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RESEARCH ARTICLE

TODAY'S CARE FOR A BETTER TOMORROW: A SYSTEMATIC REVIEW OF DENTAL CARE IN PREGNANCY

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ABSTRACT

Introduction: Pregnancy is a special state during a woman's life, which is associated with a myriad of complex anatomical, physiologic, metabolic, emotional and physiological changes. There are changes observed in cardiovascular, respiratory, gastrointestinal system as well as changes in oral health and increased susceptibility to oral infections. Majority of pregnant women have been reported to experience oral changes yet they do not seek or are advised not to seek dental care as a part of routine prenatal care. Dentists also needlessly withhold or delay treatment of pregnant patients due to unrealistic fear of injuring patient, fetus or fear of litigations. It is important on the part of stomatologists to understand that pregnancy is not a disease wherein the patients are denied or deferred treatment. Thus, the aim of this article is to emphasize on the significance of oral care during pregnancy and motivate oral health care providers to provide timely and appropriate dental care.

Methods: Articles were searched through keywords like dental care during pregnancy, drug safety, oral prenatal care, dentist's attitude towards treating pregnant patients. Original research article, case reports, randomised control trials were searched through Pubmed and medline search between 2001 and 2015

Results: Generalised lack in awareness about oral manifestations of pregnancy was seen. It was seen that dentist's usually defer treatment of pregnant patients.

Conclusions: Every gestational woman should be encouraged to include dental visits in her routine prenatal care. Dental physicians should team up with other health care providers and keep themselves abreast with the updated guidelines in providing oral care.

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INTRODUCTION

Pregnancy is a state in one life's that is marked by changes in almost every organ of the body. (Boggess, 2008) Studies have revealed that majority of expecting mothers experience oral health related problems. (Murphey and Fowles, 2010) But most of them perceive these problems as normal changes that occur during pregnancy and restrain from seeking dental care. (Ressler *et al*., 2005; Dinas *et al*., 2007) Lee *et al*. (Lee *et al*., 2010) conducted a survey and enlisted barriers in seeking dental care during pregnancy which are summarised in Table 1. Recent studies on maternal and foetal physiology indicate that the benefits of providing dental care during pregnancy far outweigh potential risks. If the oral diseases are timely diagnosed and appropriately managed then it is beneficial for the oral and systemic health of both the mother and the foetus.

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(Gordon, 2002) In the following paragraphs, we will discuss the various changes seen during pregnancy. Fig.1 presents interrelationship of systemic and oral health in pregnancy.

Interrelation between maternal systemic and oral health during pregnancy

Hypertensive disorders, including both pre-existing and gestational hypertension, occur in 12–22% of pregnant women. (Gordon, 2002) Uncontrolled severe hypertension may increase the risk of bleeding during dental procedures. During pregnancy due to vasomotor instability, pregnant patients are more prone to suffer from postural hypotension. (Lee *et al*., 2010; Gordon, 2002) Thus, while treating a pregnant patient, dentist should be cautious while changing the chair position from reclining to an upright position. An abrupt change in posture can predispose the patient to postural hypertension. Moreover, the increasing size of uterus puts pressure on superior vena cava and aorta which results in decreased cardiac output, decreased venous return and decreased uteroplacental

blood flow. Aortocaval compression which occurs specifically in supine position leads to supine hypotensive syndrome. This syndrome is characterised by early changes like light headedness, weakness, sweating, restlessness, tinnitus, pallor, decrease in blood pressure and advanced changes like syncope and convulsions. Supine hypotensive syndrome can be managed by having the patient roll on her left side and placing pillows or rolled towels under her right hip thereby elevating it by 15°. This manoeuvre lifts uterus off the venacava and re-establishes aortocaval patency. 2–5% of pregnant women suffer from gestational diabetes. Uncontrolled diabetes is associated with adverse pregnancy outcomes like preeclampsia, congenital anomalies, and large-for gestational age newborns. Rapidly spreading odontogenic infections and severe periodontitis is associated with poorly controlled diabetes. (Ressler *et al*., 2005; Gordon, 2002)

