International Journal Dental and Medical Sciences Research
Volume 4, Issue 6, Nov-Dec 2022 pp 287-291 www.ijdmsrjournal.com ISSN: 2582-6018

Awareness and Knowledge of Oral Radiology among Dental Undergraduates - A Cross Sectional Study

Dr. Sowmiya G[1], Dr.AravindhSwamy R M[2], Dr. Thalaimalai Saravanan[3]
[1] *Intern, KarpagaVinayaga Institute of Dental Sciences*
[2] *Senior lecturer, Department of Oral Medicine and Radiology, KarpagaVinayaga Institute of Dental Sciences*
[3] *Professor, Department of Oral Medicine and Radiology, KarpagaVinayaga Institute of Dental Sciences*

Submitted: 05-11-2022 Accepted: 20-11-2022

ABSTRACT
Dentists perform faulty radiographic procedures, as reported in few literatures. This is due to inadequate training of undergraduate students during the course of study.
AIM: To assess the precise knowledge and awareness of dental radiology among dental undergraduates and to analyze the nature of their knowledge levels.
METHODS: A questionnaire study containing 30 multiple choice questions from oral radiology. The questions were pertained to three domains. 1. General principles. 2. Radiobiology/ Radioprotection. 3. Technique/ Interpretation. The sample size was 250.
RESULTS: Less statistical difference was found in General principles domain. In radiobiology/ radioprotection, students of fourth year and interns answered comparatively better than students of third year. Fourth year students performed better than other years in technique/ interpretation domain.
CONCLUSION: From the results of the study, it was evident that students had less knowledge about Technique/ interpretation.It is high time already; hence the dental fraternity should concentrate more on training the students about technique and interpretation in oral radiology to improve the standard of diagnosis and treatment planning.
KEYWORDS: Oral radiology, radiographs, radioprotection, techniques, undergraduates, dentists.

I. INTRODUCTION

Radiographs play a very important role in the diagnosis and treatment planning. So, it is essential for every dentist to know the principles of oral radiology and implement the same in day-to-day practice.

But few literatures show that many dentists perform inappropriate radiographic procedures[1]. This leads to inadequate quality for diagnosis, high radiation exposure to patients, and damage to the environment. The most common inappropriate practices are inadequate film development, wrong use of cone indicators, improper radiographic technique, long exposure times, failing to shield patients during radiographic exposure and improper disposal of lead foil and processing solutions[2,3]. So, it is important for every undergraduate to have proper knowledge about radiology.

For methodological techniques to be suggested and the curriculum to be improved, learning shortcomings must be evaluated. With that backdrop, the goal of this study was to assess the precise knowledge and awareness of dental radiology among undergraduates and to analyze the nature of their knowledge levels.

II. MATERIALS AND METHODS

This cross-sectional study was conducted at KarpagaVinayaga Institute of Dental Sciences, Chengalpet, Tamil Nadu, India. The data was validated and approved by the Institutional Ethical Committee.

The participants were undergraduate students of third year, fourth year and interns. Students of first year and second year did not participate because oral radiology is not a subject in their curriculum. To access the students' knowledge, a self-administrated questionnaire in Google forms was sent to 250 students.

The questionnaire consisted of 30 multiple choice questions from oral radiology. The questions were pertained to three domains. **1. General principles. 2. Radiobiology/ Radioprotection. 3. Technique/ Interpretation.** The question had been previously validated according to the protocol of Ferreria et al. Each question had three options**1. True 2. False 3.I don't know**. I don't know option was added to prevent random answers from the students just by guessing.

The results were tabulated in Microsoft Excel spreadsheet and subjected to statistical analysis using SPSS software version 24. The students received the questionnaire only after

International Journal Dental and Medical Sciences Research
Volume 4, Issue 6, Nov-Dec 2022 pp 287-291 www.ijdmsrjournal.com ISSN: 2582-6018

agreeing to participate and gave their written informed consent.

QUESTIONNAIRE

Questions and their respective correct answers are given below.

