

# Dentists' knowledge of oral health during pregnancy: a review of the last 10 years' publications

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Pregnancy is a period in which several physical and emotional changes occur. These changes in pregnant women's mouths promote changes that need to be known by dentists, so that they can provide the necessary care to women. **Purpose:** To gather data from published studies on the knowledge of dentists about the oral health of pregnant women. **Methods:** Papers published between 2003 and 2013 containing surveys on the topic under study were searched. Fourteen studies were selected and grouped into work areas. **Results:** Dentists have doubts and fears about the care of pregnant women, to a greater or lesser degree, especially with regard to the use of X-rays, prescriptions and ideal gestational period of treatment. **Conclusion:** The results suggest a need to improve dentists' knowledge regarding dental care of pregnant women especially as during pregnancy women may acquire new habits relevant to the oral health of their children.

**Key words:** oral health, pregnant women, public health dentistry, knowledge

## Introduction

The gestation period is a peculiar period in a woman's life, characterised by several changes, both physiological and emotional. The transformations that occur during this period of life, especially hormonal, may bring oral changes, requiring greater assistance from dental surgeons (Hemalatha *et al.*, 2013; Lopez *et al.*, 2011; Mascarenhas *et al.* 2003; Steinberg *et al.*, 2013;). Oral changes resulting from pregnancy happen mainly in the periodontium and are related to factors such as nutritional deficiencies, high levels of hormones like estrogen and progesterone and the presence of plaque, often favoured by the association to other local factors, as well as the transient immunosuppression state. There are also alterations in saliva and oral flora, increasing the acidity of the mouth and favoring bacterial growth (Xavier and Xavier, 2010).

Despite this evidence, many dentists are reluctant to care for pregnant women due to lack of preparation and the knowledge required, which may aggravate the oral condition of the patient and bring harm to both mother and baby (Kloetzel *et al.*, 2011; Silk *et al.*, 2008). This reluctance is attributed, in part, to deficiencies in the training of undergraduate dental surgeons (Moimaz *et al.*, 2010).

Curricular studies of US and Canadian dental schools suggest changes towards a more interdisciplinary curriculum in collaboration with other professions' health schools, is desirable (Haden *et al.*, 2010). In Brazil, few undergraduate courses in odontology offer the possibility

of specific care for pregnant women. The resulting gaps in professionals' preparation increases many dental surgeons' concerns when treating pregnant women and fail to dispel myths and taboos regarding their care. Several discussions suggest a need for curriculum reform to better orientate dental surgeons towards the national public health needs. Curriculum guidance for the odontology course was proposed as a step in the direction of training professionals prepared to meet the health needs of the population via the Unified Health System (Moimaz *et al.*, 2010).

Given the above, this study consists of a literature search on the approaches of dental surgeons to providing dental care to pregnant patients, and a discussion on the main protocol measures highlighted in the literature.

## Method

A search of the main sources of scientific papers (SciELO, PubMed, MEDLINE and the Cochrane Library) used as inclusion criteria: papers published in English, Portuguese, Spanish or French during a 10 year period (2003–2013), containing any type of questions put to dentists on their knowledge of the oral health of pregnant women. The following key words were used: oral health, maternal health, pregnant, public health, dental health surveys, fluoride, antibacterial, anaesthesia, x-rays, oral hygiene, knowledge. The time period was chosen on account of the intention to include the most recent work and a decade is probably sufficient to detect any trends in professionals' attitudes.

Papers were analysed by one of the authors. Where papers contained data obtained not only from dentists but also and other health professionals, only the dentists' data were included in this study. After selection and critical reading of the work, the main data were grouped by the cited issues and tabulated. Responses to similar questions in the studies were compared between studies. These included dentists' knowledge regarding radiographs, drug prescription and administration of anaesthetics, best gestation period for treatment of pregnant women, and the confidence and knowledge of the dentists in the care of pregnant patients.