During pregnancy there is relative increase of 30% in maternal plasma volume over red blood cell mass resulting in physiologic anaemia. Haematological changes during pregnancy include leucocytosis, increased haematocrit and decreased haemoglobin which predispose to deep venous thrombosis and pulmonary edema. (Thornburg *et al*., 2000) Hormonal imbalance, particularly increased estrogen levels during pregnancy leads to engorged capillaries in the nasopharyngeal mucosa which results in edema, nasal congestion and predisposition to epistaxis. (Little *et al*., 2008) Due to difficulty in nasal breathing, patient develops a tendency to breathe through mouth. Mouth breathing predisposes to xerostomia. In lack of optimum salivary flow, patient is more susceptible to dental decay. Decreased salivary flow coupled with frequent intake of carbohydrates and sugars results in increased rate of dental caries.[3]Increased progesterone levels lead to decreased lower oesophageal tone, gastric and intestinal motility. Hormonal imbalance in conjugation with mechanical changes in gastrointestinal system and greater sensitivity to gag reflex predisposes the patient to increased risk of gastroesophageal refux disease (GERD). Due to acidic content of gastric juice, there is marked erosion of the lingual surfaces of all the teeth. Here the patient suffers from increased dentinal hypersensitivity to hot and cold food stuff. Due to superior displacement of stomach by increasing stomach, the intragastric pressure is further raised. Thus, the patient should be seated in upright position so as to relieve the abdominal pressure. (Ressler *et al*., 2005; Gordon, 2002; Little *et al*., 2008)

Dental considerations during pregnancy

Environment of dental clinic

Pregnant patients are more sensitive to changes in taste, smell and environmental temperature. Unpleasant taste or odour may cause nausea, gagging and vomiting. Overheating may predispose to hypoglycaemia. Thus, duration of dental treatment should be kept as short as possible. Patient should be advised to snack protein and carbohydrate before the appointment. In order to make dental visits more comfortable, dental staff should be more concerned and respond promptly while dealing with pregnant patients. (Khanna and Malhotra, 2010) Obstetric consultation should be sought before dental treatment in high risk patients with pregnancy related complications like pregnancy induced hypertension, gestational diabetes, threat of spontaneous abortion and history of premature labour. (Kloetzel *et al*., 2011) Pregnancy among girls less than 18 years of age is termed as adolescent pregnancy. It has detrimental effects on sexual and reproductive health resulting in irreparable consequences. Young mothers are at increased risk of adverse pregnancy outcomes like obstetric fistula and maternal death. (Pandey *et al*., 2007) According to global survey conducted in 2010, there are 11,875,182 pregnant adolescent women in India. (UNFPA and UNICEF, 2011) It is likely that such patients are unaware of being pregnant thus it is prudent to gain history about last menstrual period. Legal issues regarding adolescent pregnant are complex. In some states, consent has to be taken from parent or legal guardian while some states emancipate minors who are pregnant. (Pandey *et al*., 2007)

Timing of dental treatment

Second trimester is considered to be the safest period during pregnancy because of various reasons like: Organogenesis is completed by the end of first trimester; Uterus has not enlarged to the extent of compressing superior vena cava; Nausea, taste aversions are usually reduced by the second trimester; Labour pains have not started yet. (Murphey and Fowles, 2010) However, routine oral health maintenance procedures can be performed at any time. Extensive elective procedures may be postponed until after child-birth. (Ressler *et al*., 2005; Gordon, 2002) Nausea and vomiting are experienced by 66% of all the pregnant women, starting approximately 5 weeks after the last menstrual period, and reaching a maximum prevalence after 8-12 weeks. Thus, the morning dental appointments should be avoided by pregnant women. (Little *et al*., 2008)

Common oral complaints encountered during pregnancy

The oral changes which are seen in pregnancy include gingivitis, gingival hyperplasia, pyogenic granuloma, salivary changes, tooth mobility, erosion of tooth surface secondary to severe vomiting, chloasma and facial telangiectasia. (Khanna and Malhotra, 2010) Elevated levels of oestrogen lead to increased capillary permeability which in turn results in gingivitis and gingival hyperplasia. Interproximal papillae are red, edematous, and tender on palpation and bleed profusely on slight trauma. (Ressler *et al*., 2005) Pyogenic granulomas (pregnancy tumours) occur in about 1% to 5% of the pregnant women (Fig.2).

Hypothesis for pathology of pregnancy tumour states that hormonal imbalance leads to increased angiogenesis which in presence of local factors such as plaque causes pyogenic granuloma. Mineral changes in lamina dura and altered periodontal attachment collectively cause tooth mobility. Vitamin C deficiency is another cause for loosening of teeth and bleeding gums. (Little *et al*., 2008) Relaxin hormone, which helps in parturition, is associated with relaxation of periodontal fibres leading to loosening of teeth. Morning sickness is a frequent complaint among pregnant women. The elevated levels of gonadotropins cause nausea and vomiting. Due to acidic gastric acids in the emesis, the enamel on the

Table 1. Barriers in dental care

Barriers which prevent dentists from provding care to pregnant women	*Barriers which prevent pregnant women from seeking dental care*
• Time overconsciousness • Economic reasons • Deficiency in professional skills • Dental staff resistance • Peer pressure	• Difficulty in finding dentist • Low priority given on dental care • Misconception about safety and appropriateness of dental care during pregnancy • Sporadic anticipatory guidance during prenatal care & financial ability

