



Attitude and awareness of general dental practitioners toward radiation hazards and safety

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Abstract:

Objective: This study aims to assess the awareness level and attitude towards radiation hazards and safety practices among general dental practitioners

Methods: A cross-sectional study using a questionnaire was conducted among 300 general dental practitioners. Following the questionnaire, educational material on radiation safety and preventive measures was provided to enhance understanding and promote safety practices.

Statistical Analysis: Statistical analyses were performed using the Chi-square test, t-test, and software tools such as Microsoft Excel and SPSS version 20.0 trial.

Results: Out of 300 practitioners surveyed (247 females and 53 males), 80.3% had a dedicated section for radiographic examinations in their clinics. Intraoral radiographic machines were the most commonly used equipment (63.3%), while osteoprotegerin was the least utilized (2%). Concerning safety measures, only 11.7% of practitioners followed all necessary steps, while 6.7% did not use any safety measures in their clinics. Regarding patient safety, only 9.7% of practitioners adhered to safety protocols.

Conclusion: The awareness level among practitioners regarding radiation hazards and safety practices was acceptable. However, there is a gap in implementing this knowledge, especially concerning patient and personnel safety. Continued education programs, distribution of informative materials, and workshops are recommended to ensure adherence to safety protocols.

INTRODUCTION:

X-rays have been integral to medical and dental science since their discovery, serving various diagnostic and therapeutic purposes. In dentistry, their applications range from detecting early caries and small fractures to aiding complex procedures like implant planning. Dentists utilize modalities such as intraoral radiography and cone beam computed tomography to enhance diagnostic capabilities. While healthcare personnel receive training on radiation hazards and safety measures, the diligence in implementing these measures warrants periodic assessment. This study aims to assess awareness and validate radiation protection measures among general dental practitioners (Briggs-Kamara et al., 2013)

Although diagnostic radiation levels are low, radiation protection remains crucial. Radiographic procedures expose both patients and practitioners to radiation, necessitating stringent safety protocols. In dentistry, diagnostic radiation exposure is minimal, making it challenging to assess its adverse effects. Nonetheless, efforts to minimize ionizing radiation exposure are imperative, with practitioners expected to adhere to

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guidelines for radiation safety. Surveys among practicing dentists reveal gaps in implementing dose-reducing techniques effectively. (White & Pharoah, 2009)

MATERIALS AND METHODS:

A cross-sectional study was conducted to evaluate radiation safety practices and awareness among 300 general dental practitioners. An 18-question questionnaire covering clinical and radiographic practices was developed, along with demographic data collection on age, sex, qualification, and experience. After obtaining clearance from the institutional research and ethical committee, the questionnaire was distributed to practicing dentists, and their responses were collected.

STATISTICAL ANALYSIS:

Statistical analysis involved using the independent samples t-test, with a significance level set at $P = 0.05$, to compare mean scores among different qualifications and years of experience. The results were analyzed using the Chi-square statistical test and software including Microsoft Excel and SPSS 20.0 (IBM Corp., Armonk, NY).

RESULTS:

Upon analyzing the completed questionnaires, the study yielded the following results. The total sample size comprised 300 general practitioners, with 247 females and 53 males. Among them, 83% had over 5 years of practice, and 259 were general dental practitioners without specialized qualifications. The most commonly used radiographic equipment was intraoral radiographic machines with conventional X-ray films (63.3%), followed by radiovisiography (17.7%) and osteoprotegerin (2%), with 17% utilizing a combination of machines and techniques. About 80.3% had a dedicated section for radiographic equipment. Regarding patient positioning during radiographic exposure, 71% instructed patients to hold intraoral periapical (IOPA) films with their fingers, while only 16.7% used holders, and 12.3% used other methods. Statistical analysis revealed a P-value of 0.579 for practical score based on qualification and 0.834 based on years of experience. Safety measures included 28.3% following the "position distance rule," 22% using lead barriers, and 16% using lead aprons, with 33.3% employing a combination. However, 90.3% did not provide any radiation safety measures for patients. Attitude scores yielded P-values of 0.081 based on qualification and 0.307 based on experience.

Only 22% were aware of special considerations for vulnerable groups like pregnant women and children, while 84.3% were aware of the ALARA principle, but 66.7% were unaware of AERB recommendations. Ninety-eight percent knew about thermoluminescent dosimeter (TLD) badges, but only 2% used them. Knowledge scores yielded P-values of 0.924 based on qualification and 0.216 based on experience.

The majority expressed interest in updating their knowledge through continuing medical education programs (52.3%), articles and journals (7.3%), internet updates (13%), or a combination of these methods (27%).

DISCUSSION:

Svenson and Petersson's study among Swedish dental practitioners highlighted a correlation between higher knowledge levels and 5–25 years of experience, with specialists showing better knowledge than general practitioners. Similarly, in our study, practitioners with over 5 years of experience demonstrated better awareness of radiation hazards, although their practical implementation of safety measures was lacking. (Svenson & Petersson, 1995)

All practitioners in our study had radiographic facilities in their clinics, with a significant percentage using intraoral radiographic machines. Hayakawa et al. showed reduced radiation exposure by 40–60% using digital intraoral radiographic systems, aligning with international recommendations favoring such systems for minimizing exposure. (Hayakawa et al., 1997)

AERB guidelines emphasize separate X-ray rooms, a requirement met by 80.3% of our practitioners. The ALARA principle, known to 84.3% of our participants, underscores the importance of minimal radiation exposure. (Bushong, 2012)

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However, despite awareness, many practitioners relied on outdated safety practices. For instance, 28.3% followed the position and distance rule, while 22% used lead barriers, and 16% utilized lead aprons. Patient safety measures like thyroid collars were underutilized (22% awareness). Only 2% used TLD badges, critical for monitoring radiation exposure. (Saia, 2012)

Concerningly, 90.3% did not provide safety measures for patients. This echoes findings by Shahab et al. among Iranian dentists, highlighting inadequate patient protection practices. Lack of film holders and improper positioning during radiographic exposure were notable issues. (Du et al., 2012)

Awareness of vulnerable patient groups like pregnant women and children was low (22%), consistent with Arnout and Jafar's findings among dental students. Proper education on radiation risks and protective measures is crucial, especially considering the potential biological effects. (Arnout & Jafar, 2014)

While 98% knew about TLD badges, their usage was minimal (2%), indicating a gap between awareness and implementation. Knowledge of dose limits (14.7% aware) and biological effects of radiation (88% unaware) were lacking, mirroring findings by Razi et al. and highlighting the need for ongoing education. (Razi et al., 2011)

Continued education through workshops, journals, and internet updates is crucial, as indicated by Aps's study among Belgian practitioners. Amin Tavakli et al.'s study emphasized the necessity of ongoing education programs in radiology for dentists to stay updated. (Amin Tavakli et al., 2004)

In conclusion, while awareness of radiation hazards is relatively high among dental practitioners, there's a clear need for better implementation of safety measures, ongoing education, and adherence to modern radiation protection standards to ensure patient and personnel safety. (Le Heron et al., 2010)

CONCLUSION

The findings emphasize the importance of motivating practicing dentists to adhere to X-ray protection guidelines, with enforcement by regulatory agencies playing a crucial role. Prioritizing the safety of both practitioners and patients is essential for healthcare professionals. Recommendations from regulatory bodies like AERB should be effectively communicated through platforms such as IDA to reach dental practitioners. Ensuring safety is not just a virtue but a fundamental requirement in healthcare.

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