

Endodontic treatment of the pregnant patient: Knowledge, attitude and practices of dental residents

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ABSTRACT

Introduction: In order to control serious pulpal pain following odontogenic infections in pregnant women, endodontic treatment may become necessary. The aim of this study was to assess the perception of dentists about rendering endodontic treatment to pregnant women.

Materials and Methods: This was a cross-sectional study of resident doctors in the different dental specialties in Nigeria preparing for the various levels of the fellowship examinations of the West Africa College of Surgeons and the National Postgraduate Medical College of Nigeria. Data were collected by the means of a 17-itemed questionnaire which sought information on respondents' demography, their considerations while rendering endodontic treatment to the pregnant patients and their perceptions of the safety of endodontic treatment in pregnancy. The data collected were analyzed using the Statistical Package for Social Science version 21.0. **Results:** With regards to the safety of endodontic treatment during pregnancy, 91.8% considered it safe, and this was not statistically significant in relation to the specialty or status of the respondent. Majority (77.0%) agreed they would undertake a root canal treatment on a pregnant patient with all respondents in restorative dentistry, prosthodontics, periodontics, and pedodontics in the affirmative while all in oral pathology would refuse to do such ($P = 0.0001$).

Conclusion: Dental residents are aware of the safety of endodontic treatment in pregnant women. However, gaps exist in their knowledge, bringing to the fore, the need for inclusion of pregnancy-specific training in the dental postgraduate curriculum.

Key words: Dental residents, endodontic treatment, pregnancy

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INTRODUCTION

Pregnancy does not translate to being medically compromised; therefore dental treatment should not be denied simply because a woman is pregnant. The pregnant woman who presents for dental care may require special considerations.¹ Therefore, the management of these patients may require adjustments in the timing and type of dental treatment, as well as in the drugs to be prescribed.² Proper risk assessments should be done for the mother and fetus. The following should be considered: Risk of teratogenicity in the fetus due to drugs taken by the mother, susceptibility to supine hypotensive syndrome as a result of a decrease in blood pressure and cardiac output while the patient is in a supine position, and the potential danger

of disseminated vascular coagulopathy due to increase in clotting factors.¹

Oral health during pregnancy has, for long, been a focus of concern³ with obstetricians acknowledging its importance and attendant effect on pregnancy outcomes.^{4,5} The physiologic changes in pregnancy include changes in the oral cavity with an attendant increase in susceptibility to oral infections.⁶ Also, increased consumption of carbohydrates, increased acid in the mouth from vomiting and reduced production of saliva and possibly too, increased acidity of saliva have been believed to increase

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the risk of dental caries in pregnancy.⁷ A study found that pregnant women were 1.97 times more likely to suffer from dental caries than the nonpregnant women.⁸ A 74.5% prevalence of dental caries among the pregnant women was observed in a study by Mahmud *et al.*⁹

Usually, pregnant patients are not immunocompromised; however, there is suppression of the maternal immune system in response to the fetus⁶ subsequently causing a decrease in cell-mediated immunity, as well as natural killer cell activity.¹⁰ With the foregoing, odontogenic infections have the potential to progress rapidly to deep-space infections eventually compromising the oropharyngeal airway.¹⁰ In addition, pregnant women may also receive a prescription and/or over-the-counter analgesics to control serious pulpal pain. Abuse of these drugs rather than receiving the appropriate dental treatment may have deleterious effects on the fetus and the pregnant mother. Therefore, it is imperative that odontogenic infections should be treated promptly at any time during pregnancy. One of the possible treatment options is endodontic treatment involving the extirpation of the diseased pulp. Endodontic treatment may entail the use of radiographs, local anesthetic agents, root canal irrigants, intra-canal medications, and drugs (analgesics and antibiotics).

Radiographs are very important during endodontic treatment. They are required for proper diagnosis, determination of working length, proper obturation, and posttreatment evaluation. Intraoral radiographs are safe for pregnant patients as the X-rays are directed to the mouth and not the abdomen, along with the use of protective measures such as high-speed film, collimation, filtration, lead apron, and a thyroid collar.¹¹ It has been proposed that, concerned pregnant patients be reassured that in all cases requiring such imaging, the As Low As Reasonably Achievable (ALARA) principle will be practised, and only radiographs necessary for diagnosis and treatment will be obtained.¹² X-ray radiation exposure during pregnancy totaling <5-10 cGy, and a full mouth series of dental radiographs of only 8×10^{-4} cGy has been reported to show no increase in congenital anomalies or intrauterine growth retardation.^{11,13,14}

