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Endodontic Treatment in Pregnancy; Knowledge, Attitudes and Practices of Dentists and Interns in Riyadh, Saudi Arabia

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Abstract | **Original Research Article**

Introduction: Dental practitioners with limited training in gestational medicine may be cautious to treat their pregnant patients. Endodontic treatment requires the use of medications including analgesics as well as antibiotics. Because of a concern of harming either mother or unborn child, some dentists may hold back care or medications from their patients, unintentionally causing harm. ***Materials and methods:*** This is a cross sectional study conducted among the dental professionals and interns of Riyadh using an online survey. 504 dentists and interns were used in this study and were contacted using social media. ***Results****:* 14.3% participants were not certain whether to take full mouth radiograph for pregnant patients or not, 36.5% often used local anesthesia without epinephrine and 23.4% never prescribed antibiotics such as amoxicillin or clindamycin. ***Conclusion****:* Overall knowledge of dental practitioners regarding the endodontic therapy of pregnant patients is not satisfactory.

Keywords: Prenatal oral care, endodontic treatment, knowledge, attitude.

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INTRODUCTION

Pregnancy is an exceptional phase in a woman's lifetime. Good oral health in the course of pregnancy is essential to the overall health of both the pregnant mother and her baby. Oral health evaluation should be part of comprehensive prenatal care for all women and every general medical practitioner and obstetrician should contemplate referral of a newly pregnant woman to a dentist as routine. Unluckily, there may be instances when pregnant women, obstetricians and—on occasion—dentists are uncertain of dental care during pregnancy owing to biases about the safety of dental treatment, causing the deferral of the dental treatment (Achtari, Georgakopoulou & Afentoulide, 2012; George *et al*., 2012).

Dental practitioners with limited training in gestational medicine may be cautious to treat their pregnant patients. Endodontic treatment requires the use of medications including analgesics as well as antibiotics. Because of a concern of harming either mother or unborn child, some dentists may hold back care or medications from their patients, unintentionally causing harm. Often, the best treatment choice for a patient is to instantly address pain or infections at the source. Nevertheless, there are instances when infections cannot be cured right away with invasive dental care and antibiotics may be the required course of action. Several of the dentist's first line antibiotics are rated by the FDA as category B for pregnancy risk. These include the penicillin family, the erythromycins, azithromycin, clindamycin, metronidazole, and the cephalosporins. However tetracycline, minocycline, and doxycycline are given D ratings due to their probability of chelating bone and teeth. Thus tetracycline should be normally avoided (Jain *et al*., 2013; Rajeswari, Kandaswamy & Karthick, 2016).

A study conducted among dentists and dental interns in Jeddah, Saudi Arabia reported that overall, participant knowledge was better than the average, and knowledge levels elevated with increased age and years in clinical practice. Dental interns had lesser knowledge scores than graduated dentists, specialists, and consultants. The bulk of the study participants understood that pregnant patients need special positioning. Dental interns and dentists in Jeddah, Saudi Arabia has fair levels of knowledge regarding the endodontic treatment of pregnant patients. Two-thirds of them knew that majority endodontic procedures are

suitable and that NSAIDs are contraindicated. Nevertheless, many also believed panoramic radiographs to be contraindicated. Continuing education programs are essential for enhancing dental practitioners' second-trimester knowledge, especially regarding the use of radiographs and NSAIDs (Aboalshamat *et al*., 2020).

In the past few years, prenatal use of acetaminophen has been associated to numerous second-generation harmful effects, of which increased probability of asthma, neurobehavioral issues, and reproductive conditions have earned the most interest. Acetaminophen has been discovered to have endocrine disrupting properties and may trigger intergenerational impacts via epigenetic changes to fetal germ cells. From an endodontists' point of view, it is essential to take note of that the aforementioned information is generally linked with long term (>28 days) use. Post-operative pain after endodontic treatment usually resolves in 7 days and does not involve long-term use of analgesics (Ather *et al*., 2020; Shaheen *et al*., 2019; Dathe & Schaefer, 2019).

