

The Impact of Dental Photography on the Performance of a Dental Practice

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Abstract

Original Research Article

Dental photography becomes an integral part in daily dental practice from the first appointment until the end of treatment. It is beneficial in dental education to make proper diagnosis and treatment planning without the need for patients' presence. This study aimed to assess the effect of dental photography on performance in dental practice. An online questionnaire was sent to forty volunteer practitioners in the College of Dentistry at Taibah University in Saudi Arabia. The questionnaire included two sections, education about dental photography and use of photography in daily dental practice. After data collection, an analysis was performed. Thirty-seven participants answered the questionnaire. All of them agreed that there is a need for dental photography in their practice. However, 28 participants reported that using dental photography is time-consuming. Dental photography was used by 36 participants to compare the case before and after treatment. Twenty-four participants used a mobile phone camera, while 23 were used a digital camera. Regarding photography education, 26 participants gained their knowledge from dental photography courses within their Bachelor programs, while 23 of the participants had attended extra-curriculum workshops and reported that attending these workshops positively affects their performance in clinics. Therefore, dental photography allowed their users to do proper treatment planning and consequently, provide better treatment outcomes. However, most of the participants in this study considered photography time-consuming.

Keywords: Dental education, dental photography, dental practice, digital camera, treatment planning.

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INTRODUCTION

Dental photography is a procedure for visually describing and reporting dental conditions. It has now become an integral aspect of daily dental practice, from a patient's first appointment until the end of his/her treatment. It is essential for dental practitioners to be able to make a correct diagnosis and set up an appropriate treatment plan without the patient needing to be present. Also, it is a beneficial method of consulting colleagues, as well as communicating with patients and laboratory technicians, to establish a clear vision of the status of the patient's teeth and surrounding structures. Efficient documentation is vital for protecting the dentist from any legal accountability, while photographs can also be used for assessing treatment outcomes, along with improving research, teaching and marketing [1-5].

The guidelines of the American Academy of Cosmetic Dentistry (2013) state that, clinically speaking, dental photography includes extra-oral and intra-oral photographs[6]. Extra-oral photographs

consist of frontal at rest, frontal with smiling, profile, and 3/4 frontal smiling. The patient should be positioned at an appropriate distance from the camera, with head and eye position being straightforward, while the camera is placed in a vertical direction. Intra-oral photographs consist of frontal, two lateral, upper and lower occlusal photographs [6,7].

The most appropriate equipment for taking these photographs is a professional digital Single Lens Reflex (SLR) camera, which should be of the kind suitable for taking portraits and close-up photographs, i.e. a D70 or D90 Nikon SLR camera (Nikon Corporation, Tokyo, Japan) and a Canon EOS 20D (Canon, Tokyo, Japan) [8,9]. SLR cameras are generally composed of two main components, i.e. the camera body and interchangeable lenses[5]. The critical aspect of creating a high-quality photograph concerns the selection of the appropriate lens. Dentistry deals with areas that are small, dark and inaccessible, requiring a light source and several other accessories, i.e., a ring flash, retractors, and a dental mirror [3,7].

The use of these accessories can improve image quality while also ensuring the recommended patient and dentist positions and adequate camera settings.

Many previous studies have assessed attitudes towards, and awareness of, the use of dental photography by dental practitioners. A study conducted in India in 2014 revealed dental practitioners to have sufficient knowledge of photography while also displaying various methods of application [3]. A further study undertaken in 2015 reported that dental photography was used as part of the daily dental practice; with photographs preserved alongside the relevant medical records [2] a study conducted among members of the Canadian pathology community in 2017 found that photography was highly recommended for educational purposes [10].

Since dental photography has become an essential aspect of daily dental practice and dental education, it is crucial to understand the interest of dental practitioners in acquiring such skills. Few dental schools currently include dental photography as a course as part of a Bachelor's degree (i.e., to educate students concerning the role of photography in daily practice), with, as noted above, the majority of dentists having either attended photography workshops or acquired such skills independently.