Local anesthetics are relatively safe when administered properly and in the correct amount during pregnancy.¹⁰ The quantity of anesthetic agent administered could be a probable cause for concern among endodontists. This may be because of the uncertainty of the initial dose administered being ineffective in achieving anesthesia, thus requiring an additional anesthetic agent to make the patient feel more comfortable. Pain incurred during treatment may induce stress which could be more damaging to the fetus than the effect (s) of additional quantities of anesthetic agent. Most anesthetic agents contain the vasoconstrictor epinephrine which is a category C drug. This drug has

been studied in amount of up to 0.1 mg added to local anesthetics. No unusual side effects or complications were reported following its use for epidural anesthesia during labor.¹⁵ It has been reported that the local anesthetic with epinephrine administered as an intravascular injection may, at least supposedly, cause a deficiency of uteroplacental blood flow.¹⁰ However, for a healthy pregnant patient, the 1:100,000 epinephrine concentration used in dentistry, administered by proper aspiration technique and limited to the minimal dose required, is safe.¹⁶

Endodontic treatment in pregnancy is directed towards controlling disease, maintaining a healthy oral environment, and preventing potential problems that could occur later in the pregnancy or during the postpartum period.¹⁶ It has been asserted that neither the cleansing irrigant, hypochlorite nor root canal filling materials used in endodontic treatment is detrimental to the fetus.¹⁷ The initial 3 months of pregnancy are considered vital to the growth of the fetus. It has been recommended that any avoidable treatment in the first trimester should be moved to the next trimester to prevent any threat of untoward effects of dental treatment.¹⁰ By the end of the first trimester, organogenesis is complete, the uterine size is not large enough to make sitting on the dental chair uncomfortable and nausea has generally waned. These make the second trimester an ideal period to undertake endodontic treatment. However, extensive elective endodontic procedures should be postponed until after delivery.

Dentists frequently have to face the anxiety associated with the safety of the dental treatment during pregnancy¹⁸, as well as the need to eliminate the odontogenic infection. Assessment of the potential risk in rendering endodontic treatment during pregnancy is important while paying attention to the physiologic changes associated with pregnancy. Probably due to the wrong suppositions propagated following the lack of proper information, dentists are wary of rendering treatment to pregnant women.^{19,20} Reviews on amalgam fillings and periodontal therapy have been reported²¹, but there is a paucity of studies reviewing perceptions of endodontic treatment in the pregnant woman. This study to assess the perception of dentists about endodontic treatment during pregnancy thus became imperative as the purpose of this study.

MATERIALS AND METHODS

This cross-sectional study was carried out among the resident doctors in the different dental specialties in Nigeria preparing for the various levels of the fellowship examinations of the West Africa College of Surgeons and the National Postgraduate Medical College of Nigeria, who attended the revision course in Lagos State in September 2012 and April 2013. A pretested,

self-administered questionnaire was used for the data collection. The 17-itemed questionnaire sought information on respondents' demography, their considerations while rendering endodontic treatment to the pregnant patients and their perceptions of the safety of endodontic treatment in pregnancy.

The data collected were analyzed using the IBM Statistical Package for Social Science (SPSS) for windows version 21.0. Armonk NY: IBM Corp. The results were presented as tables and cross-tabulations. The nonparametric analysis in the form of Chi-square test was carried out for statistical significance with $P < 0.05$ considered statistically significant.

RESULTS

The majority (72.1%) of the respondents were <35 years of age. There was a male dominance with a male:female ratio of 1:0.42. Most (86.9%) of the respondents were junior residents and 42.6% were residents in oral and maxillofacial surgery [Table 1].

The majority (86.9%) thought that appropriate treatment of dental pain and infection was important in pregnancy. While rendering such treatment, 82% were aware that the pregnant patient should be positioned in a special way [Table 2] with 36.1% recommending that the pregnant patient's positioning should allow her head to be higher than her feet.

With regards to the safety of endodontic treatment during pregnancy, 91.8% considered it safe [Table 2] and this was not statistically significant in relation to the specialty

or status of the respondent. However, 52.4% of the respondents recommended that the ideal period to carry out endodontic treatment was the second trimester while 21.3% thought that any time during pregnancy was safe if endodontic treatment was indicated.

Table 3 displays the responses of respondents concerning agents employed in the course of endodontic treatment. The majority (77.0%) of the respondents felt use of local anesthetic with epinephrine was safe in pregnancy. All the females were certain of the safety of local anesthetic with epinephrine, and this was statistically significant ($P = 0.03$). All the respondents in oral medicine and orthodontics considered the use of local anesthetic with epinephrine in pregnancy safe while respondents in oral pathology were uncertain, and this was statistically significant ($P = 0.0001$). This had no statistically significant relationship with the status of the respondents.

