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KNOWLEDGE AND ATTITUDES TOWARD DENTAL X-RAYS AMONG PATIENTS AT MUHIMBILI SCHOOL OF DENTISTRY IN TANZANIA

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ABSTRACT

Background: Dental X-rays are vital diagnostic tools in dentistry, providing critical information for treatment planning. However, patient awareness and understanding of the risks and benefits associated with dental radiography can significantly influence their attitudes toward these procedures. **Method:** This cross-sectional study was conducted in 2008 at the Radiology Department of Muhimbili Dental School. A total of seventy patients attending the dental clinic who underwent periapical and orthopantomogram (OPG) radiography were surveyed. Data were collected using structured questionnaires designed to assess knowledge and attitudes regarding dental X-rays. **Results:** The results revealed that 70% of participants understood the radiation risks associated with X-rays, while 75% were aware of the indications for their use. However, only 60% were familiar with the benefits of OPG. In terms of attitudes, 80% of patients agreed that X-rays are essential for diagnosis, and 85% believed their dentist should explain the necessity of X-rays. **Conclusion:** The findings indicate that while patients at Muhimbili Dental School exhibit a moderate level of knowledge and positive attitudes toward dental X-rays, there is a need for enhanced patient education regarding the risks and benefits. Implementing educational initiatives could improve understanding and alleviate concerns related to dental radiography.

KEYWORDS: Dental X-rays, patient awareness, radiography, periapical, orthopantomogram, knowledge, attitudes

INTRODUCTION

Background: Dental X-rays are essential diagnostic tools in modern dentistry, allowing for accurate assessment and treatment planning of various dental conditions [1]. These radiographic images provide crucial information that is not visible during a clinical examination, enabling dentists to detect issues such as cavities, infections, and bone loss [1, 2]. As dental practices increasingly rely on radiographic imaging, understanding the patient's perspective on the necessity and safety of these procedures becomes paramount.

Despite the recognized importance of dental X-rays, there is often a significant gap in patient knowledge regarding the associated risks and benefits. Many patients may harbor misconceptions about radiation

exposure and its potential harm, leading to anxiety or reluctance to undergo necessary imaging procedures [3, 4, 5]. Research has shown that patient education plays a vital role in alleviating concerns and enhancing compliance with recommended diagnostic practices [6, 7, 8]. Therefore, it is crucial to assess the current level of awareness and understanding among patients to address these gaps effectively.

The advent of digital radiography has introduced new benefits, including reduced radiation exposure and improved image quality [9, 10]. However, patients may not be fully aware of these advancements or how they impact their safety. This study was done evaluate the knowledge and attitudes of patients attending the dental clinic at Muhimbili Dental School regarding periapical and orthopantomogram (OPG) radiography. By understanding patient perceptions, dental practitioners can tailor educational initiatives to improve informed consent processes and enhance the overall patient experience.

MATERIAL AND METHODS

Study Design and Period

This cross-sectional study was conducted in 2008 at the Radiology Department of Muhimbili Dental School during the elective study period to assess the knowledge and attitudes of patients attending the dental clinic at Muhimbili Dental School regarding periapical and orthopantomogram (OPG) radiography.

Study Setting

The study was carried out at the Radiology Department of Muhimbili University of Health and Allied Sciences. The Radiology Department operates Monday through Friday, accepting referrals from the in-house dental clinic as well as external private hospitals.

Participants

Participants included patients aged 18 years and older who were required to undergo dental radiographic procedures. A total of 70 patients participated in the study.

Sample Size

The sample size was calculated using the following formula:

$$n = \frac{z^2 p (1-p)}{e^2}$$

Where:

p=0.167 (the overall prevalence of caries from Savani et al., 2008)

e=0.10 (maximum error)

z=1.96 (Z-value for a 95% confidence interval)

Substituting the values into the formula:

$$n=\frac{1.96^2 \times 0.167\ (1 - 0.167)}{0.0139^2}$$

$$n = 54$$

Seventy patients were selected based on a series of predefined inclusion and exclusion criteria.

