

Knowledge, Attitude and Practice of Dental Practitioners regarding dental radiographs in pregnant women

Fathima Hinaz, Arthi Balasubramaniam

1 Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical Sciences (SIMATS),
Saveetha University,
Chennai - 600077
Email ID: 152001081.sdc@saveetha.com

2 Senior Lecturer,
Department of Public Health Dentistry,
Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical Sciences (SIMATS),
Saveetha University,
Chennai- 600077
Email ID: arthib.sdc@saveetha.com

Abstract

Introduction: The possibility of an x-ray during pregnancy causing harm to your unborn child is inevitable, the dental practitioners need to have enough knowledge, practice and attitude to deal and guide a pregnant woman during her pregnancy about dental radiographs.

Materials and Methods: A cross-sectional study was conducted among 73 dental practitioners. A Self structured, pre-validated questionnaire was distributed among the subjects. Statistical analysis was performed in SPSS software version- 23. Descriptive statistics was performed to present the responses of the study subjects.

Results: The results showed that about 73.69% of dental practitioners are not aware of the ALARA principle and, given the opinion, 52.05% feel that the first semester is best suitable to take dental radiographs in pregnant women. Among the practitioners 63.01% of them say that the dental radiographs are useful to take in pregnant women. There was no significant difference in the awareness of dental x-rays for pregnant women among male and female participants ($p>0.05$).

CONCLUSION: Dental practitioners have good knowledge, attitude and practice of dental radiographs for pregnant women during treatment. They are not very much aware of the precautions to be taken during dental radiographs in pregnancy. However, the awareness on the precautions to be taken during dental radiographs in pregnancy to be created among dental practitioners.

KEYWORDS: pregnant women, radiographs, dental practitioners, x-ray, side effects, innovative technique, novel method

Introduction

Good oral health is very important amongst pregnant women. Recently there has been an increased awareness of oral health among pregnant women. The dental caries management among pregnant patients has just recently increased the education on dental radiographs among dental practitioners who play a vital role in prenatal care. There are certain key principles and safety measures to be

followed while taking radiographs of pregnant women. These ionizing radiations that are emitted from the radiographs have their own side effects causing various other biological damage to the child and mother (1). Therefore knowledge of dental practices regarding the dental radiographs and pregnant women play a very important role in achieving a healthy prenatal dental routine (2). The ICRP, in 1977 announced that pregnant women must undertake exposures of low doses only (3). ALARA principle which states "As low as reasonably achievable" was made mandatory at times of routine dental procedures. It has been reported that dental practitioners often postpone dental treatments to a period generally after the delivery, because of lack of sufficient knowledge on the low doses involved in dental radiography (4). It has been reported that the fetus does not receive any direct radiation doses during the head and chest radiographs and the absorbed dose was estimated to be less than 0.01mGy (5) All radiographs that lessen the absorbed dose, should be taken only when the radiographs are of utmost need, and should be conducted along with well collimated beams inside protected Shields (6). High kVp procedure is suitable and recommended in such conditions (7). Therefore nowadays obstetricians and gynecologists are advised to perform a routine oral checkup during the first prenatal visit (7,8) and are asked to encourage their patients to visit a dentist during their pregnancy. Our team has extensive knowledge and research experience that has translated into high quality publications (9–28) . The major role or objective is to evaluate the knowledge, attitude and practice of dental practitioners regarding dental radiographs in pregnant women in Chennai city.

Materials and Methods

A cross sectional study was conducted among 73 dental practitioners in February 2021 to evaluate the knowledge, attitude and practices of dental practitioners regarding dental radiographs in pregnant women in the city of Chennai. Prior approval to carry out the study was obtained from the Institutional Research Committee (IRB) of the authors University. A pre-validated and reliable questionnaire containing 10 question items had been distributed to the subjects (Annexure 1). The internal consistency of the questionnaire using cronbach's α was found to be 0.83. The questionnaire was circulated via google forms to mail id of the practitioners obtained from Indian Dental Association, Madras branch. A reminder mail was sent to those practitioners who had not responded. Anonymity and confidentiality was highly maintained by asking no personal questions in the questionnaire. The responses to the questions were recorded with yes or no options and then the data was collected, entered and analysed for knowing the frequencies and percentages using the SPSS software version 23.0.

Results

The present study consisted of 73 dental practitioners out of which (FIGURE 1), 88% of them were unaware of the dental radiographs. Among the practitioners 52% of the dental practitioners do not know the precautions to be taken during a dental radiography procedure in pregnant women. Among the practitioners (FIGURE 2), 63% feel that if needed dental radiographs are useful to take in pregnant women. Among the practitioners (FIGURE 3) 74% of the dental practitioners are not aware of the ALARA principle and its theory of low doses. Among the practitioners (FIGURE 4), 63% of the dental practitioners feel high speed radio films reduce exposure. Among the practitioners (FIGURE 5), 67% of dental practitioners know that the teratogenic x- ray is thousand times less than the spontaneous risk of natural abortion or malformation. Among the practitioners (FIGURE 6), 60% of dental practitioners