## Results

Just 14 studies met the inclusion criteria and were analysed. These surveys encompassed a total of 4,184 dentists from different countries: USA (2,169 dental surgeons across 4 studies), Germany (702), Brazil (556 across 5 studies), France (259), Iran (250), Saudi Arabia (212) and India (36). All but one study used objective and structured questions on professionals' oral health knowledge in the care of pregnant women, the other (Da Costa *et al.*, 2010) being a qualitative study. Samples were mostly randomly selected though some were convenience samples. Quantitative results were converted to percentages.

Some survey questions were about the confidence of dentists caring for patients during pregnancy, on the use of drugs, local anaesthetics, the need to use prenatal fluoride, use of X-rays, best time to care, emergency situations, among others. However, reported knowledge is not always reflected in professional practice and therefore many studies also evaluated the attitude of professionals regarding care for pregnant women (Da Costa *et al.*, 2010; Egea *et al.*, 2013; Huebner *et al.*, 2009; Lee *et al.*, 2010; Patil *et al.*, 2013). Al-Shadan and Al-Manee (2008) analysed professional practice and concluded that professional practice is reflective of acquired knowledge. Zanata *et al.* (2008) also evaluated dentists' knowledge and practice and suggested these indicated a need for updating. Leal and Jannotti (2009) mainly addressed the practical and professional behaviour in their qualitative study. While

the Caneppele *et al.* (2011) study focused on the level of knowledge regarding pregnancy and oral health. Pina and Douglass (2011), in their descriptive study assessed professional opinions and professional practice, while Razi *et al.* (2011), evaluated dentists' knowledge of radiography for pregnant women.

Table 1 summarises responses to the questions about the use of radiographs, while Table 2 presents data on the prescription of drugs and anaesthetics for pregnant women. In Table 3, it can be seen that many dentists have many doubts regarding when best to treat pregnant women. Table 4 presents findings regarding dentists' confidence in providing dental services to pregnant women.

## Discussion

A high percentage of dentists are uncertain how to proceed regarding radiography and pregnant women. Two studies of found 40% would never request a radiograph for pregnant women (Al-Shadam and Al-Manee, 2008; Caneppele *et al.*, 2011). However, there is no evidence that the radiation dose involved would cause changes in the development of the pregnancy and/or the foetus (Razi *et al.*, 2011). Radiographs do not need to be avoided, and it is best to take them in the second trimester of pregnancy, when the foetus is less susceptible to radiation. All necessary precautions should be taken, such as the use of lead apron shielding the gonads and thyroid, avoid unnecessary exposure and technical errors, besides using properly calibrated equipment (Vasconcelos *et al.*, 2012; Xavier and Xavier, 2010).

With regard to drug prescription and anaesthetics administration, doubts also persist, as shown in Table 2. In all 10 studies that contained those questions, there were some dentists with doubts related to local anaesthesia and prescription of antibiotics, analgesics and/or an anti-inflammatory. In one study three quarters were reluctant to provide services to relieve pain and swelling associated with a dental emergency (Lee *et al.*, 2010) while in another 14% considered anaesthesia contraindicated for pregnant women (Pistorius *et al.*, 2003). Although the percentage differs between the two studies, many dentists

**Table 1.** Knowledge of dental surgeons regarding taking radiographs of pregnant women

<i>Publications</i>	<i>n</i>	
Capucho <i>et al.</i>	40	50% have doubts about the use of X-rays
Al-Shadan and Al-Manee	212	43% would not take a radiograph under any circumstance
Zanata <i>et al.</i>	37	16% considered use of X-rays safe throughout pregnancy; 38%, only after 1 <sup>st</sup> quarter 38% oppose radiography at any stage of pregnancy.
Huebner <i>et al.</i>	829	54% believe not to be appropriate to obtain a radiograph of the whole mouth 3% believe it inappropriate to obtain a periapical radiograph
Da Costa <i>et al.</i>	495	18% said it unsafe to take dental radiographs of pregnant women 7% are unsure about the safety of dental radiography during pregnancy
Caneppele <i>et al.</i>	284	40% do not take radiographs
Pina and Douglass	116	77% would take a radiograph for patients with 10 weeks of pregnancy, who sought treatment for dental pain, but only 2% would request routine radiographs, regardless of the trimester of pregnancy.
Razi <i>et al.</i>	250	28% were aware that radiographic doses, for diagnostic purposes, do not result in developmental or mental problems in the foetus 60% believed that radiation doses for diagnostic purposes led to later neoplasms 62% were aware of the need to question about pregnancy before performing radiographic procedures

