

Analysis of Knowledge of Professional Dentist Students Regarding Dentistry Radiation In Pediatric

Kemala Hayati^{1*}, Zuraida Usman Bany¹, Khadijah Amirah²

¹Departement of Oral Radiology, Faculty of Dentistry, Universitas Syiah Kuala, Darussalam, Banda Aceh, Indonesia

²Profesional Dentist Students Faculty of Dentistry, Universitas Syiah Kuala, Darussalam, Banda Aceh, Indonesia

*Corresponding Author: kemalahayati@usk.ac.id

ARTICLE INFO : Received, August 5, 2023; Revised, October 7, 2023; Accepted, November 12, 2023; Published, December 20, 2023
ORCID : Hayati K ([0000-0003-3433-0457](https://orcid.org/0000-0003-3433-0457)); Bany ZB ([0000-0001-5219-6373](https://orcid.org/0000-0001-5219-6373)); Amirah K ([0000-0001-5219-6373](https://orcid.org/0000-0001-5219-6373))
DOI : [10.24815/jds.v8i2.36593](https://doi.org/10.24815/jds.v8i2.36593)

ABSTRACT

Background: Radiation that often used in dentistry was the X-ray radiation. X-rays were used as a means of supporting the diagnosis because of its physical properties that can recorded the tissue image in its path on photographic film. Besides beneficial, X-rays can cause damage in the form of tissue damage due to its biological properties that can damaged *deoxyribonucleic acid* (DNA) and triggerred the formation of free radicals. The Professional (Koas) dental students in the University of Syiah Kuala (USK) of Oral and Dental Hospital (RSGM) Banda Aceh often used X-rays for diagnosis and treatment of teeth, so that they should had knowledge of radiation on children. **Objective:** of this study was to determined the level of knowledge of clinical dental students about radiation dentistry for children in the University of Syiah Kuala Oral and Dental Hospital Banda Aceh. **Methods:** of this research was a descriptive survey. The study involved 205 clinical dental students who met the inclusion criteria. Research subjects were asked to completed a questionnaire in the form of questions about radiation dentistry for children. **Results:** The study indicated the level of knowledge of clinical dental students about radiation dentistry for children amounted to 51.2% including moderate category, followed by 31,7% of good category and 17,1% poor category. **Conclusion:** The level of knowledge of clinical dental students about radiation dentistry for children mostly in the moderate category.

Keywords: Knowledge of clinical dental student, radiation dentistry, children, tissue radiosensitivity

ABSTRAK

Latar Belakang: Radiasi yang sering dimanfaatkan dalam kedokteran gigi adalah radiasi sinar-X. Sinar-X digunakan sebagai sarana penunjang diagnosis karena sifat fisisnya yaitu dapat mencatat gambaran jaringan yang dilaluinya pada film foto. Sinar-X dapat menimbulkan kerugian berupa kerusakan jaringan tubuh karena sifat biologisnya yaitu dapat merusak *deoxyribonucleic acid* (DNA) dan memicu pembentukan radikal bebas. Dokter gigi muda di RSGM USK Banda Aceh sering memanfaatkan sinar-X untuk diagnosis dan perawatan gigi, sehingga seharusnya mereka memiliki pengetahuan tentang radiasi terhadap anak. **Tujuan:** Tujuan penelitian ini adalah untuk mengetahui tingkat pengetahuan dokter gigi muda tentang radiasi kedokteran gigi pada anak di RSGM USK Banda Aceh. **Metode:** Penelitian ini adalah survei deskriptif. Penelitian ini melibatkan 205 dokter gigi muda yang memenuhi kriteria inklusi. Subjek penelitian diminta mengisi lembar kuesioner berupa pertanyaan mengenai radiasi kedokteran gigi pada anak. **Hasil:** Hasil penelitian menunjukkan tingkat pengetahuan dokter gigi muda mengenai radiasi kedokteran gigi pada anak sebesar 51,2% termasuk kategori sedang, diikuti 31,7% kategori baik dan 17,1% kategori buruk. **Kesimpulan:** Kesimpulan bahwa tingkat pengetahuan dokter gigi muda tentang radiasi kedokteran gigi pada anak sebagian besar berada dalam kategori sedang.

