Journal of Applied Dental and Medical Sciences
NLM ID: 101671413 ISSN:2454-2288
Volume 3 Issue1 January-March 2017

Original article

A survey on radiographic prescription practices in dental implant assessment

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ARTICLE INFO

Keywords:
Cost-effectiveness, routine dental checkup, treatment

ABSTRACT

Aim
To survey the current radiographic prescriptions in dental implant assessment among implant practitioners in Kingdom of Saudi Arabia.

Material and Methods
One hundred and twenty dentists were interviewed by employing a questionnaire which enquired about the radiographic evaluation methods prescribed by practitioners in implant site assessment in their implantology practice. Other reasons for choosing particular imaging modalities were also enquired. The data collected from the survey was analysed using SPSS.

Result
It was observed that the majority of the surveyed dentists prescribe panoramic radiographs for dental implant assessment. The main reasons given for prescribing panoramic radiography were availability and broad coverage.

Conclusion
The majority of surveyed dentists prescribe panoramic radiographs for dental implant assessment based on its availability and only a small number strictly adhered to the recommended guidelines of the international associations with regards to cross sectional imaging.

Introduction

The use of osteointegrated dental implants is a widely accepted procedure in the replacement of edentulous spaces. Long-term clinical success of osteointegrated implants is based on careful diagnosis and treatment planning. Treatment planning for implants includes a radiographic examination that provides information about the location of anatomical structures, the quality and quantity of available bone, the presence of bone lesions, and the number and size of implants, which are essential for successful implant treatment. Radiographic measurement of marginal bone loss has been the main criteria in the assessment of success in oral implants.1-5

Several types of radiographic techniques are used in implant treatment planning, such as Intra-Oral Periapical Radiography (IOPAR), Orthopantomography (OPG), occlusal radiography, Conventional tomography, Computed Tomography (CT), and Cone-Beam Computed Tomography (CBCT). It is the clinician who usually decides the best method for each clinical situation.6-9 The American academy of oral and maxillofacial radiology (AAOMR) recommended that cross-sectional imaging be used for the assessment of all dental implant sites and many studies have reported cross-sectional imaging to be more accurate. Currently CBCT is the imaging method of choice to gain this diagnostic information.10

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A study in USA which determined the types of imaging used for pre-operative implant site assessment showed that over 95% of the dentists take panoramic radiographs on at least 80% of patients and over 90% never prescribe conventional tomography.11 Another study in Brazil reported approximately 63.8% of the dentists prescribed only panoramic radiography for dental implant assessment and 28.9% ordered panoramic radiography plus periapical radiography and/or conventional tomography and/or computed tomography (CT). Only 7.2% of the dentists ordered conventional tomography or CT as a single examination, although 10.1% ordered it in combination with other imaging modalities. The main reasons given for prescribing panoramic radiography were broad coverage and cost (86.4%).12

There is a scarcity regarding the literature stating the radiographic prescription trends among the implant practitioners worldwide and whether they adhere to the recommendations put forward by professional bodies. Since there is no information about how dentists in the Kingdom of Saudi Arabia (KSA), where thousands of implants are placed each year prescribe radiographs for dental implant assessment, the aim of this study was to survey the current radiographic prescription for this task in KSA and to compare it with the AAOMR recommendations.

Material and Methods

One hundred and twenty dentists were randomly interviewed by employing a closed-end questionnaire which enquired about the types of radiographic examinations the dentists prescribe for pre-operative implant site assessments and follow-up, such as panoramic radiography, CT, conventional tomography and periapical radiography, either alone or in combination. They were also asked the reasons for their choice, including cost, patient radiation dose, broad coverage of facial bones and teeth, availability and measurement precision.

All of the dentists involved in the study were specialised or trained in implant dentistry. The study received ethical approval. A completed questionnaire indicated the consent to participate in the study. Anonymity and confidentiality were assured. The data was entered onto computer for analysis using Statistical Package for Social Science (IBM-SPSS) Version 22 for Windows. Descriptive analysis was undertaken to present an overview of the findings from this study sample.

Results

Table 1 shows the frequency distribution of demographic variables of the sample. The median age of the participants was 31-40 years. The majority of the participants were males (81.4%, n=96) and periodontist (34.5%, n=39). Equal proportion of participants had ⩽10 years and >10 years of practice. Practitioners were also equally distributed in private and government type of practice.

