NARRATIVE REVIEW

Dental care of the pregnant patient: an update of guidelines and recommendations

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Abstract

Pregnancy is a dynamic state marked by several physiological changes. Oral healthcare in pregnancy is often avoided and misunderstood, with healthcare professionals struggling to interpret the safety and appropriateness of dental treatment during this period. Despite international guidelines and consensus reports indicating that preventive and restorative dental treatment are safe and essential, there is still a widespread belief among healthcare professionals and general population in Pakistan that dental treatment during pregnancy may pose damage to the foetus. Over the past three decades, as human knowledge of the biology behind periodontal diseases broadened, its systemic impact upon various physiological states is better understood and management protocols are accordingly formulated. Lack of knowledge among dentists regarding the timing of routine dental treatment, avoidance of certain medications and poor understanding of the clinical changes in the periodontium of the pregnant patient needs to be addressed so that timely treatment is provided. The current narrative review was planned to highlight the physiological and pathological changes that may occur in the oral cavity of a pregnant patient.

Keywords: Dentistry, maternal health, oral healthcare.

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Introduction

Pregnancy is a delicate period in a woman's life, characterised by various physiological and pathological changes. As an extension of these changes, alterations in oral health are often reported. An increase in gonadotropins, particularly oestrogen and progesterone, leads to enhanced vascularity in the gingival tissue,[1] making pregnant women susceptible to periodontal diseases, particularly gingivitis. Additionally, increased incidence of caries and dental erosions is also reported in literature.[2-4]

The old superstition regarding "the loss of a tooth for every pregnancy" normalises these changes and regards them as an inevitable and unpreventable occurrence. However, research over the years indicates that most of these oral changes are not only reversible, but also preventable.[5,6] This understanding highlights the importance of establishing rules for prevention and counselling.

Pregnant women in Pakistan are often apprehensive about seeking dental treatment, with their dental phobia compounded by common myths. On the other side, despite international guidelines presenting the possibility of performing diagnosis and treatment in pregnant patients, dental care practitioners are often cautious in treating pregnant women. This reluctance often arises from a lack of knowledge of clinical guidelines, a poor understanding of pharmacology as well as fear of a possible medico-legal action based on negligence.[7]

The current narrative review was planned to provide an update of the guidelines used in the dental care of pregnant patients, the physiological and pathological changes that may occur in the oral cavity, and to highlight the importance of timely preventive strategies.

Oral pathologies in pregnancy

Gingivitis

Gingivitis has high occurrence in pregnancy, with prevalence ranging 30-100% depending on the diagnostic criteria.[8] Clinical features typically appear in the 2nd trimester and increase in severity till the 3rd trimester, and may start decreasing in the 9th month, resolving post-parturition.[9] The pathogenesis of pregnancy gingivitis is largely unknown, but an exacerbation of inflammatory response to periodonto-pathogens caused by an increase in gonadotropins is generally accepted as the causative factor. Progesterone is also associated with increased vascular permeability, causing tissue oedema, and swelling as well as an increase in prostaglandins, which collectively lead to inflammation in the gingival tissues.

Treatment of pregnancy gingivitis includes non-surgical periodontal therapy (NSPT), compromising scaling and

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root planing (SRP) and oral hygiene education. Patient motivation and provision of oral hygiene instructions play a pivotal role in maintaining good oral hygiene and preventing plaque build-up and calculus formation. Research indicates that oral health educational interventions during pregnancy improve periodontal health.[10] These interventions must be carried out throughout the course of pregnancy, not just the beginning. NSPT is safe and should be undertaken, not postponed.

Pyogenic granuloma

Pyogenic granuloma (PG), otherwise known as pregnancy tumour and granuloma gravidarum, is a rapidly growing inflammatory enlargement of the gingiva. It occurs in approximately 2% of pregnancies,[11] typically starting facially in the interdental gingiva as a pedunculated or sessile nodular lesion which bleeds profusely upon touching.[12] The rapidly growing mass causes discomfort and tenderness, bleeding and aesthetic concerns. In most cases, it recedes spontaneously postpartum or upon removal of local irritants. Treatment protocols comprise either NSPT, which removes the irritants, secondarily resolving the inflammatory component, or the surgical therapy which eliminates the fibrotic components. Surgical intervention with surgical blade, lasers or cryotherapy is only warranted in situations where the lesion is large and interferes with chewing.

