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Knowledge and Awareness amongst Dental Undergraduate Students Regarding CAD-CAM Technology in Central India: A Cross Sectional Survey

Jaykumar Gade, Karan Jaiswal*, Megha Agrawal, Anand Agarkar, Anil Ingole, Sayali Dandekar

Department of Prosthodontics, Swargiya Dadasaheb Kalmegh Smruti Dental College and Hospital, Nagpur, India

ABSTRACT

Introduction: Contemporary dentistry has progressed towards digitization and advancing towards computer-aided design/ computer-aided manufacturing (CAD/CAM) technology. Recently, the application of CAD-CAM technology in dentistry which includes field of prosthodontics has rapidly grown. But the budding dentists are unaware of the advancement in dentistry.
Aim: The aim of this study was to assess knowledge and awareness amongst dental undergraduate students regarding CAD-CAM technology in Central India.
Material and Methods: The study was carried out in Central India. A questionaire with total 17 questions including open and multiple-choice type was designed and validated by experts in the field. It was circulated using Google forms amongst 225 dental undergraduate students and the responses were recorded.
Results and discussion: The present survey reveals that participants in the study were almost of 20-23 years of age. Amongst them, 65% students had CAD/CAM technology included in their curriculum. About 80% of the students had basic knowledge about the advantages of CAD/CAM technology over traditional technique and 89% of students were aware about the dental prosthesis that can be fabricated using CAD/CAM technology where 90% of students are willing to give time and efforts to learn chair-side CAD/CAM technology.
Conclusion: On the basis of this study, the students were aware regarding digital technologies, but they lack certain clinical knowledge about them. Hence, the curriculum shall be modified and newer advancements shall be included to improvise the basic knowledge and clinical practice of the students in the upcoming times.

Key words: CAD/CAM, Digitization, Undergraduates, Knowledge, Dental prosthesis

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Corresponding author: Karan Jaiswal
e-mail ✉: karanjaiswal9396@gmail.com
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INTRODUCTION

Computer-Aided Designing/Computer-Assisted Manufacturing frequently known as CAD/CAM was first introduced into dentistry in the 1970s with Duret, et al. and Preston, et al. [1,2]. Digitization with the help of CAD/CAM technology has become very popular in the past few decades. In the early 1980s, the production of clinical dental restorations was with the help of CAD/CAM technology [3]. CAD/CAM has been particularly useful in dentistry in permitting the fabrication of custom patient-specific restorations and prostheses without using traditional dental laboratory methods [4]. In the 1980s, the development of the CEREC system had helped at the beginning to use CAD/CAM technology as a routine technology in many dental laboratories and some clinical practices [5].

The introduction of CAD-CAM technology was made to improve the design and to create dental restorations. These included especially the dental prostheses including crowns, veneers, inlays and on lays, fixed bridges, dental implant restorations, dentures (removable or fixed), and orthodontic appliances, etc. [6,7]. This technology was developed to solve three challenges i.e. to ensure adequate strength of the restoration, especially for posterior teeth, to create restorations with a natural appearance and to make tooth restoration easier, faster, and more accurate [8]. In some cases, CAD/CAM technology provides patients with same-day restorations [6]. CAD/CAM for complete dentures was put forward following the success of CAD/CAM in implant and fixed prosthodontics [9].

The chair-side CAD/CAM system provides dentists several benefits such as less dependence on the dental laboratory technician, reduced number of patient visits, clarified

technical procedures, and reduced consumption of materials, increased productivity, and cost-effective dental restorations [6]. However, the CAD/CAM technology has some restrictions such as the high initial cost of purchasing the CAD/CAM system, time and cost investment to master the technique on the dentist/ technician side, some difficulties in the acquisition of accurate digital impressions for multiple unit prosthesis., and chances of fabrication errors or faulty shaping, especially with multi-unit dental restorations, which may risk the mechanical properties of the already produced restorations [10,11]. CAD/CAM technology so far has become an essential part of modern dentistry [12]. CAD/CAM has emerged as a new approach for the design and fabrication of complete dentures [13]. The use of CAD/CAM was limited in the production of removable dentures due to the lack of suitable CAD software until recently [14].

The present study focuses on assessing knowledge and awareness regarding CAD-CAM technology amongst dental undergraduate students in Central India. Wherein, this will help us to assess and make the dental undergraduate students aware about the recent advances in dentistry.

