

Knowledge, attitude, and practice of lead aprons among dental practitioners and specialists

P. Anushya,
Maha Lakshmi Jayaraman

Department of Conservative Dentistry
and Endodontics Saveetha Dental
College and Hospitals, Saveetha
Institute of Medical and Technical
Science, Saveetha University, Chennai,
Tamil Nadu, India

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ABSTRACT

In dentistry, radiographs are often used to diagnose and assess problems relating to oral conditions as well as for better treatment planning. Even though the radiation risk offered by X-rays is minimal, the absorption of this lower level radiation in the individual for a long time challenges a health concern. The aim of the study was to assess the knowledge, attitude and practice of lead aprons among dental practitioners and specialists in Tamil Nadu. A cross-sectional survey was performed around 100 dentists in Tamil Nadu, India, by framing standard questionnaires and collecting responses by online survey forms such as "Google Forms." The statistical study was undertaken with SPSS version 22 and the Chi-square test was selected to determine the correlation. This study showed that lead aprons were regularly used by 63% of participants during radiation exposure. Thirty percent of participants were aware of radiation protection protocol but neglected to use lead aprons routinely ($P = 0.113$). About 91% of participants gave more preference for thyroid gland to protect it from dental radiation rather than other head-and-neck organs and 82% of them were using thyroid collars for patients during exposure ($P = 0.671$). Our survey shows that the usage of lead aprons is practiced strictly by dental practitioners under <5 years of clinical experience. However, dental practitioners and specialists were aware of radiation protective aprons but often neglected to use them in practice.

Key words: Awareness, dental X-rays, innovative technology, lead aprons

INTRODUCTION

Dental radiographs are valuable diagnostic tools for oral diseases. It aids the dentist in assessing the most appropriate treatment regimen for patients' dental status and plays an important role in dental practice.^[1] When compared to

medical practitioners, dental specialists are the ones who execute the most X-ray queries. X-rays are required for almost all dental treatments such as root canal treatment, extraction, and implant. An intraoral periapical radiograph is the most common radiological method conducted to test the teeth and their periapical region.^[2] According to the Polish Sanitary Inspectorate, dental X-ray devices accounted for more than half of the approximately 15,000 devices in use in 2012.^[3] These data suggest that dental radiography doses account for a substantial portion of the annualized dose from medicinal resources. Repeated exposure to cytotoxic materials has been indicated to induce prolonged cellular destruction, competitive cell growth, granulation tissue formation, and tumorigenesis.^[4] As a result, both dental professionals and patients are more likely to be

Address for correspondence:

Dr. Maha Lakshmi Jayaraman,
Department of Conservative Dentistry and Endodontics,
Saveetha Dental College and Hospitals, Saveetha Institute
of Medical and Technical Science, Saveetha University,
Chennai - 600 077, Tamil Nadu, India.
E-mail: mahalakshmij.sdc@saveetha.com

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exposed to radiation and dentists should be conscious of various radiation safety procedures to reduce this risk. To mitigate these impacts, the As Low As Reasonably Achievable (ALARA) guideline should be followed.^[5] Using appropriate equipment and the right methodology, unwanted radiation dose to clinician and patient could be reduced.

Radiation awareness among dental radiologists, medical students, and physicians of various specialties has been studied extensively. Dental practitioners who were trained about radiation protocol were more conscious than those who had not. Furmaniak *et al.* recommend that dental practitioners should be ready to tell patients about the potential risks associated with radiation.^[6] Dentists who treat pediatricians should be conversant with the American Academy of Pediatric Dentistry radiation protocol and should use dose reduction techniques.^[7,8] When health-care personnel wears lead aprons and thyroid shields during procedures, their radiation exposure is reduced by half. Radiation dosage can be reduced using a variety of methods such as increased purification and voltage, lower current, and an average distance of 3 feet from X-rays.^[9] Our team members have the extensive clinical knowledge and research skills which have resulted in publications of the highest quality.^[10-29] In the current survey, we attempted to evaluate dentists' awareness, perception, and validate the usage of lead aprons by conducting a study among general dental practitioners in Chennai.

