

# Public knowledge regarding dentomaxillofacial radiographic examination in Lau Bakeri Village Deli Serdang Regency

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## Abstract

**Background:** Radiographic examination plays an important role in every stage of dental case management. Lack of public knowledge about radiography may cause it to be viewed dangerous. The purpose of the study was to determine the level of public knowledge about dentomaxillofacial radiography in Lau Bakeri Village, Deli Serdang Regency.

**Materials and Methods:** This type of research is a descriptive survey using a questionnaire as a tool to collect data. Location of this research was conducted in Lau Bakeri village. The research population is people aged 20-60 years in Lau Bakeri village as many as 3,351 people. The sampling method used the Slovin formula so that there were 370 research samples.

**Results:** Public knowledge regarding dentomaxillofacial radiographic examination in Lau Bakeri village was 14.9% in the good category, 68.6% in the sufficient category, and 16.5% in the low category.

**Conclusion:** The level of public knowledge regarding dentomaxillofacial radiographic examination in Lau Bakeri village, Deli Serdang Regency is sufficient (68.6%). Our investigation reveals reasonable public knowledge with respect to ionizing radiation. The moral obligation of doctors who refer patients to explain about the health hazards and risks associated with ionizing radiation and to provide appropriate safety measures when conducting radiological examinations.

**Key Word:** knowledge; dentomaxillofacial radiographic examination.

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## I. Introduction

The use of x-ray has always been indispensable in medicine and dentistry.<sup>1</sup> Radiographic examination plays a role in adding important information to the clinical examination, diagnosis, management, and treatment planning.<sup>1-3</sup> Dental radiography is performed at a relatively low dose, which is one of the most frequently performed radiographic procedures, and is often repeated several times.<sup>4</sup> Simple procedures such as caries diagnosis, or complex procedures such as implant placement, radiographic examination is very important.<sup>1-3</sup>

Radiography is a modality used by dentists from periapical intraoral radiography to the use of newer radiographic advances such as CBCT. Dentists use radiographs more often than other specialists. Guidelines for the use of radiographic equipment exist to avoid unnecessary exposure, as well as to identify individuals for whom radiographic examination will be useful.<sup>1,4,5</sup> It is well accepted that when performing a radiographic examination, giving ionizing radiation to a patient can be considered to have a biological effect on the body, in the form of deterministic and stochastic effects as a result of radiation exposure.<sup>1,2,6</sup>

Since ionizing radiation is invisible, it can be argued that the practitioners have a greater responsibility to inform their patients about radiation than any other diagnostic service.<sup>6</sup> It is not known whether doctors provide information on radiation safety and if this information is understood and kept by the public. Informed consent for radiographic examination is a medical-legal issue that is often overlooked in dental care. When visiting the dentist, patients or parents entrust the dentist to take care of their teeth or their children therefore they have the right to understand the treatment plan and the actions to be taken, including the risks that will arise and the benefits of a procedure, including radiographic examination.<sup>4</sup>

Although most patients are ready for dental radiography as part of the diagnosis, some patients have questions and concerns about safety during the dental radiography procedure. Some of this information may be misleading, confusing or incorrect, therefore, patients may refuse to undergo radiographic examinations based on information they receive through social media or misinformation they receive from non-professionals. The patient may also be unaware of the need for an examination by a dentist to properly diagnose and treat the

disease, which will affect the outcome of dental treatment. It is important to provide information clearly and confidently to the patient to address this issue. With all the information about radiation risks in the mainstream media and the availability of information via the internet, it makes sense for one to be concerned.<sup>6-9</sup>

It is not known whether the public's fear of radiation was exaggerated, or whether—the public was knowledgeable about dentomaxillofacial radiography and accepted the risks of associated radiation exposure. This study aimed to assess the level of public knowledge about dentomaxillofacial radiography in Lau Bakeri Village, Deli Serdang Regency.

## II. Material and Methods

The type of research used is descriptive survey research using a questionnaire as a tool to collect data. Location of this research was conducted in Lau Bakeri Village, Deli Serdang Regency, North Sumatra. The research was conducted in the form of a questionnaire which would be distributed to the local community. The population in this study was the community in Lau Bakeri Village aged 20-60 years and totaling 3,351 people. Inclusion criteria were willing to be a sample and can be interviewed. The exclusion criteria were residents who being sick. The sample of this research was people aged in between 20-60 years living and settled in Lau Bakeri Village. Calculation of the sample size was determined based on the Slovin formula so that the number of research samples was 370 respondents. After completing the informed consent form, respondents were given a paper questionnaire and asked to hand it back when complete. No assistance was offered to complete the questionnaire, but it was specifically requested for writing or reading.

