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CLINICAL FINDINGS AND DIAGNOSTIC YIELD OF DENTAL RADIOGRAPHIC EXAMINATIONS IN SOUTHERN NIGERIA

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ABSTRACT

Background: Oral diseases are the most common non-communicable diseases, causing pain, discomfort, and in extreme cases, death. Dental radiography is one of the clinical tools employed during diagnostic workups for dental complaints.

Objective: To determine the diagnostic yield of dental radiography in Enugu, southeastern Nigeria.

Methods: Using simple random sampling, ninety-two radiography reports from a pool of dental examinations conducted over 2 years were selected. Information obtained includes the patient's age, gender, clinical history, and radiographic findings.

Results: 45 female (48.9%) and 47 male (51.1%) patients aged between 21 and 30 years presented to the department. Only two (2.2%) asymptomatic patients came for a routine dental check-up. Respectively, tooth pain (n = 71, 77.2%) and dental caries (n = 37, 40.2%) were the most prevalent clinical symptoms and findings, while dental radiolucency, presenting majorly as periapical radiolucency, was the commonest radiographic finding (n = 22, 23.9%). Chi-square test demonstrated a strong association between clinical and radiographic findings (χ^2: 235.9, p< 0.005). No visible pathology was seen in 8 (8.7%) of the radiographs.

Conclusion: Dental caries was the most prevalent dental disease. Radiographic examinations provided a high diagnostic yield as they demonstrated a strong association with clinical findings. It remains a pivotal examination during the clinical workup of patients with dental anomalies.

Keywords: Dental disease, Dental radiography, Dental caries, Radiography

Introduction

Dental radiographs have demonstrated usefulness in the clinical assessment of dental complaints as it provides relevant information that improves the clinical management of dental diseases[1]. Oral disease remains a major public health problem worldwide but suffers low prioritization in Africa primarily as a result of scarce resources diverted to other life-threatening conditions like HIV/AIDS, tuberculosis, and malaria [2]. Epidemiological studies have revealed a consistent rise in dental disease in developing nations. This increase has been linked to the rising consumption of refined foods and sweeteners found in refined sugars, sweets, and fruit drinks. [3–6]. It has been estimated that 51 million school hours per year are lost to dental-related illness alone [7]. In Northern Nigeria, the rising incidence of dental caries among young people was directly linked to the increased consumption of sweets

and other sugary foods in both villages and cities.[4]. Other studies in Nigeria have equally fingered improving socioeconomic status, exposure to cariogenic foods, and poor oral hygiene as front-line culprits in periodontal diseases [9–12] and dental caries [13], both of which occur at relatively younger ages.

In the diagnostic work-up for several dental symptoms, dental radiographs are regarded as a valuable adjunct to clinical examination because they provide crucial information about the bony tissues covered by the gingiva that cannot be diagnosed by clinical inspection alone [14], hence they complement the clinical examination [15]. Osseous defects from periodontal and periapical lesions are far more common and are detected routinely as incidental findings using intra-oral periapical and bitewing radiographs or extra-oral panoramic radiographs [16]. Studies on the diagnostic yield of dental radiography in Nigeria, especially in southeastern Nigeria are few and far apart. Ogenyi and colleagues carried out an appraisal of the diagnostic yield of dental X-ray requests in Northern Nigeria and identified chronic apical periodontitis, irreversible pulpitis, and dental caries as the commonest radiographic findings [17]. A related study in southern Nigeria sought to determine radiographic findings in traumatized teeth and identified significant radiographic changes in half of the studied cases [18]. However, to the best of the researcher's knowledge, no study has addressed the diagnostic yield of dental radiographs in Southeastern Nigeria, classifying its spread across age groups, gender, and common findings. Hence, this study aims to determine the common radiographic findings among patients referred for dental radiography in the Federal School of Dental Health, Enugu state over two years, identify the gender and age range of patients that are mostly affected by oral diseases, and determine the diagnostic yield of dental radiographs by determining its association with clinical findings..

Methods:

Simple random sampling was used to select 120 dental radiography studies performed in 2 years, at the Federal School of Dental Health, Enugu. Ethical clearance was obtained from the research and ethics committee of the hospital; however patient consent was not necessary because the study was retrospective in nature. Twenty-eight of the examinations were excluded from the study as they did not contain complete information such as provisional diagnosis (17 reports), gender (4 reports), and missing radiographic report (7). For ease of analysis, the clinical symptoms were grouped under routine checkup, caries, hypersensitivity, discolored tooth, and pain/swelling, while the clinical findings were grouped under dental caries, periodontitis, trauma/crack, gingivitis, eruption/impaction, cysts/abscesses, retained root, granuloma, and calculus. The radiographic findings were not grouped. The data[19] was analyzed using SPSS version 23 and results were presented using tables and charts. The chi-square test was used to test the association between radiographic and clinical findings..