MATERIALS AND METHODS

Study design

A cross-sectional survey was performed through online forms from February to April 2021 among dental practitioners and specialists.

Study subjects

A simple random sampling method was used to choose the individuals.

Inclusion criteria

All dentists and specialists who were interested in taking part in this research were included in this study.

Ethical considerations

The Institutional Review Board of Saveetha Dental College provided ethical permission for this study. The ethical approval number is IHEC/SDC/ENDO/161.

Study methods

Structured self-administered surveys with 14 questions encompassing sociodemographic information, knowledge, attitude, and perception were created. The questionnaire had a few open-ended questions and a mix of multiple-choice questions, and it was circulated through an online "Google

Forms" in 2021 to 100 dental practitioners. Awareness, knowledge, attitude, and perception are the four outcome variables. Each output variable was collected as ordinal data, and the results were frequently verified for clarity, validity, competence, and accuracy.

Statistical assessment

SPSS IBM SPSS Version 22.0, Armonk, New York: IBM Corp was used to perform the database assessment. To summarize qualitative data, descriptive statistical analysis in percent was determined. The Chi-square test of independence was used to assess the database, which yielded a significant $P = 0.05$. Pie charts, bar graphs, and percentage tables were used to display the results.

RESULTS

In this survey, a total of 100 dental practitioners and specialists participated. Of the 100 participants, 49% were general dental practitioners, 21% of oral surgeons, 12% of periodontists, 7% of endodontists and prosthodontists, and 4% of pediatric dentists. The clinical experience of participants: 65% of participants were <5 years, 24% of participants were <15 years, and only 11% of participants were >20 years. For protection from radiation exposure, only 63% of participants were regularly using lead aprons and the remaining 16% of participants were occasional users as well as 21% of participants were rare users. Only 85% of participants stood 6 feet away from the X-ray source during radiation exposure. The majority of the participants (82%) were using thyroid collars for patients during exposure. When the participants were asked about the annual radiation dose limit for a dentist, 12 mSv were reported by 55% of participants, 250 mSv by 25% of participants, no limit was reported by 9% of participants, and the remaining 11% of participants were not aware about it.

DISCUSSION

In the present study, about 97% of participants were aware of radiation protection equipment, namely X-ray aprons, thyroid collars, and kilts. Recent findings reported that medical radiation workers were aware of radiation shielding garments but frequently refused to use thyroid collars and other equipment.^[30] In this study, 63% of participants were regularly using lead aprons and 82% of participants were using thyroid collars for patients during radiation exposure. Similar to our study, 26% of dental students still wear lead aprons as protection to reduce radiation exposure to children during dental radiography. The cause for not wearing a lead apron is due to the lack of availability of a lead apron, as well as the apron's extra weight.^[31]

In our findings, only 85% of participants stood 6 feet away from the X-ray source during dental radiography. The previous study reported that 70.5% of dentists stood behind

the lead shield and 74% of them stood at a 6-foot distance from the radiation.^[32] Many dental professionals were utterly unsure of the standing distance away from rays in the absence of a shield. Just 59% of respondents recognized how far they should stay away from radiation (<6 feet), and 56% were aware of proper angulation to prevent the direction of rays.^[33]

The ALARA guideline is very important to avoid unwanted radiographs. It is fair to conclude that dentists who were unfamiliar with the concept would be unable to enforce the ALARA theory in practice. As a result, if the ALARA theory is not followed, patients should be exposed to excessive radiation.^[34] One of the limitations of an investigation of this nature is the limited sample as well as response bias. Furthermore, each dental procedure involving X-ray radiation should be operated properly and also the rules of the International Commission on Radiological Protection should be enforced, to minimize unintended harm to health-care providers and patients.