The options given were 1.True 2.False 3.I don't know

GENERAL PRINCIPLES

1. X-rays are electromagnetic radiation.	True
2. During examination, the x-ray operator must protect himself from the reflected rays	False
3. The x-ray machine must be turned off when not in use in order to avoid inadequate x-ray emission.	False
4. It takes 5 seconds after an exposure to scatter radiation be dissipated.	False
5. It is not possible to generate x-rays without power supply.	True
6. The oil in the tube head is heated when the x-ray machine is turned on, even if no exposure is performed	False
7. The room must be immediately isolated if a x-ray tube is broken.	False
8. A radiograph fixed within 15 seconds is adequate for diagnosis.	False
9. Covering the processing solutions can extend their usage time	True
10. Rinse stops the action of the developer in the manual processing	False

RADIOBIOLOGY/ RADIOPROTECTION

11. Routine radiographic examination with a six-month interval cannot cause stochastic biological effects	False
12. Radiographic examination in pregnant women must be performed only in the second trimester of pregnancy in order to reduce the chance of deleterious effects.	True
13. Protecting gonads from radiation is not necessary, because dental radiographs are taken in the head and neck region	True
14. All human tissues have the same radio sensitivity	False
15. Whole body low-intensity-fractionated irradiation is more dangerous than high-intensity-localized irradiation.	True
16. X-ray operators have minimal chance of somatic effects if they correctly adopt the radioprotection rules	True
17. Barriers like lead walls are mandatory to ensure adequate protection for the operator.	False
18. An adequate maintenance of the x-ray machine results in better productivity, and protection for both operator and patient.	True
19. Parents should hold films in children's mouth if they do not cooperate during examination.	True
20. Periapical radiographs are strictly indicated for children only in cases of emergency.	False

TECHNIQUE/INTERPRETATION

21. Bite-wing radiographs are indicated to investigate dental decay.	True
22. Occlusal radiographs are indicated to investigate bucco-lingual bone expansion.	True
23. Panoramic radiographs are indicated to investigate incipient caries lesions.	False
24. A full-mouth series (FMX) is indicated if many teeth are absent during physical examination	False
25. An unerupted superior left-canine had dislocated coincidently with the x-ray tube in the Clark method. Therefore, it is localized in a palatal position	True
26. An elliptical radiolucency in the apex of vital lower pre-molars with intact lamina	True

International Journal Dental and Medical Sciences Research
Volume 4, Issue 6, Nov-Dec 2022 pp 287-291 www.ijdmsrjournal.com ISSN: 2582-6018

dura probably refers to the mental foramen.	
27. A diffuse radiolucency in the mandibular body, apically to lower molars, may indicate an aggressive lesion named "Stafne bone defect".	False
28. Since it onset, dental decay is radiographically detected.	False
29. Multilocularameloblastoma has a ground-glass appearance	False
30. Tooth displacement and bone expansion are typical of malignant lesions	False

III. RESULTS

The overall response was 250. The final sample comprised of 100 (40%) third year, 64(25.6%) fourth year and 86(34.4%) intern students. (Table 1)

Table 1: Overall response rate

Total n	250
Third year n (%)	100 (40)
Fourth year n (%)	64 (25.6)
Interns n (%)	86 (34.4)

Table 2: Correct and incorrect answers per year group

	Third year n (%)	**Fourth year n (%)**	**Intern n (%)**	**Total n (%)**
Correct	986(32.4)	1255(65.3)	1543(59.8)	3784(50.4)
Incorrect	2014(67.1)	665(34.6)	1037(40)	3716(49.5)
Total	3000	1920	2580	7500

Table 2 showing the percentage of correct and incorrect answers to the questionnaire

Analyzing the questions separately, question 1(X-rays are electromagnetic radiation) had the highest number of correct answer. On the other hand, question 27 (A diffuse radiolucency in the mandibular body, apically to lower molars, may indicate an aggressive lesion named 'Stane bone defect') produced the largest number of incorrect answer.

Analyzing each questionnaire domain, less statistical difference was found in General principles domain. In radiobiology/ radioprotection, students of fourth year and interns answered comparatively better than students of third year. Fourth year students performed better than other years in technique/ interpretation domain. (Table 3)

Table 3: Correct and incorrect answers per year group in relation to the questionnaire domains.