think that the X-rays are absolutely contra-indicated for pregnant women. Among the practitioners (FIGURE 7), 53% of them feel that the effects of dental radiographs are reversible on fetuses. Among the practitioners (FIGURE 8), 63% of dental practitioners say that the position of X-Ray radiation cones can affect the foetus. Among the practitioners (FIGURE 9), 52% of them say that the first trimester of pregnancy is not the best period to take dental X-rays in pregnant mothers. It also reveals that the remaining (FIGURE 9), 48% feel that the first trimester is the best suitable period to take dental radiographs in pregnant women which means that those 48% of them are not aware that the second semester is the best period to take a diagnostic radiograph in pregnant women. We can infer once again that 74% of dental practitioners are not aware of the ALARA principle which states "As low as reasonably achievable". Among the practitioners (FIGURE 10) 13.07% of the female participants were aware of the necessary precautions to be taken in a pregnant woman while taking a dental radiographs, comparatively the male participants (34.25%) had a higher response of 'yes' to the precautions to be taken in a pregnant women, when compared to female participants. (FIGURE 11) 15.07% of the female participants and 47.95% of the male participants feel that dental radiographs are useful to take in pregnant women. There was no significant difference in the awareness of dental x-rays for pregnant women among male and female participants ($p>0.05$).

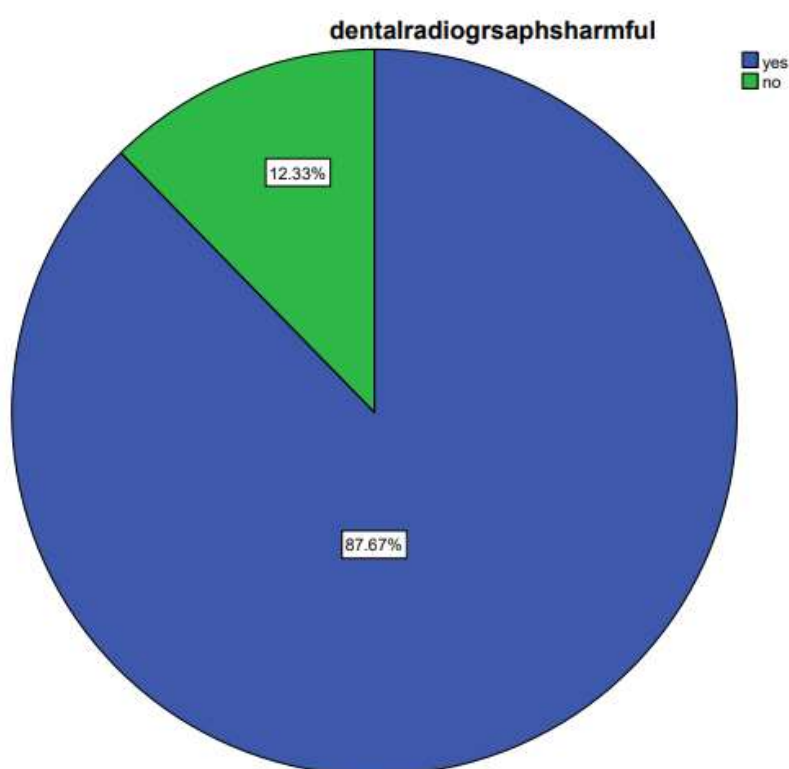


Figure 1: This pie chart depicts the percentage of participants who are aware of dental radiographs. In this figure the blue represents the responses 'yes'(87.67%)and green(12.33%) represents the responses 'no'.

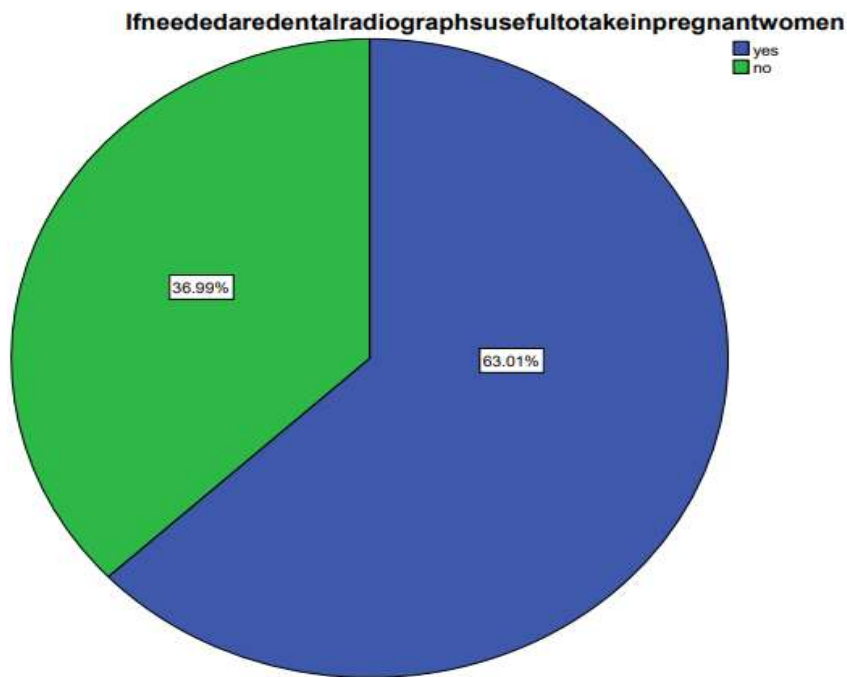


Figure 2: This pie chart depicts the percentage of participants who feel that dental radiographs are useful to take in pregnant women. In this figure the blue represents the responses 'yes'(63.01%) and green represents the responses 'no'(36.99%).

