

# Radiology Teaching in Syiah Kuala University: Assessment of Dental Students' Knowledge in Intra-Oral Radiograph Procedure

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## ABSTRACT

This study sought to assess dental students' level of knowledge in intra-oral radiograph procedure at the Faculty of Dentistry of Syiah Kuala University.

**Methods:** This is a descriptive study with a cross-sectional approach, using a validated online questionnaire for data collection. Purposive sampling technique was utilised to determine the subjects used for this study. The number of subjects was 100 clinical dental students.

**Results:** The results of this study showed that, pertaining to the knowledge of clinical dental students of the Faculty of Dentistry, Syiah Kuala University on the procedure for intra-oral radiographs, 55 students had a good level of knowledge, 38 students had a sufficient level of knowledge, and 7 students had a poor level of knowledge.

**Conclusion:** The knowledge of dental students of the Faculty of Dentistry, Syiah Kuala University in intra-oral radiograph procedure is good (79.63%).

## INTRODUCTION

Dental radiography is a diagnostic imaging using X-rays. The application of X-rays is important in dentistry because radiographs are required as part of routine examinations, helping to establish diagnoses and treatment plans as well as for evaluation of the results of patient treatment (Pramod, 2011). Radiographs are used as supporting examinations, so they are very helpful for dentists and clinical dental students (Raidha et al., 2018).

Clinical dental students mentioned in this study refer to students who are undergoing clinical dental education at the Faculty of Dentistry, Syiah Kuala University, Banda Aceh, Indonesia. The results of

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radiographs obtained by clinical dental students are often diagnostically unacceptable. Repeated radiographs must be taken, resulting in patients, clinicians, and technicians being exposed to unnecessary radiation. These errors include operator errors in the selection of techniques, double-exposure films, phalangioma, under-exposure or over-exposure, improper film placement, and errors when the operator processes the film (Wilson & Boelt, 2014). The repetitive radiograph taking is caused by the lack of knowledge of clinical dental students about standard operating procedures and the ability of radiographic technique skills (Dhillon et al., 2012). Skills in radiographic techniques include technique selection, tool specifications, settings, image capture process, image processing, image storage, and patient positioning (Fathiyya et al., 2019). There are 2 types of radiographic techniques, namely intra-oral radiography and extraoral radiography. Intra-oral radiography is one of the skills that must be learned by clinical dental students during their clinical dental year (FKG USK, 2021).

A previous study done by Mestika (2012) on clinical dental students of the Faculty of Dentistry University of Sumatra Utara showed that 83.8% of clinical dental students were well-versed in the use of radiography, 78.8% of clinical dental students knew dental radiology, and 60% of clinical dental students did radiography before dental treatment. Clinical dental students' awareness of the hazard of radiation was 88.8%, and 66.3% of clinical dental students recognized the importance of supervised radiographic taking (Mestika, 2012). A study done by Khan et al. (2015) revealed that 79% of the radiographs examined had one or more errors that compromised the diagnostic results of radiographs. Based on research conducted by Haghnegahdar et al. (2013), there were several errors made by clinical dental students in taking periapical radiographs, namely 35.4% in improper film placement, 18.2% in cone cutting, 16.6% in horizontal angulation, and 14.4% in vertical angulation. These inaccuracies resulted in repeated patient exposure to radiation, cost, and time inefficiency (Haghnegahdar et al., 2013).

Based on these data, the researchers sought to assess dental students' knowledge intra-oral radiograph procedure at the Faculty of Dentistry of Syiah Kuala University.

## **METHODS**

This is a descriptive study with a cross-sectional approach. The study was conducted online from December 23, 2022, to January 6, 2023. The subjects in this study were clinical dental students of the Faculty of Dentistry of Syiah Kuala University Dental Hospital (USK-RSGM) who met the inclusion criteria. Determination of subjects was carried out using a purposive sampling technique and the number of subjects who met the inclusion criteria was 100 people.

### **Subject selection**

The subjects in this study were USK-RSGM clinical dental students who met the inclusion criteria. The researchers communicated with the research subjects through the head of each class using WhatsApp. A Google Forms link was distributed to the committee in order for it to be shared in the respective class group chats. In this study, the number of subjects was 100 clinical dental students. This number of subjects fulfills the number of subjects required by the researchers.