Results:

A total of 92 dental reports were analyzed, consisting of 45 female (48.9%) and 47 male (51.1%) patients (Table 1). The modal age range was 21 – 30 years. Pain/swelling and dental caries were the most common reasons patients visited the dental clinic (Figure 1), while only 2.2% visited the clinic for routine dental checkups (Table 2). Males were more likely to present with radiolucency findings than females (Figure 2). The most common radiographic finding was radiolucencies followed by paramolar dentition (Table 3), and only 8.7 % (n = 8) of the radiographs were reported as normal findings. With a value of χ^2 value of 235.9 and a p-value of less than 0.005, the Chi-square test demonstrated a strong and significant association between radiographic and clinical findings (Table 4)

Table 1: Age group and gender distribution

	Gender					
	Female		Male		Total	
Age (Years)	N	%	N	%	N	%
0 to 20	3	3.3	11	12.0	14	15.2
21 to 30	17	18.5	10	10.9	27	29.3
31 to 40	9	9.8	10	10.9	19	20.7
41 to 50	9	9.8	7	7.6	16	17.4
51 to 60	1	1.1	6	6.5	7	7.6
>60	6	6.5	3	3.3	9	9.8
Total	45	48.9	47	51.1	92	100.0

Table 2: Presenting clinical symptoms and findings

		Gender					
		Female		Male		Total	
		N`	%	N`	%	N`	%
Clinical findings	Dental caries	21	22.8	16	17.4	37	40.2
	Periodontitis	4	4.3	6	6.5	10	10.9
	Trauma/Crack	6	6.5	4	4.3	10	10.9
	Gingivitis	3	3.3	6	6.5	9	9.8
	Eruption/Impaction	4	4.3	4	4.3	8	8.7
	Cysts/Abscesses	2	2.2	3	3.3	5	5.4
	Retained root	1	1.1	4	4.3	5	5.4
	Granuloma	2	2.2	2	2.2	4	4.3
	Calculus	2	2.2	2	2.2	4	4.3
	Total	45	48.9	47	51.1	92	100.0
Clinical symptoms	Pain/Swelling	37	40.2	38	41.3	75	81.5
	Dental caries	6	6.5	6	6.5	12	13.0
	Dental check-up	1	1.1	1	1.1	2	2.2
	Hypersensitivity	0	0.0	2	2.2	2	2.2
	Discolored tooth	1	1.1	0	0.0	1	1.1
	Total	45	48.9	47	51.1	92	100.0

Table 3: Specific radiographic findings

Specific radiographic finding	Gender					
	Female		Male		Total	
	Count	%	Count	%	Count	%
Paramolar	8	8.7	16	17.4	24	26.1
Dental radiolucency	7	7.6	4	4.3	11	12.0
Interproximal Radiolucency	7	7.6	3	3.3	10	10.9
Normal Findings	4	4.3	4	4.3	8	8.7
Enamel Radiolucency	1	1.1	6	6.5	7	7.6
Cervical Radiolucency	3	3.3	3	3.3	6	6.5
Root Radiolucency	3	3.3	3	3.3	6	6.5
Gingival Radiopacity	3	3.3	2	2.2	5	5.4
Impacted tooth	3	3.3	1	1.1	4	4.3
Widened Apex	3	3.3	1	1.1	4	4.3
Retained Root	1	1.1	2	2.2	3	3.3
Curved Root of Tooth	1	1.1	1	1.1	2	2.2
Empty Socket with Fracture line	1	1.1	1	1.1	2	2.2
Total	45	48.9	47	51.1	92	100.0

Table 4: Chi-square test for association between clinical and radiographic findings

Chi-square test	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	235.932[a]	32	.000
Likelihood Ratio	171.297	32	.000
Linear-by-Linear Association	20.427	1	.000
N of Valid Cases	92		

a. 43 cells (95.6%) have an expected count of less than 5. The minimum expected count is .22.

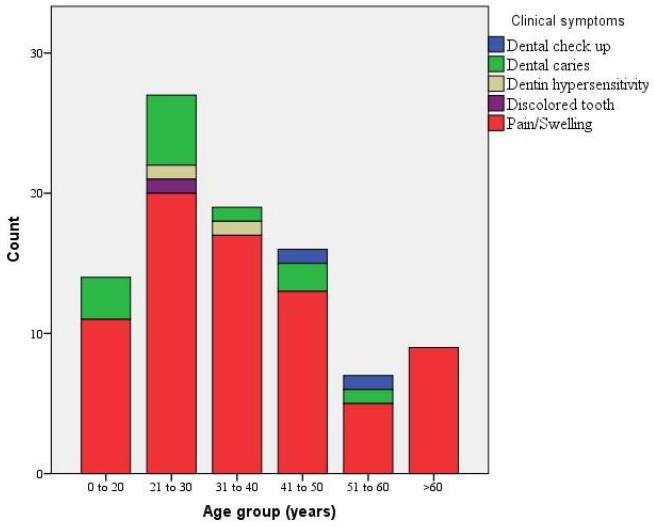

Figure 1: Distribution of clinical symptoms with age group.