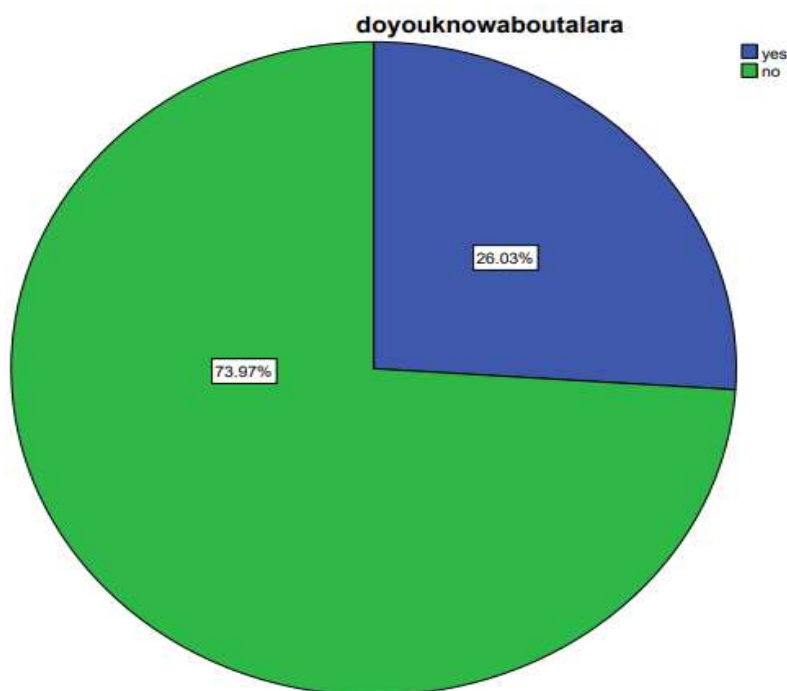


Figure 3: This pie chart depicts the percentage of participants who are aware of the ALARA principle. In this figure the blue represents the responses 'yes'(26.03%) and green represents the responses 'no'(73.97%).

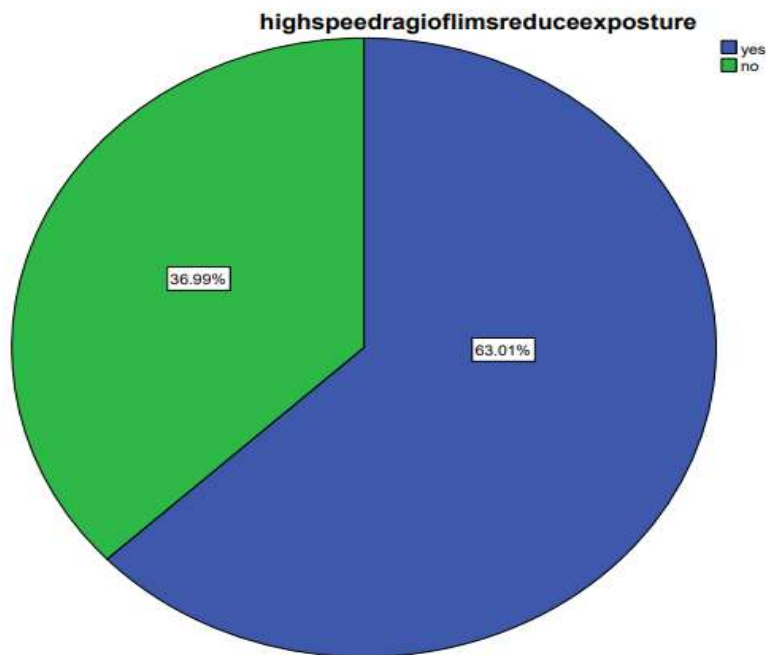


Figure 4: This pie chart depicts the percentage of participants who know that the high speed radio films reduce exposure. In this figure the blue represents the responses 'yes'(63.01%) and green represents the responses 'no'(36.99%)

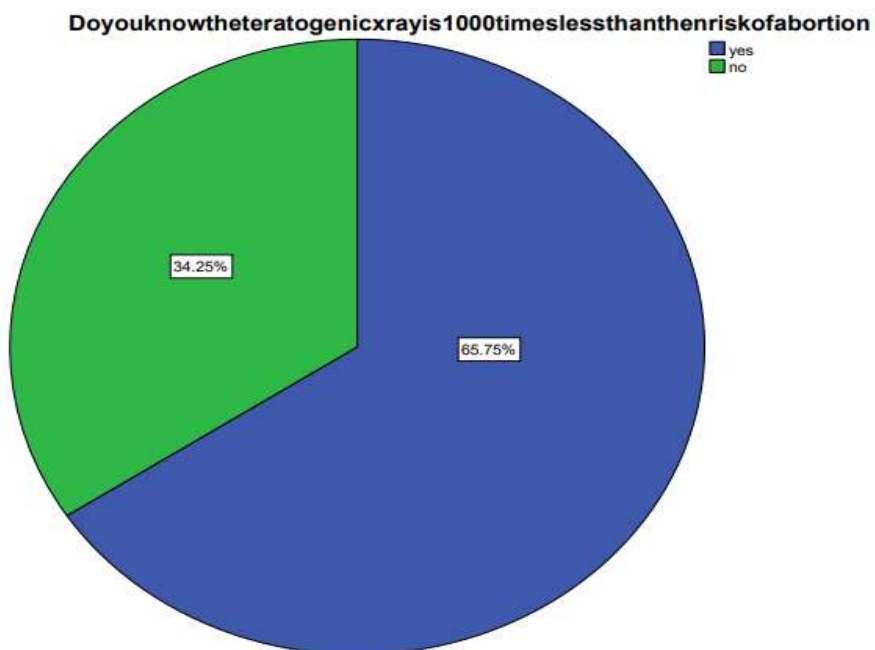


Figure 5: This pie chart depicts the percentage of participants who know that the teratogenic x-rays is 1000 times less riskier than a natural abortion. In this figure the blue represents the responses 'yes'(65.75%) and green represents the responses 'no'(34.25%).