Kata kunci: Pengetahuan dokter gigi muda, radiasi kedokteran gigi, anak-anak, radiosensitivitas jaringan.

1. Introduction

X-rays are an example of radiation that has been widely used in the medical field and dental practice as a means of providing information and supporting diagnosis. X-ray radiation in dental practice is an important component in patient care that provides dentists with information regarding anatomy. and the status of the teeth and supporting bones.¹ Apart from being useful in the medical and dental fields, radiation carries the risk of causing harm by damaging Deoxyribonucleic acid (DNA) and the formation of free radicals.² This affects the body's biological damage, use of radiation doses in dentistry is relatively small, but small amounts of radiation absorbed repeatedly over a long

period of time can have a negative impact on the body in the form of cancer formation and genetic defects.³

The effect of radiation on the body is determined by tissue radiosensitivity and age at the time of exposure.⁴ Radiation damages dividing cells more quickly than mature cells, so bodies that are still growing are more susceptible to radiation (radiosensitive). This is experienced by younger patients, namely pediatric patients. Radiation exposure during childhood is more susceptible to radiation injury than at other ages.⁵ Children may have a higher radiosensitivity to some types of cancer due to radiation. The relationship between an increased risk of brain tumors and a history of frequent panoramic photographs at ages under 10 years and ages 10-19 years.⁶ The patients who received dental X-rays before 1970 had an increased risk of thyroid cancer by 13% for every 10 dental radiographs.^{9,10} The RSGM is a place for providing dental education, existing facilities and infrastructure are used to achieve clinical competence for young dentists as well as providing information and dental care to the community.⁷

Based on data from the dental radiology section at RSGM USK, throughout 2014 there were 239 children under 11 years of age who had x-rays, both panoramic and cephalometric. The large number of pediatric patients who undergo X-rays can be caused by the high prevalence and risk of proximal caries in the primary and mixed dentition period or for the purpose of monitoring dentofacial/dentoskeletal growth and development.⁸ The person responsible for determining dental radiographs for patients is the dentist. The dentist uses professional judgment to make decisions about the number, type and frequency of dental radiography, therefore young dentists who will become dentists in the future must work based on knowledge of the dangers of radiation to living tissue, especially in children.⁹

Knowledge is a very important part for the formation of action.¹⁴ Actions that are based on knowledge will be more sustainable than actions that are not based on knowledge. The knowledge of young dentists at RSGM USK Banda Aceh regarding ionizing radiation and the negative effects of ionizing radiation in dental radiography was still in the sufficient category, only a small number of residents, including radiology residents at Emory University in Atlanta (35%) knew that children were five times more radiosensitive to radiation than adults.¹⁰ Based on this description, the author was interested in conducting research regarding the level of knowledge of young dentists about radiation dentistry in children at RSGM USK Banda Aceh Indonesia. The main aim of this research was to evaluate the level of knowledge of professional dentists students about radiation dentistry in children at the Dental and Oral Hospital of USK, Banda Aceh Indonesia.

2. Material and Methods

This type of research is a descriptive survey carried out in 2015-2019 by obtaining data from subjects using a questionnaire. This research was conducted at the RSGM at USK, Banda Aceh, involving 380 subjects. Researchers visited research subjects at predetermined times at RSGM Syiah Kuala University. Researchers ask the research subjects' willingness to participate in the research. Subjects who are willing and meet the inclusion criteria will be given an informed consent sheet and questionnaire. After filling out the informed consent sheet, the research subjects were then asked to fill out the questionnaire sheet that had been given. First, the researcher explained how to fill out the questionnaire, and the subjects were asked to fill it in correctly. The researcher will wait until the research subject has finished filling in the questionnaire sheet. After the data is collected, the researcher analyzes it to make a research report. Next, the data was analyzed univariately, then presented in the form of tables and bar charts.