Hyperemesis and dental erosion

Hyperemesis gravidarum is the term used to describe excessive vomiting with intractable nausea and dry heave that is faced by 0.3% to 2% pregnant women.[13] The daily, repetitive nature of vomiting softens and erodes the protective enamel. While initial erosive lesions are not visible, the lesions caused by repetitive episodes of vomiting are often permanent and clinically visible.[14]

During dental visits, the frequency, timing and duration of vomiting of the pregnant patients must be recorded. The presence of an acidic potential of hydrogen (pH) and the contact of gastric acid on the enamel surface makes it vulnerable to surface loss if subjected to tooth brushing, especially with a hard brush. To counteract the situation, it is suggested that in the first hour after vomiting, the mouth should be rinsed with warm saltwater or warm tap water to neutralise the acidic contents.[15] After one hour, tooth brushing can be attempted with a soft toothbrush, with care being taken not to apply excessive force. Patients also benefit from the application of fluoride varnishes that reduce enamel demineralisation. In case of excessive and uncontrollable vomiting, pregnant women should be referred to their physicians and gynaecologists to control the related medical conditions.

Adverse periodontal outcomes

In 1900, a British physician, William Hunter, introduced the concept of bacteria present in the oral cavity being responsible for systemic infections by producing toxins and low-grade superinfections. Periodontal disease, being a chronic gram-negative infection of the periodontal tissues, is associated with long-term local elevation of certain pro-inflammatory cytokines, mainly interleukin-1b (IL-1b), IL 6), prostaglandin E2 (PGE2) and tumour necrosis factor-alpha (TNF-α). These pro-inflammatory cytokines systemically affect the host, rupturing the cell membrane, and may cause preterm birth (PB) and low birthweight (LBW) indirectly by inducing inflammatory changes or directly through bacterial assault on the amnion.[16] While wholesale extraction to eliminate sepsis practised in the 1940s and 1950s is not implemented anymore, the Hunter theory is the subject of extensive research, with links being created between periodonto-pathogens and several systemic conditions.

The concept of periodontal diseases being a risk factor for adverse pregnancy outcomes (APO) has been tested in various epidemiological and experimental trials with varying evidence. While some systematic reviews revealed that nonsurgical periodontal treatment did not improve birth outcomes,[17-20] others reported that NSPT did reduce the occurrence of PB and LBW.[21]

1. **PB and LBW neonates:** PB is defined as delivery taking place <259 days of gestation, while LBW includes all neonates weighing <2500g at birth irrespective of their chronological age.[22] The incidence of PB has seen an upward trend in recent decades, with occurrence in up to 10% of all pregnancies.[23] The immediate and delayed neonatal morbidity and mortality associated with PB and LBW make them public health problems. PB is found to be associated with intrauterine infection in as much as 25-40% of cases.[24] Stimulation of macrophages and the subsequent release of cytokines and transcription factors lead to the activation of genes related to uterine contractility, resulting in the onset of labour.[25] While the factors that determine LBW are not entirely known, PB and other factors that can curtail intrauterine foetal growth (multiple gestation, maternal medical pathology, and foetal infections) are implicated as risk factors.

   Offenbacher et al. were the first to demonstrate an association between periodontal disease and LBW babies. Their case-control study suggested that maternal periodontal disease leads to a seven-fold increased risk of LBW babies.[26] Human case-control

studies have also demonstrated that mothers with PB and LBW babies tend to have more severe periodontal diseases compared to those with healthy periodontium.[27] A meta-analysis revealed an odds ratio (OR) for PB of 4.32 in subjects with periodontitis.[28] Analysis of a series of case-control studies, randomised studies, and controlled trials revealed no conclusive evidence of association between periodontitis and abnormal pregnancy, with OR for PB ranging from 2.12 to 20.0 depending on the size and quality of the study.[29] More methodologically rigorous studies were required to ascertain the association between periodontitis and APO.