#### **Inclusion Criteria**

- (i) Clinical dental student at USK-RSGM Banda Aceh.
- (ii) Willing to fill out an Informed Consent form and become a research subject.
- (ii) Clinical students of class 2019, 2020, 2021 and 2022 who have completed the radiology cluster.

### **Validity and reliability test**

The data collected from the online questionnaire as a measuring tool to obtain data in accordance with the research objectives was tested for reliability and validity. The validity and reliability test on the online questionnaire used tested for 20 questions related to knowledge regarding dental intra-oral radiographs procedures. Testing the validity and reliability of the questionnaire was carried out on 30 clinical dental students of the Faculty of Dentistry of Syiah Kuala University.

### **Data collection**

Research data collection was conducted online. Students who filled out the subject selection form and met the inclusion criteria were asked to fill out the Informed Consent sheet and Google Forms questionnaire sent by the clinical dental student committee. Respondents could contact the researchers via WhatsApp or short message service (SMS) if any queries arose while answering the questionnaire for further clarification.

### **Data processing**

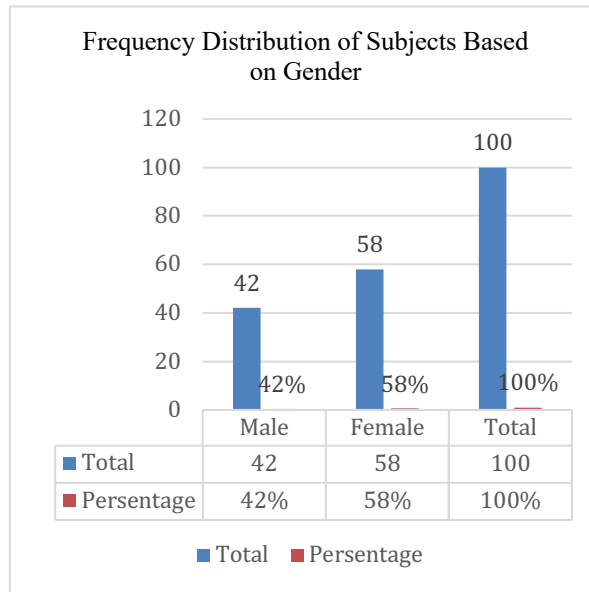
The knowledge of dental students of the Faculty of Dentistry, Syiah Kuala University in intra-oral radiograph procedure was measured by giving scores in the questionnaire. The number of question items was 11 and each question item required the respondents to choose the most appropriate answer in the form of 'Yes' or 'No'. For the scoring of each question, a correct answer was given a score of 1 while a wrong answer was given a score of 0 (Pranatawijaya et al., 2019).

### **Research data analysis**

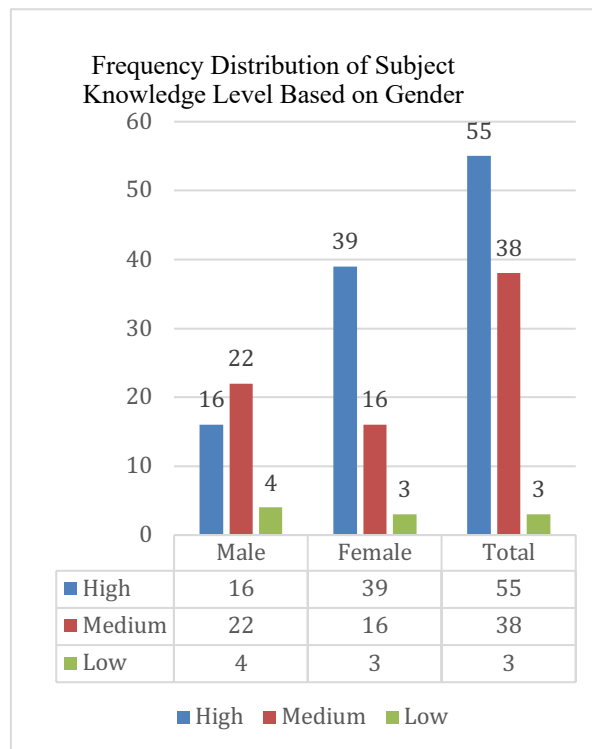
The data used in this study was primary. The collected primary data was analysed descriptively to determine the level of knowledge. The data was processed using the SPSS version 25 and Microsoft Excel 2013 application.