Another study conducted in Nigeria reported that 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 commence a root canal treatment on a pregnant patient with all respondents in restorative dentistry, prosthodontics, periodontics, and pedodontics in the favor while all in oral pathology would refuse to do such (P = 0.0001). Dental residents are mindful of the safety of endodontic treatment in pregnant women. However, disparities existed in their knowledge, bringing to the fore, the need for inclusion of pregnancy-specific training in the dental postgraduate curriculum (Ibhawoh & Enabulele, 2015).

AIMS OF THE STUDY

- To determine the knowledge, attitude and practice of dental practitioners and interns towards endodontic treatment of pregnant patients.
- To determine the association of knowledge, attitude and practice with gender and qualification of dental practitioners.

MATERIALS AND METHODS

Study Design: This is a cross sectional study conducted among the dental professionals and interns of Riyadh using an online survey.

Study Sample: 504 dentists and interns were used in this study and were contacted using social media.

Study Instrument: Online questionnaire was constructed consisting of questions related to personal, professional, and demographic data followed by questions including knowledge, attitude and practice towards the endodontic therapy of pregnant patients.

Instrument Validity and Reliability: A pilot study was conducted by sending the survey to 20 participants and the data was inserted in SPSS version 22 to determine the reliability by using Chronbach's coefficient alpha (0.767). Validity of the questionnaire was tested by sending it to experienced researchers in REU but no changes were made.

Statistical Analysis: Collected data was analyzed using SPSS version 22, where descriptive as well as inferential statistics were conducted. Comparison between genders was made with the value of significance kept under 0.05 using Chi-Square test. Test for normality was conducted and respective correlation (Pearson's for normally distributed and Spearman's for abnormally distributed data) was done between qualification and practice of study participants.

RESULTS

A total of 504 dental professionals participated in this study, which included 70.4% males and 29.6% females. 36.1% were interns, 50.2% general dentists and 13.7% were specialists/consultants. 85.5% had less than 10 years of experience and 14.5% with more than 10 years. 13.9% were academician, 61.5% had clinical practice and 24.6% had both (Table 1). 82.9% participants believed that it is important to provide appropriate endodontic treatment for dental pain and infection in pregnant patients. 49% reported that a single periapical radiograph is safe in any trimester, 52.6% reported endodontic treatment is safe in any trimester, 28.4% revealed that local anesthesia with epinephrine is safe in 2nd trimester (Table 2).

Table 3 shows the practice related questions and their responses, which revealed that 14.3% participants were not certain whether to take full mouth radiograph for pregnant patients or not, 36.5% often used local anesthesia without epinephrine and 23.4% never prescribed antibiotics such as amoxicillin or clindamycin. Table 4 shows the attitude related questions with responses, which disclose that 14.3% strongly disagreed to routine endodontic treatment being a part of prenatal care, 21.4% strongly agreed that their practice is too busy to add counselling for pregnant patients, 28.4% strongly agreed that they required more information about treating pregnant patients.

Table 5 shows the comparison of knowledge among males and females, which revealed majority of the differences not being statistically significant, but significant comparisons were achieved when inquired about performing endodontic treatment (p-value: .000), administering local anesthesia without epinephrine (p-value: .043) and a few more. Table 6 also compared the responses of genders regarding their practice, which

showed significant differences only when inquired about administering local anesthesia with epinephrine (p-value: .005) and performing access opening (p-value: .019). Comparisons of attitudes among genders were statistically significant as can be observed in Table 7.

Table 8 shows the correlation of qualification with practice of dental professionals regarding endodontic treatment in pregnant patients. Majority of the data were not normally distributed, hence non-parametric test (Spearman's correlation) was done and only two set of data were normally distributed hence parametric test (Pearson's correlation) was conducted.