Preoperative

The radiographic examinations more often prescribed for dental implant assessment (preoperative) were the panoramic + CT + periapical radiography (20.2%), followed by panoramic radiography + CT (19.3%) and, panoramic radiography + periapical radiography (18.5%). Panoramic, CT, and periapical were prescribed as a single examination by 13.4%, 9.2%, and 4.2% respectively (Figure 1). The most common reason for prescribing a specific radiographic examination was availability (26.1%), followed by the desire for broad coverage of the facial bones and teeth (21%), availability + broad coverage (11.8%), cost (10.9%), and low radiation dose (5.9%) (Figure 2)..

Table 1. Demographics		Frequency (n)	Percent (%)
Age (in years)	***25-30***	**29**	**24.4**
	31-40	**51**	**42.9**
	41-50	**34**	**28.6**
	51-60	**5**	**4.2**
Gender	***Male***	**96**	**81.4**
	Female	**22**	**18.6**
Specialty	***General Dentistry***	**16**	**14.2**
	Oral Surgery	**20**	**17.7**
	Orthodontist	**2**	**1.8**
	Prosthodontics	**27**	**23.9**
	Periodontics	**39**	**34.5**
	Implantology	**3**	**2.7**
	Restorative Dentistry	**6**	**5.3**
Years of practice	***≤10***	**59**	**50.0**

	>10	**59**	**50.0**
Type of practice	***Private***	**51**	**43.2**
	Government	**51**	**43.2**
	Both	**16**	**13.6**

Figures

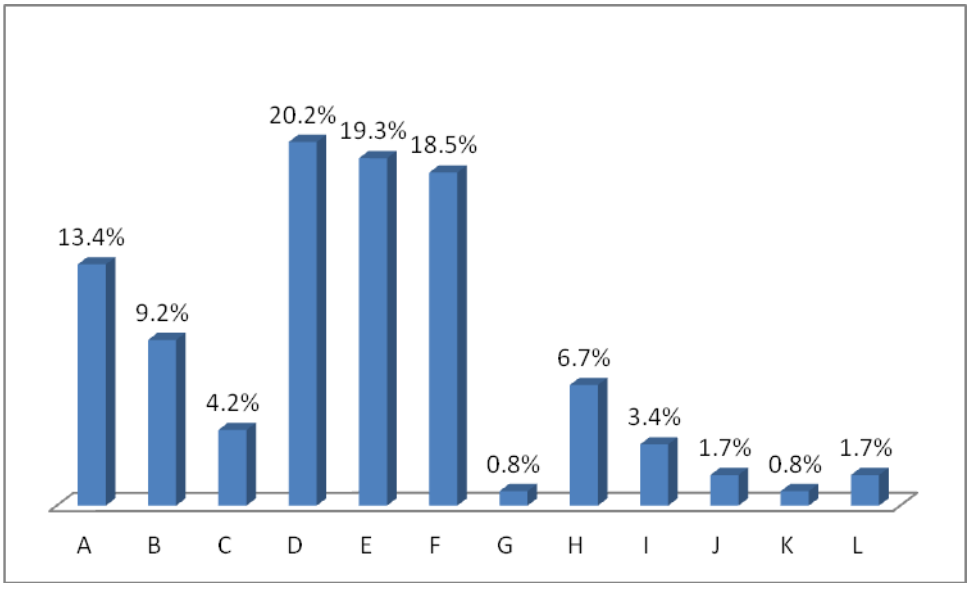

Figure 1. Distribution of the imaging modality options in dental implant assessment (preoperative)

A, panoramic radiography; B, computed tomography (CT); C, periapical radiography; D, panoramic radiography + CT + periapical radiography; E, panoramic radiography + CT; F, panoramic radiography + periapical radiography; G, CT + conventional tomography; H, panoramic radiography + conventional tomography + periapical radiography; I, panoramic radiography + conventional tomography; J, panoramic radiography + CT + conventional tomography; K, panoramic radiography + CT; L, panoramic radiography + CT + conventional tomography + periapical radiography