Several new concepts have now evolved in the dental profession that depends on dental photography and digital technology. Besides, academicians and practitioners have become increasingly aware of the importance of dental photography, resulting in a need to investigate the role of dental photography within the

dental practice [2, 3, 10]. The aim of this study was to assess the impact of dental photography on the performance of a dental practice. The hypothesis was that practitioners who are using dental photography in daily work would have better clinical performance than others.

MATERIALS AND METHODS

This observational analytical cross-sectional study was approved by the Research Ethical Committee of the College of Dentistry at Taibah University (approval #20170221). The study included dental practitioners at Taibah University, College of Dentistry (TUCD). An online questionnaire was sent to practitioners in TUCD to assess the quality of photographs, based on the methods and tools employed by dental practitioners. A convenience sample was used, and all participants in this research were volunteers. The design of the questionnaire was based on previous studies conducted in 2014 and 2017[3,10]. The questionnaire was in English and made up of two sections: (1) photography education and (2) the use of dental photography in dental practice (Appendix A). Following the data collection, and the completion of the investigation, a normality test was performed for the data, followed by a t-test with a p-value of 0.05 to compare the outcomes.

RESULT

Thirty-seven out of forty practitioners (93%) answered the questionnaire, nineteen of whom were female (51%) and eighteen male (49%). The breakdown of practitioners according to academic year level of the student is shown in Figure 1.

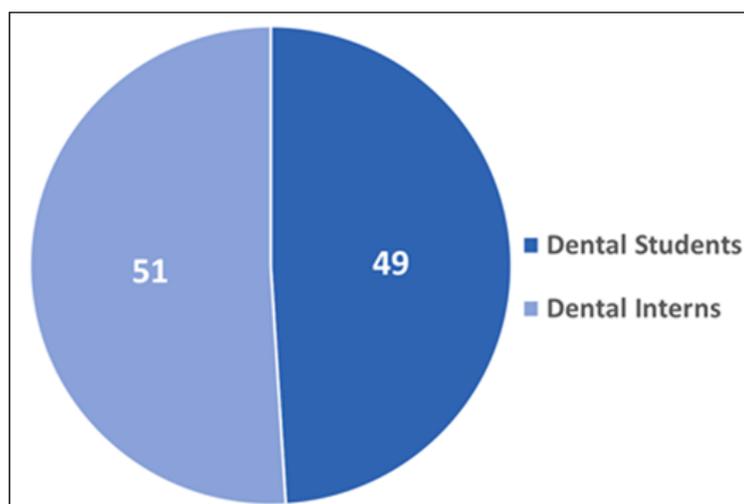


Fig-1: Number of practitioners divided according to academic year level of students

All the practitioners agreed on a need for dental photography in their practice, but only thirty (81%) regularly used dental photography as an aspect of

their practice. However, most of the practitioners (76%) considered dental photography a time-consuming procedure that requires expensive equipment (Figure 2).