Table 1: Demographic variables and response frequencies

Demographic Variables	Frequencies (%)
Gender	Males: 355 (70.4%) Females: 149 (29.6%)
Work Status	Intern: 182 (36.1%) General dentist: 253 (50.2%) Specialist/Consultant: 69 (13.7%)
Work Experience	Less than 10 years: 431 (85.5%) More than 10 years: 73 (14.5%)
Job Profile	Academician: 70 (13.9%) Practice: 310 (61.5%) Both: 124 (24.6%)

Table 2: Knowledge related questions and their responses

Knowledge Related Questions	Responses (%)
It is important to provide appropriate endodontic treatment for dental pain and infection with pregnant patients.	Yes: 82.9% No: 17.1%
The pregnant patient should be positioned in a special way.	Yes: 84.9% No: 15.1%
It is safe to use irrigation agents (e.g., sodium hypochlorite) during RCT for pregnant patients.	Yes: 73.2% No: 26.8%
It is safe to use obturation material (gutta-percha) during RCT for pregnant patients.	Yes: 78% No: 22%
It is safe to use root sealer during RCT for pregnant patients	Yes: 80% No: 20%
It is safe to use inter-appointment medicaments during RCT for pregnant patients	Yes: 74.8% No: 25.2%
A single periapical radiograph	Safe in first or later trimester: 49% 1st trimester: 8.1% 2nd trimester: 28.4% 3rd trimester: 5.2% Contraindicated or uncertain: 9.3%
Full-mouth radiograph	Safe in first or later trimester: 29.6% 1st trimester: 9.7% 2nd trimester: 36.5% 3rd trimester: 4.2% Contraindicated or uncertain: 20%
Endodontic treatment	Safe in first or later trimester: 52.6% 1st trimester: 8.9% 2nd trimester: 24.8% 3rd trimester: 6.7% Contraindicated or uncertain: 6.9%
Administer local anesthesia with epinephrine	Safe in first or later trimester: 36.9% 1st trimester: 8.5% 2nd trimester: 28.4% 3rd trimester: 4.2% Contraindicated or uncertain: 22%
Administer local anesthesia without epinephrine	Safe in first or later trimester: 46.6% 1st trimester: 8.5% 2nd trimester: 25.2% 3rd trimester: 4.4% Contraindicated or uncertain: 15.3%
Access opening to relieve pain	Safe in first or later trimester: 61.1% 1st trimester: 6.9% 2nd trimester: 22.6% 3rd trimester: 3.6% Contraindicated or uncertain: 5.8%

Make incision to drain abscess	Safe in first or later trimester: 51.2% 1st trimester: 7.7% 2nd trimester: 26.6% 3rd trimester: 4.2% Contraindicated or uncertain: 10.3%
Prescribe acetaminophen, such as paracetamol	Safe in first or later trimester: 40.7% 1st trimester: 9.1% 2nd trimester: 37.1% 3rd trimester: 3.8% Contraindicated or uncertain: 9.3%
Prescribe NSAIDS such as ibuprofen	Safe in first or later trimester: 10.7% 1st trimester: 9.3% 2nd trimester: 13.5% 3rd trimester: 6.3% Contraindicated or uncertain: 60.1%
Prescribe antibiotics such as amoxicillin or clindamycin	Safe in first or later trimester: 18.1% 1st trimester: 8.3% 2nd trimester: 36.9% 3rd trimester: 5% Contraindicated or uncertain: 31.7%

Table 3: Practice related questions and their responses

Practice Related Questions	**Response (%)**
Single periapical radiograph	Often: 49.2% Sometimes: 30.4% Never: 10.1% Not certain: 10.3%
Full-mouth radiograph	Often: 27.8% Sometimes: 44.2% Never: 13.7% Not certain: 14.3%
Endodontic treatment	Often: 51.6% Sometimes: 31.2% Never: 6.7% Not certain: 10.5%
Administer local anesthesia with epinephrine	Often: 33.3% Sometimes: 32.7% Never: 24.2% Not certain: 9.7%
Administer local anesthesia without epinephrine	Often: 36.5% Sometimes: 41.7% Never: 10.1% Not certain: 11.7%
Access opening to relieve pain	Often: 57.5% Sometimes: 26% Never: 8.5% Not certain: 7.9%
Make incision and drain abscess	Often: 46.8% Sometimes: 38.1% Never: 6% Not certain: 9.1%
Prescribe acetaminophen such as paracetamol	Often: 31.9% Sometimes: 49.4% Never: 8.9% Not certain: 9.7%
Prescribe NSAIDS such as ibuprofen	Often: 11.9% Sometimes: 24.2% Never: 46% Not certain: 17.9%
Prescribe antibiotics such as amoxicillin or clindamycin	Often: 15.7% Sometimes: 47.8% Never: 23.4% Not certain: 13.1%

