



Original article

Perception of Tooth Carving Sessions among Undergraduate Dental Students within the Faculty of Dentistry/University of Benghazi

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ABSTRACT

Background: In most dental schools, dental anatomy is taught in both theoretical and practical sessions during the first years of the Bachelor of Dental Surgery (BDS). This comprehensive course equips students with essential knowledge about dental morphology and occlusion. Furthermore, it serves as the fundamental basis for various clinical disciplines within dentistry, particularly those related to tooth restoration.

Aim: The study aimed to evaluate dental students' response to tooth carving sessions using wax blocks within the BDS curriculum at the Faculty of Dentistry in Benghazi and to assess the benefit of these sessions in improving their knowledge, and understanding of tooth morphology.

Methods: A three-month cross-sectional descriptive study was conducted in 2022 among 474 undergraduate dental students at the Faculty of Dentistry in Benghazi. We employed a convenience sampling approach to collect the data. The questionnaire was prepared using a semi-structured proforma, which included questions about participants' perceptions of tooth carving. Participants received a Google Form link through the telegram channel of the students. Descriptive statistics, including mean, standard deviation, percentage, and frequency were calculated using the SPSS 21.

Results: A total of 474 dental students participated in this study. Among them 94% practiced tooth carving using wax blocks during their practical sessions of dental anatomy. More than 70% of participants agreed that tooth carving enhanced their understanding of precise tooth morphology, dental anatomy, and proper occlusion relationships. Interestingly, 63% of the participants believed that live demonstration assisted with step-by-step video tutorials would be more effective in practicing tooth carving.

Conclusion: Based on the results, it is evident that most students at the Dental Faculty of Benghazi recognize the significant importance of tooth carving in their educational journey as future dental practitioners. This valuable data can inform the development of dental education programs, ensuring continued emphasis on teaching tooth carving during the undergraduate stage. However, as we move forward, exploring innovative approaches becomes essential. Incorporating newer techniques such as computer-aided platforms and video tutorials could enhance student engagement and provide a deeper understanding of tooth morphology and anatomy.

Keywords: *Tooth carving, Dental anatomy, Tooth morphology.*

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INTRODUCTION

Obtaining both foundational theory and practical skills is required for detection, management, and therapy of disorders affecting the oral cavity.¹ Dental anatomy is

the study of anatomical and morphological components of human dentition (both permanent and deciduous) in addition to their placement and connection to the related oral structures.² Therefore, it is considered a fundamental course for establishing a firm dental background that will be needed in future dental procedures.^{3,4}

Dental anatomy is taught in most dental schools around the world in two stages: theory and practical.⁵ First, students learn theoretical material through lectures, reading textbooks, looking at models of teeth, and diagrams. Second, students carve a reference model of

various teeth using different materials (wax, soap, or plaster) in order to reinforce their psychomotor skills.⁶ Both cognitive and psychomotor skills are involved in the process of learning tooth morphology through carving sessions.^{7,8}

There are six surfaces on every tooth in the dental arch, and each surface has special characteristics that set it apart from the others. Learning to mimic the forms, convexities, and concavities particular to the type and location of teeth is the goal of dental wax carving.⁹ Dental students can gain experience with hand instrumentation techniques and practice skills like grip, aiming, reaction, and finger dexterity through dental wax carving.¹⁰ These skills are critical for the high level of precision required in the field of dentistry.^{11,12}

Tooth carving is a crucial aspect of practicing dental anatomy and represents a substantial challenge for most dental students.^{10,13} Different opinions concerning tooth carving exist among dental students who have already completed the tooth carving phase during undergraduate study. The use of this traditional method reveals some weak points that can cause frustration for students. Therefore, this study's goal was to analyze the perceived importance of tooth carving among undergraduate dental students during the preclinical stage.