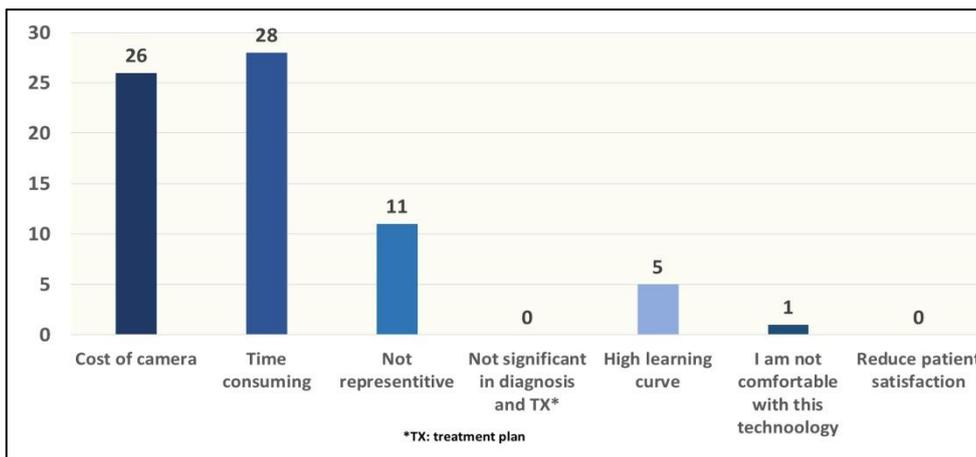


Fig-2: Disadvantages of dental photography in a dental practice

The responses to their training in dental photography revealed that photography is viewed as most effective for dental documentation and reporting a case as well as for diagnosis and treatment planning (Figure 3). When it came to training in dental photography, twenty-six (70%) of the practitioners had

acquired their knowledge from dental photography courses within their Bachelor's degree programs, while twenty-three (62%) had attended a dental photography workshop, reporting a positive impact on their performance.

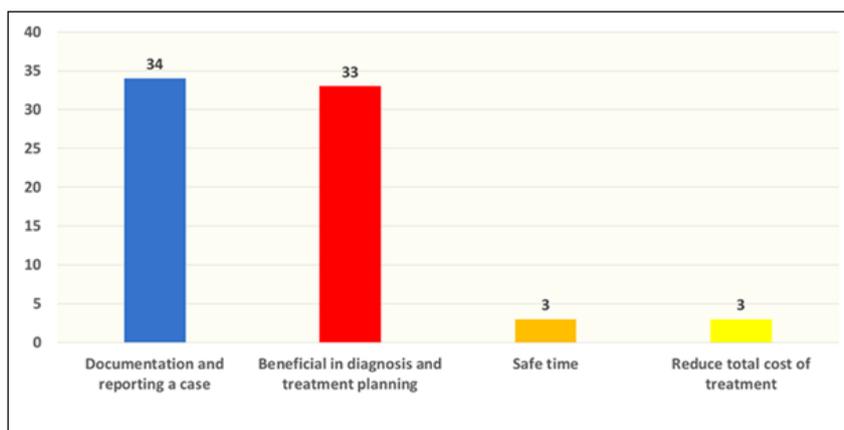


Fig-3: Advantages of dental photography in a dental practice

The responses to the second part of the questionnaire (which focussed on the use of dental photography in dental practice), identified that thirty-six (97%) of the practitioners (97%) mainly used dental

photography to compare a case before and after treatment followed by designing treatment plans (84%) and follow-up a patient condition (78%) (Figure 4).

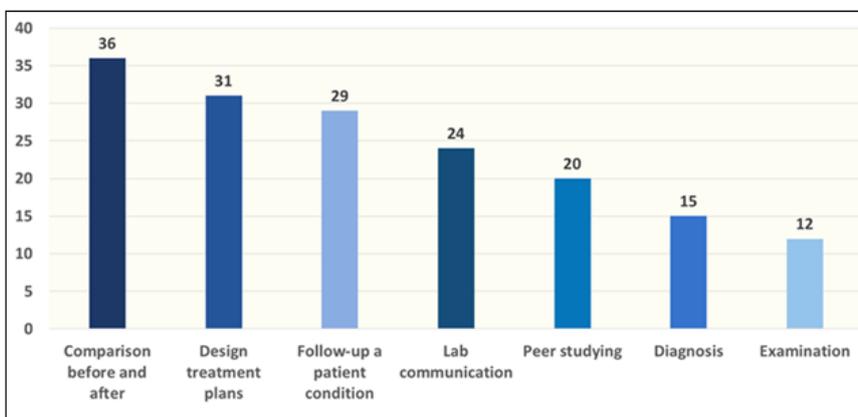


Fig-4: Different scenarios of using dental photography in dental practice

Twenty-four (65%) of the practitioners routinely used dental photography for different cases (Figure 5), with thirty-six (97%) ensuring they acquired verbal agreement from their patients. When it came to the type of electronic devices and programs used to review the photographs, twenty-eight (76%) of the practitioners used laptops with Photo Manger program

(i.e. Magix Photo Manager, Picasa or another); twenty-four (65%) used mobile phones; seventeen (46%) used laptops included Microsoft Office PowerPoint or Apple's iWork Keynote software; and two (5%) used an iPad, employing either Photo Manger Programme software for Windows, Microsoft Office PowerPoint, or iWork Keynote software.

