UPDATES IN RELATION BETWEEN ORAL HEALTH AND PHYSIOLOGICAL CHANGES IN PREGNANCY

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Abstract Speaking about pregnancy we can say that include physiologic changes mediated by female sex hormones with important effects even on healthy women. Physiologic changes during pregnancy can exacerbate already existing oral pathologic conditions, such as gingivitis, periodontitis, salivary and caries lesions. Aim This paper aims to illustrate recent informations about physiologic changes during normal gestation and also the management of dental treatment in women with normal pregnancy and in women at risk for adverse pregnancy outcomes.

Materials and methods We addreddes some queries to the electronic databases including clinical trials in PubMed and Thomson ISI - Web Of Science, published in English in the last five years using key words: „hematological, respiratory, gastrointestinal, cardiovascular changes, pregnancy, dental caries, gingivitis, dental management‖. From the collected materials, we have conceived a summary of the data about the physiologic changes during pregnancy wich can exacerbate already existing oral pathologic conditions, such as gingivitis, periodontitis, salivary and caries lesions.

Results Oral infections during pregnancy may be associated with adverse pregnancy outcomes. Prenatal care is an essential part of a successful pregnancy and oral health assessment must be part of prenatal care. Changes produced by pregnancy present a number of unique management problems in dental treatment.

Conclusion The best approach to avoid pregnancy complications and adverse pregnancy outcomes is to apply preventive strategies. One of the important direction in managing dental care for the pregnant woman is to promote a healthy oral environment free of inflammation and infection. All the changes in gingival tissues during pregnancy are associated with an exacerbated clinical inflammatory response. Immune adaptations that occur during pregnancy may further facilitate infections of oral tissues.

Key words: physiologic changes, pregnancy, dental management.

Introduction Pregnancy involves complex physiologic, physical, and psychological changes mediated by female sex hormones that have a grate impact even on healthy women. Physiologic changes during pregnancy can exacerbate already existing oral pathologic conditions, such as gingivitis, periodontitis, and caries lesions. Also, oral infections during pregnancy may be associated with adverse pregnancy outcomes. A successful pregnancy means a prenatal care, and oral health assessment must be part of its. Changes produced by pregnancy present a number of unique management problems in dental treatment. The best approach to avoid pregnancy complications and adverse pregnancy outcomes is to apply preventive strategies. The most important objective in planning dental care for the pregnant woman is establishing a healthy oral environment free of inflammation and infection.

We are going to present the physiologic changes that occur during normal gestation and discusses the management of dental treatment in women with normal pregnancy.

Materials and methods We addreddes some queries to the electronic databases including clinical trials in PubMed and Thomson ISI - Web Of Science, published in English in the last five years using key words: „hematological, respiratory, gastrointestinal, cardiovascular changes, pregnancy, dental caries, gingivitis, dental management‖. From the collected materials, we have conceived a summary of
the data about the physiologic changes during pregnancy which can exacerbate already existing oral pathologic conditions, such as gingivitis, periodontitis, salivary and caries lesions. The most important physiologic changes associated with pregnancy that have dental relevance are addressed in this paper.

Results and discussion

Pregnancy is characterized by a lot of physiological changes, especially endocrinological ones. Placental tissues produce a significant increase in progesterone and estrogen concentrations, with influence on physiologic changes in systemic and oral tissues.

Hematologic changes in pregnancy

During pregnancy, the total blood volume increases by about 1.5 liters, mainly to supply the demands of the new vascular bed and to compensate for blood loss occurring at delivery [1]. Of this, around one liter of blood is contained within the uterus and maternal blood spaces of the placenta. Increase in blood volume is, therefore, more marked in multiple pregnancies and in iron deficient states. Plasma volume increases above that of red blood cells, leading to the condition known as physiologic anemia of pregnancy [2]. Because of this hematologic adaptation, pregnant women are diagnosed with anemia only when the hematocrit falls below 33%. Leukocytosis during pregnancy is established when the white blood cell count is above 15000/mm$^3$ [3]. This is important to know when evaluating laboratory tests in the setting of oral infections. Large cross-sectional studies done in pregnancy of healthy women (specifically excluding any with hypertension) have shown that the platelet count does decrease during pregnancy, particularly in the third trimester [4]. This is termed as “gestational thrombocytopenia.” It is partly due to hemodilution and partly due to increased platelet activation and accelerated clearance [5]. Clotting factor production by the liver is stimulated by gestational hormones, leading to a hypercoagulable state, which predisposes to thromboembolism. Several disorders (for example antiphospholipid syndrome) aggravate this condition and may require the use of aspirin or heparin. Such patients should receive close treatment surveillance to determine whether dental procedures may be performed without the risk of excessive bleeding.

