The awareness and attitude of medical radiologists toward oral and maxillofacial radiologists

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ABSTRACT

Objectives: To investigate the awareness and attitudes of medical radiologists toward the subspecialty of oral and maxillofacial (OMF) radiology. Methods: A cross-sectional study design was used, and an electronic questionnaire was sent out to radiologists in Saudi Arabia. The data from the 19-questions survey was collected between September 2018 and June 2020. Results: Despite the frequency of requests for imaging of the OMF region, most of the radiologists (82.8%) in our study have never consulted with an OMF radiologist. The majority of the radiologists (61.2%) reported not knowing an OMF radiologist, and another significant number (40.8%) had instead consulted with head and neck medical radiologists or neuroradiologists. In contrast, 80% were willing to collaborate with OMF radiologists in the future, and 70.7% supported establishing an online referral system to OMF radiologists. Conclusion: Most of the radiologists in this study were not aware of the subspecialty of OMF radiology. The majority of medical radiologists showed a positive attitude and willingness to collaborate with their dental counterparts. OMF radiologists should make their services available, accessible and proactively seek collaboration with other professionals.

Keywords: Oral and maxillofacial radiologist; Medical radiologist; OMFR; Interprofessional collaboration, Radiology

1. INTRODUCTION

Radiology is a distinct medical specialty. Members of this specialty provide an invaluable service and play a vital role in the diagnosis and management of patients. They do so by acquiring conceptual knowledge and expertise related to the various imaging
modalities and the endless diseases and conditions that affect the human body (Gunderman et al., 2001). This volume of knowledge and expertise is beyond the capabilities of a single specialist. Subspecialties such as neuroradiology, musculoskeletal radiology, and pediatric radiology, to name a few, have therefore been developed. Indeed, several studies have shown that the diagnostic accuracy of subspecialists in their specific subfields surpass the accuracy of general radiologists (Sickles, Wolverton and Dee, 2002; FitzGerald, 2009; Bell and Patel, 2014).

Oral and maxillofacial (OMF) radiology is a newly recognized subspecialty of the dental profession and is positioned at the interface between medical radiology and dental specialty (Frommer and Fortier, 1995). The specialty focuses on the interpretation of diagnostic images of the OMF region. Traditionally, most OMF radiologists have been dentists with advanced training in diagnostic imaging of the OMF region, have pursued careers in academia, or have primarily been involved in teaching dental students the art and science of dental radiology. However, the technological advances over the past decade, particularly the introduction of cone beam computed tomography (CBCT), have caused a paradigm shift in the practice of OMF radiologists. It has presented more lucrative opportunities in private practice, which has resulted in the specialty gaining immense popularity in many countries (Togan et al., 2016; Bamgbose et al., 2018; Selim, Sexton and Monsour, 2018). Moreover, advancements in imaging modalities have expanded the OMF radiology specialty beyond the conventional intraoral and panoramic images to include advanced imaging modalities such as multidetector computed tomography (MDCT), magnetic resonance imaging (MRI), ultrasonography, and sialography (Langland and Langlais, 1995; Kamburoğlu, 2015).

While there is a general sense of a lack of awareness of OMF radiology as a recognized specialty in Saudi Arabia and indifference from the radiology community toward this specialty and all it has to offer, to our knowledge, there is no conclusive data to confirm or refute this theory. This study was therefore undertaken to assess the awareness and attitudes of radiologists toward OMF radiology. Understanding these factors will aid in developing structured strategic plans for the future of the specialty.

2. MATERIAL AND METHODS

Ethical approval was obtained from the research ethics committee at the faculty of dentistry of King Abdulaziz University (Ethical approval #081-09-18). Data collection was done between September 2018 and June 2020. The study further complied with the Declaration of Helsinki. Using a cross-sectional study design, an English language questionnaire was distributed electronically via email and social media to reach the largest number of radiologists in Saudi Arabia. Emails were sent to radiologists whose contact details were available on the websites of the institutions. In addition, the presidents of national professional organizations such as the Saudi Society of Radiology and the Radiological Society of Saudi Arabia were contacted for their support in the distribution of the questionnaires. The Sample size was calculated and the required sample size for this study was 377 participants. A convenience sampling technique was used to recruit the study population. The final sample consisted of 58 medical radiologists.