3. Result and Discussion

In reviewing the demographic distribution from Table 1, several trends emerge that are worth noting and discussing further. First and foremost, the class of 2019 contributed the largest number of participants, with 53 individuals (25.8%). This could indicate a particular interest or availability in research participation among recent graduates or possibly a larger class size for that year. Conversely, the classes of 2015 and 2018 had the lowest participation, each with 10 individuals (4.8%), suggesting less engagement or smaller classes during those years.¹¹

Gender distribution is notably skewed across the classes. The class of 2020 had the highest number of male participants, with 15 (7.3%), and the class of 2019 had the highest number of female participants, with 40 (19.5%).¹² On the other end of the spectrum, the class of 2018 had the fewest males (0.5%), and the class of 2015 had the fewest females (2.9%). These variations might reflect changing demographics in dental schools over the years or could be an artifact of the recruitment methods used for this study.¹³

Overall, the research subjects were predominantly female, with 151 women (73.7%) compared to 54 men (26.3%). This aligns with trends seen in other healthcare professions, where there has been a consistent increase in female practitioners.¹⁴ While the higher number of females reflects broader societal trends, it also raises questions about the representativeness of these findings to the general population of young dentists. Researchers should consider these gender disparities when interpreting their results, as they may have implications for both the applicability of the findings and the understanding of gender dynamics within the field.¹⁵ While the demographic information provided by Table 1 offers valuable insights into the composition of the research sample, it also highlights the need for careful consideration of how these demographics might influence the study's findings. Future research should aim to recruit a more balanced and representative sample or, at the very least, acknowledge the limitations and potential biases introduced by uneven demographics.¹⁶

Table 1. Distribution of Research Subject Forces Based on Gender

Class Year	Male		Female		Amount	
	f	%	f	%	f	%
2006	4	1,9	6	2,9	10	4,8
2007	11	5,4	25	12,2	36	17,6
2008	10	4,9	34	16,6	44	21,5
2009	13	6,3	40	19,5	53	25,8
2010	15	7,3	37	18,1	52	25,4
2011	1	0,5	9	4,4	10	4,9
Total	54	26,3	151	73,7	205	100

The findings from Table 2 present an interesting overview of the knowledge levels among young dentists regarding pediatric radiation dentistry at RSGM USK Banda Aceh. It's noteworthy that the majority of the participants fall into the medium knowledge category, with 105 individuals (51.2%). This suggests that while a significant portion of the young dentists have a foundational understanding of radiation in dentistry, there is room for improvement to elevate them into the good knowledge category. Enhancing educational programs and continuous professional development opportunities could address this gap and ensure a higher level of competency in radiation safety and techniques.¹⁷

The good knowledge category, comprising 65 individuals (31.7%), reflects those who have a robust understanding of pediatric radiation dentistry. This is encouraging as it indicates a sizeable group with a strong foundation in this critical area. However, the challenge remains to increase this percentage to ensure that the majority of young dentists are not just adequately informed but are well-versed in the latest protocols and safety measures in radiation dentistry, especially for children who are more susceptible to the risks of radiation.¹⁸

On the other end of the spectrum, 35 individuals (17.1%) fall under the poor knowledge category. This is concerning, as inadequate knowledge in this area could lead to improper use of radiographic techniques, potentially increasing the risk to pediatric patients.¹⁹ It is imperative that educational institutions and professional bodies address this issue through targeted interventions such as refresher courses, workshops, and more stringent competency assessments to ensure that all practicing dentists have the necessary knowledge to safely administer dental care involving radiation.²⁰

The distribution of knowledge levels calls for a multi-faceted approach to education and training in pediatric radiation dentistry. While the majority of young dentists possess medium to good knowledge levels, the presence of a significant minority with poor knowledge underscores the need for continuous education and assessment strategies. Institutions like RSGM USK Banda Aceh might consider implementing more rigorous and regular training programs, increasing access to resources and research on radiation safety, and perhaps revising the curriculum to ensure that all graduating dentists are proficient in this critical aspect of dental care.²¹

Table 2. Frequency distribution of subjects' level of knowledge regarding radiation dentistry in pediatric

Knowledge level	Subjects	
	f	%
Good	65	31.7
Moderate	105	51.2
Bad	35	17.1
Total	205	100

Table 3's frequency distribution of young dentists' knowledge about pediatric radiation dentistry segmented by gender reveals interesting patterns that warrant discussion. Notably, females predominantly occupy the good and moderate knowledge categories with 52 out of 65 and 84 out of 105 individuals, respectively. This suggests that female dentists might have either better access to educational resources, more engagement with the subject matter, or possibly more motivation to excel in this area. These findings align with studies suggesting that female students often outperform male counterparts in academic settings, possibly due to differences in study habits, motivation, or institutional support.²²