MATERIALS AND METHODS

A cross-sectional study was conducted in Central India from December 2020 to May 2021. The institutional ethical committee clearance was obtained before commencing the study. A questionnaire with total of 17 questions including open and multiple-choice types was designed and validated by the experts in the field. It was circulated using Google forms amongst 225 dental undergraduate students and the responses were recorded.

The questionnaire survey consisted of 17 questions.

The questions were related to knowledge and awareness regarding CAD-CAM technology and the demographic data (gender and designation) of the individual.

The questionnaire was assessed.

- A total of 225 dental undergraduate students across central India, were included in the survey. (The sample size calculation was done using the reference articles of similar types of studies conducted in India).
- Inclusion criteria were independent of the institute, gender, and curriculum content.
- Exclusion criteria are invalid.
- Subsequently, the questionnaires regarding knowledge and awareness regarding CAD-CAM technology amongst dental undergraduate students were randomly administered to be then answered on an anonymous basis, and the responses were collected. The results of the survey were further tabulated in Google Sheets.

Statistical analysis

Statistical analysis was done by using descriptive statistics and software used in the analysis was SPSS 27.0 version.

RESULTS

The response rate was 80%. The results of the present survey revealed that the participants in the study were almost between 20-23 years of age, predominantly female. Among all the participants, about 68% of students were interns. In the present sample, 94.67% of students were aware of digital impressions (Figure 1). 65.8% of students had CAD-CAM technology included in their curriculum (Figure 2). More than 50% of students gave the correct elaboration of the term CAD/CAM. 50% of undergraduate students had not seen a CAD/CAM unit, whereas 48% of them had seen the unit. Out of these, 7% said that metals are used, 16% said zirconium wax, and 81% of students said that both of them could be used in CAD/CAM technology.

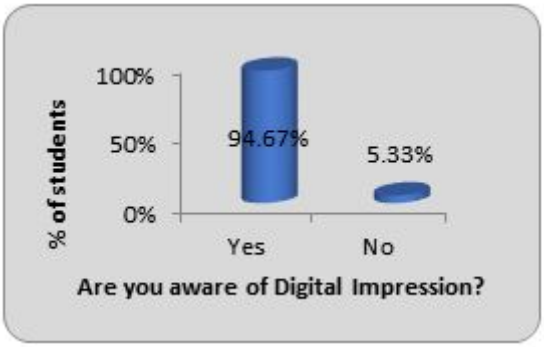

Figure 1: Are you aware of digital impression.

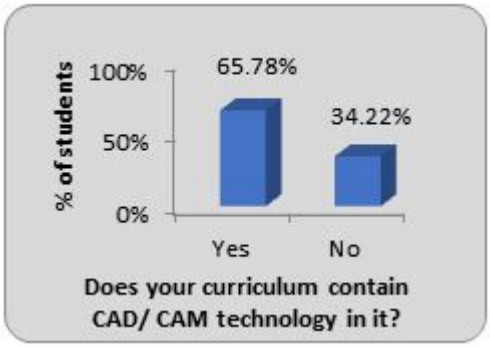

Figure 2: Does your curriculum contain CAD/ CAM technology in it?.

89% of the students were aware of the complete dentures while 90% told that post and core could be fabricated using CAD/CAM technology. 86% of them were aware of the 3D printing technology while 94% said that CAD/CAM technology is more precise than conventional procedure (Figure 3). More than 90% said that CAD/CAM is faster than the conventional method of producing restoration (Figure 4). At the same time, 69% of them were aware of the chair-side CAD/CAM while 90% of the students had basic knowledge about the indications of

chair-side CAD/CAM. Amongst them, 80% said that it could be time-saving at a dental practice (Figure 5) while 73% of the students said they would prefer a chair-side CAD/CAM system over a laboratory CAD/CAM system for routine practice.

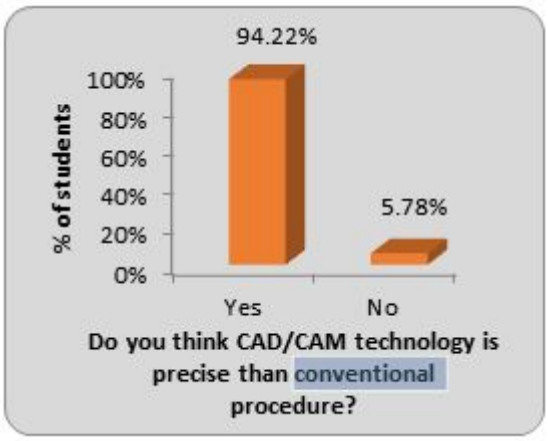

Figure 3: Do you think CAD/CAM technology is precise than conventional procedure?.