The questionnaire was divided into three sections: the demographics of the responding radiologists, which constituted the first 6 questions; the awareness and practices of the medical radiologists (8 questions); and the attitudes of the radiologists toward OMF radiology (5 questions). The total number of questions was 19, and some required yes/no answers, while others were multiple choices. The participants were informed of the aim of the study and that their participation was voluntary. To ensure privacy and anonymity, no personal information was requested or recorded. To validate the questionnaire, it was sent to 10 radiologists before the initiation of the study, and they were asked to complete the questionnaire and comment on its clarity and length.

The statistical analysis of the data was conducted using the Statistical Package for the Social Sciences version 22 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to derive values in the form of counts and percentages to define the characteristics of the study variables.

3. RESULTS

Fifty-eight medical radiologists responded to the survey. The majority of the respondents (62.1%) were female. Most of the respondents (82.8%) were younger than 40 years of age. Accordingly, the respondents were predominantly residents (50%) or had less than 5 years of experience (56.9%). A solid majority of the respondents were general radiologists (63.2%), which was consistent with the respondents’ levels of education and years of experience. Some of the respondents with subspecialties included neuroradiologists (7%), musculoskeletal radiologists (5.3%), interventional radiologists (3.5%), head and neck radiologists (3.5%), and others (17.5%). Finally, most of the respondents were employed in governmental institutions (81%). The characteristics of the participants are listed in Table 1.

Most of the respondents (60%) were familiar with the OMF radiology specialty. Less than half of the respondents (48.3%) reported having received a request for an OMF examination weekly, while the overwhelming majority of the respondents (74.1%) had reported on imaging of the OMF region. Not surprisingly, most of these examinations were requested by OMF surgeons (75%)
and otolaryngologists (72.4%). Among these examinations, malignant tumors were the most challenging to diagnose, followed by pathologies related to dental implants and odontogenic tumors (Figure 1).

Table 1 The characteristics of the participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
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<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Younger than 30</td>
<td>23</td>
<td>39.7</td>
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<tr>
<td>30-39</td>
<td>25</td>
<td>43.1</td>
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<tr>
<td>40-49</td>
<td>9</td>
<td>15.5</td>
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<tr>
<td>50-59</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>60 and above</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>36</td>
<td>62.1</td>
</tr>
<tr>
<td>Male</td>
<td>22</td>
<td>37.9</td>
</tr>
<tr>
<td><strong>Years in practice</strong></td>
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<tr>
<td>Less than 5</td>
<td>33</td>
<td>56.9</td>
</tr>
<tr>
<td>5 to less than 10</td>
<td>14</td>
<td>24.1</td>
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<tr>
<td>10 to less than 15</td>
<td>8</td>
<td>13.8</td>
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<tr>
<td>15 and more</td>
<td>3</td>
<td>5.2</td>
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<tr>
<td><strong>Rank</strong></td>
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<td></td>
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<tr>
<td>Resident</td>
<td>29</td>
<td>50</td>
</tr>
<tr>
<td>Specialist</td>
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<td>8.6</td>
</tr>
<tr>
<td>Consultant</td>
<td>24</td>
<td>41.4</td>
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<tr>
<td><strong>Employment</strong></td>
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<tr>
<td>Government</td>
<td>47</td>
<td>81</td>
</tr>
<tr>
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<tr>
<td>Academic institution</td>
<td>19</td>
<td>32.8</td>
</tr>
</tbody>
</table>

Figure 1 Oral and maxillofacial pathology based on the anatomy that are the most challenging to diagnose

Most of the respondents (72%) considered the oral cavity the most challenging anatomy-related pathology, followed by the temporomandibular joints and the jaws (Figure 2).
During their clinical practice, 85.4% of the radiologists had not consulted an OMF radiologist because they did not know any OMF radiologists (61.2%), preferred to consult with head and neck radiologists or neuroradiologists (40.8%), had diagnosed the cases themselves (10.2%), or had had difficulty communicating and sending the cases to OMF radiologist (8.2%). The majority of the respondents (80%) were willing to collaborate with OMF radiologists, 10% were unwilling, and 10% were unsure. Two conflicting results were that most of the respondents (53.4%) believed that OMF radiologists would prevent them from gaining experience in interpreting the OMF area, yet 86.2% believed that there was a need for OMF radiologists to be employed in healthcare centers receiving referrals for head and neck pathologies, and 70.7% believed that OMF radiologists should be available to be consulted on a case-by-case basis through an online referral system. Finally, 51.7% of the respondents were willing to attend courses related to the interpretation of the OMF area, while 36.2% were prepared to do so if the topics were interesting, and 12.1% were unwilling to attend such courses.