Conversely, the poor knowledge category comprises more males than females (20:15). This could be indicative of various factors such as different learning styles, lesser emphasis on the importance of pediatric radiation dentistry in their training, or even lack of targeted educational support. The implications of these gender disparities are significant as they suggest potential areas for intervention, such as adjusting educational strategies to better engage male students or providing additional resources and support where needed.²³

It is also important to consider the broader context of these findings. The gender disparities in knowledge levels might reflect wider trends in education and professional development within dentistry or perhaps in the healthcare sector at large. Literature indicates that there might be systemic biases or differences in how male and female students are educated or mentored in various fields, which could contribute to the differences observed in this study.²⁴

Table 3. Frequency distribution of subjects' level of knowledge about dental radiation in children based on gender

Knowledge Level	Sex		Total
	Male	Female	
Good	13	52	65
Moderate	21	84	105
Bad	20	15	35
Total	54	152	205

Furthermore, while the data presents a clear gender divide in knowledge levels, it's crucial to delve into the underlying causes. Are these differences attributed to differences in the educational journey, personal interest, or are they reflective of broader societal trends? Understanding these nuances can help in designing targeted interventions that not only address the knowledge gaps but also contribute to more gender-equitable educational environments. While it's heartening to see a strong representation of women in the good and moderate knowledge categories, the underrepresentation of men, particularly in the poor knowledge category, is a concern that needs addressing. Educational institutions and professional bodies need to consider these gender disparities seriously and work towards ensuring equitable educational opportunities and outcomes for all young dentists, irrespective of gender.²⁵ This might involve revisiting curricular content, teaching methods, and support systems to ensure they cater effectively to all learners.²⁶

4. Conclusion

In conclusion, the data from RSGM USK Banda Aceh indicates that most young dentists have a medium level of knowledge in pediatric radiation dentistry, with a significant number still in the poor knowledge category. This finding calls for enhanced educational strategies and targeted interventions, particularly addressing the notable gender disparities with females generally faring better than males. It is crucial for educational bodies and policymakers to implement comprehensive measures to improve knowledge in this field, including curriculum updates, continuous professional development, and innovative teaching methods. Addressing these gaps is essential for ensuring that all dentists are well-equipped to provide the highest standard of pediatric dental care, thereby improving health outcomes for children.