CONCLUSION

Our survey revealed that the usage of lead aprons is practiced strictly by dental practitioners under <5 years of clinical experience. However, dental practitioners and specialists were aware of radiation protective aprons but often neglected to use them in practice. It is advised that dental professionals and practitioners be trained and reinforced to change their attitude toward radiation protection safety guidelines.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Whaites E, Drage N. Essentials of Dental Radiography and Radiology. Edinburgh: Churchill Livingstone: Elsevier Health Sciences; 5th edn 2013.
- Lee BD, Ludlow JB. Attitude of the Korean dentists towards radiation safety and selection criteria. *Imaging Sci Dent* 2013;43:179-84.
- Hussey DH. Radiation oncology: Yesterday, today, and tomorrow. *Radiology* 1998;209:597-9.
- Miller MA, Zachary JF. Mechanisms and morphology of cellular injury, adaptation, and death. *Pathol Basis Vet Dis* 2017;2:43.e19.
- Preminger G, Lipkin M, Cabrera F. As low as reasonably achievable: Methods for reducing radiation exposure during the management of renal and ureteral stones. *Indian J Urol* 2014;30:55.
- Furmaniak KZ, Kołodziejska MA, Szopiński KT. Radiation awareness among dentists, radiographers and students. *Dentomaxillofac Radiol* 2016;45:20160097.
- Campbell RE, Wilson S, Zhang Y, Scarfe WC. A survey on radiation exposure reduction methods including rectangular collimation for intraoral radiography by pediatric dentists in the United States. *J Am Dent Assoc* 2020;151:287-96.
- Ng CG, Manan HA, Zaki FM, Zakaria R. A survey of awareness of parents and caretakers on diagnostic radiological examination related radiation exposure in a tertiary hospital in Malaysia. *Int J Environ Res Public Health* 2022;19:3898.
- Cheon BK, Kim CL, Kim KR, Kang MH, Lim JA, Woo NS, *et al.* Radiation safety: A focus on lead aprons and thyroid shields in interventional pain management. *Korean J Pain* 2018;31:244-52.
- Muthukrishnan L. Imminent antimicrobial bioink deploying cellulose, alginate, EPS and synthetic polymers for 3D bioprinting of tissue constructs. *Carbohydr Polym* 2021;260:117774.
- PradeepKumar AR, Shemesh H, Nivedhitha MS, Hashir MM, Arockiam S, Uma Maheswari TN, *et al.* Diagnosis of vertical root fractures by cone-beam computed tomography in root-filled teeth with confirmation by direct visualization: A systematic review and meta-analysis. *J Endod* 2021;47:1198-214.
- Chakraborty T, Jamal RF, Battineni G, Teja KV, Marto CM, Spagnuolo G. A review of prolonged Post-COVID-19 symptoms and their implications on dental management. *Int J Environ Res Public Health* 2021;18:5131.
- Muthukrishnan L. Nanotechnology for cleaner leather production: A review. *Environ Chem Lett* 2021;19:2527-49.
- Teja KV, Ramesh S. Is a filled lateral canal – A sign of superiority? *J Dent Sci* 2020;15:562-3.
- Narendran K, Jayalakshmi, Saravanan A, Ganesan SA, Sukumar E. Synthesis, characterization, free radical scavenging and cytotoxic activities of phenyl vilangin, a substituted dimer of embelin. *IJPS* 2020;82(5):909-912.
- Reddy P, Krithikadatta J, Srinivasan V, Raghu S, Velumurugan N. Dental caries profile and associated risk factors among adolescent school children in an Urban South-Indian city. *Oral Health Prev Dent* 2020;18:379-86.
- Sawant K, Pawar AM, Banga KS, Machado R, Karobari MI, Marya A, *et al.* Dentinal microcracks after root canal instrumentation using instruments manufactured with different NiTi alloys and the SAF system: A systematic review. *Appl Sci* 2021;11:4984.
- Bhavikatti SK, Karobari MI, Zainuddin SLA, Marya A, Nadaf SJ, Sawant VJ, *et al.* Investigating the antioxidant and cytocompatibility of *Mimusops elengi* Linn extract over human gingival fibroblast cells. *Int J Environ Res Public Health* 2021;18:7162.
- Karobari MI, Basheer SN, Sayed FR, Shaikh S, Agwan MA, Marya A, *et al.* An *in vitro* stereomicroscopic evaluation of bioactivity between Neo MTA Plus, Pro Root MTA, BIODENTINE & glass ionomer cement using dye penetration method. *Materials (Basel)* 2021;14:3159.
- Rohit Singh T, Ezhilarasan D. Ethanolic extract of *Lagerstroemia speciosa* (L.) Pers., induces apoptosis and cell cycle arrest in HepG2 cells. *Nutr Cancer* 2020;72:146-56.
- Ezhilarasan D. MicroRNA interplay between hepatic stellate cell quiescence and activation. *Eur J Pharmacol* 2020;885:173507.
- Romera A, Peredpaya S, Shparyk Y, Bondarenko I, Mendonça Bariani G, Abdalla KC, *et al.* Bevacizumab biosimilar BEVZ92 versus reference bevacizumab in combination with FOLFIRI or FOLFIRI as first-line treatment for metastatic colorectal cancer: A multicentre, open-label, randomised controlled trial. *Lancet Gastroenterol Hepatol* 2018;3:845-55.
- Raj R. β -Sitosterol-assisted silver nanoparticles activates Nrf2 and triggers mitochondrial apoptosis via oxidative stress in human hepatocellular cancer cell line. *J Biomed Mater Res A* 2020;108:1899-908.
- Vijayashree Priyadharsini J. *In silico* validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. *J Periodontol* 2019;90:1441-8.
- Vijayashree Priyadharsini J, Smiline Girija AS, Paramasivam A. *In*