Table 2. Dental procedures/Medications considered safe during pregnancy

Dental procedure	Safe in pregnancy	Recommendations
Oral prophylaxis	yes	Safe throughout pregnancy
Dental radiography	Yes	During pregnancy expecting mother receives 75mrem from naturally occurring radiation. Full mouth radiographs deliver a radiation dose less than 1mrem. So, dental radiography is safe
Dental restoration	Yes	Use rubber dam and high speed suction to prevent inhalation of mercury vapours
Emergency dental treatment	yes	Any foci of odontogenic infection should be immediately removed for better oral health of both mother and foetus
Analgesics	Yes (with caution)	• Category B(safe): Acetaminophen, meperidine, morphine (do not exceed recommended doses) • Do not prescribe ibuprofen in third trimester • Category C (use with caution): Codeine, hydrocodeine (short term prescription) • Aspirin should never be prescribed
Antibitiotics	yes	• Safe: Penicillin, Amoxicillin, Amoxicillin+clavulonic acid, Cloxacillin ,Cephalosporins ,Clindamycin ,Azithromycin, Nystatin&Chlorhexidine rinse. • Unsafe antibiotics during pregnancy are tetracyclin, ciprofloxacin, metronidazole and estolate erythromycin
Antibiotic prophylaxis for infective endocarditis	yes	• Primary prophylaxis 2g amoxicillin 1hr prior to treatment • If Allergic to penicillin:Cephalexin 2gm /clindamycin600mg/azithromycin or clarithromycin 500mg
Local anesthetics	yes	Category B(safe): lidocaine with epinephrine, prilocaine Category C(use with caution): mepivacaine , articaine and bupivacaine
Nitrous oxide	With caution	Avoid during first trimester Lower level sufficient during pregnacy Obstetric consultation must
Fluoride	With caution	Fluoride varnish preferable
Sedatives & barbiturates	no	Associated with congenital anomalies

Table 3. Meta-analysis of pregnancy related studies published between year 2001-year2015

Author	Year	Aim of the study	Results of the study
ParappaSajjan *et al*.	2015	Conducted a cross sectional survey to assess oral health related awareness and practices among pregnant women in Karnataka, India.	Majority of participants were not aware of oral changes during pregnancy.19.87% were aware that exposure to high dose of radiation was hazardous. Around 18.6% did not brush while 35.25% cleaned their teeth using finger.
Amit *et al*.	2014	Conducted a survey to assess Oral and Dental Health Knowledge, Attitude and Practice among Pregnant Women in Rajasthan India.	83%: regular visit to dentist is necessary 22%: pregnancy predisposes to dental or gum problems. 40.5% : every painful tooth should be removed.
ChaitanyaTellapragada	2014	Conducted a cross-sectional study to estimate the prevalence of periodontal infections among a cohort of antenatal women and find the associated microbial etiologies.	Results showed increased prevalence of P. gingivalis, E. corrodens, A. actinomycetemcomitans and C. rectus.
SatheeshMannem *et al.*	2013	Conducted a case control study to assess relationship between maternal periodontitis and preterm birth &low birth weight (PTB/LTW).	Concluded periodontal disease to be a risk factor for preterm birth weight.
Dye *et al*.	2012	Conducted a prospective study to assess the relationship between children's oral health status and that of their mothers.	The authors found that a higher level of untreated dental caries or tooth loss among mothers was a strong indicator of higher level of caries in their children.
Kim Ajetal	2012	Performed systemic review and meta-analysis of randomised controlled trials to assess whether scaling and root planning (SRP) treatment for periodontitis reduces PTB/ LBW.	They found that SRP reduced risk for PTB only for groups at higher risks for PTB
Carmichael *et al*.	2012	To assess association between maternal diet & congenital anomalies	Higher maternal diet quality in year before pregnancy resulted in reduced risk of neural tube defects and orofacial clefts.
Hwang *et al*.	2012	Conducted a study to determine the association between maternal oral health experiences and risk of preterm birth in ten states; *Pregnancy risk assessment monitoring system(2004-2006)*	Found that women who did not receive oral health counselling or did not have tooth cleaning during pregnancy were at slightly higher risk for preterm delivery than those who did.