The data that has been collected is calculated and examined. Data analysis was carried out by univariate data then processed descriptive in percentage form. Each correctly chosen choice had a value of 1, and for both each wrongly chosen and 'don't know response' had a value of 0. The level of knowledge assessment is based on Arikunto's which was categorized, as good if the score was > 75-100% (12-15 points), sufficient if the score was 60-75% (9-11 points), and low if the score was < 60% (< 11 points).<sup>10</sup> Ethical clearance was obtained from (Health Research Ethical Committee of North Sumatera) Universitas Sumatera Utara No. 570/ KEP/ USU/ 2021.

**Table 1.** Respondent's experience of radiographic examination (I) and the results of measuring respondents' knowledge about dentomaxillofacial radiography (II)

No	Questions	%
<b>I. Respondent's experience regarding radiographic examination</b>		
1.	Respondents know what radiographic examination is.	69.5
2.	Respondents had undergone a general radiographic examination.	53.2
3.	Respondents know when first time radiography is used.	55.9
4.	Respondents have done dentomaxillofacial radiography.	28.6
<b>II. Respondent's knowledge about dentomaxillofacial radiographic examination</b>		
5.	Respondents know whether in dentistry there are radiographic examination (x-ray)	58.1
6.	Respondents know the importance of radiographs (x-ray) in supporting dental and oral care.	67.0
7.	Respondents know whether the type of dentomaxillofacial radiography (x-ray) is divided into intraoral (inside the mouth) and extraoral (outside the mouth).	60.5
8.	Respondents know that there is no difference between radiographic techniques for children and adults.	44.1
9.	Respondents know the function of radiographs (x-ray) is to be able to see the teeth development and growth.	64.6
10.	Respondents know the function of radiographs (x-ray) is to be able to see tooth decay, such as the extent of caries cavity.	65.7
11.	Respondents had not done radiographs (dental x-ray) without a recommendation letter from a doctor.	69.5
12.	Respondents know that a radiographic examination (x-ray photo) needs to be done to help establish the diagnosis of dental and oral disease.	55.1
13.	Respondents know whether radiographs (x-ray) of the teeth can be done before determining the treatment plan.	55.7
14.	Respondents know whether the effects of radiation can cause damage to body tissue cells and reproductive cells.	61.6
15.	Respondents know whether long-term use of radiographs (x-ray) can cause dry mouth, skin damage and difficulty swallowing.	35.4
16.	Respondents know whether the unnecessary use of radiographs (x-ray) can cause interference growth and development of teeth.	56.5
17.	Respondents know that one of the patient's protections when performing a radiographic examination (x-ray) is by wearing protective clothing (apron)	61.6
18.	Respondents know whether the use of radiographs (x-ray) exposed to high doses of radiation for a certain period of time can cause acute radiation syndrome such as, fainting, vomiting, diarrhea and lesion of skin and mouth.	33.8
19.	Respondents know whether radiographic examination (x-ray) can see abnormalities of the supporting tissues of the teeth, the expansion of a lesion/tumor and jaw fractures.	54.6

**Table 2.** Level of knowledge regarding dentomaxillofacial radiographic examination based on socio-demographic characteristic of the respondents

Characteristics	Knowledge Level						Total	
	Good		Sufficient		Low		N	%
Gender	N	%	N	%	N	%	N	%
Male	25	12.8	144	73.8	26	13.3	195	100.0
Female	30	17.1	110	62.9	35	20.0	175	100.0
<b>Age (years)</b>								
20-30	13	10.1	83	64.3	33	25.6	129	100.0
31-40	23	18.3	85	67.5	18	14.3	126	100.0
41-50	13	15.9	63	76.8	6	7.3	82	100.0
51-50	6	18.2	23	69.7	4	12.1	33	100.0
<b>Education</b>								
Elementary School	0	0.0	23	57.5	17	42.5	40	100.0
Junior High School	2	3.1	55	85.9	7	10.9	64	100.0
Senior High School	7	4.0	132	75.0	37	21.0	176	100.0
Diploma	3	37.5	5	62.5	0	0.0	8	100.0
Bachelor	31	44.9	38	55.1	0	0.0	69	100.0
Master Degree	11	91.7	1	8.3	0	0.0	12	100.0
Doctoral Degree	1	100.0	0	0.0	0	0.0	1	100.0

**Table 3.** Public knowledge regarding dentomaxillofacial radiographic examination in Lau Bakeri Village Deli Serdang Regency

The level of knowledge	N	%
Good	55	14.9
Sufficient	254	68.6
Low	61	16.5
Total	370	100.0

### III. Result

The questionnaires filled out by the respondents were divided into 2 groups. Group 1 is the respondent's experience of general radiographic examination and dentomaxillofacial radiography. Group 2 is the respondent's knowledge of dentomaxillofacial radiographic examination (Table 1.).