As regards the safety of the use of irrigants during root canal treatment, 13.1% of the respondents thought that their use posed some danger to the fetus while 42.6% were uncertain of any danger their use posed. This was statistically significant in relation to the specialty of the respondents ($P = 0.02$) with a majority of respondents who thought that it was not safe being oral and maxillofacial surgery residents. In the same vein, it was statistically significant in relation to the gender of the respondents with no female agreeing that irrigants used during endodontic treatment posed any danger to the fetus ($P = 0.006$). However, there was no statistically significant association between the status of the respondents and their perception of the safety of irrigants use.

More than half (57.4%) of the respondents agreed they would expose dental X-rays for a root canal treatment procedure during pregnancy. The majority of those who were uncertain if they would expose X-rays for a root canal treatment during pregnancy were residents in oral and maxillofacial surgery, and this was statistically significant ($P = 0.002$). Likewise, 59.0% agreed that they would place interappointment medicaments during a root canal treatment procedure in pregnancy. The majority of the respondents in restorative, periodontics, pedodontics, prosthodontics, and orthodontics specialties were willing to use interappointment medicaments during root canal treatment on the pregnant patient while all those in oral pathology were uncertain and this was statistically significant ($P = 0.0001$). Also statistically significant was the association of gender with the use of interappointment medicaments for a root canal treatment during pregnancy with more females agreeing ($P = 0.01$) but no such association with the status of the respondents.

In relation to the use of root sealers for a root canal treatment during pregnancy, majority (80.3%) admitted they would use them, and this was statistically significant

Table 1: Demographic characteristics of the respondents

Characteristics	Frequency (%)
Age (years)	
≤35	88 (72.1)
≥35	34 (27.9)
Gender	
Male	86 (70.5)
Female	36 (29.5)
Status	
Junior resident	106 (86.9)
Senior resident	16 (13.1)
Specialty	
Community dentistry	8 (6.6)
Oral and maxillofacial surgery	52 (42.6)
Oral pathology	2 (1.6)
Oral medicine	4 (3.3)
Orthodontics	16 (13.1)
Paedodontics	10 (8.2)
Periodontics	6 (4.9)
Prosthodontics	2 (1.6)
Conservative dentistry	22 (18.0)
Total	122 (100.0)

Table 2: Responses regarding dental treatment among pregnant women

Question	Response		
	Yes n (%)	No n (%)	Uncertain n (%)
Is the appropriate treatment of dental pain and infection important in pregnancy?	106 (86.9)	2 (1.6)	14 (11.5)
Should the pregnant patient be positioned in a special way?	100 (82.0)	8 (6.6)	14 (11.5)
Is root canal treatment safe during pregnancy?	112 (91.8)	6 (4.9)	4 (3.3)

Table 3: Responses regarding agents employed during endodontic treatment in pregnancy

Question	Response		
	Yes n (%)	No n (%)	Uncertain n (%)
Is local anesthetic with epinephrine safe for use during pregnancy?	94 (77)	14 (11.5)	14 (11.5)
Do the irrigants used during root canal treatment pose any danger to the fetus?	16 (13.1)	54 (44.3)	52 (42.6)
Will you take X-rays for a root canal treatment during pregnancy?	70 (57.4)	36 (29.5)	16 (13.1)
Will you use inter-appointment medicaments for a root canal treatment during pregnancy?	72 (59.0)	36 (29.5)	14 (11.5)
Will you use root sealers for a root canal treatment during pregnancy?	98 (80.3)	4 (3.3)	20 (16.4)
Do the root canal obturation points have any adverse effect on the fetus?	2 (1.6)	72 (59.0)	48 (39.3)

in relation to the specialty of the respondents ($P = 0.0001$). All respondents in prosthodontics, pedodontics, and orthodontics affirmed they would use root sealers while those in oral pathology were not certain.

When asked if root canal obturation points could have any adverse effect on the fetus, only 1.6% claimed they could, and these participants were in restorative dentistry and this was statistically significant ($P = 0.005$).

Majority (77.0%) agreed they would undertake a root canal treatment on a pregnant patient with all respondents in restorative dentistry, prosthodontics, periodontics, and pedodontics in the affirmative while all in oral pathology would refuse to do such ($P = 0.0001$, Table 4).

DISCUSSION

Understanding the physiologic changes associated with pregnancy, as well as the effects of dental procedures including radiography and drug use on the pregnant patients and the developing fetus is requisite in rendering dental treatment to pregnant patients.²²

The male preponderance in this study is similar to other Nigerian studies^{23,24} reflecting that there is still a male-dominance of the dental profession in Nigeria. Oral and maxillofacial surgery was the most enrolled specialty among residents in this study. This may be due to the fact that it was one of the first specialties of dentistry to be developed in Nigeria.