Cardiovascular changes in pregnancy

As the placenta and fetus develop, flow through the uterine and placental arteries increases notably. Changes in the cardiovascular system in pregnancy are begin early in pregnancy, such that by eight weeks gestation, the cardiac output has already increased by 20%. Changes in the microcirculation and within the intervillous space (mimicking an arteriovenous shunt) decrease arterial resistance. Elevations in blood volume and heart rate compensate for the changes in vascular resistance and cardiac output increases throughout pregnancy. Maternal blood pressure tends to lower during the first and second trimester, reaching baseline levels early in the third trimester. The growing uterus may compress the interior vena cava, impairing the venous return to the heart and therefore the stroke volume. Compensatory mechanisms are set in action, leading to symptoms such as palpitations (due to tachycardia), nausea, hypotension, and dizziness [6]. This events are frequently observed during the second half of pregnancy when pregnant women is in the supine position. Dentists may elevate the right hip of the patient with a pillow or folded sheet, or rolling the patient to the left to alleviate vena cava obstruction.

Respiratory changes in pregnancy

There is a significant increase in oxygen demand during normal pregnancy. This is due to a 15% increase in the metabolic rate and a 20% increased consumption of oxygen. There is a 40–50% increase in minute ventilation, mostly due to...
an increase in tidal volume, rather than in the respiratory rate [7]. The most important physiologic adaptations at the respiratory level are derived from the pressure that the pregnant uterus imposes on the abdominal side of the diaphragm, reducing the height and increasing the transverse diameter of the thorax. A progesterone driven hyperventilation compensates for the decreased residual capacity of the lungs. Dyspnea is not an uncommon sign during the third trimester, especially in patients with twin gestation, large fetuses, or polyhydramnios. Avoiding the supine position is central to the management of these patients.

Gastrointestinal changes in pregnancy
In the gastrointestinal (GI) tract, normal physiological changes during pregnancy produce dramatic modifications. Visceral organs rearrange to accommodate uterine growth. Ovarian and placental hormone levels fluctuate, altering: esophageal sphincter pressure, GI motility, gallbladder contractility, intrahepatic bile salt transport.

Beginning in the first trimester, endocrine changes induce a reduction in smooth muscle tissue tone and frequency of contractions. This affects gastric emptying and the functionality of the gastroesophageal sphincter, facilitating reflux of stomach content toward the esophagus and mouth. Psychological changes appear early in pregnancy and contribute to the nausea and vomiting syndrome called morning sickness [8]. A small percentage (1% to 3%) of these patients progress to hyperemesis gravidarum, which is associated with weight loss, electrolyte imbalance, dehydration, and eventually ketonemia [9]. Persistence of these symptoms despite treatment obligates one to rule out other disorders, such as pancreatitis, cholecystitis, hepatitis, psychiatric illness, and hyperthyroidism.

Salivary changes during pregnancy include an increase in volume that depends on oral-esophageal content delay rather than salivary flow rate. Rarely, patients lose more than 1 liter of saliva per day, a disorder known as Ptyalism [10]. Additional changes are a decreased salivary pH and elevations of protein and estrogen concentrations. Estrogens act locally by increasing the proliferation and desquamation of the oral mucosa, setting the conditions for bacterial growth [11].

Dental care management and normal pregnancy
A number of data indicate that 30% to 50% of women do not receive dental care during pregnancy and about 10% of dentists provide complete treatment for conditions considered necessary during the gestation period, delaying most of them for the postpartum period [12,13,14]. Only about 25% of patients are referred for a dental examination by healthcare providers during pregnancy [15]. These data indicate that both health professionals and patients tend to postpone dental treatments until after delivery.

Dental Caries in pregnancy
Maternal dental educational and behavioral interventions such as use of fluorides, control of cariogenic diet, chlorhexidine mouthwashes, and varnishes can decrease caries activity and the associated oral flora, thus improving women’s oral health and reducing bacterial transmission to their children [16]. The main bacteria that produce caries are Streptococcus mutans, which is usually acquired by young children from their mothers through direct salivary contact [17]. Since maternal oral flora are the strongest predictor of infant oral flora, maternal health status is critical to children’s oral health [18].