Domain		**Third year n (%)**	**Fourth year n (%)**	**Intern n (%)**	**Total n (%)**
1. General Principles	**Correct**	726 (72.6)	506 (79)	658 (76.8)	1890(75.6)
	Incorrect	274 (27.4)	134 (20.9)	202 (23.4)	610(24.4)
	Total	1000	640	860	2500
2. Radiobiology/ Radioprotection	**Correct**	443 (44.3)	429(67)	546(63.4)	1418(56.7)
	Incorrect	557(55.7)	211(32.9)	314(36.5)	1082(43.2)
	Total	1000	640	860	2500
3. Technique/ Interpretation	**Correct**	289(28.9)	393(61.4)	495(57.5)	1177(47)
	Incorrect	711(71.1)	247(38.5)	365(42.4)	1323(52.9)
	Total	1000	640	860	2500

IV. DISCUSSION

This study was conducted to analyze the knowledge of dental undergraduates pertaining to the field of oral radiology. It helps to access the knowledge of the students developed during their undergraduate course.

Many previous studies show that there are numerous faulty radiographs which are not useful

in the diagnosis. Literature also suggests that many dentists have neglected oral radiology. Undergraduate dental students must realize the importance of oral radiology and have at least basic knowledge of dental radiographs to arrive at an accurate diagnosis. Therefore, in this study students' knowledge on oral radiology was evaluated by a questionnaire study containing three domains (1. General principles 2.Radiobiology/Radioprotection 3. Technique/Interpretation)The questionnaire used in this study was validated by chief oral radiologists and a thorough opinion was obtained. Initially a pilot study was conducted to check the understanding of the questions, consistency of data and reproducibility of the questionnaire. In this study, fourth year students answeredmore questions correctly than students of third year and interns. However, some students lacked knowledge in relation to specific domains which was assessed in the study.

In the general principles domain, most of the students answered correctly with less statistically significant difference between them. The evaluated students answered correctly about 70 to 80% of this domain showing that they possess better knowledge in the basic principles of oral radiology.

In radiobiology and radioprotection, there existed a definite gap in the knowledge between different categories. Third year students had minimum knowledge in this domain because they had not studied the subject fully when the study was conducted. Hence, they produced more incorrect answers than other years. However, students of 4^{th} year and interns had satisfactory knowledge of the same. The result indicated a little less awareness about radio protection which shows that students need enhancement of knowledge towards the same. This strongly indicates that it is essential to emphasize the importance of radioprotection for the patient as well as to the operator which will eventually prevent the damage to the environment.

The technique/ Interpretation domain showed a vast difference in the result. Fourth year students performed better than other years. They answered more questions correctly because they were studying the subject for the examination when the study was conducted. Hence, they outperformed when compared to the students of other years.

In dentistry, radiographs have become the most important part for diagnosis and treatment. In comparison to other fields here in oral radiology, application of skill as well as knowledge is essential for proper diagnosis. The results obtained from the study showed that students have less knowledge of technique/ interpretation domain As a dental surgeon, a complete knowledge of various available radiograph modalities, their application and accurate interpretation of the images is necessary for proper ethical and efficient practice of dentistry in the future.

Undergraduate institutions play a key role in inculcating the knowledge of oral radiology in students. They have a major role in producing highly skilled, trained and efficient dentists to the society. The students must be trained completely in the radiographic techniques and adequate knowledge should be administered during their undergraduate course itself.

V. CONCLUSION

From this study it is evident that undergraduate students have less knowledge in technique/ interpretation domain. The dental fraternity should emphasize more on technique and interpretation in the curriculum which is the need of the hour. The Institutions should conduct lectures or continuing Dental Education(CDE) to ensure better knowledge of oral radiology among undergraduates. The importance of oral radiology should be reinforced in the students during their undergraduate course because of its wide application in diagnosis and treatment planning. Dental students must gain more knowledge about oral radiology to have better clinical practice in the future.