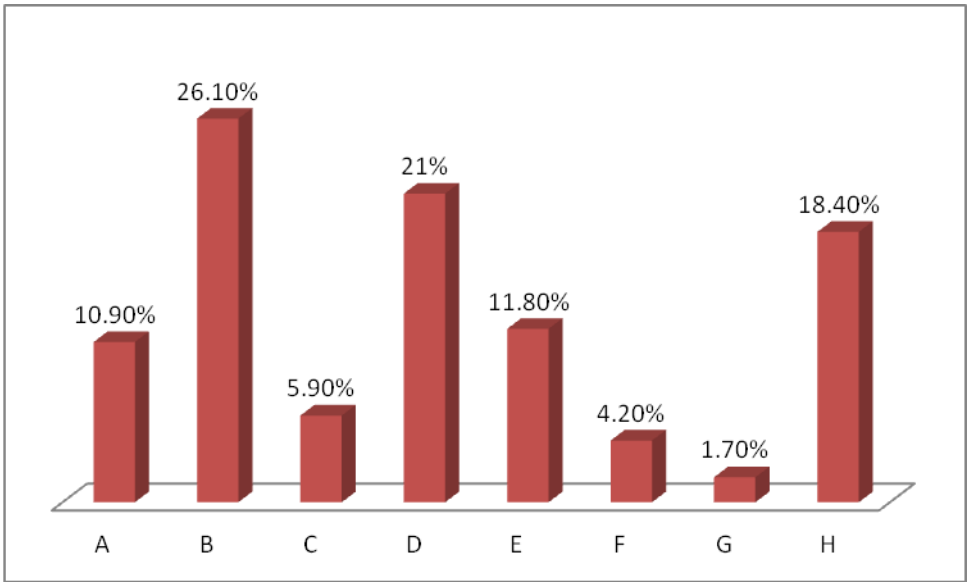

Figure 2. Distribution of the main reasons for prescribing radiographs for dental implant assessment
A, cost; B, availability; C, low radiation dose; D, broad coverage; E, availability + broad coverage; F, availability + broad coverage + cost; G, cost + radiation dose; H, other reasons

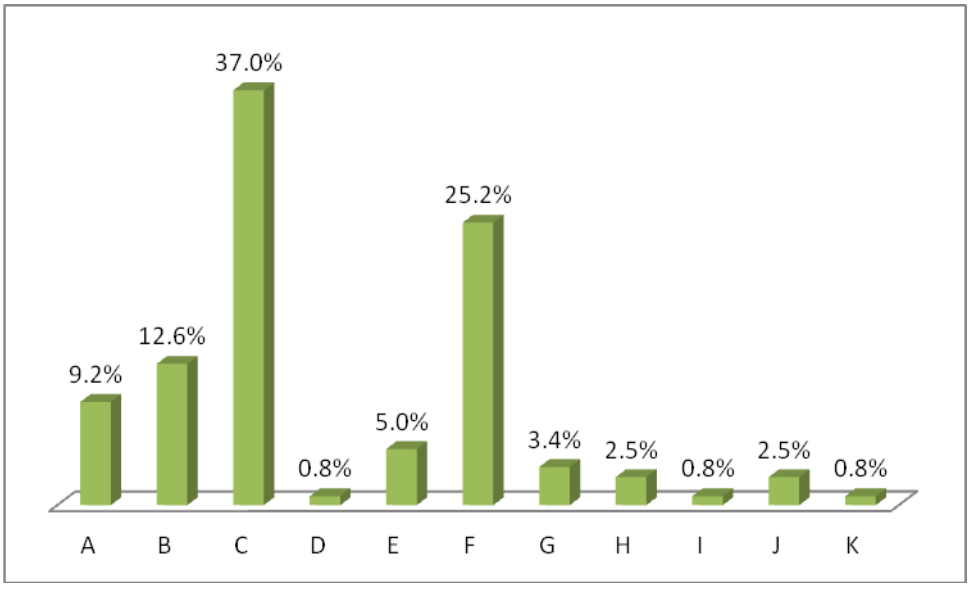

Figure 3. Distribution of the imaging modality options in dental implant assessment (during treatment)
A, panoramic radiography; B, computed tomography (CT); C, periapical radiography; D, conventional tomography; E, panoramic radiography + CT; F, panoramic radiography + periapical radiography; G, CT + periapical radiography; H, panoramic radiography + CT + periapical radiography; I, panoramic radiography + periapical radiography + conventional tomography; J, panoramic radiography + conventional tomography; K, panoramic radiography + CT + conventional tomography + periapical radiography