- silico* analysis of virulence genes in an emerging dental pathogen *A. baumannii* and related species. Arch Oral Biol 2018;94:93-8.
26. Uma Maheswari TN, Nivedhitha MS, Ramani P. Expression profile of salivary micro RNA-21 and 31 in oral potentially malignant disorders. Braz Oral Res 2020;34:e002.
 27. Gudipaneni RK, Alam MK, Patil SR, Karobari MI. Measurement of the maximum occlusal bite force and its relation to the caries spectrum of first permanent molars in early permanent dentition. J Clin Pediatr Dent 2020;44:423-8.
 28. Chaturvedula BB, Muthukrishnan A, Bhuvaraghan A, Sandler J, Thiruvengkatachari B. Dens invaginatus: A review and orthodontic implications. Br Dent J 2021;230:345-50.
 29. Kanniah P, Radhamani J, Chelliah P, Muthusamy N, Joshua Jebasingh Sathiy Balasingh E, Reeta Thangapandi J, *et al.* Green synthesis of multifaceted silver nanoparticles using the flower extract of *Aerva lanata* and evaluation of its biological and environmental applications. Chem Select 2020;5:2322-31.
 30. Mohd Ridzwan SF, Bhoo-Pathy N, Isahak M, Wee LH. Perceptions on radioprotective garment usage and underlying reasons for non-adherence among medical radiation workers from public hospitals in a middle-income Asian setting: A qualitative exploration. Heliyon 2019;5:e02478.
 31. Mehrotra V, Sachdev R, Garg K, Singh SK. Assessment of knowledge attitude and perception of dental students towards obesity in Kanpur city. J Adv Res Dent & Oral Health 2018;03:1-6.
 32. Wazir SS, Ghosh S, Mahanta S, Shah R, Das A, Patil S. Knowledge, attitude and perception toward radiation hazards and protection among dental undergraduates, interns and dental surgeons – A questionnaire-based cross-sectional study. J Med Radiol Pathol Surg 2019;6:1-7.
 33. Pal S, Bhattacharya PT, Sinha R. Radiation protection in dentistry – Do we practice what we learn? J Adv Clin Res Insights 2015;2:155-9.
 34. Ekşioğlu AS, Uner Ç. Pediatricians' awareness of diagnostic medical radiation effects and doses: Are the latest efforts paying off? Diagn Interv Radiol 2012;18:78-86.