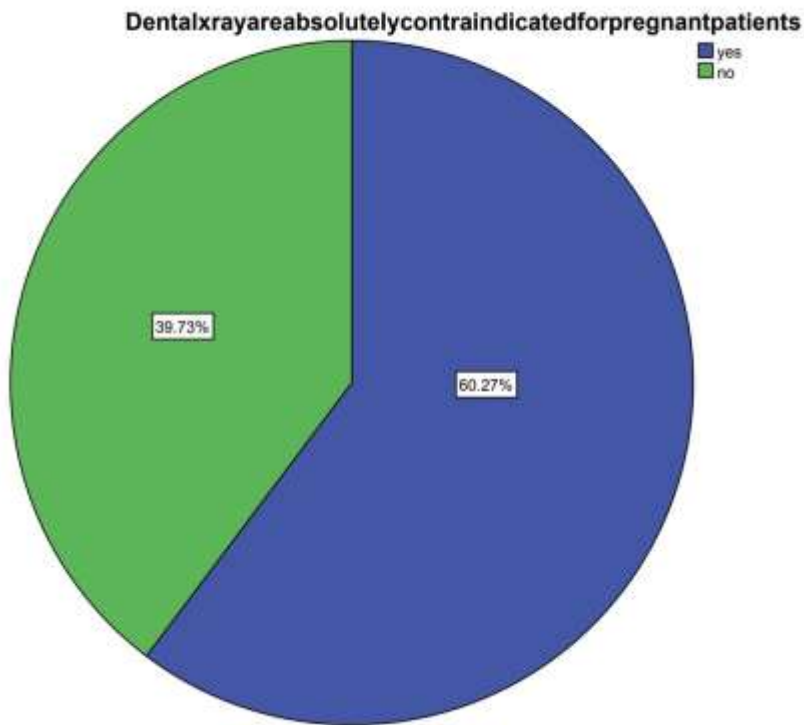


Figure 6: This pie chart depicts the percentage of participants who feel that dental x-rays are absolutely contraindicated for pregnant women. In this figure the blue represents the responses 'yes' (60.27%) and green represents the responses 'no' (39.73%)

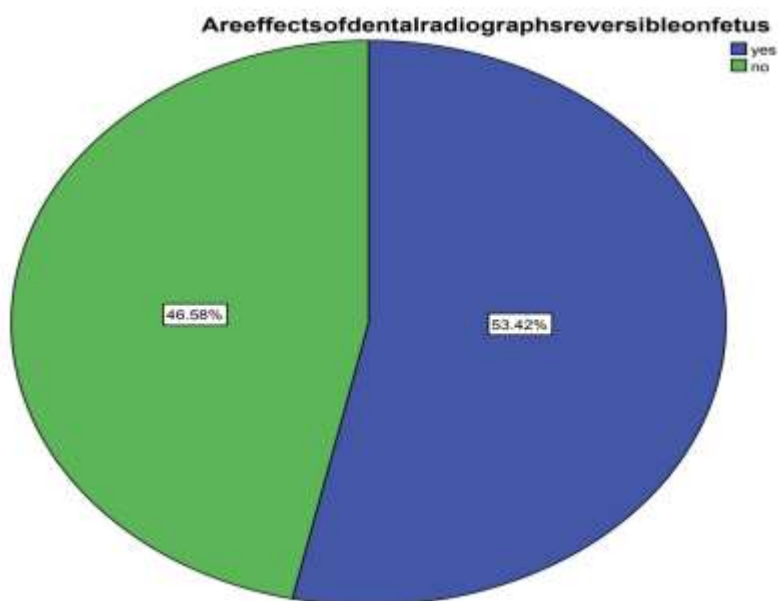


Figure 7: This pie chart depicts the percentage of participants who feel that the effects of dental radiographs are reversible on foetus. In this figure blue represents the responses 'yes'(53.42%) and green represents the responses 'no' (46.58%)