Continue……

Baccaglini	2011	Performed meta-analysis of 11 randomised controlled trials to assess outcome of periodontal treatment in pregnancy.	No evidence to prove that periodontal treatment during pregnancy prevents adverse pregnancy outcomes.
Matevosyan	2011	Performed meta-analysis of 125 studies published between year1998-2010 on births to women with periodontal disease.	Authors concluded that maternal periodontal disease is associated with adverse perinatal outcome such as increased rates of preeclampsia and spontaneous preterm labour.
Bates *et al*	2011	Examined an online approach for promoting awareness of oral health during pregnancy.	Respondents changed their views to more strongly agree that oral health care during pregnancy is important and mother can reduce risk of cavities in her child by having good oral health herself.
A. A.P.D	2011	Revised guidelines on perinatal oral health care	Oral care should be a regular part of perinatal care.
Hunter *et al*.	2011	Conducted a survey to assess oral health & oral health care practices among low income pregnant women.	46% : dental caries 37% : gingivitis 88% : brushed teeth twice daily 12% : reported daily flossing Hispanic women had poorer oral health and fewer healthy practices than others.
Da Costa *et al*.	2010	Conducted a survey to assess the awareness about dental care for pregnant women among general dentists in North Carolina.	98% respondents provided oral health care services for pregnant women each month. Approximately 50% respondents identified low reimbursement, time restrictions, culture & language differences and lack of demand for services as barriers to care.
Lee *et al*.	2010	Conducted a survey to determine the dentist's perceptions of barriers to providing dental care to pregnant women.	Dentists with high level of barrier are more likely to have incorrect assumptions about appropriateness of routine and emergency oral health care during pregnancy.
Polyzos *et al*.	2010	Obstetric outcomes after treatment of periodontal disease during pregnancy	No significant effect on incidence of preterm birth.
Uppal *et al*.	2010	to determine the effectiveness of periodontal disease treatment during pregnancy in reducing the risk of PTB/LBW	Periodontal disease treatment during pregnancy does not reduce the risk.
Le *et al*.	2009	Barriers to utilisation of dental services during pregnancy: a qualitative analysis.	women's negative attitude towards oral health professionals; not valuing oral health; inability to pay for care; time constraints and poor attitude of oral health professionals and dental office staff towards pregnant women.
Skelton *et al*.	2009	to integrate oral health education and treatment into prenatal care in a rural health care clinic in West Kentucky.	Program findings include improved oral health status of pregnant women at 34-38 weeks of gestation and possible benefits for birth
Huebner *et al*	2009	to assess the attitude of dentists in providing dental care to pregnant patients in Oregon.	92% Dentists believed that treatment should be a part of prenatal care. 68% were interested in receiving CDE about pregnancy related topics.
Michalowicz *et al*.	2008	To examine safety of dental treatment in pregnant women. In this study, pregnant women received scaling, root planning and other dental treatment at 13-21 weeks gestation	Treatment was not associated with increased risk of experiencing serious adverse medical events or adverse pregnancy outcomes.
Kunnen *et al*.	2007	Conducted a case control study on 52 pregnant women with early onset preeclampsia (< 34 weeks)	Periodontal disease is prevalent among cases. 82% in cases vs 37% in control group.
Santo-Pereira *et al*.	2007	Conducted a cross sectional study on 124 women	Found that women with periodontal disease during pregnancy had 62% preterm labour while healthy ones had 27% only.
Offenbacher *et al*.	2006	Conducted a prospective study on 1020 women.	women with periodontal disease are at increased risk for preterm birth(<32 weeks)
Xiong *et al*.	2006	Conducted a case control study	Pregnant women with periodontal disease are three times more likely to develop gestational diabetes.
Pitiphat *et al*.	2006	Conducted a prospective study on 101 pregnant women	periodontal disease may increase the levels of C-reactive protein levels during pregnancy
Boggess *et al*.	2005	Conducted a prospective study on 640 umbilical cord samples.	Foetal inflammation and immune response to oral pathogens increased preterm birth risk.
Lopez *et al*.	2005	Conducted a randomized clinical trial intervention study	Treatment significantly reduced PTB/LBW.(6% among untreated vs. 2% treated)
Moore *et al*.	2005	Conducted a case-control study involving 154 women.	No association between periodontal disease and pregnancy outcome.
Hollbrook *et al*.	2004	Conducted a prospective study involving 96 women	No association between periodontal disease and preterm birth
Cankci *et al*.	2004	To determine adverse pregnancy outcomes of periodontal disease	periodontal disease is associated with increased risk of preeclampsia(1.1:11.9)
Boggess *et al*.	2003	Conducted a prospective study on 850 women	periodontal disease is associated with preeclampsia
Lopez *et al*.	2002	Conducted a randomized clinical trial intervention study	Periodontitis was a risk factor for PTB/LBW and therapy reduced their rates.
Jeffcoat *et al*.	2001	Conducted a prospective observational study involving 1313 pregnant women.	Periodontal disease is associated with PTB
Mitchell-Lewis *et al*.	2001	Conducted a prospective intervention study involving 164 pregnant women.	Women with preterm birth had higher levels of oral pathogens in the mouth. While the frequency of PTB was much lower in patients who received regular dental treatment