**Table 2.** Knowledge of dental surgeons regarding drug prescription and anaesthetics administration

<i>Publication</i>	<i>n</i>	
Pistorius <i>et al.</i>	702	14% were against the use of anaesthesia during pregnancy
Capucho <i>et al.</i>	40	7% have doubts about the use of medications 43% do not know the best anaesthetic for pregnant women
Navarro <i>et al.</i>	183	68% would recommend paracetamol as 1st choice painkiller 16% would recommend dipyrone as a second option of analgesic 8% do not recommend the use of analgesics for pregnant women 31% do not indicate the use of anti-inflammatory drugs for pregnant women 31% recommend the use of NSAIDs such as nimesulide and piroxicam 82% indicated antibiotics like penicillins and 14% indicated the Macrolides 50% of 118 dentists opted for macrolides, for patients allergic to penicillins 28% chose cephalosporins; 3.4% sulfonamides; 3.4% tetracyclines; and 1.7% aminoglycosides 82% of 143 did not indicate the use of anxiolytics during pregnancy. However, 10.3% indicated diazepam. 60% use lidocaine as the anesthetic of 1st choice 22% opted for mepivacaine and 13.2% chose prilocaine 46% do not recommend the use of vasoconstrictor associated with the anesthetic
Al-Shadan and Al-Manee	212	65% do not prescribe clindamycin and 11.5% are unsure whether it is permitted to prescribe clindamycin 1.5% prescribe tetracycline during pregnancy and 5% did not know how to answer 15% would prescribe metronidazole 19% would prescribe cephalosporins 28% would prescribe paracetamol, while 56% would not use it 5% to 13% would prescribe ibuprofen, aspirin and codeine, and 76.5% to 85% would not prescribe none of them 25% are against the use of local anaesthetics 75% would use lidocaine without vasoconstrictor (adrenaline) and would not use prilocaine 18% were uncertain about the use of prilocaine without vasoconstrictor
Zanata <i>et al.</i>	37	penicillin and cephalosporin were the first choice of 2978% prescribe penicillin and cephalosporin as antibiotics; in case of allergy, 56.7% considered that a consultation with the obstetrician is required Acetaminophen was the first choice of analgesics for 67.6%, while 21.6% chose dipyrone 47% would recommend systemic fluoride during pregnancy
Leal and Jannotti	12	Testimony of a dentist: "If by an unlucky event the child is born with a malformation. Then, the mother will think it was because she went to the dentist 'that day I went there I took an anaesthetic and so on and so forth [...]' The dentist is afraid of that kind of situations. He wants to protect himself ..., because the mother may think that there was a problem ... that she went to the dentist that day."
Huebner <i>et al.</i>	829	2.7% said they did not give injections of local anaesthetics for pregnant patients. 13% reported that they would never prescribe acetaminophen to pregnant patients 28% would recommend aspirin to pregnant patients 17% sometimes prescribe ibuprofen to pregnant women
Lee <i>et al.</i>	729	~75% were reluctant to provide services to relieve pain or swelling associated with an emergency
Caneppele <i>et al.</i>	284	42% chose the correct anaesthetic for pregnant patients 85% indicate paracetamol, followed by 8.8% with sodium dipyrone, 2.5% with ibuprofen and 1.4% with aspirin 65% recommend penicillin, followed by 13% that recommend cephalosporin; 11% erythromycin; 1.1% chloramphenicol; 1.1% tetracycline and 1.1% sulfonamide. 12% prescribe anxiolytics during pregnancy
Patil <i>et al.</i>	36	53% indicate paracetamol as the first choice of analgesics 89% are against the use of aspirin 58% indicate penicillin as the first choice of antibiotic