MATERIALS AND METHODS

A cross-sectional descriptive study was conducted over three months in 2022 amongst undergraduate dental students at the Faculty of Dentistry, Benghazi, Libya using a web-based questionnaire. The ethical approval (APP No: 0173) was obtained from the Scientific Research Ethics Committee (SREC)-Faculty of Dentistry. A semi-structured self-administered questionnaire consisting of 15 open-ended questions related to the perception of tooth carving was prepared based on the literature review.⁸ Several questions were included regarding various aspects of tooth carving sessions including the benefits of these sessions on improving the student understanding of tooth morphology. We also asked the students how these sessions enhance their manual dexterity. Several questions were about the suitability of the equipment, the workspace, session time and the carving material. Further inquiries focused on the marking standards and the practicality of life carving demonstrations. Moreover, they have been asked about how helpful the carving session is in fixed and restorative prosthodontic sessions. Finally, they have been asked if they have any other comments or suggestions for future improvement. The questionnaire was set using Google Forms via docs.google.com/forms and the link

was sent to the enrolled participants through the telegram channel of the department. The participants were selected to be from the second year, who had already completed their preclinical tooth carving stage in the first academic year of BDS. No personal information was collected, and the participation was totally voluntary. The filled questionnaires were removed from Google Forms and exported to Microsoft Excel 2019. Only completely filled Questionnaires were included in the study. Descriptive statistics, mean, standard deviation, frequency and percentage were calculated using IBM SPSS Statistics for Windows, version 21 (IBM Corp., Armonk, N.Y., USA).

RESULTS

The Google link to the questionnaire was shared with 474 students, and 271 of them responded, contributing to the final analysis. This resulted in a response rate of 57.17%. Among the participants, 207 (76%) were female, while 64 (24%) were male students enrolled in the second year at the Dental Faculty of Benghazi University.

Of the total number of participants only 86 (31.7%) carved a full set of permanent teeth while the majority of the students have carved only a few permanent teeth 185 (86.2%). More than half of the student believed that the crown is the most important part of the tooth 146 (53.8%) while the other thought that both the crown and root are very important. About two-thirds 205 (75.6%) agreed that tooth carving enhanced their understanding of tooth morphology (**figure 1**). Moreover, (67.5%) of participants found carving sessions very helpful in understanding occlusion.

When they were asked if the tooth carving was helpful in restorative and prosthodontics lab sessions in the second year 108 (39.8%) answered yes to this question. About 156 (57.5%) of dental students agreed that the total time allowed for the course per year is relevant, while 124 (45.7%) assumed that the time allowed for each carving session wasn't enough for them to finish the tasks (**figure 2**). More than half of the participants 169 (62.3%) believed that tooth carving shouldn't be continued as an assessment parameter for first-year dental students, and about the same percentage (63%) thought that using video demonstration instead would be more helpful.

Regarding comments and feedback from the students, most comments were focused on criticizing the smaller number of tutors in contrast to the number of students in each carving session. A few of them came up with different ideas like teaching the carving as step-by-step videos which could be delivered to the students to use for continuous practicing at home.

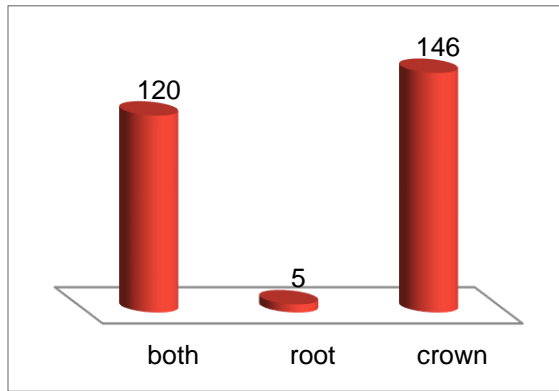


Figure 1: The most important part in the tooth: participants insights

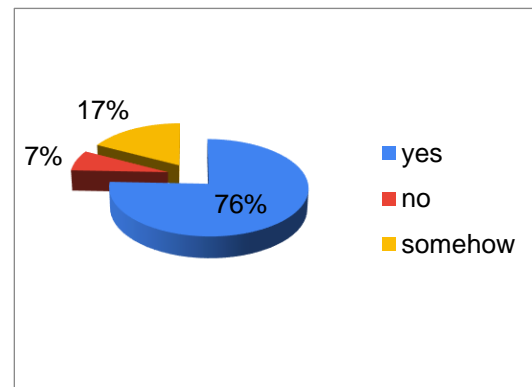


Figure 2: Tooth carving helped in better understanding of tooth morphology: participants insights