2. Preeclampsia is a complication encountered in pregnancy that is characterised by hypertension (minimum blood pressure [BP] 140/90), proteinuria and oedema.[30] It occurs in 3-7% of pregnancies and may lead to convulsions, coma and even death. Preeclampsia is a multifactorial disease associated with infection, genetic susceptibility, heightened immune responses, hypoxia and a markedly enhanced systemic inflammatory burden. Elevated serum levels of C-reactive protein (CRP) increase the risk of preeclampsia.[27] Since periodontal infections demonstrate increased CRP level, it is biologically plausible that they could play a part in the multifactorial aetiology of preeclampsia.[31] The link between periodontal disease and risk of preeclampsia is shown only in few studies and has not been confirmed universally.[32]

3. **Gestational diabetes:** Gestational diabetes mellitus (GDM) is defined as high blood glucose level in pregnant state that usually disappears post-parturition, affecting 3-7% of pregnant women.[33] GDM places pregnant women at greater risk of developing periodontal diseases. Furthermore, development of periodontal disease causes a systemic inflammatory state, making diabetes control more difficult. This highlights the importance of early diagnosis and interception of periodontitis in diabetic patients.

Delivering dental care to the pregnant patient

Health history: While obtaining history from the pregnant patient, in addition to the standard principles of history-taking and assessment, information must be extracted regarding due date, oral health concerns, changes in dietary habits, morning sickness and other vomiting episodes, and oral hygiene routine.

Patient comfort and positioning: For a comfortable seating of the patient on the dental chair, the semi-reclined position is recommended, with the head higher than the feet.[34] In the third trimester, owing to the increased risk of the inferior vena cava being compressed by the weight of the foetus, the patient may either be tilted slightly to the left side, or with a small pillow placed under the right hip to relieve the venous circulation.[35]

Clinical evaluation: A complete dental examination includes assessment of the hard and soft tissues, with emphasis on periodontal changes, dental erosion as well as dental caries and other potential causes of infection.

Dental radiographs: The Food and Drug Administration (FDA) and the American Dental Association (ADA) advise that routine or "administrative" radiographs should be avoided in pregnancy, but areas of dental pathologies or history of dental pain may be radiographed as necessary instead of being postponed.[36] Radiographs must be taken with appropriate shielding comprising a thyroid collar and a leaded apron.[37] The American Congress of Obstetricians and Gynaecologists affirms that limited use of dental radiographs poses no risk to the developing embryo, stating that "exposure to <5 rad has not been associated with an increase in foetal anomalies or pregnancy loss".[38] Since a single diagnostic X-ray is associated with only 0.0001 rad of radiation, the cumulative 5 rad dose will be met after a minimum of 5,000 X-rays.[39]

Prescription of medications: Medicines are easily absorbed during pregnancy, crossing the placental barrier to cause potential exposure to the foetus, highlighting the importance of cautious and controlled prescription to the pregnant female. Most medicines are also expressed in breast milk and may be toxic to the new-born, depending upon the dose, frequency, chemical properties of the active ingredient as well as the amount of milk consumed.[40]

The FDA has characterised medicines according to their teratogenic risk, or the probability of altering the development of the foetus during the organogenesis stage.[41] It also considers medicines, such as tetracycline, which if taken in the second half of pregnancy causes yellowish-brown staining of the primary dentition (Table).

The classification: Pain of the tooth origin puts maternal body into stress and may induce contractions, and, hence, analgesics should be prescribed whenever appropriate. Acetaminophen, which belongs to category B in terms of teratogenicity risk, is taken to be safe during all stages of pregnancy and in the nursing period, having no known side-effect. Non-steroidal anti-inflammatory drugs (NSAIDs) are best avoided in pregnancy, especially in the 3rd trimester. The use of NSAIDs, including acetylsalicylic acid (ASA), is less favourable, particularly late in pregnancy. NSAIDs may predispose to ineffective contractions during

Table: Food and Drug Administration (FDA) classification of medicines according to teratogenicity risk.