are withholding the safe use of anaesthetics for pregnant women. The literature recommends that the preferred choice of anaesthetic solution for pregnant women is 2% lidocaine with epinephrine (1:100,000). Prilocaine should be avoided as it hinders placental circulation and may cause methemoglobinemia, a serious disease that makes haemoglobin unable to properly carry oxygen (Amadei *et al.*, 2011; Xavier and Xavier, 2010). In addition, anaesthetics should be associated with vasoconstrictive agents as they prevent systemic absorption of the local anaesthetic, reducing their toxicity and prolonging their

duration and effectiveness. The combination of vasoconstrictive agents to anaesthetics, up to two or three tubes per session, does not trigger cardiovascular changes, being safe for pregnant women. Furthermore, the amount of adrenaline released during a state of anxiety and pain is much higher than the amount present in a local anaesthetic tube (Andrade, 2006). Nevertheless, 46% of dentists in one study did not recommend the use of vasoconstrictor associated with the anaesthetic (Navarro *et al.*, 2008).

Drug therapy is part of the health care process, though drugs should be used rationally and based on evidence.

**Table 3.** Knowledge of dental surgeons and odontology students regarding the best treatment period for pregnant women

<i>Publication</i>	<i>n</i>	
Pistorius <i>et al.</i>	702	36% would postpone dental treatment for postpartum 10% would perform all the required treatments <50% would not treat during the 1 <sup>st</sup> trimester 9% would not treat during the 2 <sup>nd</sup> trimester
Capucho <i>et al.</i>	40	71% do not know what is the best time for treatment
Zanata <i>et al.</i>	37	81% consider that emergency care can be performed throughout pregnancy
Leal and Jannotti	12	The idea that pregnant women have risks for dental treatment and it is better to wait and treat later was very common, except among dentists working in units specialising in dental services for pregnant women.
Huebner <i>et al.</i>	829	3% would not do scraping procedures at any stage of pregnancy
Da Costa <i>et al.</i>	495	9% were not sure about the ideal time to provide preventive care 66% said that restorative elective treatment should be postponed to after pregnancy 10% believe that pregnant women should receive only emergency dental treatment
2010 Lee <i>et al.</i>	729	57% would not do scaling and root planning during 1 <sup>st</sup> trimester, 22% in the 2 <sup>nd</sup> and 46% in the 3 <sup>rd</sup> trimesters of pregnancy 69% would not do this procedure during an emergency (such as a periodontal or gum abscess involving suppuration, intraoral swelling and fever) >50% are reluctant to perform routine services during pregnancy ~75% were reluctant to provide services to relieve pain or swelling associated with a dental emergency
Patil <i>et al.</i>	36	54% believe that dental treatment can be done safely in any trimester 65% consider the period for routine and emergency care should be in the 2 <sup>nd</sup> trimester

**Table 4.** Knowledge and confidence of dentists in the care of pregnant patients

<i>Publication</i>	<i>n</i>	
Pistorius <i>et al.</i>	702	55% felt sufficiently informed and prepared for the treatment of pregnant women
Capucho <i>et al.</i>	40	50% do not feel capable of solving the doubts of pregnant women
Zanata <i>et al.</i>	37	41% feel the need to consult a doctor before performing routine procedures
Leal and Jannotti	12	“I do not attend her, but she should go to the paediatric dentist to have information about the foetus... Because paediatric dentist looks at the foetus... It is important to go to the paediatric dentist so to have all the guidelines of the good diet that she should have to have a good oral health”
Huebner <i>et al.</i>	829	It is common practice to request written medical authorisation before dental treatment 7% said they did not feel secure to treat pregnant women
Pina and Douglass	116	45% felt “very comfortable” in the treatment of pregnant patients 50% or more of the dentists reported not feeling completely comfortable in treating pregnant women
Patil <i>et al.</i>	36	39% say they have limited knowledge about prenatal oral health care 81% always consult a gynaecologist before prescribing any drug