Table 4: Attitude related questions and their responses

Attitude Related Questions	Responses (%)
Routine endodontic treatment should be part of prenatal care	Strongly disagree: 14.3% Disagree: 14.9% Neutral: 34.1% Agree: 15.5% Strongly agree: 21.2%
Pregnant patients are more likely to seek dental care if their physicians recommend it.	Strongly disagree: 9.5% Disagree: 15.3% Neutral: 33.1% Agree: 19% Strongly agree: 23%
Physicians are better able than dentists to counsel pregnant patients about oral health	Strongly disagree: 25% Disagree: 15.1% Neutral: 33.9% Agree: 13.7% Strongly agree: 12.3%
My practice is too busy to add counseling for pregnant patients.	Strongly disagree: 12.3% Disagree: 15.5% Neutral: 35.3% Agree: 15.5% Strongly agree: 21.4%
I have the skills to counsel pregnant patients.	Strongly disagree: 7.1% Disagree: 13.7% Neutral: 33.3% Agree: 20% Strongly agree: 25.8%
It is important to counsel pregnant patients about how decay can affect the baby.	Strongly disagree: 10.5% Disagree: 10.5% Neutral: 31.7% Agree: 18.3% Strongly agree: 29%
I am interested in getting information about continuing dental education on treating pregnant patients.	Strongly disagree: 13.9% Disagree: 11.1% Neutral: 29.2% Agree: 17.5% Strongly agree: 28.4%

Table 5: Comparison of knowledge on the basis of gender

Knowledge Related Questions	Males	Females	p-value
It is important to provide appropriate endodontic treatment for dental pain and infection with pregnant patients.	No Statistically Significant Association		.796
The pregnant patient should be positioned in a special way.	No Statistically Significant Association		.275
It is safe to use irrigation agents (e.g., sodium hypochlorite) during RCT for pregnant patients.	No Statistically Significant Association		.826
It is safe to use obturation material (gutta-percha) during RCT for pregnant patients.	No Statistically Significant Association		.411
It is safe to use root sealer during RCT for pregnant patients	No Statistically Significant Association		.465
It is safe to use inter-appointment medicaments during RCT for pregnant patients	No Statistically Significant Association		.499
A single periapical radiograph	No Statistically Significant Association		.105
Full-mouth radiograph	No Statistically Significant Association		.143
Endodontic treatment	Safe in first or later trimester: 58% 1st trimester: 9% 2nd trimester: 19% 3rd trimester: 7% Contraindicated or	Safe in first or later trimester: 39% 1st trimester: 9% 2nd trimester: 40% 3rd trimester: 7% Contraindicated or	.000

	uncertain: 7%	uncertain: 6%	
Administer local anesthesia with epinephrine	Safe in first or later trimester: 43% 1st trimester: 8% 2nd trimester: 24% 3rd trimester: 5% Contraindicated or uncertain: 21%	Safe in first or later trimester: 23% 1st trimester: 11% 2nd trimester: 40% 3rd trimester: 3% Contraindicated or uncertain: 23%	.000
Administer local anesthesia without epinephrine	Safe in first or later trimester: 48% 1st trimester: 8% 2nd trimester: 22% 3rd trimester: 4% Contraindicated or uncertain: 17%	Safe in first or later trimester: 43% 1st trimester: 9% 2nd trimester: 33% 3rd trimester: 5% Contraindicated or uncertain: 10%	.043
Access opening to relieve pain	Safe in first or later trimester: 66% 1st trimester: 7% 2nd trimester: 19% 3rd trimester: 3% Contraindicated or uncertain: 6%	Safe in first or later trimester: 50% 1st trimester: 7% 2nd trimester: 32% 3rd trimester: 5% Contraindicated or uncertain: 5%	.006
Make incision to drain abscess	Safe in first or later trimester: 57% 1st trimester: 8% 2nd trimester: 22% 3rd trimester: 4% Contraindicated or uncertain: 9%	Safe in first or later trimester: 38% 1st trimester: 7% 2nd trimester: 38% 3rd trimester: 4% Contraindicated or uncertain: 13%	.001
Prescribe acetaminophen, such as paracetamol	No Statistically Significant Association		.565
Prescribe NSAIDS such as ibuprofen	No Statistically Significant Association		.087
Prescribe antibiotics such as amoxicillin or clindamycin	Safe in first or later trimester: 19% 1st trimester: 10% 2nd trimester: 40% 3rd trimester: 5% Contraindicated or uncertain: 27%	Safe in first or later trimester: 16% 1st trimester: 5% 2nd trimester: 30% 3rd trimester: 5% Contraindicated or uncertain: 44%	.005