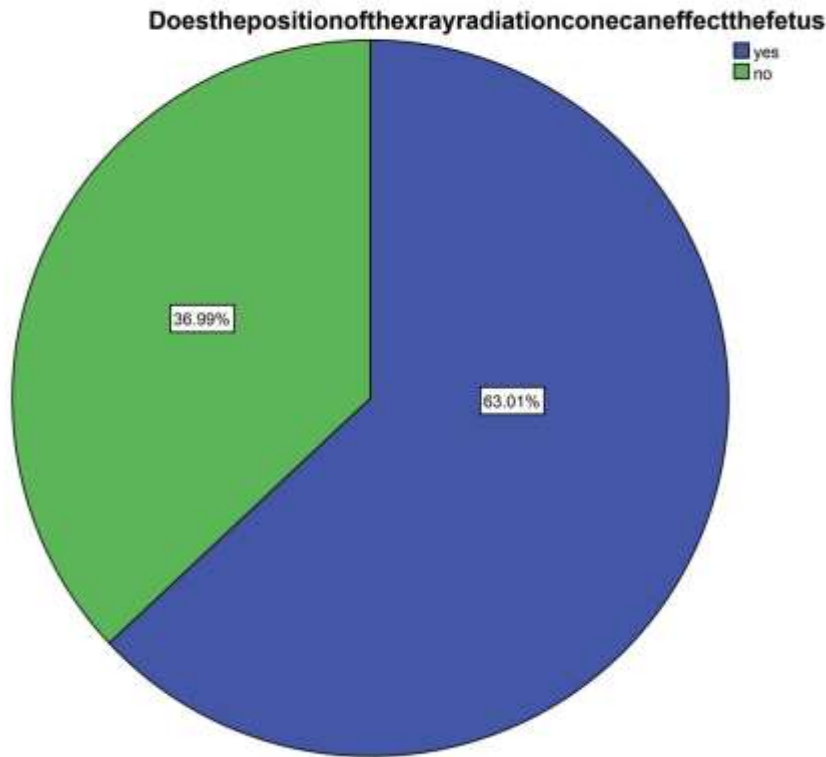


Figure 8: This pie chart depicts the percentage of participants who feel that the effects of dental radiographs are reversible on foetus. In this figure blue represents the responses 'yes'(53.42%) and green represents the responses 'no' (46.58%)

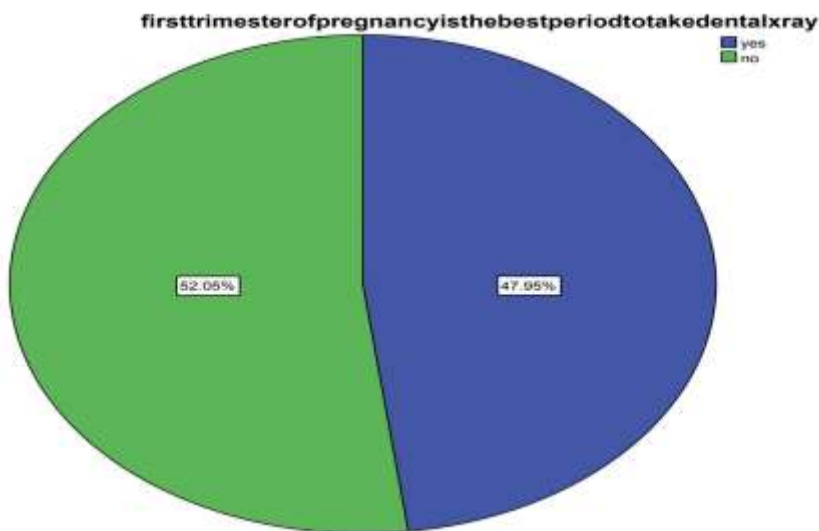


Figure 9: This pie chart depicts the percentage of participants who feel that the first trimester is the best suitable period to take a dental radiograph in pregnant women. In this figure the blue represents the responses 'yes'(47.95%) and green represents the responses 'no'(52.05%)

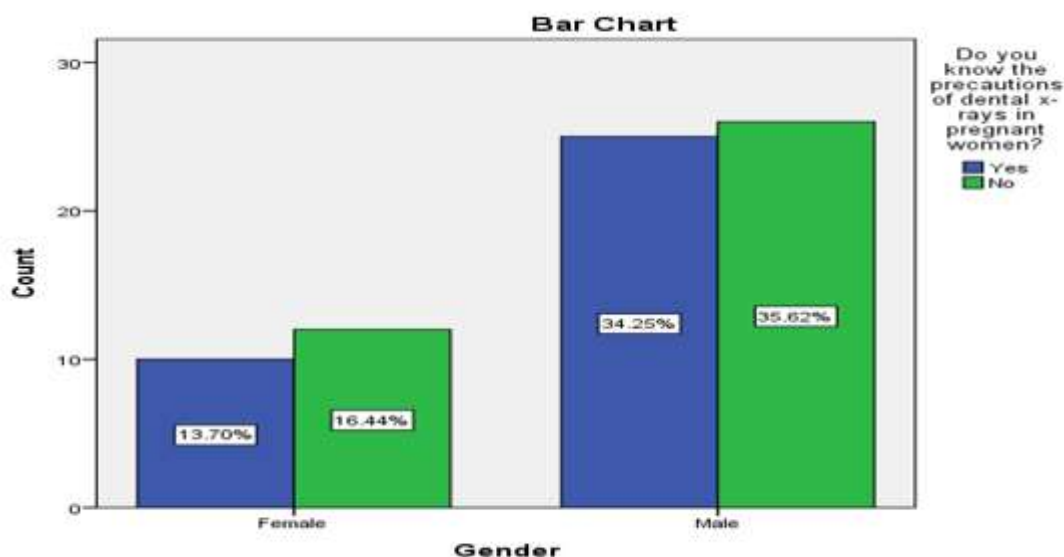


FIGURE:10 This bar graph depicts the association between the two genders and their responses to the necessary precautions that to be taken while taking dental radiographs in pregnant women. The X axis represents the gender of the participants and the Y axis represents their responses, 'yes' or 'no'. Most of the male and female participants were unaware of the precautions of dental x-rays in pregnant women. This difference was not significant (Chi-square; $p = 0.56$ - not significant)