## **RESULTS**

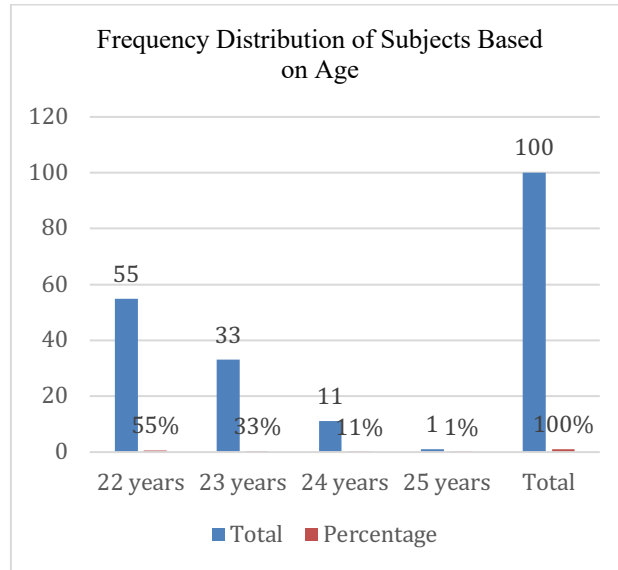
This study was conducted by providing a validated online questionnaire using Google Forms involving 100 clinical dental students of the Faculty of Dentistry, Syiah Kuala University who met the inclusion and exclusion criteria. This study aimed to assess the knowledge of dental students of the Faculty of Dentistry, Syiah Kuala University regarding the procedure for taking intra-oral radiographs.



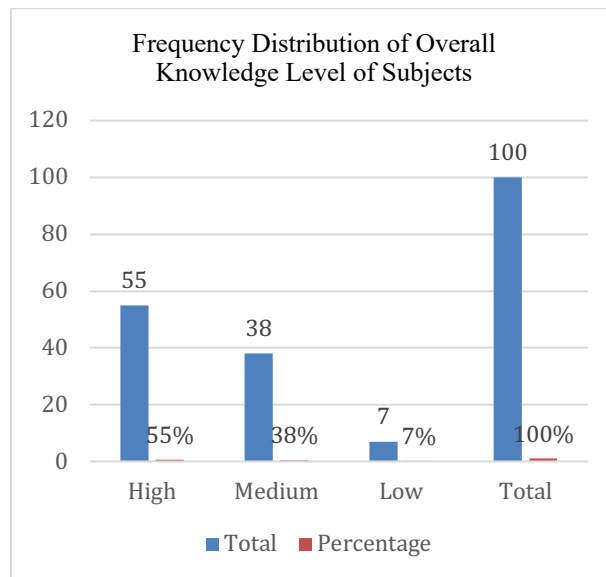
Graph 1. Frequency distribution of subjects based on gender



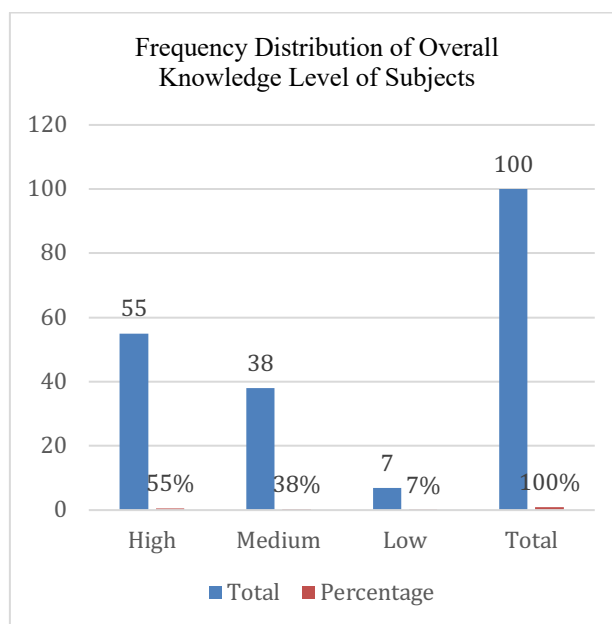
Graph 2. Frequency Distribution of Subject Knowledge Level Based on Gender