Table 6: Comparison of practice on the basis of gender

Practice Related Questions	**Males**	**Females**	**p-value**
Single periapical radiograph	No Statistically Significant Association		.059
Full-mouth radiograph	No Statistically Significant Association		.349
Endodontic treatment	No Statistically Significant Association		.065
Administer local anesthesia with epinephrine	Often: 37% Sometimes: 28% Never: 25% Not certain: 11%	Often: 26% Sometimes: 44% Never: 23% Not certain: 7%	.005
Administer local anesthesia without epinephrine	No Statistically Significant Association		.465
Access opening to relieve pain	Often: 60% Sometimes: 25% Never: 10% Not certain: 6%	Often: 52% Sometimes: 30% Never: 6% Not certain: 13%	.019
Make incision and drain abscess	No Statistically Significant Association		.051
Prescribe acetaminophen such as paracetamol	No Statistically Significant Association		.803
Prescribe NSAIDS such as ibuprofen	No Statistically Significant Association		.052
Prescribe antibiotics such as amoxicillin or clindamycin	No Statistically Significant Association		.432

Table 7: Comparison of attitude on the basis of gender

Attitude Related Questions	Males	Females	p-value
Routine endodontic treatment should be part of prenatal care	Strongly disagree: 14% Disagree: 14% Neutral: 32% Agree: 15% Strongly agree: 26%	Strongly disagree: 15% Disagree: 17% Neutral: 40% Agree: 16% Strongly agree: 11%	.006
Pregnant patients are more likely to seek dental care if their physicians recommend it.	Strongly disagree: 10% Disagree: 16% Neutral: 30% Agree: 16% Strongly agree: 28%	Strongly disagree: 8% Disagree: 13% Neutral: 42% Agree: 27% Strongly agree: 11%	.000
Physicians are better able than dentists to counsel pregnant patients about oral health	Strongly disagree: 28% Disagree: 16% Neutral: 30% Agree: 13% Strongly agree: 12%	Strongly disagree: 17% Disagree: 13% Neutral: 42% Agree: 15% Strongly agree: 13%	.023
My practice is too busy to add counseling for pregnant patients.	Strongly disagree: 13% Disagree: 15% Neutral: 31% Agree: 14% Strongly agree: 27%	Strongly disagree: 11% Disagree: 16% Neutral: 45% Agree: 19% Strongly agree: 9%	.000
I have the skills to counsel pregnant patients.	Strongly disagree: 8% Disagree: 14% Neutral: 29% Agree: 19% Strongly agree: 29%	Strongly disagree: 4% Disagree: 13% Neutral: 44% Agree: 21% Strongly agree: 17%	.004
It is important to counsel pregnant patients about how decay can affect the baby.	Strongly disagree: 11% Disagree: 12% Neutral: 27% Agree: 16% Strongly agree: 33%	Strongly disagree: 9% Disagree: 7% Neutral: 42% Agree: 23% Strongly agree: 19%	.001
I am interested in getting information about continuing dental education on treating pregnant patients.	Strongly disagree: 15% Disagree: 12% Neutral: 25% Agree: 17% Strongly agree: 31%	Strongly disagree: 10% Disagree: 9% Neutral: 40% Agree: 18% Strongly agree: 23%	.006