The importance of appropriate treatment of dental pain and infection has been well-emphasized, and this was affirmed in this study. It has been advocated that endodontic treatment, when indicated, should not be deferred till after delivery to avoid the inappropriate long-term use of analgesics to relieve pain.¹⁶ However, proper positioning of the pregnant patient during dental treatment

Table 4: Relating undertaking a root canal treatment on a pregnant patient with specialty

Specialty	Would you undertake a root canal treatment on a pregnant patient?		Total n (%)
	Yes n (%)	No n (%)	
Community dentistry	4 (50.0)	4 (50.0)	8 (100.0)
Oral and maxillofacial surgery	34 (65.4)	18 (34.6)	52 (100.0)
Oral pathology	0 (0.0)	2 (100.0)	2 (100.0)
Oral medicine	2 (50.0)	2 (50.0)	4 (100.0)
Orthodontics	14 (87.5)	2 (12.5)	16 (100.0)
Paedodontics	10 (100.0)	0 (0.0)	10 (100.0)
Periodontics	6 (100.0)	0 (0.0)	6 (100.0)
Prosthodontics	2 (100.0)	0 (0.0)	2 (100.0)
Conservative dentistry	22 (100.0)	0 (0.0)	22 (100.0)
Total	94 (77.0)	28 (23.0)	122 (100.0)

$P = 0.0001$

is necessary, given the likelihood of hypotensive syndrome and the attendant loss of consciousness. In this study, the need for this proper positioning of pregnant women during dental treatment was recognized by a majority but only a few had an idea of which was the best position. This reflects a gap in knowledge among residents who are in active, specialization training and who are expected to be up-to-date with current trends.

Dental treatment, including endodontic treatment, has been certified safe in pregnancy. Nevertheless, it has been recommended that elective procedures be avoided until the end of pregnancy and for only emergency treatment to be given or if possible, be delayed until the second trimester.²² The findings of this study suggest that dental residents have a clue of the timing of dental treatment for the pregnant patient. However, this level of awareness is insufficient.

Studies have not reported adverse events associated with rendering endodontic treatment. Local anesthetic with vasoconstrictor can be safely administered to the pregnant

patients during the dental treatment²⁵ but aspiration must always be done to minimize the likelihood of intravascular injection.²⁶ Dental residents seem to be conversant with this especially as most dental procedures require the use of local anesthetic. The scope of oral medicine specialty consists of the nonsurgical management of oral diseases where applicable and includes the use of pharmacological agents in the management of dental conditions. Therefore, it is not surprising that all the residents in oral medicine were conversant with the safety of the use of local anesthetic with epinephrine in pregnancy.

Not much has been reported on the use of endodontic irrigants for root canal treatment during pregnancy, and this was reflected in the varied opinions regarding the safety of endodontic irrigants use in pregnancy. It is imperative therefore that research into the possible adverse effects of endodontic irrigants in pregnancy be looked into, this will provide informed choices for dentists while selecting which irrigant to use for root canal treatment procedures in pregnant women. A lot has been done to ascertain the safety of dental X-rays during pregnancy. However, a reasonable percentage of dental residents in this study were not confident exposing X-rays for root canal treatment procedures on pregnant women. There is the need for more emphasis on the safety of dental X-rays and the use of protective measures such as the use of modern imaging machines (with low-dose, high-yield radio-diagnosis), high-speed films, collimation, filtration, lead aprons, and a thyroid lead collars.

The female residents in this study exhibited a better knowledge of the use of local anesthetics, interappointment medicaments, and endodontic irrigants. This may be because women tend to be interested in or concerned with medication use in pregnancy. The specialty of training tends to boost confidence in rendering treatment to pregnant patients. Endodontics is a subspecialty in restorative dentistry in Nigeria, so residents in this specialty tended to display more confidence by their eagerness to render endodontic treatment to pregnant patients.

The hierarchical status of the respondents did not play any role in the outcomes of all the questions asked. This shows that increased clinical exposure, experience, and knowledge did not influence the perception of dental residents toward rendering endodontic treatment to the pregnant women.

Limitations exist in the ability to generalize the findings of this study given the fact that some specialties such as oral medicine and oral pathology were poorly represented in the study. In addition, the authors recognize that specific agents used as irrigants, sealers, and obturating points were not enquired about. This could have thrown more light on the depth of knowledge of the respondents about these materials and their use in endodontic treatment in pregnancy.

CONCLUSION

The findings of the study suggest that dental residents are aware of the safety of endodontic treatment in pregnant women. However, there are gaps in knowledge with regards to the proper positioning of pregnant women, the timing of treatment, the safety of the use of irrigants, and radiographic exposure for pregnant women. It is imperative that the postgraduate training should include pregnancy-specific, confidence-boosting knowledge for better endodontic treatment of the pregnant women.

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Conflicts of interest

There are no conflicts of interest.

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