lingual surface of teeth is eroded. Management includes sodium bicarbonate mouth rinses. (Little *et al*., 2008; Hemalatha *et al*., 2013) Excessive secretion of saliva is a frequent complaint in pregnant patient. Increased salivary flow (sialorrhoea/ptylism) can be true or relative. Relative increase in salivary flow is perceived when due to persistent nausea; the pregnant patient is unable to swallow the normal amount of saliva. Thus, she feels as if her mouth is always filled with saliva. It can be managed by dietary modifications such as reducing the intake of complex carbohydrates. (Ressler *et al*., 2005; Little *et al*., 2008; McCann and Bonci, 2001) Salivary composition is also altered during pregnancy which includes decrease in the sodium concentration and pH, and an increase in the potassium, protein, and the oestrogen levels. Increased salivary oestrogen levels lead to increased proliferation and desquamation of the oral mucosa. Desquamated cells serve as suitable medium for bacterial growth thereby making conditions favourable for varied oral infections. Salivary oestrogen level is a screening test to determine risk of preterm labour. (Hemalatha *et al*., 2013) Due to decrease in cell mediated immunity and natural killer cell activity, odontogenic infections develop rapidly into space infections which may compromise the oral pharyngeal airway. (Ressler *et al*., 2005) So any odontogenic foci of infection should be removed. Melasma' or the "mask of pregnancy" is a hyper pigmented patch seen bilaterally on malar region in 73% of the pregnant women. The aetiology of this condition is linked to elevated hormone levels. (Little *et al*., 2008)

Oral radiography

Oral radiography is safe for pregnant patients provided measures like lead apron, thyroid collar, and fast speed films are used. The National Commission for Radiation Protection (NCRP) recommends that the cumulative foetal exposure to radiation should not exceed more than 0.20 Gy, which can cause microcephaly and mental retardation. Full mouth intraoral radiographic examination results in $8X10^{-4}$ cGy. (ADA Council of Scientific Affairs, 2001) Bitewing and panoramic radiography with E speed film and rectangular collimator results in $1/3^{rd}$ radiation exposure. Within the first 2 weeks of conception, the patient might herself be unaware of being pregnant, thus it is advisable to use lead shielding in all women of child bearing age. Anxious patients should be assured that dental radiography is done following ALARA principle (As Low as Reasonably Achievable). (McCann and Bonci, 2001; Hemalatha *et al*., 2013)

Medications

There are certain drugs that can cross the placental barrier and may cause teratogenic effects to the foetus.US Food and Drug Administration has defined five categories of drugs according to the risk they pose to the pregnant women and foetus as under. (Meadows, 2001)

- Category A: Adequate, well-controlled studies in pregnant women have not shown an increased risk of foetal abnormalities.
- Category B: No evidence of risk in humans; either animal studies show risk (human findings do not) or, if no adequate human studies done, animal findings negative.
- Category C: Human studies are lacking and animal studies are either positive for foetal risk or lacking as well; potential benefits may justify the potential risk.
- Category D: Positive evidence of risk. Investigational or post marketing data show risk to foetus. Nevertheless, potential benefits may outweigh the risk.
- Category X: Studies, adequate well-controlled or observational, in animals or pregnant women have demonstrated positive evidence of foetal abnormalities. The use of the product is contraindicated in women who are or may become pregnant.

Analgesics

Acetaminophen is categorised in group B and it is the safest analgesic to be prescribed to a pregnant patient. Ibuprofen is category B analgesic in first and second trimester but it is contraindicated in third trimester. Ibuprofren if administered during third trimester is associated with lower levels of amniotic fluid, premature closure of fetal ductus arteriosus and inhibition of labour. Aspirin is associated with postpartum haemorrhage. High doses of NSAIDS can be substituted with combination of acetaminophen plus codeine or oxycodeine. Prolonged use of narcotic analgesics has been associated with cases of neonatal respiratory depression. The dental prescriptions are usually of short term to alleviate specific pain. (Meadows, 2001)

Antimicrobial therapy

Dental prescriptions usually contain category B drugs except tetracyclin and its derivatives. Tetracyclin group of drugs are category D because of hazardous effects on bone and teeth. Ciprofloxacin is associated with arthropathy and adverse effects on developing cartilage. No human trials have been documented citing association of ciprofloxacin in pregnancy.[1] Prescription of metronidazole has also been associated with potential harm to foetus. Though many studies conclude against the ill effects of metronidazole; risk: benefit ratio should be assessed before prescribing it. But estolate form of erythromycin is proven to have detrimental effects on the mother's liver. Chlorhexidine gluconate antimicrobial mouthwash is category B drug. (Ressler *et al*., 2005; Meadows, 2001)