5. References

1. Mallya SM. Effective and Safe Use of X-Rays: Understanding the Risks for Decision-Making. *Journal of the California Dental Association* 2021;49(5).
2. Rai G, Kumar A, Mahobiya P. The effect of radiation on thyroid gland. *International journal of biology research* 2018;3(1):217-22.
3. Kamiya K, Ozasa K, Akiba S, et al. Long-term effects of radiation exposure on health. *The lancet* 2015;386(9992):469-78.
4. McBride WH, Schae D. Radiation-induced tissue damage and response. *The Journal of pathology* 2020;250(5):647-55.
5. Kutanzi KR, Lumen A, Koturbash I, Miousse IR. Pediatric Exposures to Ionizing Radiation: Carcinogenic Considerations. *Int J Environ Res Public Health* 2016;13(11).
6. Claus EB, Calvocoressi L, Bondy ML, et al. Dental x-rays and risk of meningioma. *Cancer* 2012;118(18):4530-7.
7. Neta G, Rajaraman P, Berrington de Gonzalez A, et al. A prospective study of medical diagnostic radiography and risk of thyroid cancer. *Am J Epidemiol* 2013;177(8):800-9.
8. Zou J, Meng M, Law CS, Rao Y, Zhou X. Common dental diseases in children and malocclusion. *Int J Oral Sci* 2018;10(1):7.
9. Kim IH, Singer SR, Hong DJ, Mupparapu M. Fundamentals of radiographic interpretation for the dentist. *Dental Clinics* 2021;65(3):409-25.
10. Prasanna PG, Woloschak GE, DiCarlo AL, et al. Low-dose radiation therapy (LDRT) for COVID-19: Benefits or risks? *Radiation research* 2020;194(5):452-64.
11. Miller AL, Dumford AD. Do high-achieving students benefit from honors college participation? A look at student engagement for first-year students and seniors. *Journal for the Education of the Gifted* 2018;41(3):217-41.
12. Kwiek M, Roszka W. Gender-based homophily in research: A large-scale study of man-woman collaboration. *Journal of Informetrics* 2021;15(3):101171.
13. Scott S, Marchetti C. A Review of the Biennial AHEAD Surveys: Trends and Changes in the Demographics and Work of Disability Resource Professionals. *Journal of Postsecondary Education and Disability* 2021;34(2):107-26.
14. Shannon G, Minckas N, Tan D, et al. Feminisation of the health workforce and wage conditions of health professions: an exploratory analysis. *Human resources for health* 2019;17(1):1-16.
15. Rich-Edwards JW, Kaiser UB, Chen GL, Manson JE, Goldstein JM. Sex and gender differences research design for basic, clinical, and population studies: essentials for investigators. *Endocrine reviews* 2018;39(4):424-39.
16. Rice S, Winter SR, Doherty S, Milner M. Advantages and disadvantages of using internet-based survey methods in aviation-related research. *Journal of Aviation Technology and Engineering* 2017;7(1):5.
17. Vassileva J, Applegate K, Paulo G, Vano E, Holmberg O. Strengthening radiation protection education and training of health professionals: conclusions from an IAEA meeting. *Journal of Radiological Protection* 2022;42(1):011504.
18. Karjodkar FR. *Essentials of oral & maxillofacial radiology*: Jaypee Brothers Medical Publishers; 2019.
19. Memari AH, Panahi N, Ranjbar E, et al. Children with autism spectrum disorder and patterns of participation in daily physical and play activities. *Neurology research international* 2015;2015.
20. Bidell MP, Stepleman LM. An interdisciplinary approach to lesbian, gay, bisexual, and transgender clinical competence, professional training, and ethical care: Introduction to the special issue. *Journal of homosexuality* 2017;64(10):1305-29.
21. Basha SMA, BinShabaib MS, SS AL. Assessment of Knowledge towards Radiation Protection Measures among Newly Graduated Dentists from Egypt and the Kingdom of Saudi Arabia: A Questionnaire-Based Cross-Sectional Study. *Dent J (Basel)* 2022;10(6).
22. Dabas CS, Muljana PS, Luo T. Female students in quantitative courses: An exploration of their motivational sources, learning strategies, learning behaviors, and course achievement. *Technology, Knowledge and Learning* 2023;28(3):1033-61.
23. Su R, Rounds J. All STEM fields are not created equal: People and things interests explain gender disparities across STEM fields. *Frontiers in psychology* 2015;6:189.
24. Meschitti V, Lawton Smith H. Does mentoring make a difference for women academics? Evidence from the literature and a guide for future research. *Journal of Research in Gender Studies* 2017;7(1):166-99.
25. Choroszewicz M, Adams TL. *Gender, age and inequality in the professions: Exploring the disordering, disruptive and chaotic properties of communication*: Routledge; 2019.
26. Main K. *Teaching middle years: Rethinking curriculum, pedagogy and assessment*: Routledge; 2020.

Authors Contribution

Contribution	Hayati K	Bany ZU	Amirah K
Concepts or ideas	√	√	√
Design	√	√	√
Definition of intellectual content	√		
Literature search	√	√	√
Experimental studies	√		√
Data acquisition	√	√	√
Data analysis	√	√	
Statistical analysis	√		√
Manuscript preparation	√		√
Manuscript editing	√	√	√
Manuscript review	√	√	√



JDS (Journal of Syiah Kuala Dentistry Society) is an Open Access Journal licensed under a Creative Commons Attribution-ShareAlike 4.0 International License. This license authorizes the utilization, replication, modification, distribution, and reproduction of the article in any medium or format, provided that due credit is given to the original Author (s) and the source, a link to the Creative Commons license is provided, and any alterations made to the article are duly indicated.

Citation Format: Hayati K, Bany ZU, Amirah K. Analysis of knowledge of professional dentist students regarding dentistry radiation in pediatric. J Syiah Kuala Dent Soc. 2023; 8(2): 200–205.

Publisher's Note: The authors of this article assert that all claims made herein are exclusively their own and may not necessarily reflect the views of their respective affiliated institutions or those of the publisher, editors, and reviewers. The publisher does not provide any guarantee or endorsement for any product subject to evaluation in this article or any claim made by its manufacturer.

Knowledge Dentistry Radiation In Pediatric