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KNOWLEDGE, ATTITUDES, AND PRACTICES REGARDING ENDODONTIC TREATMENT DURING PREGNANCY AMONG INTERNS AND RESIDENT DENTISTS IN INDIA

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Abstract
Introduction: Physiological changes and concerns for the health of the mother and fetus during pregnancy necessitate a complex approach to dental care. This study aims to evaluate the knowledge, attitudes, and practices of dental interns and postgraduate dental residents in India concerning endodontic treatment during pregnancy.
Materials and Methods: A cross-sectional study was conducted in India with 1289 resident dentists who treated pregnant patients in government and commercial dental clinics who filled out validated self-administered questionnaires. Participants' knowledge, opinions, and practical methods for managing pregnant patients and behavioural counselling were evaluated by a questionnaire. Following the computation of descriptive statistics, a significance level of 0.05 was applied.
Results: More than 80% of respondents agreed that addressing dental discomfort and infections is crucial in pregnant patients. With a preference for the second trimester (55.3%), 90.7% of respondents thought endodontic therapy was safe to receive while pregnant. Specialists' opinions on the safety of particular medications differed. Fetal safety concerns were voiced by 12.9% of respondents, with differences observed between specializations and genders. Of those who could perform root canal therapy on pregnant patients, 90.7% were willing.
Conclusion: There are substantial knowledge gaps even when dental residents demonstrate awareness of the dangers connected to endodontic therapy during pregnancy. To raise the bar for treatment, postgraduate training specifically designed to manage pregnant patients and updated protocols for procedures unique to each trimester is advised.
Keyword: Pregnancy, Radiography, Root Canal Therapy, Local Anaesthetics, Questionnaire.

INTRODUCTION

Pregnancy does not imply medical compromise, necessitating a nuanced approach to dental treatment. Special considerations are required, including adjustments in treatment timing, types, and prescribed drugs, with comprehensive risk assessments to safeguard both maternal and fetal well-being.[1,2]

Oral health during pregnancy is especially important because physiological changes increase susceptibility to oral infections.[3] Elevated carbohydrate consumption, increased mouth acidity from vomiting, reduced saliva production, and heightened acidity raise the risk of dental caries.[4] While pregnant people are not immunocompromised, immune system suppression highlights the importance of treating odontogenic infections as soon as possible to avoid complications.[3]

Endodontic therapy, including diseased pulp removal, becomes a viable option during pregnancy. Radiographic methods for the oral cavity, along with preventative measures, result in low exposure. Properly given local anaesthetics with vasoconstrictors are considered relatively safe, easing worries and emphasizing their safety for healthy pregnant women.[5]

This study emphasizes the need for endodontic therapies during pregnancy, focusing on disease prevention and dental health preservation. The second trimester is judged appropriate for balancing organogenesis completion with patient comfort. Extensive elective operations are prudently postponed until postpartum.[6]

Dentists have concerns about the safety of dental procedures during pregnancy, as well as the need to treat odontogenic infections. Given the physiological changes, it is critical to

assess potential hazards when giving endodontic therapy during pregnancy. Dentists are wary of treating pregnant women due to misconceptions caused by a lack of information. Therefore, this study aims to assess dentists' perspectives of endodontic treatment during pregnancy, acknowledging the importance of understanding and mitigating concerns in providing appropriate care to pregnant populations.

MATERIALS AND METHODS

Development and standardisation of the questionnaire

Stage 1: Building the Questionnaire

An expert panel of individuals with knowledge in endodontics, obstetrics, and survey design were assembled to create a comprehensive questionnaire. The questionnaire comprised of 20 items, was constructed in English based on relevant literature and previous dental surveys. The panel discussed important issues of endodontic therapy during pregnancy, including demographics, variables influencing attitudes, and views about safety. The questionnaire contained various closed-ended questions, multiple-choice, checkbox questions, and Likert scales.

The questionnaire was divided into four parts.

1- Respondents' demography
2- Considerations while rendering endodontic treatment to pregnant patients
3- Knowledge of the drugs/agents used in endodontic therapy for pregnant individuals
4- Attitude towards providing dental care and support to pregnant patients

To increase response rates and facilitate quantitative analysis, questions were deliberately constructed. The questionnaire's expected completion time was less than 10 minutes. Furthermore, deliberately including scientifically unjustified solutions meant that replies were driven by rational reasoning rather than random choice.