Gingival hyperplasia and edema in pregnancy
The clinical manifestation of plaque-induced gingival inflammation is modulated by the hormonal imbalances during pregnancy. Different forms of severity have been described. During the first months of
the pregnancy, the persistent influence of the plaque induces catarrhal inflammation of the gingiva that serves as a base for the development of hyperplastic gingivitis during the last months, modulated by the cumulating hormonal stimuli. In non-controlled cases a development of pyogenic granuloma can be observed. This lesion is rarely observed in women with poor oral hygiene in regions with local irritating factors such as improperly fit obturation or dental calculus and needs specialized treatment. During pregnancy the pyogenic granuloma when treated surgically by excision may reappear due to incomplete excision or non-adequate oral hygiene. Vasodilation, increased vascular permeability, and cell proliferation by pregnancy hormones result in the swelling of gingival and descamation cells and a significant increase of gingival crevicular fluid [19,20]. Changes described in the microcirculation of pregnant women include swelling of endothelial cells, adherence of granulocytes to vessel walls, generation of microthrombi, disruption of perivascular mast cells, and vascular proliferation [19,20]. All the changes in gingival tissues during pregnancy are associated with an exacerbated clinical inflammatory response. However, the level of inflammation is not associated with an increase in progesterone or estradiol levels in saliva or with changes in PGE2 or IL-1beta levels in gingival crevicular fluid [21]. Immune adaptations that occur during pregnancy may further facilitate infections of oral tissues. For example, gingival fibroblasts exposed to progesterone downregulate the production of interleukin 6 and a variety of matrix metalloproteinases, making the gingiva more susceptible to inflammatory challenges elicited by bacteria [22,23].

**Gingivitis in pregnancy**

Plaque-induced gingivitis is an inflammation of the gingiva resulting from bacterial infection, and it is one of the most common oral diseases in pregnant women [24,25]. Pregnant women have more gingivitis than nonpregnant women, with a prevalence ranging from 30% to 75% [26]. During pregnancy, the severity of gingivitis has been reported to be elevated, yet unrelated to the amount of dental plaque present [27,28]. Approximately one of two women with preexisting gingivitis has significant exacerbation during pregnancy [29]. Gingivitis is usually more evident during the second month of pregnancy and reaches a maximal level during the eighth month. The severity of gingivitis is correlated with sex steroid hormone levels during pregnancy [28]. The characteristics of pregnancy-associated gingivitis are similar to plaque-induced gingivitis, but with a tendency to more severe inflammation [27,28].

The factors associated with higher gingival inflammation in pregnancy are increased levels of estrogen and progesterone [30] and a decreased immune response [31]. Aggravation of gingival inflammatory symptoms during pregnancy is also associated with low concentrations of plasminogen activator inhibitor type-2 (PAI-2) in gingival fluid. PAI-2, produced by macrophages, is an important inhibitor of tissue proteolysis and has multiple other functions.

Women showing a low inflammatory response to plaque have high concentrations of PAI-2, which probably protects connective tissue from excessive breakdown [32].

Changes in subgingival flora may occur during pregnancy. Early evidence from cultivation-based approaches indicated that hormonal surges during pregnancy may play a role in increasing subgingival levels of black-pigmented Bacteroides [33]. However, more recent investigations using molecular methods did not corroborate these findings [34]. It is possible that the increased gingival inflammation in pregnant women had a greater contribution in altering the composition of the subgingival microbiome than female sex steroids [30].
Periodontitis in pregnancy

Although the biological plausibility and the potential for a treatment that could reduce the risk of preterm birth and other adverse outcomes previously appeared to be promising, there is significant evidence that periodontal disease is not associated with preterm birth and other pregnancy outcomes. More importantly, four large trials have all demonstrated no beneficial effect with treatment [33,34,35,36]. Therefore, the current evidence does not support screening and treatment of periodontal disease to improve pregnancy outcomes suggesting that it is time to move on and search for other etiologic agents and therapies to decrease the rate of preterm birth and other adverse pregnancy outcomes.

Periodontitis, the destructive form of periodontal disease, affects 15% of women of childbearing-age in developed countries and 45% of women in undeveloped countries [37,38]. But also, up to 40% of pregnant women of low socioeconomic status have some form of periodontal infection, for example in the United States [39]. Several studies have shown that maternal periodontal infection is associated with adverse pregnancy outcomes, such as preterm birth, preeclampsia, gestational diabetes, delivery of a small-for-gestational age infant, and fetal loss [40,41,42,43,44].

Conclusions

The dentist should inform the pregnant woman of the oral changes she may expect during pregnancy and should discuss how to prevent dental problems that may arise from these changes. All women should receive at the beginning of the pregnancy period an evaluation of their oral health status, which includes a comprehensive periodontal examination, assessment of gingival inflammation, periodontal probing depth, and clinical attachment level measurements. Pregnancy may be a period to obtain modifications in lifestyle behaviors because women are more motivated to make healthy changes during this time. Patient education about the effects of oral health on systemic health and pregnancy outcomes should be given before pregnancy or early in pregnancy. The physiologic and behavioral changes that occur during pregnancy can aggravate preconceptional existing gingivitis or periodontitis. Oral hygiene instructions to control dental plaque must be emphasized in pregnant women, and treatment of gingivitis and periodontitis should be performed if it is necessary.

References