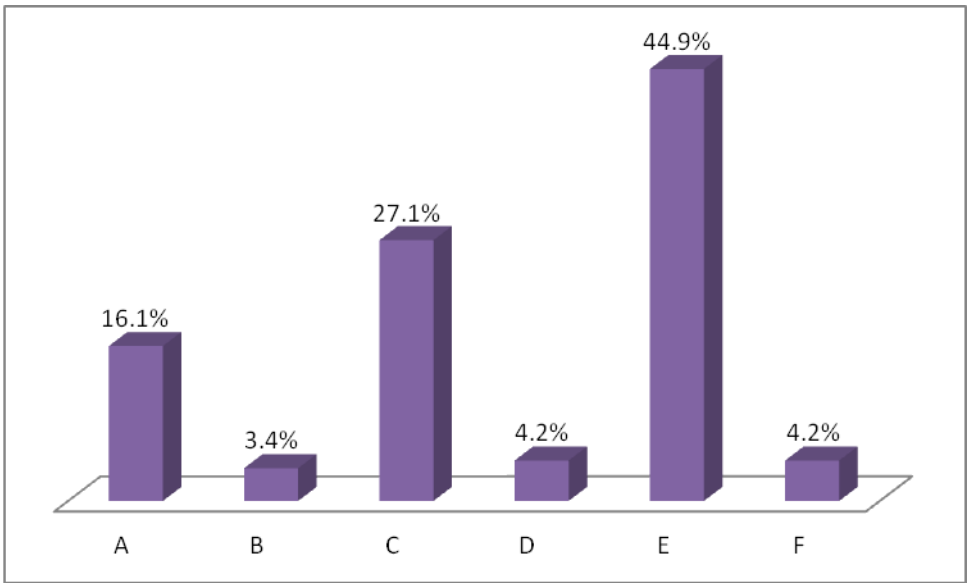

Figure 4. Distribution of the imaging modality options in dental implant assessment (postoperative)
A, panoramic radiography; B, computed tomography (CT); C, periapical radiography; D, panoramic radiography + CT; E, panoramic radiography + periapical radiography; F, panoramic radiography + CT + periapical radiography

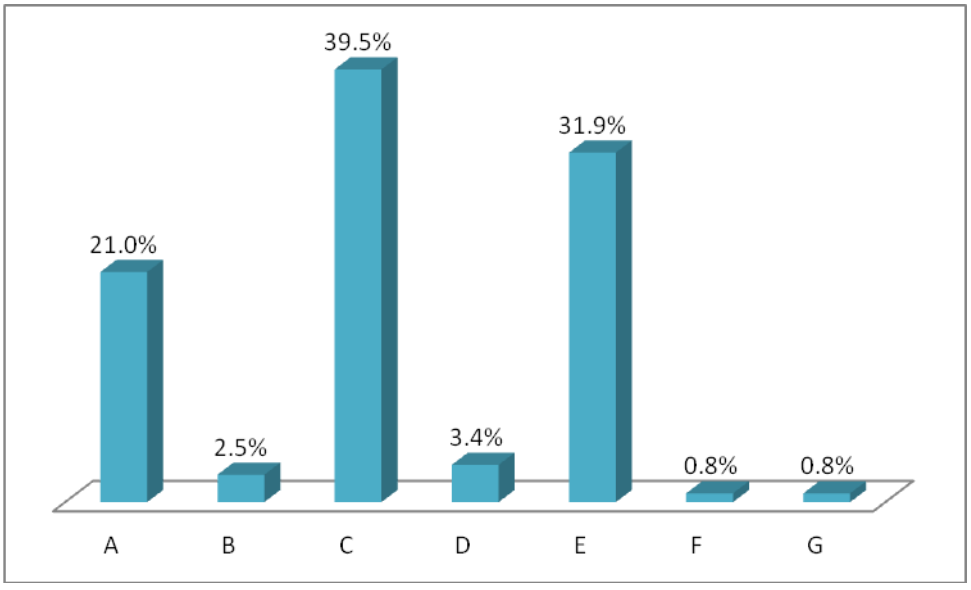

Figure 5. Distribution of the imaging modality options in dental implant assessment (follow up)
A, panoramic radiography; B, computed tomography (CT); C, periapical radiography; D, panoramic radiography + CT; E, panoramic radiography + periapical radiography; F, panoramic radiography + CT + periapical radiography, G, panoramic radiography + conventional tomography