Stage 2: Adaptation of the Questionnaire

The questionnaire was translated into Hindi and checked for linguistic accuracy. Bilingual doctors who were conversant with endodontic terminology provided forward translation into Hindi. Independent translators then back-translated the translated versions into English to guarantee that the original questionnaire was not altered. The expert group analyzed the discrepancies and made necessary adjustments.

Stage 3: Pilot Test and Semantic Adjustment of the Questionnaire

To validate the questionnaire, a pilot test was done in India with dentists who spoke Hindi and English. A total of 20 dentists from each language group were recruited to complete the questionnaire via the online Google Form platform. Dentists were requested to fill out the questionnaire, and reliability was determined by re-administering it to the same individuals 7 days later, without feedback.

Study Setting and Population

The poll was directed at dentists working in private and public hospitals and clinics throughout India, including general and specialist dentists. The questionnaire was tested in both Hindi and English to ensure inclusion.

Ethical Perspectives

Participation in the trial was optional, and the dentists provided informed consent. No personally identifiable information was gathered, and individual responses were not the emphasis. The study followed ethical requirements, and permission from the local ethics commission was not required.

Data Management and Statistical Analysis

The acquired data was analyzed using IBM Statistical Package for Social Science (SPSS) version 21.0 for Windows, which was created by IBM Corp in Armonk, NY. The results were presented using tables and cross-tabulations. Statistical significance was determined using nonparametric analysis, especially the Chi-square test, with a significance level of $P < 0.05$.

RESULTS

Of 2500 forms sent via email and social media platforms along with 2 reminders sent after 14 days and after a month, 1307 agreed to participate in the study (response rate 52.3%). Participants who completed the survey were 1289, out of which 953 (73.9%) were below the age of 35, and there was a prevailing female dominance with 69.5%. The majority (64.7%) were junior residents, with 33.8% specializing in Conservative Dentistry and Endodontics (Table 1).

A sizable proportion (87.6%) recognized the necessity of properly treating tooth pain and infection during pregnancy. During the dental procedure, 80% were aware of the necessity for a particular position of pregnant patients though only few could describe the correct position. (Table 2).

When it came to the safety of endodontic treatment during pregnancy, 90.7% thought it was safe, and this opinion was shared by people from all specialities and professions (Table 2). However, when selecting the best time for endodontic treatment during pregnancy, 55.3% advocated the second trimester, while 20.3% stated that any time throughout pregnancy was safe if treatment was required.

When asked about drugs used in endodontic treatment, 75.6% of respondents believed that local anaesthetic with epinephrine was safe during pregnancy. Interestingly, all female respondents were confident in its safety. The perceived safety of local anaesthetic with epinephrine differed by speciality, with oral medicine and orthodontics reporting assurance whereas the majority of oral pathology respondents were unsure (Table 3).

Regarding the safety of irrigants during root canal treatment, 12.9% thought there was a risk to the fetus, while 43.1% were unsure. This perception differed considerably by speciality and gender with most oral and maxillofacial surgery residents voicing worries. Approximately 56.7% of respondents agreed to reveal dental X-rays during root canal treatment in pregnancy, and this preference was significant among oral and maxillofacial surgery residents. Similarly, 80.6% of respondents agreed to utilize interappointment medications during root canal treatment. The majority (81.2%) showed a willingness to employ root sealers during pregnancy, with this attitude differing considerably by specialization. Respondents from prosthodontics, pedodontics, and orthodontics were more positive. When asked about the potential negative consequences of root canal obturation points on the fetus, only 1.3% indicated concern. The study also found that a sizable proportion of responders (90.7%) consented to perform root canal therapy on pregnant women. (Table 2, 3)

Various perspectives were observed among participants concerning endodontic treatment for pregnant patients, and the responses are detailed in Table 4.

Table 1: Demographic characteristics of the respondents

Characteristics	Frequency (%)
Age (years)	
≤35	73.9 (953)
≥35	26.1 (336)
Gender	
Male	30.5 (393)
Female	69.5 (896)
Status	
Junior resident	64.7 (834)
Senior resident	35.3 (455)
Specialty	
Conservative Dentistry and Endodontics	33.8 (436)
Prosthodontics	8.6 (111)
Community Dentistry	6.1 (79)
Oral and maxillofacial surgery	13.8 (178)
Oral Pathology	3.5 (45)
Oral medicine	3.6 (47)
Orthodontics	11.9 (154)
Pedodontics	8.2 (106)
Periodontology	10.3 (133)

Table 2: Responses concerning dental care Practice for pregnant women

Question	Response		
	Yes%	No%	Don't know %
Is it necessary to handle dental pain and infection effectively during pregnancy?	87.6	11.2	1.2
Is it necessary for the pregnant patient to be positioned in a specific manner?	80	13.7	6.3
Is it safe to have endodontic treatment during pregnancy?	90.7	8.1	1.2

Table 3: Responses regarding Knowledge of the drugs used in endodontic therapy.

