

Effectiveness of Training on Dental Photography Skills among Undergraduate Students: An Interventional Study

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Abstract

Background: Dental photography is crucial in modern dentistry for diagnosis, treatment planning, patient education, and documentation, enhancing communication and patient care. Despite its importance, proficiency among dental students varies, highlighting the need for targeted training. This study evaluates a structured training program designed to improve dental photography skills using a comprehensive checklist and objective scoring system, analyzed with digital tools. **Materials and Methods:** This cross-sectional study assessed 30 undergraduate dental students' photography skills using a checklist developed with expert input. A training session covered essential techniques, and students' images were evaluated based on predetermined profiles. **Results:** Significant improvements in photographic skills were observed post-training. Analysis of demographic factors and the use of digital tools for objective assessment supported the training program's effectiveness. **Conclusion:** This research supports the effectiveness of structured training in dental photography and advocates for standardized training and assessment methods to improve educational outcomes in dental photography.

Keywords: Dental informatics, Dental photography, Treatment protocol.

INTRODUCTION

Dental photography plays a crucial role in contemporary dental practice, serving as an indispensable tool for diagnosis, treatment planning, patient education, and documentation.^[1] The quality of dental photographs significantly affects the ability of dental professionals to communicate with both patients and colleagues, thus impacting the overall quality of patient care.^[2] Despite its importance, proficiency in dental photography among undergraduate dental students remains variably addressed in dental curricula worldwide.^[3]

Recent studies have highlighted the gap in practical skills, including dental photography, among dental undergraduates, suggesting a need for targeted training programs.^[4] Training in dental photography, encompassing both theoretical knowledge and practical skills, is essential for preparing future dentists to meet the demands of modern dental practice.^[5] Furthermore, the effectiveness of such training programs in enhancing the photographic skills of dental students has become a subject of increasing interest within the academic community.^[6]

The integration of digital technology into dental education has opened new avenues for teaching and learning dental photography.^[7] Innovative teaching methods, including hands-on workshops and digital simulations, have been shown

to significantly improve the photographic skills of dental students.^[8] However, the variability in training methodologies and assessment criteria makes it challenging to standardize training programs across institutions.^[9]

The assessment of dental photography skills often involves subjective evaluation, which can lead to inconsistencies in determining the effectiveness of training programs.^[10] Objective assessment methods, such as checklists and scoring systems, have been proposed to provide a more standardized evaluation of students' photographic skills.^[11] In addition, the use of digital tools and software for data analysis has been recognized as an effective approach for assessing the outcomes of training programs in dental photography.^[12]

Given the significance of dental photography in clinical practice and the potential benefits of structured training programs, this

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study aims to evaluate the effectiveness of a training program on improving dental photography skills among undergraduate dental students. By employing a comprehensive checklist and objective scoring system analyzed through digital software, this study seeks to contribute valuable insights into optimizing dental photography training within dental education.

MATERIALS AND METHODS

Materials used in this study,

- DSLR camera
- Intraoral mirror
- Cheek retractor.

Study design

This research was structured as an interventional to assess the photography proficiency of undergraduate dental students. The institutional ethical clearance is obtained (2023/IRB-NOV-PROSTHO-13/APDCH). The main aim was to evaluate their capacity to capture precise dental images of high quality, which is crucial for precise diagnosis, treatment planning, and dental records.

Participants

The study included a total of 30 undergraduate dental students. These participants were selected based on their willingness to participate and their availability for both the training session and the subsequent evaluation.

Development of assessment criteria

The initial phase of our approach entailed developing an extensive checklist aimed at assessing participants' proficiency in dental photography. To ensure its comprehensiveness, we consulted a panel of photography experts specializing in dentistry, incorporating their insights. As a result of this collaborative process, we refined the checklist to encompass key areas such as full-face, smile, anterior, left lateral, right lateral, maxillary, and mandibular arch, yielding a thorough evaluation tool tailored to the requirements of our study.

Photographic training session

Before the evaluation, all participants underwent a detailed photographic training session. This session was aimed at equipping them with the necessary skills and knowledge required to capture dental images accurately. The training covered various aspects of dental photography, including camera settings, lighting techniques, and the correct positioning of subjects.

Evaluation of photographic skills

Following the training session, the students were tasked with capturing images in different dental profiles. Specifically, they were required to take photographs mirroring seven predetermined images showcasing various profiles. These images served as a reference point for assessing the student's ability to replicate professional dental photographs under similar conditions.