Local anesthetics

Lidocaine and prilocaine are category B drugs. Mepivacaine, articaine and bupivacaine are category C drug. Epinephrine is category C drug. No unusual side effects have been reported till date with 0.1mg of epidural anesthesia. In dentistry 1:100000 concentration of epinephrine is routinely used which if administered with proper aspiration is safe. (Gordon, 2002; Little *et al*., 2008)

Fluoride

Fluoride is a category C drug. It should be safely given in patients with GERD caused by nausea and vomiting. Fluoride varnish should be preferred over fluoride gels as former is better tolerated. (Ressler *et al*., 2005)

Sedatives and barbiturates

Sedatives and barbituratesare category D drug. Benzodiazepines are associated with cleft lip or palate. Nitrous oxide interferes with vitamin B_{12} metabolism rendering enzyme methionine synthase inactive. This enzyme is important for DNA production. So use of nitrous oxide should be avoided during first trimester of pregnancy. It has been associated with repeated miscarriages. (Gordon, 2002; Meadows, 2001) Table 2 enlists dental procedures and medications which are considered safe during pregnancy.

Dietary modifications

A healthy diet is essential to provide adequate amount of essential nutrients to the mother-to-be and foetus. Though nutritional demands are increased but 'eating for two' concept is not recommended. Total energy demand ranges between 2500-2700Kcal/day but it should be customised according to pre-pregnancy BMI, rate of weight gain, maternal age and physiological appetite. (Kaiser and Allen, 2002)

Deleterious habits

Smoking while pregnancy has adverse outcomes like ectopic pregnancy, spontaneous abortion, preterm delivery. Infants are small for gestational age with low birth weight. Smoking has been associated with intellectual disability and birth defects like oral clefts, still birth, neonatal death. Sudden infant death syndrome is associated with maternal tobacco consumption. (Pandey *et al*., 2007; McCann and Bonci, 2001) In Table 3, authors have provided a meta-analysis of studies published between years 2001-2015. The studies were searched using keywords like pregnancy, dental care, oral manifestations of pregnancy, dentist's attitude towards providing dental care, drug safety, and periodontitis associated risks in pregnancy.

Take home messages

- Control of oral diseases in pregnant women has the potential to reduce the transmission of oral bacteria from mothers to their children.
- Preeclampsia is a challenging condition but not a contraindication to dental care
- Counsel pregnant patient not to delay dental treatment; to maintain proper oral hygiene, taking prenatal vitamins, including folic acid and eating foods high in protein, calcium, phosphorus and vitamins A, C and D. Ask them to limit intake of fermentable carbohydrates—sugars , soda or carbonated drinks.

Conclusion

Every gestational woman should be encouraged to include dental visits in her routine prenatal care. Dental physicians should team up with other health care providers and keep themselves abreast with the updated guidelines in providing oral care.

REFERENCES

ADA, 2001. Council of Scientific Affairs. An update on radiographic practices: information and recommendations. *J Am Dent Assoc*., 2001;132:234–38

Amit *et al., Sch. Acad. J. Biosci.,* 2014; 2(9):627-632

Baccaglini, 2011. Outcome of periodontal treatment in pregnancy: meta-analysis of 11 randomised controlled trials. *JADA,* 142(10):1192-93.

Bates, S.B. and Riedy, C.A. 2011. Changing knowlegde and beliefs through an oral health pregnancy message. *J of Public Health Dentistry,* 2011;72(2):104-11

Boggess, K.A. 2008. Maternal oral health in pregnancy. *Obstet Gynecol.,* 111:976-986.

Boggess, K.A., Beck, J.D., Murtha, A.P., *et al*. 2005. Maternal periodontal disease in early pregnancy and risk for a small-forgestational-age infant. *Am J Obstet Gynecol.* 194(5): 1316–22.

Boggess, K.A., Lieff, S., Murtha, A.P., Moss, K., Beck, J. and Offenbacher, S. 2003. Maternal periodontal disease is associated with an increased risk for preeclampsia. Obstet Gynecol. 2003;101(2):227–31.

Canakci, V., Canakci, C.F., Canakci, H., *et al*. 2004. Periodontal disease as a risk factor for pre-eclampsia: a case control study. *Aust N Z J Obstet Gynaecol.* 44(6):568-73.