Category	Risk assessment	Antibiotics	Analgesics	Local anaesthesia	Sedatives
A	Controlled trials on humans showed no risk to foetus				
B	No demonstrated risk to foetus demonstrated on animal trials; absence of well controlled trials on humans	Amoxicillin Cephalexin Clindamycin Erythromycin Metronidazole Penicillin	Acetaminophen	Lidocaine Prilocaine	
C	Animal studies demonstrating risk to foetus; appropriate trials on humans not available	Ciprofloxacin	Codeine with acetaminophen Hydrocodone + acetaminophen	Lidocaine Prilocaine	
D	Evidence of risk to foetus in human trials; prescribed only in exceptional circumstances when benefits outweigh hazards	Doxycycline Tetracycline	Ibuprofen		Barbiturates Benzodiazepines
X	Proven risks of using drugs in pregnant women clearly outweigh benefits				

labour, increased bleeding during delivery or premature closure of the ductus arteriosus of the heart. NSAIDs are, therefore, contraindicated in the third trimester.[42]

If acetaminophen is insufficient, opioids are considered acceptable during pregnancy provided they are given for a short duration. Chronic opioid use can result in foetal dependence, premature delivery and growth retardation.[42] When necessary, antibiotics amoxicillin, penicillin V, cephalosporins, clindamycin, erythromycin and metronidazole can be prescribed for usage in pregnancy as they are safe and not associated with known side-effects. Gentamycin may cause foetal ototoxicity and should be avoided. Tetracycline must always be avoided as it may cause maternal toxicity and discolouration of primary dentition.

With respect to local anaesthesia, category B compounds, such as lidocaine, etidocaine and prilocaine, are the safest local anaesthetists. Mepivacaine and bupivacaine are associated with faetal bradycardia and should be avoided in pregnancy.

With regards to sedatives/hypnotics, conscious sedation using nitrous oxide should be avoided during pregnancy, especially during the first trimester as it may lead to spontaneous abortion. Other hypnotics, such as barbiturates and benzodiazepines, should also be avoided.

Dental health education: Ideally, dental health education should be provided to women prior to conception in order for any potential cause of infection to be treated before. In the early stages of pregnancy, the patient must be informed of the commonly encountered physiological as well as pathological changes, including gingivitis, pyogenic granuloma, dental erosion and caries.

Provision and scheduling of dental treatment

1st trimester

While routine dental care can be provided during all stages of gestation, the American Academy of Periodontics recommends avoiding elective dental procedures in the first trimester,[43] as organogenesis takes place during this period and the risk of teratogenesis and spontaneous abortion is high. The following are some important guidelines:

1. Scheduled dental assessment visits are encouraged in order to inform the patient of changes that may occur and how maternal dental problems can be avoided.
2. Emphasis should be placed on maintenance of oral hygiene throughout the course of pregnancy.
3. Treatment should be limited to scaling and any emergency treatment, if necessary.
4. Routine radiographs should be avoided, but selective radiography for diagnostic purposes may be carried out.
5. Metronidazole should be avoided.

2nd trimester

1. As organogenesis is complete, risk to foetus is low. As

such, this is the best period for performing any elective dental procedure, like root canal treatment, extraction or restorations, that may eradicate a source of pain and potential infection.

2. Routine scaling may be carried out.

3rd trimester

1. It is generally safe to provide routine dental treatment in the early part of the third trimester.
2. Mid-third trimester onwards, dental treatment should be avoided as it may be a source of discomfort for the mother.
3. Chances of constriction of inferior vena cava by the weight of the foetus in the supine position must be taken into consideration.
4. NSAIDs should be avoided.
5. Sulphonamides should be avoided as well.

Published data cited above indicates high occurrence of gingival diseases amongst pregnant women, and there are contradictory findings regarding whether or not periodontal therapy decreases APO risk. High-quality clinical trials with methodological consistencies should be conducted to provide strong evidence and verify the possible association.

Dental care practitioners should place a strong emphasis on the maintenance of meticulous oral hygiene in cases of gingivitis and pyogenic granuloma, most of which resolve with nonsurgical periodontal therapy or spontaneously after delivery. If the periodontal conditions do not resolve after delivery, referral to a periodontist must be considered.

Conclusion

While international guidelines clearly state that dental care can be provided to pregnant patients, most dentists are very apprehensive about treating them. Dentists are thereby encouraged to keep themselves updated with the latest guidelines and to prescribe safe alternatives to medicines wherever necessary. Better channels of communication between pharmacological research with dentists along with obstetricians will help formulate a joint obstetric-dental drug regimen that is safe and effective. Contradiction leads to doubts, causing apprehension and unnecessary suffering among pregnant patients.

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