery, the levels quickly returned to normal. During pregnancy, salivary cortisol profiles showed a distinct circadian rhythm [28].

Pregnancy-associated stress

Pregnancy-related stress and anxiety lead to poor oral hygiene, which may increase the incidence of intraoral lesions. Pyogenic granuloma, gingival hyperplasia, oral candidiasis, cheek biting, benign migratory glossitis, aphthous ulcers, and telangiectasia are the most common oral lesions during pregnancy that have been reported in the literature, and they can all be linked in a way to psychological stress [29]. Regarding oral health, three pathways were identified by the analysis as having significant relationships with oral health and psychological well-being during pregnancy: psychological (dental anxiety directly limits the use of oral healthcare), behavioral (maternal depression lowers oral health self-efficacy), and physiological (elevated stress biomarkers correlate with periodontal disease, and periodontal therapy is associated with reduced salivary cortisol). These relationships are intergenerational, with children's caries risk significantly correlated with mom psychological distress [30].

Dental treatment during pregnancy

Pregnant women who have dental issues may have pain, functional limitations, and a lower quality of life. Professionals have agreed that periodontal care, filling treatments, diagnostic procedures, and routine preventive practices for pregnant women do not result in negative pregnancy outcomes. Unfortunately, data indicates that pregnant women's use of dental services is inadequate, and that this advice is not being implemented in practice. According to surveys done on a variety of populations, at most half of pregnant women sought dental care during their pregnancy, and some pregnant women would choose not to see a dentist even if they had dental issues. Additionally, even pregnant women who had a history of frequent dental visits before becoming pregnant showed minimal dental care-seeking activity [31].

Conclusion

Pregnancy induces a range of hormonal, immunological, and behavioral changes that significantly affect oral health. These alterations increase susceptibility to conditions such as gingivitis, dental caries, mucosal lesions, and salivary changes, all of which can negatively impact maternal and fetal outcomes. Elevated stress levels and poor oral hygiene practices further exacerbate these issues, highlighting the relation between psychological well-being and oral health. Despite the clear risks, dental care during pregnancy remains underutilized due to misconceptions and lack of awareness. Emphasizing early screening and maternal education is essential for preventing complications and improving both maternal and neonatal oral health outcomes.

Bibliography

1. Cornejo C., *et al.* "Oral Health Status and Oral Health-Related Quality of Life in Pregnant Women from Socially Deprived Populations". *Acta Odontológica Latinoamericana* 23 (2013).
2. Sheikh J., *et al.* "Vulnerabilities and Reparative Strategies During Pregnancy, Childbirth, and the Postpartum Period: Moving from Rhetoric to Action". *EClinicalMedicine* 67 (2024).
3. Silk H., *et al.* "Oral Health During Pregnancy". *American Family Physician* 77.8 (2024): 1139-1144.
4. Aloqayfi MI., *et al.* "An Overview of Periodontal Disease in Pregnancy". *International Journal of Community Medicine and Public Health* 11.1 (2023): 475-479.
5. Thomas C., *et al.* "Oral and Periodontal Assessment at the First Trimester of Pregnancy: The PERISCOPE Longitudinal Study". *Acta Obstetricia et Gynecologica Scandinavica* 102.6 (2023): 669-680.
6. Le QA., *et al.* "Periodontitis and Preeclampsia in Pregnancy: A Systematic Review and Meta-Analysis". *Maternal and Child Health Journal* 26.12 (2022): 2419-2443.

7. Jamal WZ., *et al.* "Association of Periodontal Disease with Gestational Diabetes Mellitus among Postpartum Women at a Private Tertiary Care Hospital of Karachi, Pakistan: A Cross-Sectional Study". *Scientific Reports* 14.1 (2023).

8. Shenoy R., *et al.* "Preventing Early Childhood Caries through Oral Health Promotion and a Basic Package for Oral Care: A Pragmatic Trial". *Contemporary Clinical Dentistry* 13.2 (2022): 162-168.

9. Hemalatha VT., *et al.* "Dental Considerations in Pregnancy: A Critical Review on the Oral Care". *Journal of Clinical and Diagnostic Research* 7.5 (2013): 948-953.

10. Sachelarie L., *et al.* "Impact of Hormones and Lifestyle on Oral Health During Pregnancy: A Prospective Observational Regression-Based Study". *Medicina* 60.11 (2024): 1773.