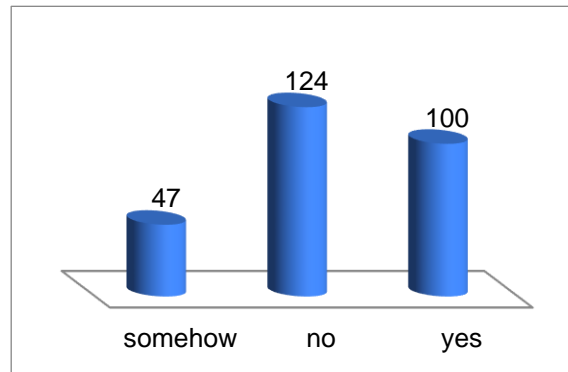


Figure 3: Participants response about time sufficiency of tooth carving sessions

DISCUSSION

Within the context of dental education, it is conventionally expected that dental students acquire a comprehensive understanding of scientific principles and develop exceptional skills related to tooth morphology. These competencies are crucial for dentists, as they enable precise restoration of lost tooth structures, particularly in the fields of operative dentistry and prosthodontics.¹⁴ Comprehending tooth morphology plays a pivotal role in various aspects of dentistry, including endodontic therapy, forensic investigations, anthropological research, and the prevention of dental diseases.^{15,16} This makes dental anatomy a fundamental course that fosters the seamless integration of these diverse specialties.

At the faculty of Dentistry, Benghazi, students learn about tooth anatomy through lectures and by carving a tooth-sized wax block following a tutor's demonstration. To make improvements, we wanted to know how students felt about the carving exercise and how helpful

it was for them in their practice. More than half of the students believed that the crown is the most important part of the tooth 146 (53.8%) which is contrary to the Kathmandu study,¹⁷ where dental students carved only the crown (16.2%) while (82.7%) of respondents carved both the crown and the root. However, the majority of students felt that the carving of the tooth's crown and root was equally significant.¹⁷

In the current study, fewer than half of the students (39.8%) said that carving sessions were useful in the restorative and prosthodontics lab sessions. This percentage was less than that of studies conducted in Kathmandu and West India by Chaulagain et al, and Nayak et al, (73.1% - 62.6%) respectively.^{8,18} More than half of the participant 169 (62.3%) in our study have agreed that carving sessions were useful in all. These findings align with a study conducted at Baqai Dental College in Karachi, where approximately 66% of students reported the benefits of carving sessions.¹⁹

Furthermore, another study revealed that around 75% of students found practicing tooth carving valuable for distinguishing between normal and anomalous teeth, as well as replicating tooth morphology in a laboratory setting. These results challenge the assertions made by some authors who advocate for the removal of tooth carving from undergraduate dental curricula, citing it as a waste of time, effort, and resources.²¹

Among the students in this study, a significant percentage (63%) thought that watching a step-by-step video demonstration of tooth carving would be more helpful as it can be repeated when needed. A similar result was found in another study conducted by Yara Oweis et al., where a large number of students agreed that combining live carving with video demonstrations of tooth carving would be highly beneficial.²²⁻²⁴ This finding may reflect the fact that the students at the Faculty of Dentistry in Benghazi perceive inadequate training and a need for additional repetition. The underlying reasons may include a scarcity of teaching staff for laboratory training, limited facilities, and the overwhelming number of dental students on the faculty (over 300 in a building designed for a maximum of 50). Consequently, educational quality and training have been compromised.²⁵⁻²⁷

Two-thirds of participants in the current study agreed that the carving session enhanced their conception of tooth morphology and occlusion relationship. Similar findings were reported in Moretto et al, study.²⁸ The current study emphasized that carving exercises should remain as part of the dental anatomy course, but some new methods, such as video-based carving tutorials, and computer-assisted learning programs should also be introduced.

LIMITATIONS

As with any other questionnaire-based studies, using questionnaires offers ease of use and access to substantial data, they can raise some challenges relating to sampling, instrument design, low response rates, biased self-selection and over-claims on data from a small sample.²⁹ Also, the use of Google Form questionnaires may significantly affect the response rate. Another limitation of the study was its focus solely on Benghazi dental faculty students, which prevents the generalization of the findings beyond this specific group.

CONCLUSION

This study highlights the students' inclination toward tooth-carving exercises. Among the primary objectives of these exercises, students acknowledged their role in enhancing manual dexterity, deepening tooth identification knowledge, and refining clinical skills. The effective teaching of dental anatomy through this carving module appears to benefit dental students significantly.

However, there is a need for improvement in the BDS curriculum at the Faculty of Dentistry in Benghazi. It is recommended to explore innovative approaches, such as computer-aided platforms and video tutorials, to enhance student engagement. Continuously introducing fresh ideas and teaching strategies will foster a more dynamic and effective learning environment for aspiring dentists.

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