Table 2. shows the level of knowledge regarding dentomaxillofacial radiographic examination based on socio-demographic of the respondents (gender, age, and education). Respondents had sufficient level of knowledge by gender, both male (73.8%) and female (62.9%). Likewise, based on age group, the level of knowledge is sufficient. However, based on the education group of the respondents, the level of knowledge varied. Respondents in the Elementary School (57.5%), Junior High School (85.9%), Senior High School (75.0%), Diploma (62.5%), and Bachelor (55.1%) education groups, respectively, had a sufficient level of knowledge. Respondents in the Master Degree (91.7%) and Doctoral Degree (100.0%) education groups, respectively, had a good level of knowledge. Table 3 shows that public knowledge in Lau Bakeri Village, Deli Serdang Regency, regarding dentomaxillofacial radiographic examination of 14.9% is good, 68.6% is sufficient, and 16.5% is low.

### IV. Discussion

Radiographic examination is an integral part of clinical dental examination to assist diagnosis and treatment planning in most patients, so radiography can be referred to as a diagnostic aid examination.<sup>1</sup> In this study, respondents knew about radiographic examination (69.5%) and had undergone radiographic examination, both general radiographs (53.2%) and dentomaxillofacial radiographs (28.6%), which may undergo periapical intraoral radiography, bitewing radiography or extraoral radiography, such as panoramic.

There were 58.1% of respondents who were aware of the existence of a dental radiographic examination. When compared to urban areas and developed countries, the percentage of respondents who are aware of dental radiography is higher. Sources of information regarding dental radiographic examinations apart from the mass media, including dentists, general practitioners/specialists who will perform the treatment.<sup>4,11,12</sup>

There are 60.5% of respondents who know that dentomaxillofacial radiographs are divided into two types, namely intraoral and extraoral radiographs, each of which has different uses and benefits. A total of 67.0% of respondents know the benefits of radiography for dental support and oral care, 64.6% of respondents know the use of radiography to assess the growth and development of teeth and jaws, 65.7% of respondents know that radiographic examination is performed for caries detection, and 54.6% of respondents know that with radiographic examination can be known abnormalities of the supporting tissues of the teeth and lesions or tumors. Radiographic examination is important in supporting treatment, especially in helping to confirm the

diagnosis and the characteristics and extent of disease in some clinical cases.<sup>4,5</sup> In general, dentomaxillofacial radiography plays an important role (statistically 32%) of the total radiographic examination of the human body.<sup>2,9</sup> Radiographic examination can assess the growth and development of teeth and jaws starts from childhood to old age, detection of carious lesions, periodontal disease, as well as various kinds of cysts and tumors, both benign and malignant.<sup>13-16</sup>

A total of 44.1% of respondents knew that there was no difference in the radiographic technique used between adult and pediatric patients. Younger children may find it difficult to treat, but with careful placement, children usually adapt well by the age of four.<sup>15</sup> The use of radiographs should be individualized and guided by clinical examination findings and the patient's medical and dental history. The approach must be systematic and must remember ALARA principle, which works minimize patient risk and maximize patient benefit. The use of assistive devices and the lowest possible exposure dose (by using faster speed film, reducing the average radiation dose, and reducing the exposure time) is the way to go. Sometimes it may be necessary to gradually introduce the experience to younger children over several visits. If children are unable to cooperate, radiography should be postponed and treatment based on clinical diagnosis and history on the grounds of avoiding poor radiographs, with limited diagnostic capacity should be avoided.<sup>13,15</sup>

In the study, it was found that 69.5% of respondents did a radiographic examination without including a referral letter from a doctor. It can be said that respondents did not know that to carry out a radiographic examination, a referral letter must be included. The radiographic examination carried out must be based on a decision in accordance with the professionalism of the dentist who has carried out a clinical examination keeping in mind the ALARA principle. Practitioners also in carrying out radiographic examinations consider other conditions, such as the type, frequency, and area to be examined. Repeat radiographs may be performed during periodic evaluations thereby providing additional radiation exposure for the patient.<sup>17</sup>