4. DISCUSSION
There are no published studies in the English literature that examine the awareness and attitudes of medical radiologists regarding the existence of the OMF radiology specialty. In the current study, 60% of the medical radiologists were aware of the specialty of OMF radiology. In contrast, 94.6% of the pathologists were aware of OMF pathology as a subspecialty in Saudi Arabia (Binmadi and Almazrooa, 2017). The reduced awareness of the OMF radiology specialty among medical radiologists may be due to the specialty being relatively new as a recognized specialty in Saudi Arabia. The number of registered OMF radiologists in Saudi Arabia is also small relative to the other dental specialties. OMF radiology is a newly recognized diagnostic specialty in many countries and is positioned at the interface between dental specialty and medical radiology. In most countries, a qualified OMF radiologist must obtain a diploma or a fellowship from an accrediting organization, such as the American Board of Oral and Maxillofacial Radiology in the United States, the Royal Colleges of Dentists of Canada in Canada, and the Royal College of Radiologists in the United Kingdom, whereas master or doctor of philosophy academic degrees are provided in some countries (Rohlin et al., 1995; Ruprecht, 2009; Pakchoian et al., 2015; Bamgbose et al., 2018). The medical radiologists in the present study indicated that investigations of the OMF regions were frequently requested. Most of the respondents reported receiving a weekly request for an OMF examination. This is because the medical radiology department is the custodian of the multidetector computed tomography, magnetic resonance imaging, and nuclear imaging modalities, which are essential for the diagnosis and management of most OMF pathologies. Based on personal experience and inquiries, these advanced imaging modalities are not usually available in the majority of dental schools where most OMF radiologists practice. In West Africa, where there are limited facilities, OMF radiology training is performed jointly with a medical radiology department (Bamgbose et al., 2018). Accordingly, medical–dental collaboration is needed to enhance the sharing of facilities and resources across both departments.
In our study, the medical radiologists reported that the most challenging cases to diagnose were those involving malignant tumors (43%), pathology related to dental implants (40%), and odontogenic tumors (35%). Moreover, most of the respondents reported that the oral cavity (72.9%), jaws (39.6%), and temporomandibular joints (39.6%) were the anatomy-related pathologies that were most challenging to diagnose. This may be an area for improvement in radiology training programs. Head and neck radiology training includes in-depth training of the maxillofacial region pathology; however, only a small proportion of the respondents (3.5%) in the current study were head and neck radiologists. In the United Kingdom, a study was conducted to assess the adequacy of the medical training in the diagnosis, management, and appropriate referral of 10 common oral diseases (McCann et al., 2005). Only 28% of the medical physicians diagnosed cases correctly compared with 88.7% of the dentists. Furthermore, oral pathology was incorporated in the curricula of only 11 of the 21 responded medical schools (McCann et al., 2005). Two previous studies have investigated the differences between dental radiologists and medical radiologists in diagnosing maxillary sinus pathologies (Soon-Chul; 1998; Chang-Seo; 1999). In both studies, the dental radiologists showed higher accuracy compared to the medical radiologists (Soon-Chul, 1998; Chang-Seo, 1999). In Australia, more than 90% of general dentists prefer reports from OMF radiologists than from medical radiologists (Selim, Sexton and Monsour, 2018). In our study, 75% of the OMF examinations were requested by OMF surgeons. This is most likely because they need access to advanced imaging modalities. It would be interesting to find out whether OMF surgeons prefer reports from either OMF radiologists or medical radiologists.