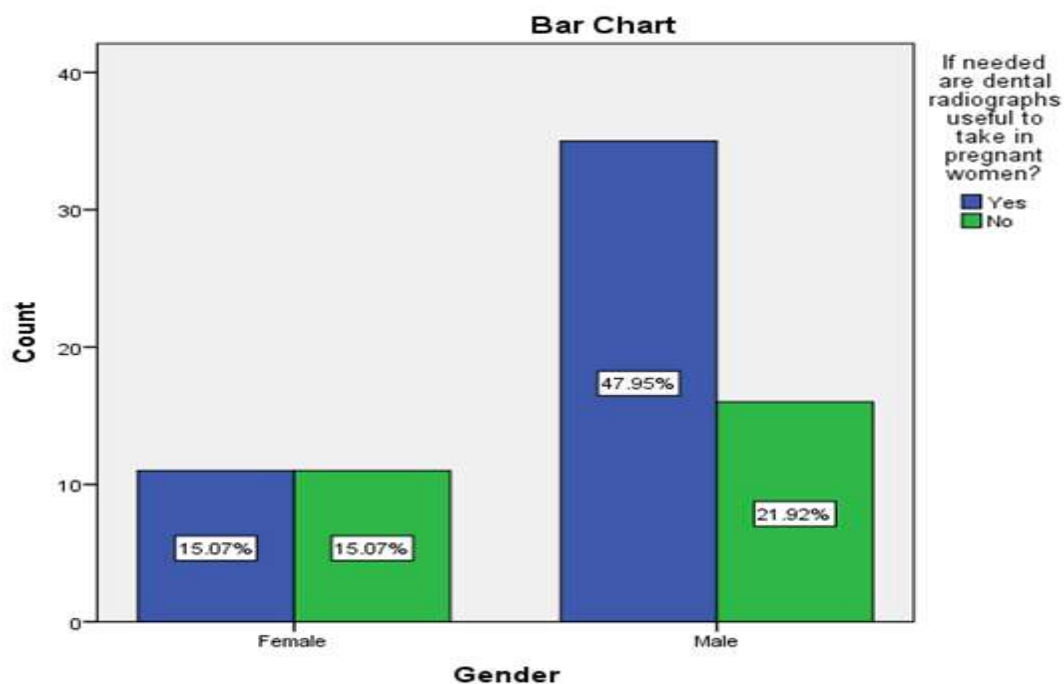


FIGURE:11 This bar graph depicts the association between the two genders and their responses on, if necessary, are dental radiographs useful to take on pregnant women. The X axis represents the gender of the participants and the Y axis represents their responses, 'yes' or 'no'. Most of the female and male participants felt dental x-rays are useful if needed to be taken. The difference was not significant (Chi-square; $p=0.76$ - not significant)

Discussion

This present study is done to assess the knowledge, attitude and practice of dental practitioners towards radiographs in pregnant women. The electromagnetic radiations released in the format of X rays have the chance to ionize the materials through which they pass. On the basis of amount of radiation and the trimester of pregnancy, there are chances for the damaging of the fetal cells, which can further lead to miscarriage and birth defects, therefore the dental radiations exposure of the foetus is inevitable (6,29). It has been reported that the ionizing radiation has biological damaging effects and that it affects the cells directly, by indirectly producing free radicals and damaging the DNA (30). Majority of dental practitioners are not aware of the ALARA principle and the theory of low doses involved in radiographic treatment. This radiation safety principle will limit the exposure by various techniques (31). The objective of professionals in oral health care at times of first trimester is to avoid fetal hypoxia, unnecessary premature labour and various other teratogenic effects (31,32). In a study conducted, 48% of dental practitioners feel that it is safe to take X-rays during the first trimester of pregnancy, while the second semester is the right time to take dental radiographs in pregnant women (33). In a study conducted, it was reported that 16.2 percent of the dental surgeons indicated that all types of radiography can be taken throughout the pregnancy (34) Dental practitioners must be aware of radiographic recommendations in pregnant women to prevent life-threatening events(35). It has been reported that, whenever possible, the radiographs should be delayed until the second trimester, the radiographs that are taken for regular checkups are best suited to take after delivery(36) In a study conducted the dental practitioners agreed that radiographs in pregnant women should always be taken only with proper protection and shield (37). In a study conducted in the city of Karachi the results showed that 47.68% knows that we can take radiographs during pregnancy. While 83.33% show their attitude that they are allowed to take radiographs. 37.68% dentists have performed radiographs in their daily practice, in which 52.7% give the opinion that the 2nd trimester is the safest period in (38) . This study was conducted with a small and Limited sample size only, and could have included practitioners from various other regions and ethnicities for better results and analyses. This survey was conducted only within the South Indian population with Limited sample size. This research can be used for further understanding and knowledge among dental practitioners of South India. And the amount of knowledge they hold towards the awareness of dental radiographs on pregnant women, and the precautions they take when dealing with pregnant women.

Conclusion

Dental practitioners must be aware of the side effects and precautions they need to take with regards to the dental radiographs on pregnant patients in order to prevent unwanted life-threatening events and clinical complications while dental education should include techniques to train and guidelines to follow for the upcoming and budding dentist for excellence practice in their dentistry.

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CONFLICT OF INTEREST

All the authors declare that there was no conflict of interest in the present study.