The use of radiography has become an integral part of modern clinical dentistry with some form of radiographic examination required of most patients in today's daily practice of dentistry. In general, dental practice in developing countries about 10% of patients undergo radiological examination.<sup>12</sup> In this study, 55.1% of respondents knew that radiographic examination was necessary to help establish the diagnosis and 55.7% of respondents knew that radiographic examination was carried out before determining the treatment plan. Radiographic examination is an important part used by dentists in helping to establish a diagnosis and is a key factor in the comprehensive treatment plan that will be given to the patient. Usually it is done for every definite complaint of the patient, detecting the extent of the disease or at the time of screening to check for the presence of disease where there are physical signs or symptoms that are not clearly visible so that they can be diagnosed.<sup>4,12,18-20</sup> The patient must be given a detailed explanation of the comprehensive treatment plan by the dentist so that the patient can participate in treatment decisions. All forms of consideration, including the possibility of undesirable events that can occur, are the basis for patients to refuse the proposed treatment plan. Patients have the right to make decisions after being informed of the significant risks, benefits and alternatives.<sup>17</sup>

In this study, it was found that only 61.6% of respondents knew that radiation can cause damage to body and reproductive tissue cells, 35.4% of respondents knew that prolonged use of radiography can cause dry mouth, skin damage and difficulty swallowing. As many as 33.8% of respondents know the effects of using high doses of radiation for a certain period of time can cause acute radiation syndrome, such as fainting and vomiting. Regardless of the type of X-ray radiation used, the radiation produced can cause side effects for the patient. The radiation dose resulting from a dentomaxillofacial radiograph is considered small; however repeated exposure and the resulting number of doses can cause irreversible damage.<sup>16</sup>

Diagnostic imaging is one of the parts used in planning patient care. After a careful clinical examination is carried out, in order to formulate an appropriate treatment plan, dentists often require further examination to confirm their clinical findings by requesting various imaging modalities. Dentists must adhere to the ALARA principle when requesting any imaging modality that is appropriate and necessary to produce the desired diagnostic radiograph.<sup>9</sup> Dentists must have full awareness<sup>21</sup> and sufficient knowledge about the consequences of radiation exposure as well as the negative effects of x-rays used.<sup>18,22</sup> Patients are naturally concerned about radiation exposure and the risks associated with their health,<sup>23</sup> so may have questions about safety during dental imaging procedures. Some of the information may be misleading, confusing, or incorrect; therefore, patients may refuse to undergo radiographic examination based on information they receive through social media or misinformation from non-professionals. In addition, the patient may not be aware of the need for radiographic examination to support the diagnosis and properly treat the disease, which will affect the dental treatment outcome.<sup>9</sup>

The radiation hazard is never considered to be zero, but when the procedure will benefit the outcome of the treatment, the dentist must determine whether the amount of radiation received outweighs the risk. The amount of radiation received by a patient cannot be compared between individuals receiving different treatments; however, the dose depends on the type of imaging and how often it is used by the dentist. Radiation exposure to any part of the body carries a level of risk.<sup>9</sup> The risk has the potential to cause harmful effects.

Dentomaxillofacial radiographic examination can also produce harmful effects in the form of biological changes in oral tissues because most dentomaxillofacial radiography procedures involve ionizing radiation.<sup>18</sup>

Biological changes that occur can affect cells, which directly attack cells and cause changes in the structure and function of the affected molecules. Indirectly with the formation of free radical molecules that react with other free radicals to produce hydrogen peroxide which can break down large molecules such as proteins and DNA which ultimately causes cell damage.<sup>16</sup> These biological changes can cause: skin irritation, changes in blood-forming organs and the nature of circulating blood cells, cancer, genetic effects and cataract formation. Both the salivary glands and thyroid are example of the risk organs in ionizing radiation. In particular, the salivary glands are often located within the radiation exposure on intraoral and panoramic radiographs. Previous studies have shown that ionizing radiation used in dentomaxillofacial radiographs increases the risk for salivary glands and thyroid, and increases the likelihood of brain tumors.<sup>18,24-28</sup> Other studies also mention that the salivary glands and oral mucosa absorbed the highest radiation dose of all tissues during dentomaxillofacial radiography. Changes in the quantity and quality of saliva, xerostomia, decreased salivary pH, changes in the oral microbiota, which ultimately lead to an increase in dental caries.<sup>24-28</sup> Biological hazards are classified into deterministic and stochastic effects. Cancer and genetic mutations are examples of stochastic effects in which the probability of occurrence increases with the level of exposure to ionizing radiation, but exposure does not affect the severity of the effects.<sup>9,13,16,27</sup> The importance of these effects has led the International Commission for Radiological Protection (ICRP) to introduce an "effective dose" accepted as risk measures of various radiographic examinations.<sup>9,25,27</sup>

## V. Conclusion

The level of public knowledge regarding dentomaxillofacial radiographic examination in Lau Bakeri village, Deli Serdang Regency is sufficient (68.6%). Our investigation reveals reasonable public knowledge with respect to ionizing radiation. The moral obligation of doctors who refer patients to explain about the health hazards and risks associated with ionizing radiation and to provide appropriate safety measures when conducting radiological examinations.

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