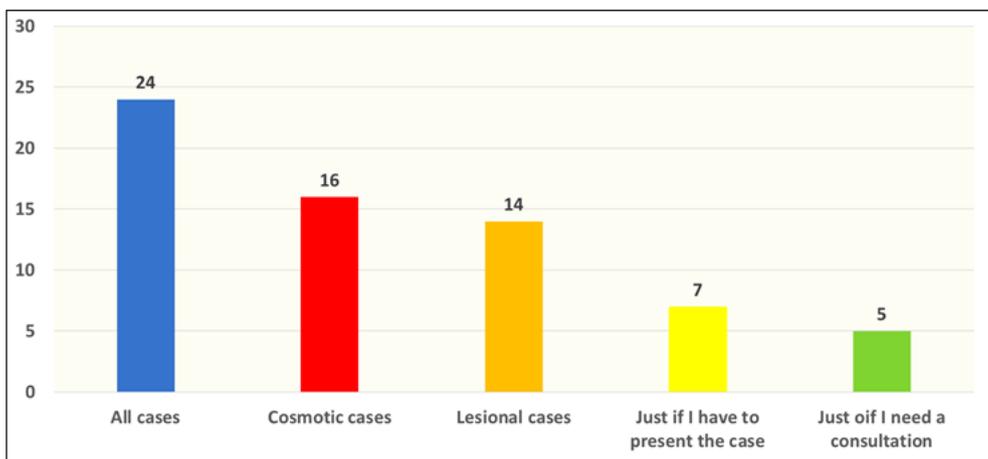


Fig-5: Types of cases documented by participants using dental photography

Regarding types of camera used, many practitioners stated that they used different types of cameras as twenty-four (65%) used a mobile phone camera, while twenty-three (62%) used a Digital Single Lens (DSL) professional camera and nine (24%) used a semi-professional camera. When practitioners were asked about the other equipment they employed for

dental photography, eleven (30%) used additional macro lenses. Moreover, twenty-four (65%) did not use any flash, nine (24%) used additional ring flashes, and four (11%) used the built-in flash. Thirty-six (97%) used dental retractors, and all practitioners used dental mirrors (Figure 6).

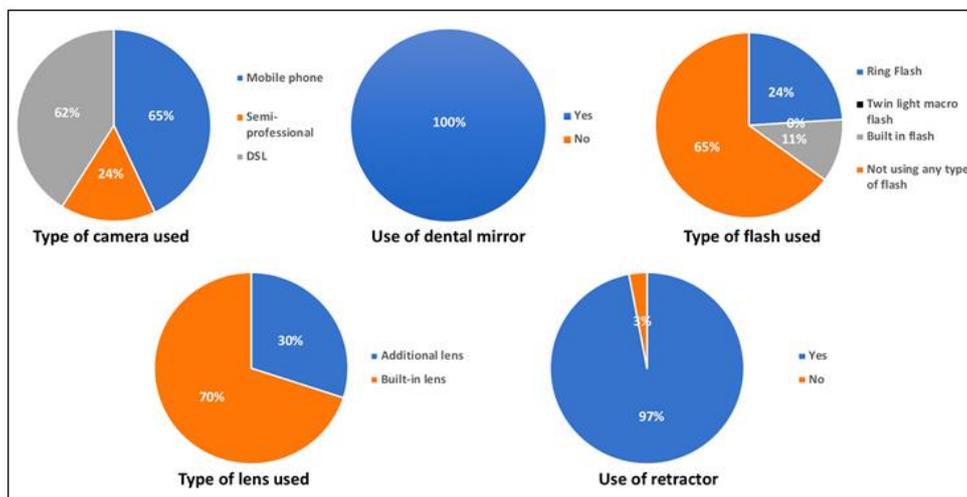


Fig-6: Different equipment used by the participants for dental photography

Finally, the practitioners were questioned concerning the factors potentially influencing the quality of images. Thirty-six (97%) reported that the quality of an image could be compromised by the position of a patient, and all the practitioners agreed that the angulation of the camera has the potential to influence the quality of an image.