The principle guiding the choice of treatment for pregnant women is based on the risk-benefit ratio for the foetus and the mother (Amadei *et al.*, 2011). When prescribing a medication during pregnancy, the main concern is the risk of teratogenesis because drugs diffuse cross the placental barrier. Drugs should be administered during pregnancy only when essential to the welfare of the pregnant woman with the least toxic medication being chosen (Achtari *et al.*, 2012). To guide for the most appropriate therapeutic choice for pregnant women, the U.S. Food and Drug Administration (FDA) classified the drugs, regarding the effects on pregnancy, in risk groups A to D and X (Meadows, 2001). Group A includes drugs tested in controlled studies in pregnant women and showed no risk to the foetus. Group B is comprised of drugs which animals research demonstrated no foetal risk, but lacking controlled studies in pregnant women, or where animal studies have shown risk, not confirmed in controlled studies in pregnant women. In group C are drugs which have not been tested in animals or pregnant women; or the studies in animals have shown

foetal risk which did not show in pregnant women. Group D includes drugs with evidence of foetal risk, however, the benefits to the pregnant woman can, eventually, justify their risk. Finally, in group X drugs are contraindicated for pregnant women following evidence of foetal abnormalities in animals and humans.

The most recommended analgesic for pregnant women is paracetamol (FDA group B), which can be prescribed safely for both pregnant women and nursing mothers. Sodium dipyrone is the second choice of analgesic, as it may cause agranulocytosis, the reduction of the number of granulocytes in peripheral blood, predisposing the individual to infections (Fuchs *et al.*, 2006). However, the manufacturers of sodium dipyrone contraindicate its use during the first trimester of pregnancy.

Non-steroidal anti-inflammatory drugs (NSAIDs) such as acetylsalicylic acid (ASA), diclofenac, ibuprofen, naproxen and rofecoxib are often prescribed by dental surgeons. They should be used with extreme caution in the last three months of pregnancy and for a limited period, as they may cause

uterine inertia and/or premature closure of the foetus' arterial canal (link between mother and foetus), besides interfering with the platelet aggregation, which may predispose to bleeding in case of dental surgery (Andrade, 2006).

The most highly recommended antibiotics during pregnancy belong to the penicillin group of drugs considered safe being in FDA group B, as are the cephalosporins such as macrolides. In odontology, apart from metronidazole associated with erythromycin, azithromycin and clarithromycin are indicated for patients allergic to penicillin, in the treatment of endodontic infections and periapical abscesses. In the group of lincosamides, clindamycin is the only antibiotic suitable for pregnant women, and may be administered to patients allergic to penicillin. There is no evidence of teratogenic risks associated with this drug, which is classified as FDA group B.

Tetracycline has high affinity to bivalent ions (such as calcium), affecting bone development, leading to significant reductions in gingival collagenase and periodontal bone loss. Moreover, that antibiotic can cause severe dental alterations such as dentin pigmentation and enamel hypoplasia and are classified as FDA group D so unsuitable for pregnant women (Lodi *et al.*, 2009). In the surveys studied, it can be seen that few dentists prescribe tetracycline to pregnant women. One study found 3.4% would prescribe tetracycline to pregnant women (Navarro *et al.*, 2008) and another found 1.5% would prescribe this antibiotic and 5% were uncertain of its safe use during pregnancy (Al-Shadan and Al-Manee, 2008).

Two studies (Caneppele *et al.*, 2011; Navarro *et al.*, 2008) have also evaluated the use of anxiolytics in pregnant women. Of the first's respondents, 12% would prescribe anxiolytics, while 10.3% of the latter's dentists indicated diazepam. Anxiolytics such as bromazepam, lorazepam and diazepam are contraindicated during pregnancy, as it is suspected that these drugs have a reasonable teratogenic power (Armonia and Tortamano, 2006).