Carmichael, S.L., Yang, W., Feldkamp, M.L., Munger, R.G., Siega-Riz, A.M., Botto, L.D. and Shaw, G. 2012. National Birth Defect Prevention Study, *Archives of Paediatrics & Adolescent Medicine,* 166(2):121-26

Da Costa, E.P., Lee, J.Y., Rozier, R.G. and Zeldin, I. 2011. Dental care for pregnant women: an assessment of North Carolina general dentists. *JADA,* 141(8):986-94

Dinas, K. *et al*. 2007. Pregnancy and oral health: utilization of dental services during pregnancy in Northern Greece. Acta Obstetriciaet Gynecologica Scandinavica, 86:938-944.

Dye, B.A., Vargas, C.M., Lee, J.J., Magder, L. and Tinanoff, N. 2012. Assessing the ealtionship between children's oral health status and that of their mothers. *J Am Dent assoc.,* 142(2):173-83.

Gordon, M.C. 2002. Maternal physiology in pregnancy. In: Gabbe SG, Niebyl JR, Simpson J, editors. Obstetrics: normal and problem pregnancies. 4th ed. New York: Churchill Livingstone, p. 63–91.

Guidelines on perinatal oral health care(rev.) *American Academy of Paediatric Dentistry,* 2011;33(6):118-123

Hemalatha, V.T. *et al*. 2013. Dental Considerations in Pregnancy-A Critical Review on the Oral Care. *J Clin Diagn Res.,* 7(5): 948–953.

Holbrook, W.P., Oskarsdottir, A., Fridjonsson, T., Einarsson, H., Hauksson, A. and Geirsson, R.T. 2004. No link between low-grade periodontal disease and preterm birth: a pilot study in a healthy Caucasian population. *Acta Odontol Scand,* 62(3): 177-9.

Huebner, L.E., Milgrom, P., Conrad, D., Lee, R.S. 2009. Providing dental care to pregnant patients: a surveyof Oregon general dentists. *JADA,* 140(2):211-22.

Hunter, L.P., Yount, C.M. 2011. Oral health & Oral health care practices among low income pregnant women. *J of Midwifery & Women's health,* 56(2):103-9

Hwang, S.S., Smith, V.C., McCormick, M.C. and Barfield, W.D. 2012. The Association between Maternal Oral Health Experiences and Risk of Preterm Birth in 10 States, Pregnancy Risk Assessment Monitoring System, 2004–2006. *Maternal and child health journal*, 16(8):1688-1695.

Jeffcoat, M.K., Geurs, N.C., Reddy, M.S., Cliver, S.P., Goldenberg, R. and Hauth, J.C. 2001. Periodontal infection and preterm birth:Results of a prospective study. *J Am Dent Assoc.,* 132(7);875-880.

Kaiser, L.L. and Allen, L. 2002. Position of the American Dietetic Association: Nutrition and lifestyle for a healthy pregnancy outcome. *J Am Diet Assoc.,* 102(10):1479-90.

Khanna, S. and Malhotra, S. 2010. Pregnancy and oral health: Forgotten territory revisited. *J Obstet Gynecol India,* 60(2):123-27

Kim, A.J., Lo, A.J., Pulin D.A. Thorlon, Johnson, D.S., Karimbux, N.Y. 2012. Scaling and root planning treatment for periodontitis reduces preterm birth & low birth weight: asystemic review and meta-analysis of randomised controlled trials. *J Periodontol.*, 83(12):1508-19.

Kloetzel, M.K., Huebner, C.E. and Milgram, P. 2011. Referrals for dental care during pregnancy: a systemic review.J of Midwifery & Women's Health.2011;56(2):110-17

Kunnen, A., Blaauw, J., van Doormaal, J.J., *et al*. 2007. Women with a recent history of early-onset pre-eclampsia have a worse periodontal condition. *J Clin Periodontol.,* 34(3):202-7.

Le, M., Riedy, C., Weinstein, P. and Milgrom, P. 2009. Barriers to utilization of dental services during pregnancy: a qualitative analysis. *J Dent Child.,* 76(1), 46-52.

Lee, R.S., Milgrom, P., Huebner, C.E. and Conrad, D.A. Dentist's perceptions of barriers to providing dental care to pregnant women. *Women's Health Issues,* 2010;20:359-365.

Lee, R.S., Milgroom, P., Huebner, C.E. and Conrad, D.A. 2010. Dentists' perceptions of barriers to providing dental care to pregnant women. *Women's Health Issues,* 20(5):359-65.

Little, J.W., Falace, D.A., Miller, C.S. and Rhodus, N.L. 2008. Dental management of the medically compromised patient. 7th ed. St. Louis: CV Mosby; 2008. p. 268–278, 456.

Lopez, N.J., Da Silva, I., Ipinza, J. and Gutierrez, J. 2005. Periodontal therapy reduces the rate of preterm low birth weight in women with pregnancy-associated gingivitis. *J Periodontol.,* 76(11 suppl):2144-53.