Sampling Technique

A non-probability convenience sampling method was employed for this study. Patients attending the dental clinic who met the inclusion criteria were approached for participation.

Inclusion criteria:

Participants in this study included patients aged 18 years and older who were undergoing dental radiographic procedures, specifically periapical and orthopantomogram (OPG) X-rays. All participants were required to provide informed consent before taking part in the study, ensuring that they understood the purpose of the research and their role within it.

Data Collection

Data were collected using a structured questionnaire specifically designed to assess patients' knowledge and attitudes toward dental X-rays. This questionnaire incorporated both closed and open-ended questions, enabling quantitative analysis while also providing opportunities for qualitative insights. Key topics covered included patients' understanding of dental X-ray procedures and safety measures, their attitudes toward the necessity and perceived risks of dental radiography, and demographic information such as age, gender, and previous experiences with dental X-rays. The data collection process took place over a defined period, conducted by the authors of this manuscript, who were trained to carry out research. The authors administered the questionnaires to ensure consistency and accuracy in responses. Participants were informed about the study's purpose, assured of confidentiality, and required to provide informed consent before completing the questionnaire. To further enhance response rates, participants were encouraged to ask questions for clarification throughout the process, fostering a supportive environment for open communication

Data Analysis

Data analysis was conducted using statistical software, SPSS (IBM Corp., version 24), to ensure a comprehensive evaluation of the collected information. Initially, the data underwent cleaning and preparation to identify and address any incomplete or inconsistent responses. Descriptive statistics were calculated to summarize the demographic characteristics of participants, including age, gender, and previous experiences with dental X-rays. This was followed by inferential statistical analyses,

including chi-square tests to evaluate differences in attitudes among various demographic groups, and t-tests or ANOVA to assess variations based on age and experience. Correlation analysis was performed to explore the relationships between knowledge of dental X-rays and overall attitudes. Additionally, open-ended responses were thematically analyzed to extract common themes and insights regarding patient perceptions. The results of these analyses were then interpreted in the context of existing literature, and findings were reported using tables and graphs to facilitate clear visualization of key results.

RESULTS

Participant Demographics

A total of 70 patients participated in the study, with a demographic profile reflecting a diverse range of ages and backgrounds. The demographic characteristics are summarized in Table 1.

Table 1 *(Demographic Characteristics of Participants.)*

Variable	Category	Frequency (n)	Percentage (%)
Sex	Female	30	42.9
	Male	40	57.1
Age	18-24	15	21.4
	25-34	20	28.6
	35-44	18	25.7
	45-54	10	14.3
	55+	7	10.0
Education Level	Primary	10	14.3
	Secondary	30	42.9
	Post-Secondary	30	42.9
Occupation	Farming	10	14 .2
	Employed	25	0.4
	Business	30	42.8
	Students	5	7.1

Knowledge of Dental X-Rays

The assessment of knowledge regarding dental X-rays revealed that 70% of participants understood the radiation risks associated with X-rays. Additionally, 75% of respondents were aware of the specific indications for X-ray procedures, such as diagnosing cavities and assessing bone health. However, only 60% reported familiarity with the benefits of orthopantomogram (OPG) imaging. The detailed knowledge levels are presented in Table 2.

Table 2 *(Knowledge of Dental X-Rays among Participants.)*

Variable	Frequency (n)	Percentage (%)
Awareness of radiation risks	49	70.0
Knowledge of indications for X-rays	52	75.0
Familiarity with benefits of OPG	42	60.0

Attitudes toward Dental X-Rays

An encouraging 80% of patients agreed that dental X-rays are essential for accurate diagnosis. Additionally, 85% expressed the belief that their dentist should provide clear explanations regarding the necessity of X-rays. Table 3 summarizes the attitudes toward dental X-rays.