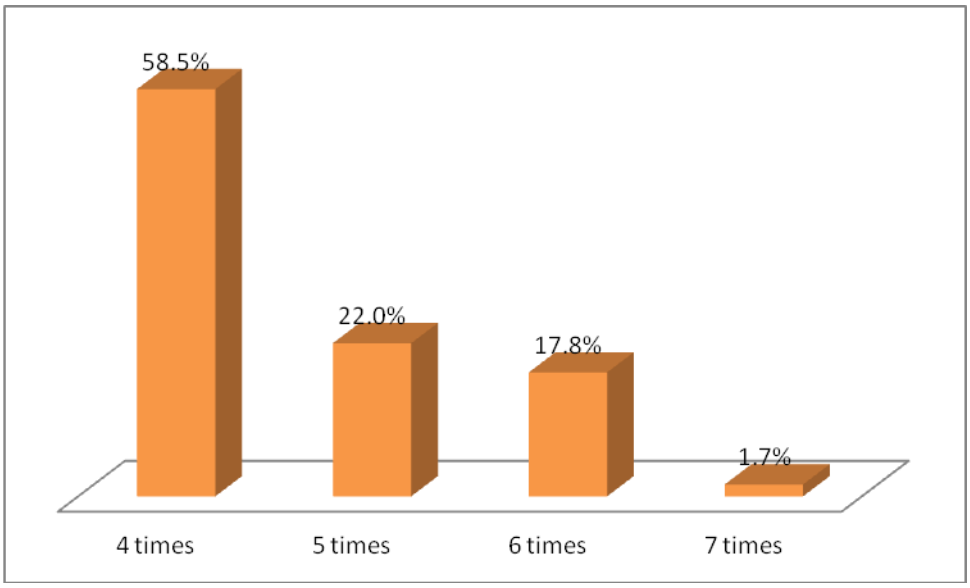

Figure 6. The distribution of follow up appointments every two years

During treatment

The radiographic examinations more often prescribed for dental implant assessment (during treatment) were the periapical radiography (37%), followed by panoramic radiography + periapical radiography (25.2%) and, CT (12.6%). Panoramic radiography was prescribed as a single examination by 9.2% (Figure 3).

Postoperative

The more frequently prescribed radiographic examinations for dental implant assessment (postoperative) were the panoramic radiography + periapical radiography (44.9%), followed by periapical radiography (27.1%) and, panoramic radiography (16.1%) (Figure 4).

Follow up

The radiographic examinations more commonly prescribed for dental implant assessment (follow up) were the periapical radiography (39.5%), followed by panoramic radiography + periapical radiography (31.9%) and, panoramic radiography (21%) (Figure 5). Figures 6 shows the distribution of follow up appointments every two years with majority of 4 time (58.5%), followed by 5 times (22%), 6 times (17.8%), and 7 times (1.7%).

Discussion

The main aim to conduct this study which was the first of its kind in KSA is to survey the current radiographic prescription in dental implant assessment in order to determine the prescription pattern among the experienced dentists and whether dentists are using imaging modalities for implant placement as recommended by the AAOMR. Several options are available, from which the dentist can choose but the choice of radiography is determined by the advantages and disadvantages of each modality.13, 14

In the present study, the panoramic radiograph was the most frequent radiographic examination prescribed for

treatment planning of osseointegrated implants. This ascertained that they have all not been following the international AAOMR recommendations. The majority of the dentists prescribed a panoramic radiograph because of availability, followed by broad coverage, and the combination of availability and broad coverage. The results of this study were in agreement with those obtained by previous studies.11, 12, 15

The panoramic radiograph gives useful information in the initial evaluation for pre-operative planning. However, owing to its large horizontal magnification which varies depending on the region measurements are not recommended on panoramic radiographs. Although panoramic radiograph requires only a small radiation dose, it does not provide information in the third dimension, which is considered as another limitation of panoramic radiographs.6, 7, 10

This study also found that majority of dentists tends to use periapical radiographs during surgery and follow up. A study suggested that conventional periapical radiographs and digital radiographs were more accurate than panoramic radiographs in the assessment of peri-implant bone loss.16 Moreover, periapical radiographs requires less radiation dose; produces minimal magnification and a minimally distorted relationship between the bone height and adjacent teeth, making it a more convenient diagnostic tool in clinical practice.10 Within the limitation of smaller sample size, the current study tries to emphasize the current radiographic prescription trends in the studied population.

Conclusion

This study has shown that the majority of dentists sampled in KSA prescribe panoramic radiographs followed by a combination of panoramic and intraoral periapical radiographs for dental implant assessment based on availability and broad coverage. Many of them were not aware and did not follow the recommended guidelines of AAOMR with regards to cross sectional imaging.

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