Most of the respondents in our study (83%) reported that they had never consulted an OMF radiologist. Not knowing an OMF radiologist was the main reason (61.2%). Similarly, in the study of Bimadi and Almazrooa (Bimadi and Almazrooa, 2017), 70% of the pathologists had not referred a case to or consulted with an OMF pathologist. Among these, 57.7% did not know any OMF pathologists. We advocate for better medical–dental collaborative practice to improve the quality of patient care. It is essential to foster the establishment of interprofessional collaboration during undergraduate and graduate education. A survey regarding the awareness and attitudes of medical and dental students in Hong Kong toward collaboration between medical and dental practices found a good attitude toward and awareness of such collaboration, with radiology being one of the disciplines in which both fields were connected (Zhang, Lo and Chu, 2015). Future research on the issue of medical–dental interprofessional collaborative practice and its influence on the quality of patient care in Saudi Arabia are strongly recommended.

We suggest a two-fold approach to this issue: the first is changes to the education of medical and OMF radiologists and the second, changes to the practice of OMF radiologists. We suggest that medical radiology residents have a rotation in the OMF radiology department and vice versa to expand the knowledge base of both specialties and to enrich the learning experience. For example, a basic knowledge of dental implants, the bone augmentation procedures used prior to implant placement, and implant complications are required. Inflammatory disorders of an odontogenic origin area common cause of multiple conditions, including sinusitis, osteomyelitis, and head and neck space infections, while radiotherapy and multiple medications are potential causes of osteonecrosis of the jaws. Radiologists need to be vigilant regarding a possible dental cause and knowledgeable of the role they play in the diagnosis and management of these conditions (Boeddinghaus and Whyte, 2018). It is equally essential for OMF radiology department to operate in close collaboration with medical radiology department, specifically head and neck radiology and neuroradiology. For instance, OMF radiologists may come across incidental findings in anatomical regions beyond the expertise of OMF radiologists, such as the intracranial or cranial base, in CBCT diagnostic imaging (Barghan, Tahmasbi Arashlow and Nair, 2016; Alsufyani, 2017). Consultation with medical radiologists for a second or specialist opinion may be necessary in some cases.

The majority of the respondents (70.7%) in our study agreed that OMF radiologists are needed for reporting as well as consultation on individual cases. However, one-third of the respondents believed that the OMF radiology subspecialty is not needed because medical radiologists, particularly head and neck radiologists and neuroradiologists, report on maxillofacial imaging. Interprofessional continuing education is an effective mean to eliminate stereotypes about another professional’s identity (Zhang, Lo and Chu, 2015). Continuing education also provides a valuable way to strengthen clinical team work and enhance collaboration (Zhang, Lo and Chu, 2015). The majority of the medical radiologists in our study were interested in attending courses on OMF diagnostic imaging. Only 12.1% of the respondents were not interested.

OMF radiologists are encouraged to make their services available. This can be achieved through the adoption and implementation of teleradiology services in their clinical practices to promote referrals and sharing of cases. These services have been successfully implemented in some countries (Boringi et al., 2015; Ratib et al., 2016; Yang et al., 2016). In a nationwide survey conducted by the European Society of Radiology, 74% of the respondents reported using teleradiology services, 52% of them for second or specialist opinions (Ratib et al., 2016). Most of the respondents (80%) in the present study showed their willingness to collaborate with OMF radiologists. There is currently no OMF radiology specialty training program in Saudi Arabia, and most of the OMF radiologists have been trained abroad and are practicing in academia. It is imperative for OMF radiologists to establish collaborative relationships with medical radiologists and for the presence of OMF radiologists in healthcare centers in Saudi Arabia.
to be increased. Collaborative relationships are of paramount importance not only for improving patient care, but also for the future training of OMF radiologists and medical radiologists. Plans to increase interprofessional collaborative learning experiences through joint meetings and scientific activities are therefore essential.

There were some limitations to the current research. First, it was not possible to calculate the response rates because of the sampling method utilized. Social media was used to distribute the survey because contact email addresses on the websites of most institutions were rarely available. Furthermore, the awareness of medical radiologists was not assessed across different parts of the country as data regarding the cities in which the radiologists were practicing was not collected.

5. CONCLUSIONS
Most of the medical radiologists in our study showed a positive attitude and willingness to collaborate with their dental counterparts. Plans to enhance interprofessional collaboration in education and clinical practice would be beneficial. OMF radiologists are encouraged to improve the visibility and availability of their services in order to provide the best possible patient care.

Conflicts of interest
The author declares that there are no conflicts of interest.

Ethical approval
The ethical committee approval number of the study was #081-09-18.

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Data and materials availability
All data associated with this study are present in the paper.

REFERENCES AND NOTES
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