Table 3 *(Attitudes toward Dental X-Rays.)*

Attitude Statement	Frequency (n)	Percentage (%)
X-rays are essential for diagnosis	56	80.0
Dentists should explain the necessity of X-rays	60	85.7

Perceived Risks and Benefits

While a significant proportion of patients recognized the importance of X-rays for diagnosis, concerns about radiation exposure were evident. 40% of participants indicated that they felt anxious about the potential risks of X-ray procedures. This is summarized in Table 4.

Table 4 *(Perceived Risks of Dental X-Rays.)*

Perception	Frequency (n)	Percentage (%)
Concerned about radiation exposure	28	40.0
Willing to undergo necessary imaging procedures	50	71.4

Correlation between Knowledge and Attitudes:

Correlation analysis indicated a positive relationship between knowledge of dental X-rays and overall attitudes toward their necessity. Patients who demonstrated a higher understanding of safety measures were more likely to view X-rays as essential for dental diagnosis.

Themes from Open-Ended Responses

The thematic analysis of open-ended responses provided additional insights into patient perceptions. Common themes included:

- The desire for more comprehensive explanations from dental professionals regarding the procedure.
- The need for clearer communication about the safety of X-rays.

DISCUSSION

The findings of this study reveal a moderate level of knowledge and generally positive attitudes among patients at Muhimbili Dental School regarding dental X-rays. A significant majority of participants recognized the radiation risks associated with X-rays and understood their indications. These results are consistent with similar studies conducted in other regions; highlighting a comparable level of awareness [11, 12, 13]. However, the finding that only a portion of participants were familiar with the benefits of orthopantomogram (OPG) imaging points to a gap in patient education. This gap resonates with other studies that revealed patients often expressed uncertainty regarding the advantages of specific radiographic techniques, suggesting an urgent need for enhanced educational initiatives to bridge these knowledge gaps [14, 15, and 16].

Regarding attitudes, a substantial number of patients agreed that X-rays are essential for accurate diagnosis, aligning with studies where a similar proportion of participants acknowledged the importance of radiographic imaging in treatment planning [17]. Moreover, the strong desire expressed by patients for their dentists to explain the necessity of X-rays indicates openness to communication and education [18]. This is a promising sign for practitioners, as it provides an opportunity for dental professionals to engage with patients more effectively. Improved communication can enhance patient trust and compliance with recommended diagnostic practices, fostering a better overall experience in dental care [19].

Despite the positive attitudes and awareness observed, a notable concern regarding radiation exposure was evident, with a significant portion of participants expressing anxiety about potential risks. This anxiety may stem from broader societal apprehension about radiation in medical procedures, as documented in a number of studies [20, 21]. Patients often harbor misconceptions about the safety of X-

rays, which can influence their willingness to undergo necessary imaging. Therefore, dental practitioners must prioritize thorough discussions about the safety measures in place and the benefits of radiographic procedures to alleviate these concerns. Recommendations for enhancing patient education include creating informative materials and utilizing digital platforms to disseminate knowledge regarding the risks and benefits of dental X-rays [22, 23].

Limitations of this study should be acknowledged. The cross-sectional design restricts the ability to draw causal conclusions, and the convenience sampling method may introduce selection bias. Furthermore, this study was conducted in 2008, a time when advancements in dental radiography and changes in patient perceptions may not have been fully recognized. Consequently, the results may not accurately reflect the current landscape of patient knowledge and attitudes. Future research should consider longitudinal or repeated cross-sectional studies to assess changes in patient awareness and attitudes over time, particularly in light of emerging technologies such as digital radiography, which offers lower radiation doses and improved image quality [24, 25].

CONCLUSION

The findings indicate that while patients demonstrate moderate knowledge of dental radiography, ongoing efforts to educate them about its necessity and safety are essential, especially as dental practices continue to evolve. Future research should focus on re-evaluating patient perceptions in light of these advancements to assess whether knowledge gaps have narrowed and attitudes have shifted. Such studies could be crucial in enhancing patient education and ultimately improving clinical outcomes in dental practices.

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