Graph 3. Frequency distribution of subjects based on age



Graph 4. Frequency Distribution of Overall



Graph 5. Frequency distribution of overall knowledge level of subjects

Table 1. Frequency Distribution of Subject Knowledge Level Based on Questions

Question	ANSWER	
	YES	NO
Question 1	77 (77%)	23 (23%)
Question 2	71 (71%)	29 (29%)
Question 3	70 (70%)	30 (30%)
Question 4	88 (88%)	12 (12%)
Question 5	80 (80%)	20 (20%)
Question 6	96 (96%)	4 (4%)
Question 7	52 (52%)	48 (48%)
Question 8	80 (80%)	20 (20%)
Question 9	97 (97%)	3 (3%)
Question 10	66 (66%)	34 (34%)
Question 11	99 (99%)	1 (1%)

Based on the results of the online questionnaire, the knowledge category of dental students of the Faculty of Dentistry, Syiah Kuala University regarding the procedure for taking intra-oral radiographs was obtained as follows:

$$\frac{\text{Total score of respondents who answered correctly}}{\text{Total maximum score of respondents from the questionnaire}} \times 100\%$$

$$\frac{876}{1.100} \times 100\%$$

$$= 79.63\% \text{ (Good).}$$

## DISCUSSION

This is a descriptive study with a cross-sectional approach and the subject was determined using the purposive sampling technique. The study took place from December 23, 2022, to January 6, 2023, among clinical dental students of the Faculty of Dentistry, Syiah Kuala University. The research subjects filled out an online questionnaire containing 11 questions regarding the procedure for taking intra-oral radiographs. Each subject's "correct" answer was given a score of 1, while their "wrong" answer was given a score of 0.

This study aims to assess the knowledge of dental students of the Faculty of Dentistry, Syiah Kuala University regarding the procedure for taking intra-oral radiographs. Intra-oral radiography is an examination of teeth and surrounding tissues where the film is placed in the patient's mouth. Used as a supporting examination, it is very helpful for dentists and clinical dental students in diagnostic and proper treatment planning according to the indications of the patient's case. Radiographs are also needed in post-treatment evaluation (Musfira et al., 2022; Yoshida & Honda, 2017).

To fulfill the ideal radiograph quality, such as good contrast, image geometry, X-ray characteristics, sharpness, and image resolution, students need to create radiographs with minimum errors. Errors in radiographs and poor-quality radiographs are still common. Poor-quality radiographs lead to repetition of taking radiographs, unnecessary exposure to radiation, and increasing costs and time (Fathiyya et al., 2019; Koole et al., 2017).

The repetition of taking photos on radiographs is caused by the lack of comprehensive knowledge regarding standard operating procedures and radiographic technique skills among clinical dental students. Clinical dental students often ignore the procedures for performing dental radiography appropriately (Elangovan et al., 2016). Factors that can influence knowledge include age, education, history of obtaining information, experience, and environment (Suwaryo & Yuwono, 2017; Badri et al., 2020).

Based on Graph 1, it is known that the research subjects consisted of 58 female students and 42 male students, indicating that the majority was female. The number of female subjects in this study is higher because it follows the number of Faculty of Dentistry students on the active student data portal on the Syiah Kuala University website and attendance data which is dominated by female students. Based on research by Paryontri and Adisiyasha (2019), it showed that the number of female respondents (84%) was more than male respondents (16%). Rahtyanti et al. (2018) also showed that the subjects were dominated by the female gender at 89.2%, while males were only 11.8%. This proves that female subjects often outnumber their male counterparts in some related studies.

Based on Graph 2, the frequency distribution of subject knowledge level based on gender shows that the research subjects have a good knowledge about the procedure for taking intra-oral radiographs, namely 39 female students (67.24%) and 16 male students (38.09%). The results indicate that the female research subjects have a better level of knowledge regarding the procedure for taking intra-oral radiographs. This is in agreement with previous research done by Anwar et al. (2019) which showed that women tend to have a higher level of intelligence compared to men, especially in the learning process in college as well as in terms of comprehensive knowledge learned.