Lopez, N.J., Smith, P.C. and Gutierrez, J. 2002. Higher risk of preterm birth and low birth weight in women with periodontal disease. *J Dent Res., 81*(1):58-63.

Mannem, S. and Chava, V.K. 2013. The relationship between maternal periodontitis and preterm low birth weight: A case-control study. *Contemporary Clinical Dentistry,* 2(2):88-93

Matevosyan, N.R. 2011. Periodontal disease and perinatal outcomes. *Archives of Gynecology and Obstetrics,* 283(4):675-86

McCann, A.L. and Bonci, L. 2001. Maintaining women's oral health. *Dent Clin North Am.,* 45(3):571-601.

Meadows M. Pregnancy and the drug dilemma. FDA Consumer, Vol. 35, No. 3. Available: www.fda.gov/fdac/features/2001/301_preg.html

Michalowicz, B.S., DiAngelis, A.J., Novak, M.J *et al*. 2008. Examining safety of dental treatment in pregnant women. *JADA*, 139(6):685-95.

Mitchell-Lewis, D., Engebretson, S.P., Chen, J., *et al*. 2001. Periodontal infections and pre-term birth: early findings from a cohort of young minority women in New York. *Eur J Oral Sci.,* 109:34-39.

Moore, S., Ide, M., Coward, P.Y., *et al*. 2005. A prospective study to investigate the relationship between periodontal disease and adverse pregnancy outcome. *Br Dent J.,* 197(10):251-8; discussion 247.

Murphey, C. and Fowles, E. Dental health, cariogenic meal and snack patterns among low-income women during early pregnancy: a pilot study. Journal of Midwifery and Women's Health, 2010;55:587-592.

Offenbacher, S., Boggess, K.A., Murtha, A.P., *et al*. 2006. Progressive periodontal disease and risk of very preterm delivery. *Obstet Gynecol.,* 107(1):29-36.

Pandey, S. *et al*. 2007. Outcome of teenage pregnancy. *Indian Journal of Paediatrics, 74*:927-31.

Pitiphat, W., Joshipura, K.J., Rich-Edwards, J.W., Williams, P.L., Douglass, C.W. and Gillman, M.W. 2006. Periodontitis and Plasma C-Reactive Protein During Pregnancy. *Journal of periodontology.,* 77(5):821-825.

Polyzos, N.P., Polyzos, I.P., Zavos, A., Valachis, A., Mauri, D., Papanikolaou, E.G., Tziros, S., Weber, D. and Messinis, I.E. 2010. Obstetric outcomes after treatment of periodontal disease during pregnancy: systemic review and metaanalysis. *BMJ,* 29:341

Ressler, M. J., Krishna, R. and Robison, V. 2005. Oral health during pregnancy: current research. *JournalofWoman's Health (Larchmt),* 14:880-882.

Sajjan, P., Pattanshetti, J.I., Padmini, C., Nagathan, V.M., Sajjanar, M. and Siddiqui, T. 2015. Oral Health Related Awareness and Practices among Pregnant Women in Bagalkot District, Karnataka, India. Journal of International Oral Health : *JIOH,* 7(2):1-5.

Santos-Pereira, S.A., Giraldo, P.C., Saba-Chujfi, E. *et al*. 2007. Chronic periodontitis and pre-term labour in Brazilian pregnant women: an association to be analysed. *J Clin Periodontol.,* 34(3):208-13.

Skelton, J., Mullins, R., Langston, L.T. *et al*. 2009. Implementation of small group prenatal cae model with oral health. *J of health care for the poor and undeserved.,* 20(2):545-53.

Tellapragada, C., Eshwara, V.K., Acharya, S., *et al*. 2014. Prevalence of Clinical Periodontitis and Putative Periodontal Pathogens among South Indian Pregnant Women. *International Journal of Microbiology,* 5: 1-4

Thornburg, K.L., Jacobson, S.L., Giraud, G.D. and Morton, M.J. 2000. Hemodynamic changes in pregnancy. Semin Perinatol 2000; 24(1):11–4.

UNFPA and UNICEF. 2010. Women's & Children's Rights: Making the Connection. http://www.unfpa.org/webdav/site/global/shared/documents/publications/2011/WomenChildren_final.pdf.

Uppal, A., Uppal, S., Pinto, A., Dutta, M., Shrivatsa, S., Dandolu, V. and Mupparapin, M. 2010. The effectiveness of periodontal disease treatment during pregnancy in reducing the risk of experiencing preterm birth and low birth weight: a meta analysis. *JADA,* 141(12):1423-24.

Xiong, X., Buekens, P., Vastardis, S. and Pridjian, G. 2006. Periodontal disease and gestational diabetes mellitus. *Am J Obstet Gynecol.,* 195(4):1086-9.

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