DISCUSSION

The hypothesis of this research was accepted, as all participants reported a need for dental photography for their dental practice. Although 76% of the participants found dental photography time-consuming, 81% of them used it as part of their daily

practice. This may be due to all of the volunteers being students and thus lacking sufficient expertise in taking photographs, resulting in a need to coordinate with an assistant or a colleague to manage the various equipment and positions necessary for taking high-quality photographs. Furthermore, they also need to instruct their patients in sitting in a suitable position, while holding the retractors in an appropriate position to pull their cheeks. This requires patient communication and cooperation. These findings are supported by a study done by Altiparmakogullari *et al.* who reported similar outcomes for clinicians taking photographs for orthodontic treatment [11].

In this study, the main motivation for the use of photography as an aspect of dental practice was found to be the creation of an effective treatment plan and the ability to compare results before and following treatment. This is supported by a similar finding by Morse *et al.* but contrasts with a study conducted by Bellis *et al.* within a pathology community in Canada, which reported that dental photography was primarily used for educational purposes [10,12]

There are many advantages of using dental photography. The results of this current study identified the two main advantages as being: (1) documentation and (2) the creation of a treatment plan and diagnosis. These results were expected, as most of the participants were dental students. On the other hand, the pathology community in a Canadian study reported that photography facilitates greater accessibility and more rapid access to results, thus leading to a more efficient diagnosis [10].

The majority of the practitioners in the current study had acquired their knowledge of dental photography from dental photography courses within their Bachelor's degree programs, as well as through workshops, peer learning, and online videos. They viewed the workshops (which were held by highly experienced practitioners) as having a positive influence on their performance. In addition, they were able to acquire a range of skills for capturing dental photographs, ones that had not been covered by other courses. Finally, the workshops gave them an opportunity to practice and to be evaluated by an expert supervisor, and to strengthen any weak points. Similarly, Uzunov *et al.* reported that their participants were in need of additional practical training sessions, or for workshops focussing on dental photography, in order to improve their performance [2]. This current study, therefore, recommends the inclusion of practical sessions during the Bachelor's degree programs.

As noted above, the majority of participants in this current study preferred to use a mobile phone, followed by those who preferred a DSL professional camera. This may be due to the cameras on mobile phones being readily available, easy to use and

inexpensive, while (in contrast to a DSL camera) also lacking any need for professional training. This finding is similar to that of a study conducted by Sudenthiran *et al.* [13]. However, it should be noted that DSL cameras give high-quality photographs.

The majority of the participants reported using the Photo Manger program as helpful for reviewing photographs. This may be attributed to numerous options available in the Photo Manger software program for Windows, which assists in editing photographs when compared to Microsoft Office PowerPoint or iWork Keynote software, both of which are easier to use but have more limited options. The most commonly used device to review photographs was a mobile device, followed by a laptop. This was due to mobile phones being quick and easy to use, while also cheaper than an iPad or laptop and easier for communication. Similarly, Sudenthiran *et al.* agreed that electronic devices play an important role in modern dentistry [13].

This current study has established that several factors are involved in the quality of a photograph, including the angulation of the camera, and the position of the patient. This is due to different types of intraoral photographs requiring a correct position from the patient while requiring the dentist to handle a heavy camera. The practitioners in the current study were students at a dental college, who therefore tended to take their own photographs without the benefit of an assistant and therefore found it difficult to handle both a camera and a dental mirror simultaneously. This leads to a need for additional training, in order to avoid shadows and many other errors compromising the quality of photographs.