REFERENCES

[1]. Aps JK. Flemish general dental practitioners' knowledge of dental radiology.DentomaxillofacRadiol. 2010; 39: 113-8.
[2]. Jacobs R, Vanderstappen M, Bogaerts R, Gijbels F. Attitude of the Belgian dentist population towards radiation protection. DentomaxillofacRadiol. 2004; 33: 334-9.
[3]. Shahab S, Kavosi A, Nazarinia H, Mehralizadeh S, Mohammadpour M, Emami M. Compliance of Iranian dentists with safety standards of oral radiology. DentomaxillofacRadiol. 2011; 41: 159-64.
[4]. Svenson B, Söderfeldt B, Gröndahl HG. Attitudes of Swedish dentists to the choice of dental X-ray film and collimator for oral radiology.DentomaxillofacRadiol. 1996; 25: 157-61.
[5]. Svenson B, Söderfeldt B, Gröndahl HG. Analysis of dentists' attitudes towards risks in oral

radiology.DentomaxillofacRadiol. 1996; 25: 151-6.

[6]. Linjawi AI, Walmsley AD, Hill KB. Online discussion boards in dental education: potential and challenges. Eur J Dent Educ. 2012; 16: e3–9.

[7]. Ferreira NP, Batista MJ, Sousa MLR, Cury JA. Validation of the Questionnaire about Knowledge Cariology [in portuguese]; 2012 [in press].

[8]. Ruprecht A. The status of oral and maxillofacial radiology worldwide in 2007.DentomaxillofacRadiol. 2009; 38: 98-103.

[9]. Olapiriyakul K, Scher JM. A guide to establishing hybrid learning courses: employing information technology to create a new learning experience, and a case study. Internet Higher Educ. 2006; 9: 287-301.

[10]. Handal B, Groenlund C, Gerzina T. Dentistry students' perceptions of learning management systems. Eur J Dent Educ. 2010; 14: 50-4.

[11]. Neuhaus KW, Schegg R, Krastl G, Amato M, Weiger R, Walter C. Integrate learning in dentistry: baseline data and first evaluation at the Dental School of Basel. Eur J Dent Educ. 2008; 12: 163-9.

[12]. Woltering V, Herrler A, Spitzer K, Spreckelsen C. Blended learning positively affects students' satisfaction and the role of the tutor in the problem-based learning process: results of a mixed-method evaluation. Adv Health Sci Educ. 2009; 14: 725-38.

[13]. Tosoni GM, Campos DM, Silva MR. Frequency and quality management of intraoral radiographic examinations in private dental practices. Rev Odontol UNESP. 2003; 32: 25-9

[14]. MPV Prabhat, S Sudhakar, B Praveen Kumar. Knowledge, attitude and perception (KAP) of dental undergraduates and interns on radiographic protection-A questionnaire based cross-sectional study . Journal of Advanced Oral Research 2011; 2 (3), 45-50.

[15]. Michael G Botelho, Kalpana R Agrawal, Michael M Bornstein. An systematic review of e-learning outcomes in undergraduate dental radiology curricula—levels of learning and implications for researchers and curriculum planners. Dentomaxillofacial Radiology 2019 48 (1), 20180027.

[16]. ShaluRai, DeepankarMisra, AyushDhawan, KuberTyagi, MukulPrabhat, MansiKhatri. Knowledge, awareness, and aptitude of general dentists toward dental radiology and CBCT: A questionnaire study. Journal of Indian Academy of Oral Medicine and Radiology. 2018;30 (2), 110

[17]. SHaghanifar, E Moudi, F Abesi, A Bijani, O Kazemi. A Study of Dentists' Knowledge about Dental Radiology Principles. Journal of Babol University of Medical Sciences. 2015; 17 (9), 34-38

[18]. Crandell CE. Cause and frequency of intraoral x-ray errors by dental and hygiene students. J Dent Educ. 1958;22:189–98.

[19]. Eliasson S, Lavstedt S, Wouters F, Ostlin L. Quality of intraoral radiographs sent by private dental practitioners for therapy evaluation by the Social Insurance Office.Swed. Dental J. 1990;14:81–9.

[20]. Kavadella A, Tsiklakis K, Vougiouklakis G, Lionarakis A. Evaluation of a blended learning course for teaching oral radiology to undergraduate dental students. Eur J Dent Educ. 2012; 16: e88-95