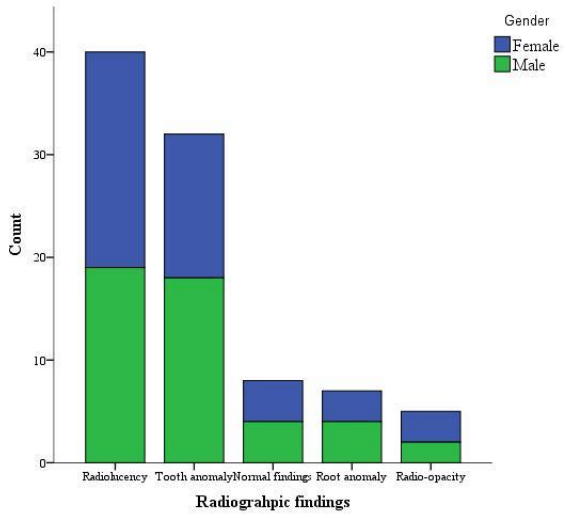

Figure 2: Radiographic findings in males and females

Discussion:

There was an equal distribution of males and females across all age groups presenting to the department for dental radiographic examination; this observation has been reported before. [18,20]. Interestingly, patients aged between 21 – 30 years had the highest representation, a finding which was reported in similar studies [17,18,21]. This is the age group that is more likely to engage in activities that expose them to dental problems e.g. poor dental hygiene due to a carefree lifestyle and higher intake of cariogenic foods. Pain/swelling and dental caries which constituted 79% of the complaints, were the most common symptom reported in our study, a finding that has earlier been reported by some authors[17,22]. Visits to the clinic for a routine dental checkup were low, and when compared with the leading reason which was pain/swelling, this suggested that people largely visited the clinic when they experienced symptoms associated with pain and/or swelling, a conclusion which was also reached by other authors [23–27]. Ouagadougou specifically opined that this trend is common in developing countries [28]. Eigbogbo and colleagues [20] blamed poor awareness of dental healthcare when in their study they reported that out of 462 subjects studied, only 4.1% (n = 19) presented for a routine checkup. This apparent lack of interest in dental healthcare may be a prevailing behavior in the southeastern part of the country.

Clinical findings from our study indicated that dental caries accounted for the highest number of diagnosed oral diseases (40.2%, n = 37) followed by periodontitis (10.9%, n = 10) and trauma/crack (10.9%, n = 10). This may not come as a surprise following the poor attitude towards dental hygiene and routine checks [13,20,22,26,28]. Dental caries, which occur due to the demineralization of enamel and dentine by organic acids formed by bacteria, are largely caused by the consumption of sugary foods [29]. In a study carried out by Ukeje et al, dental caries was reported to be commoner in younger age groups, reaching its peak in 20-29 years.[30]. Contrary to our findings, Ogenyi et al [17] and Enabuele et al [18] reported periodontitis as the most common finding.

The radiographic findings from our study indicate that radiolucencies were the most common radiographic findings reported, constituting 43.5% (n = 40) of the total abnormalities reported. These radiolucencies pertained to the tooth and interproximal spaces, with interproximal radiolucency (10.9%, n = 10) being the most prevalent. Other radiolucencies include dental (n = 11, 12%), enamel (n = 7, 7.6%) cervical (6.5%, n = 6), and root radiolucencies (6.5%, n = 6). Paramolar tooth was the next most common radiographic finding (26.1%, n = 24) followed by gingival and root problems. Our findings are in line with the reports of Ogenyi et al[17] who identified apical periodontitis, pulpitis, and dental caries as the most common radiographic finding, and these present as radiolucencies in radiographs. Eigbobo et al [20] also reported periodontal diseases as the most common radiographic finding. A Chi-square test from our study further revealed that clinical findings were strongly associated with radiographic findings, and this has put dental radiography in the frontline during clinical workup of dental complaints. The high diagnostic yield by dental radiography is further indicated in the small number of radiographs reported to be normal (8.5%, n = 8). This is also supported by Ogenyi and colleagues[17] who commented on the high diagnostic yield of dental radiographs. Lastly, Sanu et al [26]indicated that radiological investigations were the most common examination carried out on patients presenting to the clinic, as up to 83.7% of patients underwent one form of dental radiographic examination or another. The dental radiographic examination has a high diagnostic yield and remains the frontline investigation of choice in the clinical workup of patients presenting with dental complaints. It is useful in some pathological presentations that are not readily obvious clinically. For example, our findings show there was no preliminary clinical investigation that reported occult pathological presentations such as paramolar or impacted teeth, and only one clinical diagnosis of the retained root was made. This shows the high diagnostic yield of dental radiography in the management of dental pathologies.

Conclusion

Tooth pain was the most common reason for a visit to the dental clinic, and dental caries was the most prevalent dental disease in the population studied. Radiographic examinations are strongly associated with clinical findings, indicating a high diagnostic yield and consequently is indispensable in the clinical workup of dental cases

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