AUTHORS CONTRIBUTION

Fathima Hinaz: Literature search, data collection, Analysis, Manuscript drafting

Arthi Balasubramaniam: Data verification, Manuscript drafting

REFERENCES

1. Patil SK. Awareness of Dental Treatment Protocol for Pregnant Women and Lactating Mother's in General Dental Practitioners of Davangere District, Karnataka, India [Internet]. JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH. 2013. Available from: <http://dx.doi.org/10.7860/jcdr/2013/6927.3848>
2. Knowledge, Awareness And Practice Of Dental Students Regarding Dental Radiographs On Pregnant Women In Chennai [Internet]. Vol. 12, International Journal of Pharmaceutical Research. 2020. Available from: <http://dx.doi.org/10.31838/ijpr/2020.12.02.335>
3. ICRP. ICRP Publication 60: 1990 Recommendations of the International Commission on Radiological Protection. SAGE Publications Limited; 1991. 202 p.
4. R P, Pramod R. Specialized Radiographs in Dental Radiology [Internet]. Textbook of Dental Radiology. 2011. p. 141–141. Available from: http://dx.doi.org/10.5005/jp/books/11398_14
5. Beeching BW. Interpreting Dental Radiographs [Internet]. 1981. Available from: <http://dx.doi.org/10.1007/978-94-011-8025-2>
6. Faber TD, Yoon DC, Susan K. Service, White SC. Fourier and wavelet analyses of dental radiographs detect trabecular changes in osteoporosis [Internet]. Vol. 35, Bone. 2004. p. 403–11. Available from: <http://dx.doi.org/10.1016/j.bone.2004.03.002>
7. Hashim R. Self-reported oral health, oral hygiene habits and dental service utilization among pregnant women in United Arab Emirates [Internet]. Vol. 10, International Journal of Dental Hygiene. 2012. p. 142–6. Available from: <http://dx.doi.org/10.1111/j.1601-5037.2011.00531.x>
8. McBride DG. Longitudinal assessment of age-related change in the dental pulp chamber and age estimation using dental radiographs [Internet]. Available from: <http://dx.doi.org/10.32469/10355/4745>
9. Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of Streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial. Clin Oral Investig. 2020 Sep;24(9):3275–80.
10. Samuel SR. Can 5-year-olds sensibly self-report the impact of developmental enamel defects on

- their quality of life? *Int J Paediatr Dent*. 2021 Mar;31(2):285–6.
11. Samuel SR, Kuduruthullah S, Khair AMB, Al Shayeb M, Elkaseh A, Varma SR, et al. Impact of pain, psychological-distress, SARS-CoV2 fear on adults' OHRQOL during COVID-19 pandemic. *Saudi J Biol Sci*. 2021 Jan;28(1):492–4.
 12. Samuel SR, Kuduruthullah S, Khair AMB, Shayeb MA, Elkaseh A, Varma SR. Dental pain, parental SARS-CoV-2 fear and distress on quality of life of 2 to 6 year-old children during COVID-19. *Int J Paediatr Dent*. 2021 May;31(3):436–41.
 13. Samuel SR, Acharya S, Rao JC. School Interventions-based Prevention of Early-Childhood Caries among 3-5-year-old children from very low socioeconomic status: Two-year randomized trial. *J Public Health Dent*. 2020 Jan;80(1):51–60.
 14. Vikneshan M, Saravanakumar R, Mangaiyarkarasi R, Rajeshkumar S, Samuel SR, Suganya M, et al. Algal biomass as a source for novel oral nano-antimicrobial agent. *Saudi J Biol Sci*. 2020 Dec;27(12):3753–8.
 15. Chellapa LR, Shanmugam R, Indiran MA, Samuel SR. Biogenic nanoselenium synthesis, its antimicrobial, antioxidant activity and toxicity. *Bioinspired, Biomimetic and Nanobiomaterials*. 2020 Sep 1;9(3):184–9.
 16. Samuel SR, Mathew MG, Suresh SG, Varma SR, Elsubeihi ES, Arshad F, et al. Pediatric dental emergency management and parental treatment preferences during COVID-19 pandemic as compared to 2019. *Saudi J Biol Sci*. 2021 Apr;28(4):2591–7.
 17. Barma MD, Muthupandiyan I, Samuel SR, Amaechi BT. Inhibition of *Streptococcus mutans*, antioxidant property and cytotoxicity of novel nano-zinc oxide varnish. *Arch Oral Biol*. 2021 Jun;126:105132.
 18. Muthukrishnan L. Nanotechnology for cleaner leather production: a review. *Environ Chem Lett*. 2021 Jun 1;19(3):2527–49.
 19. Muthukrishnan L. Multidrug resistant tuberculosis - Diagnostic challenges and its conquering by nanotechnology approach - An overview. *Chem Biol Interact*. 2021 Mar 1;337(109397):109397.
 20. Sekar D, Auxilia PK. Letter to the Editor: H19 Promotes HCC Bone Metastasis by Reducing Osteoprotegerin Expression in a PPP1CA/p38MAPK-Dependent Manner and Sponging miR-200b-3p [Internet]. *Hepatology*. 2021. Available from: <http://dx.doi.org/10.1002/hep.31719>
 21. Gowhari Shabgah A, Amir A, Gardanova ZR, Olegovna Zekiy A, Thangavelu L, Ebrahimi Nik M, et al. Interleukin-25: New perspective and state-of-the-art in cancer prognosis and treatment approaches. *Cancer Med*. 2021 Aug;10(15):5191–202.
 22. Kamala K, Sivaperumal P, Paray BA, Al-Sadoon MK. Author response for “Identification of haloarchaea during fermentation of *Sardinella longiceps* for being the starter culture to accelerate fish sauce production” [Internet]. Wiley; 2021. Available from:

<https://publons.com/publon/47375106>

23. Ezhilarasan D, Lakshmi T, Subha M, Deepak Nallasamy V, Raghunandhakumar S. The ambiguous role of sirtuins in head and neck squamous cell carcinoma. *Oral Dis* [Internet]. 2021 Feb 11; Available from: <http://dx.doi.org/10.1111/odi.13798>
24. Sridharan G, Ramani P, Patankar S, Vijayaraghavan R. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. *J Oral Pathol Med*. 2019 Apr;48(4):299–306.
25. R H, Ramani P, Ramanathan A, R JM, S G, Ramasubramanian A, et al. CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2020 Sep;130(3):306–12.
26. J PC, Marimuthu T, C K, Devadoss P, Kumar SM. Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study. *Clin Implant Dent Relat Res*. 2018 Aug;20(4):531–4.
27. Wahab PUA, Madhulaxmi M, Senthilnathan P, Muthusekhar MR, Vohra Y, Abhinav RP. Scalpel Versus Diathermy in Wound Healing After Mucosal Incisions: A Split-Mouth Study. *J Oral Maxillofac Surg*. 2018 Jun;76(6):1160–4.
28. Mudigonda SK, Murugan S, Velavan K, Thulasiraman S, Krishna Kumar Raja VB. Non-suturing microvascular anastomosis in maxillofacial reconstruction- a comparative study. *J Craniomaxillofac Surg*. 2020 Jun;48(6):599–606.
29. Winkler KG. Influence of rectangular collimation and intraoral shielding on radiation dose in dental radiography. *J Am Dent Assoc*. 1968 Jul;77(1):95–101.
30. Prasad M, Gupta R, Patthi B, Singla A, Pandita V, Kumar JK, et al. Imaging More Imagining less: An Insight into Knowledge, Attitude and Practice Regarding Radiation Risk on Pregnant Women among Dentists of Ghaziabad - A Cross Sectional Study. *J Clin Diagn Res*. 2016 Jul;10(7):ZC20–5.
31. Einstein AJ, Tilkemeier P, Fazel R, Rakotoarivelo H, Shaw LJ, for the American Society of Nuclear Cardiology. Radiation Safety in Nuclear Cardiology—Current Knowledge and Practice: Results From the 2011 American Society of Nuclear Cardiology Member Survey [Internet]. Vol. 173, *JAMA Internal Medicine*. 2013. p. 1021. Available from: <http://dx.doi.org/10.1001/jamainternmed.2013.483>
32. Jain AK, Chen H, Minut S. Dental Biometrics: Human Identification Using Dental Radiographs [Internet]. *Lecture Notes in Computer Science*. 2003. p. 429–37. Available from: http://dx.doi.org/10.1007/3-540-44887-x_51
33. Radiographs don't tell the whole story [Internet]. Vol. 61, *Dental Abstracts*. 2016. p. 198–200. Available from: <http://dx.doi.org/10.1016/j.denabs.2016.03.026>
34. Zanata RL, Fernandes KBP, Navarro PSL. Prenatal dental care: evaluation of professional knowledge of obstetricians and dentists in the cities of Londrina/PR and Bauru/SP, Brazil, 2004.

J Appl Oral Sci. 2008 May;16(3):194–200.

35. Niemiec BA. Developing/Processing Dental Radiographs [Internet]. Practical Veterinary Dental Radiography. 2017. p. 85–91. Available from: <http://dx.doi.org/10.1201/b20288-6>
36. Braimoh O, Ilochonwu N. Knowledge of dental practitioners on the management of oral conditions in pregnancy in South Nigeria [Internet]. Vol. 3, European Journal of General Dentistry. 2014. p. 150. Available from: <http://dx.doi.org/10.4103/2278-9626.134844>
37. Prasad M. Imaging More Imagining less: An Insight into Knowledge, Attitude and Practice Regarding Radiation Risk on Pregnant Women among Dentists of Ghaziabad – A Cross-Sectional Study [Internet]. JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH. 2016. Available from: <http://dx.doi.org/10.7860/jcdr/2016/18153.8125>
38. Rahman U, Fatima Jinnah Dental College, Jamelle AN, Ansari Y, Nasrullah N, Askary G, et al. Knowledge, Attitude and Practice of Dentists Prescribing Antibiotics in Periodontal diseases in Dental Colleges of Karachi [Internet]. Vol. 29, Journal of the Pakistan Dental Association. 2020. p. 144–50. Available from: <http://dx.doi.org/10.25301/jpda.293.144>

Annexure 1

- 1.dental radiographs are harmful?
yes/no
- 2.Do you know the precautions of dental radiographs in pregnant women?
yes/no
3. If needed are dental radiographs useful to take in pregnant women?
yes/no
4. Do you know about ALARA?
yes/no
5. Do you know that high speed radio films reduce exposure?
yes/no
6. Do you know that teratogenic X-ray is 1000 times less than the risk of abortion?
yes/no
7. Dental X-rays are absolutely contraindicated for pregnant patients?
yes/no
8. Are effects of Dental radiographs reversible on fetuses?
yes/no
9. Does the position of the X-ray radiation cone can affect the foetus?
yes/no
10. First trimester of pregnancy is the best period to take a dental X-ray?
yes/no