Scoring system

The evaluation of students' photographs utilized the checklist previously established. Each student's work was assessed

against reference images by an expert evaluator. Scoring followed a binary system, where students received either a 0 (unsatisfactory) or 1 (satisfactory) for each checklist criterion. This binary approach enabled a clear and impartial evaluation of each participant's photographic abilities.

Data analysis

Upon completion of the scoring process, the collected data were compiled and analyzed using Statistical Packages for the Social Sciences (SPSS) software version 21 IBM. The use of Excel allowed for efficient data management and analysis, enabling the research team to calculate scores, identify trends, and draw conclusions regarding the photographic skills of the undergraduate dental students involved in the study.

Ethical considerations

All participants were informed about the nature of the study and provided their consent before participation. The study was conducted in accordance with ethical guidelines to ensure the confidentiality and privacy of all participants were maintained throughout the research process.

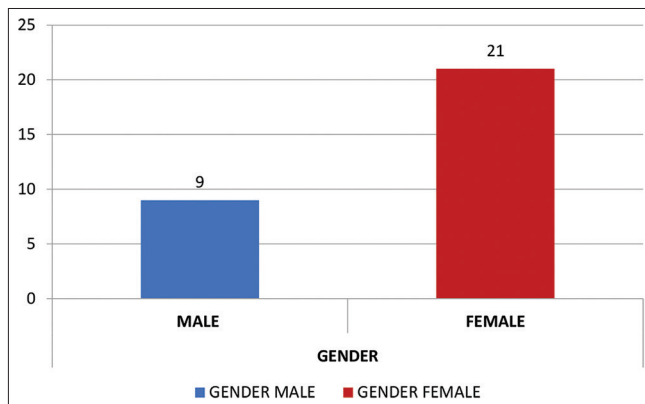
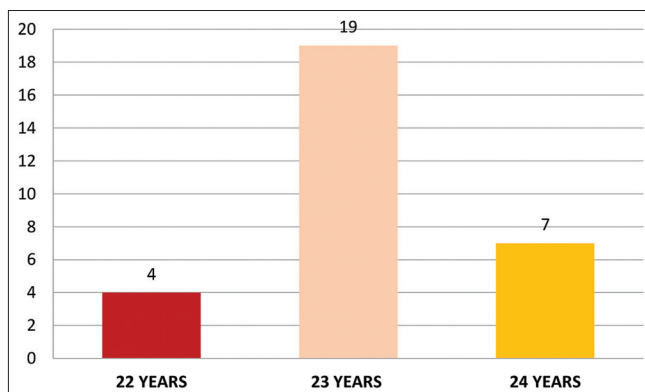
RESULTS

As shown in table 1 the comparison between pre-and post-follow up duration among the study population in by using a paired t test the comparison between the factors has been assisted using statistical analysis in which there was significant difference seen very high proportion with the value 0.00 representing that the difference between the parameters and pre-and post comparisons were very high. In real time. The profile shows a value of 0.90 in Post when compare to 30.27 with P value 0.00. Likewise, smile, Post shows 0.97 Pre value shows 0.40 with p value 0.00. The anterior values showed a significant difference when compared with pre- and post-measurements, with values of 0.97 and 0.103 (P=0.00). Similar differences were observed on the right and left sides, with greater variation in the post-measurements compared to the pre-measurements. For example, values of 0.97 and 0.93 in the post-session, compared to pre-session values of 0.30 and 0.07, indicate a large difference.

Likewise, when mandible and maxilla are compared, it showed that the Post values of mandible and maxilla were .53 and .77 in Max and Man, the post value shows 0.53 & 0.70 and per values 0.07 and 0.13 which shows significant difference 0.00. This infers that the parameters in the study shows a good difference in the clinical outcomes which has been proved with evidence among the study population. Graph 1 illustrates the gender distribution of the study population, showing that out of the total sample, 21 participants were female and 9 were male, indicating a higher representation of females compared to males. As shown in graph 2 represents the distribution of study population based on the age wise classification in which 22 years, four members, 23 years 19 members and 24 years seven members participated in the study respectively. As shown in graph 3 represents distribution of mean values for the parameters in the study in which the pre-and post assessment for profile smile anterior right lateral left, lateral maxilla and mandible were spotted with their corresponding mean values.