Question	Response		
	Yes %	No %	Don't know %
Is it safe to use a local anaesthetic containing adrenaline during pregnancy?	75.6	23	1.4
Is it safe to use irrigation agents (e.g., sodium hypochlorite) during RCT on pregnant patients?	44	12.9	43.1
Is it safe to use obturation material (gutta-percha) during RCT on pregnant patients?	84.3	1.3	14.4
Is it safe to use root sealer during RCT on pregnant patients?	81.2	7.6	11.2
Would you take x-rays for a pregnant patient undergoing root canal therapy?	56.7	28.4	14.9
Do you plan to use inter-appointment medications for a root canal procedure while pregnant?	80.6	12.3	7.1

Table 4: Responses regarding the attitude of dental surgeons while treating pregnant patients.

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
Routine endodontic therapy should be included in prenatal care.	134 (10.4%)	236 (18.3%)	324 (25.1%)	358 (27.8%)	237 (18.4%)
Pregnant individuals are more likely to seek dental care if their physician suggests it.	59 (4.6%)	123 (9.5%)	238 (18.5%)	615 (47.7%)	254 (19.7%)
Pregnant patients benefit more from oral health advice from their physicians rather than dentists.	333 (25.8%)	378 (29.3%)	229 (17.8%)	247 (19.2%)	102 (7.9%)
It's crucial to educate pregnant patients about the potential impact of tooth decay on the baby.	362 (28.1%)	437 (33.9%)	240 (18.6%)	222 (17.2%)	28 (2.2%)
My practice is too busy to offer counselling for pregnant patients.	62 (4.8%)	93 (7.2%)	280 (21.7%)	544 (42.2%)	311 (24.1%)
I want to learn more about continuing dental education for serving pregnant patients.	(3.7%)	(5.8%)	(19.8%)	(36.5%)	(34.2%)

Discussion

When treating expectant patients, it is important to comprehend the physiological changes associated with pregnancy as well as the effects of dental procedures, including radiography and drug use, on both the developing fetus and the pregnant patient.[7]

The results of this study support the importance of prompt and appropriate dental pain and infection treatment during pregnancy, which has been highlighted. There is general agreement that in order to avoid the improper lengthy use of painkillers, endodontic treatment when determined to be essential, should not be delayed until after childbirth.[5] However, considering the possibility of hypotensive syndrome and the accompanying loss of consciousness, it is imperative to make sure pregnant patients are positioned correctly during dental treatments. Although most participants in this study agreed that proper placement was necessary, very few were aware of what the ideal position was. This reveals a lack of knowledge among residents who are presently enrolled in specialty programs, despite the expectation that they stay up to date with industry developments.

Dental care, including endodontic treatment, has been certified safe during pregnancy. On the other hand, it is recommended to postpone elective procedures until the end of the pregnancy, with a focus on just treating emergencies or, if practical, waiting until the second trimester.[7] Studies have shown that, in line with our findings, a sizable portion of dental trainees and practitioners would rather treat pregnant patients with root canals in the second trimester.[8-11] While urgent dental procedures are advised during the second trimester, elective dental procedures should be postponed until the end of the pregnancy, according to recommendations.[7] Limited limitations on the timing of endodontic treatments are provided by the literature and recommendations now in use; individual operations are not expressly linked to specific trimesters. For example, the usage of acetaminophen during the third trimester has been questioned.[12] Trimester-specific requirements are generally absent from recommendations for safe endodontic operations.[13-16] The findings of the study suggest that dental residents have some knowledge regarding when it is appropriate for pregnant patients to have dental care. However, the observed consciousness level is considered insufficient.

Research has not shown any unfavourable outcomes associated with endodontic therapy. It is thought to be safe to give pregnant patients local anaesthetics with vasoconstrictors during dental treatments.[17,18] However, even in the first trimester, pregnant patients or fetuses are not deemed contraindicated for the use of lidocaine and prilocaine, with or without epinephrine, according to the US Food and Drug Administration (FDA) and the American Academy of Pediatrics (AAP).[19] Conversely, when used at the highest daily dosage, some other local anaesthetics, like mepivacaine and bupivacaine, have been reported to have embryocidal effects in rabbits.[15,17]

Given that local anaesthetics are required for the majority of dental treatments, dental residents seem to be knowledgeable about this topic. The specialty of oral medicine focuses on the nonsurgical treatment of oral disorders where appropriate, which includes the use of pharmaceuticals to treat dental conditions. Therefore, it should come as no surprise that every oral medicine resident is conversant with the safe administration of epinephrine-containing local anaesthetics to expectant mothers.