Table 8: Correlation of qualification with practice of study participants

Practice Related Questions	Correlation	p-value
Single periapical radiograph	Spearman Correlation: .108	.016
Full-mouth radiograph	Spearman Correlation: .049	.277
Endodontic treatment	Spearman Correlation: .098	.028
Administer local anesthesia with epinephrine	Spearman Correlation: -.083	.064
Administer local anesthesia without epinephrine	Spearman Correlation: -.006	.897
Access opening to relieve pain	Spearman Correlation: .173	.000
Make incision and drain abscess	Spearman Correlation: .118	.008
Prescribe acetaminophen such as paracetamol	Spearman Correlation: .147	.001
Prescribe NSAIDS such as ibuprofen	Pearson's R: -.073	.102
Prescribe antibiotics such as amoxicillin or clindamycin	Pearson's R: -.052	.245

DISCUSSION

This study was conducted to assess the knowledge, attitude, and practice of dental practitioners regarding the endodontic treatment among pregnant patients. A study conducted in Bengaluru, India by Radha & Sood (2013) reported that 61% participants believed full mouth radiograph should never be taken when treating a pregnant patient, 56% revealed that endodontic treatment should only be done during the 2nd trimester, 51% believed access opening procedure can be done during 2nd trimester, and 35% never used NSAIDS for pregnant patients. When compared these findings with our study, it was observed that 20% participants were not in the favour of taking full-mouth radiograph, which is lower than the above-mentioned study. 24.8% dentists revealed that endodontic

treatment is safe during 2nd trimester, which is again lower than the compared study. Only 22.6% believed that access opening to relieve pain could be done during 2nd trimester, which is lower than the Indian study. Finally, 46% of our subjects reported that they never used NSAIDS among pregnant patients, which was higher than the compared study.

It can be noted from the findings that overall level of knowledge of participants seem to be on the lower side and there is a diversity in participants' responses. Their knowledge was also depicted in their clinical practice as scattered responses were observed among the dentists. When inquired about certain other endodontic procedures, 51.2% felt that drainage of abscess was safe during pregnancy, 40.7% felt that prescribing acetaminophen is safe, 18.1% believed that prescribing antibiotics is safe and 45.9% were interested in getting information about treating pregnant patients. When compared our findings with a similar study conducted in Jeddah, Saudi Arabia, it was observed that he following procedures were considered safe during pregnancy such as drainage of abscesses (76.89%), prescribing acetaminophen (75.56%), and prescribing antibiotics (61.11%). Moreover, the majority (70.9%) were interested in more education about pregnant patients (Aboalshamat *et al*., 2020). There is a clear difference between the findings of both studies as the knowledge among our participants seem to be low.

Another study assessed the knowledge and practice of dental practitioners regarding the endodontic treatment of pregnant patients. It was noted that 50.7% females preferred using amoxicillin, 41.8% males preferred paracetamol and 65.7% females used Ibuprofen. 61% males believed that full mouth x-rays were contraindicated among pregnant patients and 46.5% females believed that local anesthesia is not safe to be used (Swapna *et al*., 2019). When compared these findings in our study on the basis of gender, 16% females were found to be in the favour of using amoxicillin during any trimester, 38.8% males used paracetamol in all trimesters, 61% females thought Ibuprofen was contraindicated, only 17.7% males believed taking radiographs was contraindicated and 23.4% females reported that local anesthesia is contraindicated.

Another similar study conducted in Nigeria reported that 82% of their participants agreed that pregnant patients need to be seated in a special way, 91.8% believed that root canal treatment is safe during pregnancy, 42.6% were uncertain regarding the use of irrigants during pregnancy and 80.3% were confident in using root canal sealers when treating pregnant patients (Ibhawoh & Enabulele, 2015). When compared these findings with our study, it was noted that 84.9% believed that pregnant patient should be positioned in a special way, 73.2% reported irrigation agents to be safely used, which is extremely high as compared to the Nigerian study. 80% were confident in using sealers, which is similar to the compared study.

CONCLUSIONS

- Overall knowledge of dental practitioners regarding the endodontic therapy of pregnant patients is not satisfactory.
- This was also reflected in their attitude and practice as uncertainty and varying responses were retrieved generally.
- Females exhibited significantly better levels of knowledge, practice and attitude as compared to males.
- Overall there was a positive correlation found between the participants' qualification and their practice.
- There is a need of improving the knowledge, attitude and practice of young dentists when it comes to the endodontic treatment of pregnant patients.

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