11. Radwan-Oczko M., *et al.* "How Much Do Pregnant Women Know About the Importance of Oral Health in Pregnancy? Questionnaire-Based Survey". *BMC Pregnancy and Childbirth* (2023).

12. Yenen Z and Ataçağ T. "Oral Care in Pregnancy". *Journal of the Turkish German Gynecology Association* 20.4 (2019): 264-268.

13. Paszyńska E., *et al.* "Changes in Oral Cavity During Period of Intensive Vomiting in Patient with Somatoform Autonomic Dysfunction: Description of the Case". *Psychiatria Polska* 50.3 (2016): 521-531.

14. Traylor CS., *et al.* "Effects of Psychological Stress on Adverse Pregnancy Outcomes and Nonpharmacologic Approaches for Reduction: An Expert Review". *American Journal of Obstetrics and Gynecology MFM* 2.4 (2020).

15. Kamate WI., *et al.* "Estimation of DMFT, Salivary Streptococcus Mutans Count, Flow Rate, pH, and Salivary Total Calcium Content in Pregnant and Non-Pregnant Women: A Prospective Study". *Journal of Clinical and Diagnostic Research* 11.4 (2017): XC01-XC05.

16. Islam NAB and Haque A. "Pregnancy-Related Dental Problems: A Review". *Heliyon* 10.3 (2024).

17. Patil R., *et al.* "Localized Gingival Hyperplasia Associated with Pregnancy: A Case Report". *Journal of the South Asian Federation of Obstetrics and Gynecology* 2.2 (2023).

18. Gürsoy M., *et al.* "Pregnancy-Induced Gingivitis and OMICS in Dentistry: In Silico Modeling and in Vivo Prospective Validation of Estradiol-Modulated Inflammatory Biomarkers". *OMICS: A Journal of Integrative Biology* 18.9 (2014): 582-590.

19. Africa CWJ and Turton M. "Oral Health Status and Treatment Needs of Pregnant Women Attending Antenatal Clinics in KwaZulu-Natal, South Africa". *International Journal of Dentistry* (2019).

20. Ghalayani P., *et al.* "The Comparison of Salivary Level of Estrogen and Progesterone in 1st, 2nd and 3rd Trimester in Pregnant Women with and without Geographic Tongue". *Dental Research Journal* 10.5 (2013): 609-613.

21. Rinaldi M., *et al.* "Recurrent Aphthous Stomatitis". *Actas Dermo-Sifiliográficas (English Edition)* 111.6 (2020): 471-480.

22. Rezazadeh F., *et al.* "Oral Mucosal Disorders in Pregnant versus Non-Pregnant Women". *Dentistry Journal* 2.4 (2014): 134-141.

23. Chiappin S., *et al.* "Saliva Specimen: A New Laboratory Tool for Diagnostic and Basic Investigation". *Clinica Chimica Acta* 383.1-2 (2007): 30-40.

24. Yilmaz F., *et al.* "The Effects of Pregnancy on Oral Health, Salivary pH and Flow Rate". *BMC Oral Health* 24.1 (2024): 1286.

25. Rockenbach MI., *et al.* "Salivary Flow Rate, pH, and Concentrations of Calcium, Phosphate, and sIgA in Brazilian Pregnant and Non-Pregnant Women". *Head and Face Medicine* 2 (2006): 44.

26. Lozano RP and Asmat-Abanto AS. "Periodontal Index and Salivary pH in First Trimester's Pregnant Women: A Cross-Sectional Study". *Journal of Clinical and Experimental Dentistry* 16.4 (2024): e426-e430.

27. Thau L., *et al.* "Physiology, Cortisol". StatPearls (2023).

28. Allolio B., *et al.* "Diurnal Salivary Cortisol Patterns During Pregnancy and After Delivery: Relationship to Plasma Corticotrophin-Releasing Hormone". *Clinical Endocrinology* 33.2 (1990): 279-289.

29. Bett JVS., *et al.* "Prevalence of Oral Mucosal Disorders During Pregnancy: A Systematic Review and Meta-Analysis". Journal of Oral Pathology and Medicine 48.4 (2019): 270-277.

30. Adeniyi AA., *et al*. "Oral Health, Anxiety, Depression, and Stress in Pregnancy: A Rapid Review of Associations and Implications for Perinatal Care". *International Journal of Environmental Research and Public Health* 22.1 (2025): 32.

31. Liu PP., *et al*. "Dental Care-Seeking and Information Acquisition During Pregnancy: A Qualitative Study". *International Journal of Environmental Research and Public Health* 16.14 (2019).