This study also explores the uses of lenses, flash, dental mirrors, retractors and the consent used in dental practices. Most of the practitioners took care to obtain verbal consent from their patients before taking a photograph. This study recommends that, in order to avoid any legal accountability, written consent should be obtained. All practitioners involved in this study employed dental mirrors, with 97% using dental retractors. In addition, 30% used additional macro-lens, i.e. the majority used no additional lenses. A ring flash was used by 24% of the practitioners, followed by a built-in flash. Possible reasons for avoiding the use of additional lenses or flashes are to avoid handling a heavy camera and/or buying expensive accessories. These reasons were also reported in studies done by Uzunov *et al.* and Altiparmakogullari *et al.* [2,11].

CONCLUSION

This study has established that dental photography has a positive influence on a practitioner's performance in his/her daily dental practice, with the most skilled practitioners have gained their training through workshops. This study, therefore, recommends

the implementation of additional practical training during Bachelor's degree courses, or workshops in dental photography. Moreover, it has been established that participants with adequate knowledge of dental photography demonstrated more efficient treatment planning, diagnosis, and documentation.

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Appendix A: This questionnaire includes two sections; please answer all the following questions.

Section (1): Photography education

Please answer by putting a cross in appropriate box .

- 1- Do you need dental photography in your practice?
 - Yes
 - No

- 2- In your opinion, what are the disadvantages of dental photography in your practice?

You can choose more than one option.

- Cost of camera
- Time consuming
- Not representative (does not represent patient's actual condition)
- Not significant in diagnosis and Tx
- It would take too long to learn how to use the technology
- I am uncomfortable with this technology
- Reduces patient satisfaction

- 3- In your opinion, what are the advantages of dental photography in your practice?

You can choose more than one option.

- Saves time
- Reduces the total cost of treatment
- To document and report on a case
- Beneficial in treatment planning and diagnosis

of dental photography in a dental practice.

- 4- How might you learn about dental photography?

You can choose more than one option.

- Dental photography courses within your BDS program
- Attending a dental photography workshop
- Peer learning
- Online videos, materials or webinars

- 5- Have you attended any workshops about dental photography?

If the answer is yes, please answer question 6.

If no proceed to Section (2)

- Yes
- No

- 6- Do you think attending a workshop has affected how you take photographs?

- Yes
- No

Section (2): Dental photography in dental practice

7- Is dental photography commonly used in your practice?

If the answer is no, please answer the next question.

If Yes, please continue from question 9.

- Yes
- No

8- Why do you not use dental photography in your practice?

- I don't know how to take photographs
- I think it isn't necessary to take photographs
- I think it is time consuming

9- In what capacity is dental photography used?

You can choose more than one option.

- For examination
- To create treatment plans
- For diagnosis
- To follow-up on a patient's condition
- Comparison case before and after treatment
- For consultations with a specialist
- For lab communication
- For peer review

10- Which types of cases do you consider recording using a photograph?

You can choose more than one option.

- All cases
- Cosmetic cases
- Lesional cases
- Only if I need a consultation
- Only if I have to present the case

11- After you have taken a photograph, do you usually review it from:

You can choose more than one option.

- Mobile device
- Laptop using a photo manger program
- Laptop using Power Point or Keynote
- iPad using a photo manger program
- iPad using Power Point or Keynote

12- Do you obtain consent from the patient before taking photograph?

- Yes, verbal consent
- Yes, written consent
- No

13- What type of camera do you use in your practice?

- Mobile phone
- Digital single lens (DSL) professional camera
- Semi-professional camera

14- Do you use an additional lens with the camera used in your practice?

- Yes, I use macro lens
- No

15- Do you use an additional flash in your practice?

- Yes, I use ring flash
- Yes, I use twin light macro flash
- Yes, I use built in flash
- No

16- Do you use retractors in your practice?

- Yes
- No

17- Do you use a dental mirror in your practice?

- Yes
- No

18- Do you think the position of the patient can affect image quality?

- Yes
- No

19- Do you think the angulation of the camera can affect image quality?

- Yes
- No

You can choose more than one option.