There is a lack of evidence on the safety of endodontic irrigants when used in root canal therapy during pregnancy, leading to differing views. Research on the possible side effects of endodontic irrigants during pregnancy must begin immediately. Based on our research, more than eighty percent of dental residents knew that obturation materials, root sealers, and between-appointment drugs are safe to use when treating pregnant patients with root canal therapy. It is important to remember that, even while these drugs are thought to remain contained within the root and seem harmless[8], no thorough research has looked into their possible long-term effects on the developing foetus. When utilized properly, these compounds haven't been known to specifically endanger the mother or fetus, according to current knowledge.[8,20]

During root canal therapy, 80.6% of respondents agreed with the use of interappointment medicines. Acetaminophen, also known as paracetamol, stands out as the safest painkiller for pregnant patients, according to several epidemiological research.[21,22] Its usage during breastfeeding is supported by the American Academy of Pediatrics (AAP)[23], and some evidence even suggests that it is safe to use during the first trimester.[24] Nevertheless, contradictory research points to a possible connection between extended acetaminophen use and behavioural problems in utero, such as Attention Deficit Hyperactivity Disorder (ADHD).[25,26] Acetaminophen has also been linked in another study to a lower frequency of hematopoietic stem cells.[12] Additionally, the FDA advises against using nonsteroidal anti-inflammatory medicines (NSAIDs)[27,28], citing possible side effects like constriction of the ductus arteriosus and interference with embryonic implantation. Positively, common antibiotics like amoxicillin, clindamycin, metronidazole, and penicillin are deemed safe for use in pregnant patients by the FDA.[23]

Even though a lot of work has gone into evaluating the safety of dental X-rays during pregnancy, a sizable percentage of dental residents in this study were unsure about using X-rays when treating pregnant patients for root canals. There is an urgent need to promote precautionary measures and pay more attention to how safe dental X-rays are. These precautions include the use of contemporary imaging devices that have high-speed films, collimation, filtration, lead aprons, thyroid lead collars, and low-dose, high-yield radiodiagnosis capabilities.

The study's female residents showed a deeper comprehension of the application of endodontic irrigants, interappointment medications, and local anaesthetics. The increased consciousness among female residents may be ascribed to their broader curiosity or apprehension about the usage of medications while pregnant. Additionally, the particular training focus seems to boost confidence when treating expectant patients. Since endodontics is a subspecialty of restorative dentistry, endodontic residents were more confident, as seen by their eagerness to treat pregnant women with endodontic care.

Findings from a previous study on the attitude of dentists during dental procedures during pregnancy were similar to what was found, with participants demonstrating the application of suitable practices across all items when they possessed particular and informed information.[10] A prior study carried out in India[10] likewise found that most of our participants had good attitudes toward advising pregnant patients and indicated confidence in their ability to do so. Furthermore, seventy-nine per cent of our participants indicated that they would like additional training and information to improve their ability to care for pregnant patients. This is consistent with other research findings, which point to a growing interest in adding continuing education courses on this topic for Saudi Arabia's dentists and dental interns.[9,10,29]

The answers to the questions posed were independent of the respondents' hierarchical standing. This suggests that dental

trainees' opinions toward treating pregnant patients with endodontic therapy were unaffected by elements including increased clinical exposure, experience, and knowledge.
It is important to remember, nonetheless, that the convenience sample used in this study limited the study's potential to be applied to the total Indian population. The study also included a self-report questionnaire. In order to improve the validity of subsequent research, dental students should be categorized according to their academic standing, and materials from the educational system should be used to track students starting at the undergraduate level. Moreover, continuing education resources for graduates that are especially created to increase their self-assurance and understanding of managing pregnant patients is advisable. It would also be beneficial to create revised recommendations for the care of pregnant patients that take a trimester-specific approach to procedures.

CONCLUSION

The study's findings show that dental residents are aware of the risks associated with endodontic therapy for expectant patients. However, there are still obvious information gaps about how pregnant women should be positioned during treatment procedures, when to start treatment, if using irrigants is safe, and how much radiation is safe during pregnancy. Postgraduate education must include pregnancy-specific information to boost confidence and provide better endodontic care for expectant patients.

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