Although fluoride is a known substance that prevents tooth decay, there is a consensus that fluoride supplements are not necessary for pregnant women because its benefits are proven only in the postnatal stage (Poletto *et al.*, 2008). The use of prenatal fluoride supplements are contraindicated due to the absence of scientific evidence demonstrating benefit to the developing baby's teeth (Cury, 2001). A study by Leverett *et al.*, (1997) demonstrated that to achieve the reduction of caries index in children, by the cariostatic action of fluoride, post-eruptive fluoride in mouthwash or topical applications should be used, as it acts in the mineralisation process of the tooth, increasing the amount of fluorapatite on the enamel surface, and not on the developing tooth. Fluoride therapy during pregnancy can be performed topically only to improve the oral health of the mother. However, 47% of one study's dentists prescribe systemic fluoride during pregnancy (Zanata *et al.*, 2008) though the sample size limits generalisability.

Dental care for pregnant women should be undertaken preferably in the 2<sup>nd</sup> trimester, but is acceptable at any time in urgent cases for fear of endangering the health of the mother and/or the baby. The dentists' knowledge about pregnancy is important in assessing and predicting potential problems relating to prescribing medications and radiographic examinations for safe and effective treatment minimising risks of harmful effects to the baby (Vasconcelos

*et al.*, 2012). Nevertheless, Table 3 shows that some dentists, out of fear or ignorance, advise against dental treatment at any stage of pregnancy (Da Costa *et al.*, 2010; Lee *et al.*, 2010; Pistorius *et al.*, 2003).

The testimony of a dentist shows his fear, caused by cultural myths associated with pregnancy (Leal and Jannotti, 2009). This demonstrates the need for health education to pregnant women as part of dental treatment to demystify popular beliefs, allowing the insertion of new habits that will culminate in promoting oral health of women and their children (Vasconcelos *et al.*, 2012).

Gingivitis is the most common oral change during pregnancy when a possible increase of the peripheral vascularity of the soft tissues of the oral cavity can cause gingivitis in some women. The increase of the level of progesterone in the gingival tissue increases the synthesis of prostaglandins, which are mediators of inflammation, being the probable explanation for the intensification of gingival inflammation (Pirie *et al.*, 2007; Xavier and Xavier, 2010). Nonetheless, in the work of Pistorius *et al.* (2003), 36% of the dentists postponed treatment until post-partum. Elsewhere, 57% would not do scaling and root planning during the 1<sup>st</sup> trimester of pregnancy; 22% would not do it during the 2<sup>nd</sup> trimester; and 46% would not do it during the 3<sup>rd</sup> trimester of pregnancy (Lee *et al.* (2010). This is a concern as there is evidence that periodontal disease may be associated with preterm birth and/or low birth weight babies, though there is insufficient evidence that scaling and root planning during pregnancy reduces the chances of these unfavourable outcomes (Chambrone *et al.*, 2011; Shanthi *et al.*, 2012).

In Table 4, the results of studies that contained questions regarding the confidence of dentists in providing dental services to pregnant women are presented. It is observed that many of them feel insecure and uncomfortable when serving these patients, and some of them feel the need to consult a doctor before, requesting a written approval of the doctor to attend a pregnant woman. However, for performing dental procedures in healthy pregnant women, there is no need for prior consultation with the obstetrician (Achtari *et al.*, 2012).

Despite the data presented here, it is necessary to emphasise that the assessed works have limitations regarding their study design, while their results cannot be generalised, they reveal flaws in dentists' knowledge and/or professional practice regarding the provision of dental care service to pregnant patients.

## Conclusions

Despite the proven safety of, and need for, dental treatment in pregnant patients, many dentists in several countries ignore important aspects of the recommended procedures. It is also worrying that some dentists feel the need to consult an obstetrician before performing dental procedures, even with pregnant women that do not present systemic changes that might justify this consultation.

The findings demonstrate a need to broaden the knowledge of dental surgeons regarding dental care of pregnant women. Despite dentists' awareness of the evident necessity for dental care during pregnancy, this is not always reflected in the current professional practice. Curriculum change in undergraduate courses and greater availability of training and retraining courses on these topics may be required.

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