Graph 3 shows that most of the research subjects were 22 years old, specifically 55 students (55%). As for research subjects aged 23 years old, there were 33 students (33%) while research subjects aged 24 years old were 11 students (11%), and research subjects aged 25 years old was 1 student (1%). This is in accordance with the obtained attendance data. Research by Budiman and Riyanto (2014) showed that the age of respondents in their study ranged from 22 to 25 years old, which is categorised as 'young adult' and has a more mature thinking ability than mid-adolescence.

Graph 4 shows that most of the research subjects had a sufficient level of knowledge regarding the procedure for taking intra-oral radiographs, where 55 students (55%) were in the good category, 38 students (38%) were in the sufficient category, and 7 students (7%) were in the poor category. This is because there are differences in the knowledge and abilities of respondents which is influenced by knowledge factors, namely information obtained from both formal and non-formal education that can produce changes or improvements in knowledge (Wawan & M., 2011). In line with previous research by Iswani et al. (2022) on the level of knowledge of bisectrical periapical radiography in 2017 among the Faculty of Dentistry of Baiturrahmah University students with a sample of 49 students, it was concluded that most students' knowledge of bisectrical periapical radiography was moderate.

Table 1 shows the frequency of the subjects' answers based on the question items of the knowledge level questionnaire regarding the procedure of taking intra-oral radiographs. It can be seen that the 6th, 9th, and 11th question items about the disadvantages of bisecting technique, bitewing radiography technique, and the result of incorrect film size selection making the patient uncomfortable were the most correctly answered questions. This is because clinical students already have basic knowledge about intra-oral radiography regarding the advantages, disadvantages, film size, and classification of intra-oral radiography techniques.

According to research done by Dhillon et al. (2012), the repetition of radiography taking was influenced by a lack of knowledge of standard operating procedures and comprehensive knowledge of radiographic technique skills. This is also in line with research conducted by Patankar et al. (2019) which stated that the error of periapical radiography can be determined based on an audit or assessment that has been set according to standards from the National Board of Radiation Protection guidance of the United Kingdom. The results of this research stated that the types of errors that can be made when taking periapical radiographic photographs based on a predetermined audit are errors during film positioning, exposure errors, and during chemical processing in the oral cavity (Patankar et al., 2019).

Table 1 which discusses the frequency of answers of research subjects based on questionnaire items of knowledge regarding the procedure for taking intra-oral radiographs on average shows a good level of knowledge. The difference in the percentage of subjects who answered correctly on several questions shows that this condition is influenced by factors of education level and availability in obtaining information about intra-oral radiographs, both of which are received during pre-clinic, seminars, training, and workshops (Muppirala et al., 2020). This contrasts with previous research by de-Azevedo-Vas et al. (2013) regarding clinical dental students' knowledge of oral radiology which did not increase and decreased significantly as a result from inadequate training for clinical dental students. The results of the study stated that there is a need to increase the knowledge of clinical dental students in performing radiographic procedures (de-Azevedo-Vaz et al., 2013).

The national standard for dental professional education in Indonesia (SNP2DGI) explains that the level of clinical ability of dentists for radiographic procedures according to the Miller pyramid is divided into 4 levels. Dentists' competence in procedural intra-oral radiography is at level 4, which means that dentists must have the knowledge and ability to perform intra-oral procedures independently (AFDOKGI, 2019). This is in line with the present study results, which is clinical dental students of the Faculty of Dentistry, Syiah Kuala University have good and adequate knowledge regarding the procedure for taking intra-oral radiographs (79.63%).



## CONCLUSION

Based on research that has been conducted on 100 respondents, it can be concluded that 79.63% of clinical dental students of the Faculty of Dentistry, Syiah Kuala University have good knowledge about the procedure for taking intra-oral radiographs.

## ADVICE

- (i) Further research needs to be done on other fields of dentistry so that it can be an evaluation of the dental education program.
- (ii) This study's limitation is due to the small number of respondents. Future research is recommended to look at the comparison between knowledge of intra-oral radiograph-taking procedures between clinical dental students, general dentists, and specialist dentists so that evaluation, socialization, and education can be done for practical knowledge needs in organizing dental practice.

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