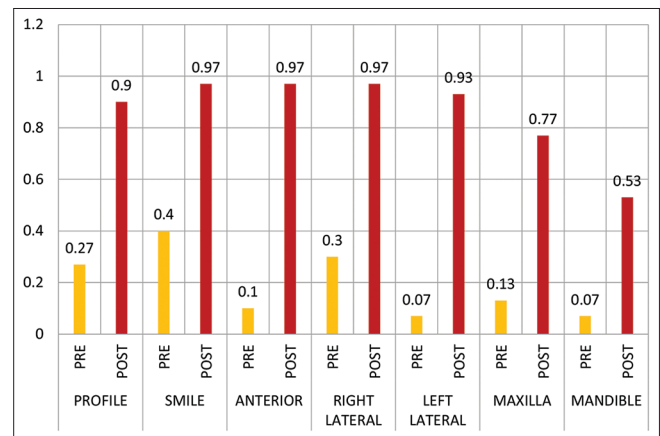
Table 1: Comparison between pre- and post-follow-up durations among the study population

Parameters	Follow up	Mean	Standard deviation	Paired test mean	Paired test standard deviation	95% Confidence interval		Sig
						Lower	Upper	
Profile	Pre	0.27	0.450	-0.633	0.490	-0.816	-0.450	0.000
	Post	0.90	0.305					
Smile	Pre	0.40	0.498	-0.567	0.504	-0.755	-0.378	0.000
	Post	0.97	0.183					
Anterior	Pre	0.10	0.305	-0.867	0.346	-0.996	-0.738	0.000
	Post	0.97	0.183					
Right lateral	Pre	0.30	0.466	-0.667	0.547	-0.871	-0.463	0.000
	Post	0.97	0.183					
Left lateral	Pre	0.07	0.254	-0.867	0.434	-0.1029	-0.705	0.000
	Post	0.93	0.254					
Maxilla	Pre	0.13	0.346	-0.633	0.556	-0.841	-0.426	0.000
	Post	0.77	0.430					
Mandible	Pre	0.07	0.254	-0.467	0.571	-0.680	-0.253	0.000
	Post	0.53	0.507					

**Graph 1:** Represents the gender-wise distribution among the study population**Graph 2:** Represents the distribution of the study population based on the age-wise distribution

Statistic analysis

The collected data were entered into a Microsoft Excel spreadsheet in which, for the 30 samples, the parameters were age and gender, respectively. The statistical analysis

**Graph 3:** Represents the distribution of mean values for the parameters in the study

was performed using SPSS software version 21 IBM, USA, in which descriptive analysis was done for age, gender, and distribution of the study population. study likewise, after assessing the normality test using the Shapiro–Wilk test, it was found to be parametric or non-parametric, and henceforth, a paired *t*-test or Wilcoxon Signed Rank test will be performed with significant difference kept as $P \leq 0.05$, respectively.

DISCUSSION

The significant improvement in dental photography skills among undergraduate students, as demonstrated in our study, echoes the findings of several recent studies, underscoring the importance of structured training programs in dental education. The use of a paired *t*-test to analyze pre- and post-training data revealed substantial enhancements across various photographic parameters, a testament to the effectiveness of the implemented training regimen.

Our findings are consistent with those who reported significant improvements in dental photography skills following a comprehensive training program. Similarly, the pivotal role of hands-on workshops in enhancing the practical skills of dental students, a methodological approach our study employed with notable success.

The gender and age distribution analysis in our study provided insights into demographic factors that might influence learning outcomes in dental photography. This aspect of our research aligns with the work, which found that demographic variables could impact the acquisition and application of dental photography skills.

Moreover, the application of digital tools and software for data analysis in our study reflects a growing trend in dental education research. The use of digital technology not only facilitates a more objective assessment of skills but also enhances the learning experience for students. This perspective advocates for the integration of digital tools in the assessment process to achieve a standardized evaluation of dental photography skills.

The variability in training methodologies across different institutions, as discussed by Evans and Harris^[9] poses a challenge to the standardization of dental photography training. Our study's success with a specific training methodology suggests the potential for developing a standardized curriculum that could be adapted to various educational settings, thereby addressing the concerns regarding the inconsistency in training approaches.

The subjective nature of assessing dental photography skills is a limitation highlighted in our study, and there is a need for further research to develop and validate objective assessment tools. This is in line with the recommendations of Patel and Kumar,^[11] who emphasized the importance of objective criteria in evaluating dental photography competencies.

In conclusion, our study contributes to the growing body of evidence supporting the effectiveness of structured training programs in improving dental photography skills among

undergraduate students. By addressing the challenges related to assessment and standardization, our research paves the way for future studies aimed at optimizing dental photography training in dental education.

CONCLUSION

In this study, participants took photographs with much greater accuracy after the training session compared to before it. Post-training, they became highly proficient in taking photographs. This study adds to the growing body of evidence supporting the efficacy of structured training programs in enhancing dental photography skills among undergraduate students. By addressing assessment and standardization challenges, our research lays the groundwork for future endeavors aimed at optimizing dental photography training within dental education.

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