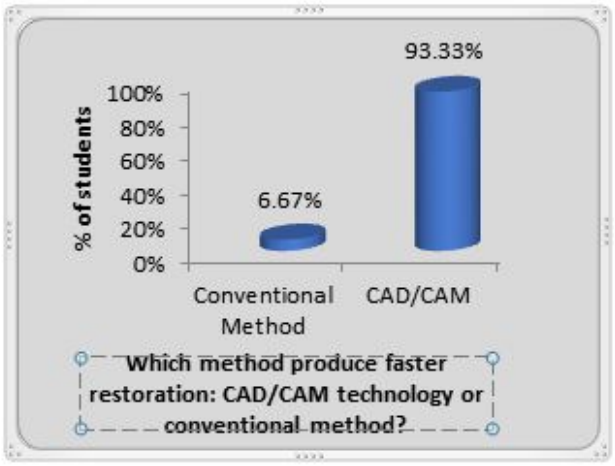

Figure 4: Which method produces faster restoration: CAD/CAM technology or conventional method?.

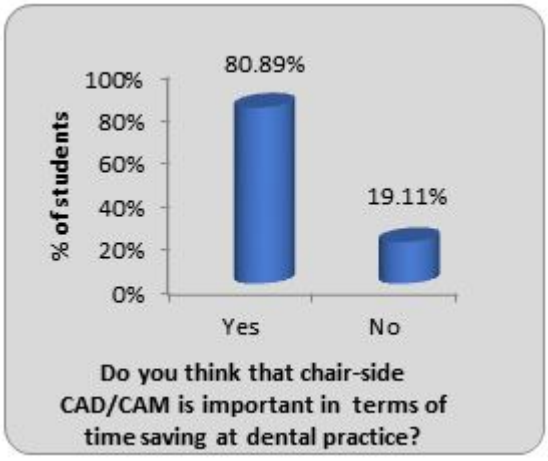

Figure 5: Do you think that chair-side CAD/CAM is important in terms of time saving at dental practice?.

Amongst all the participants, 67% of the students said that it is extremely important to have basic knowledge about the training for using chair-side CAD/CAM, while 80% of the students had basic knowledge about the advantages of CAD/CAM technology over traditional technique and more than 90% of the students said that they are willing to dedicate time and effort to learn chair-side CAD/CAM technology and continue advancing and have detailed knowledge about digital prosthodontics (Figure 6).

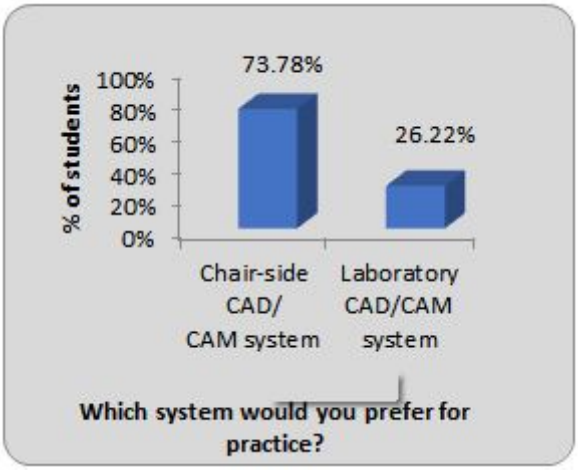

Figure 6: Which system would prefer for practice?

DISCUSSION

Dentistry has advanced from various earlier treatments such as crude restorations made of wires and wood to the new advancing world of digital dentistry [4]. Digitization using CAD/CAM technology has become popular and well-liked over the past three decades.8 CAD/CAM technology is one of them that has resulted in the precise and accurate fabrication of prostheses with fewer chances of errors in the patient's mouth and required adjustments are done.4 This is advantageous and important for both the dentist and patients. Hence it had overcome the disadvantages of the conventional methods especially in terms of quality, labor, and duration [8].

Hence, being the upcoming field, the undergraduate students should be made aware of CAD/CAM technology academically as well as practically as the future of dentistry would be digitally driven. Therefore, a questionnaire survey was conducted to assess the basic knowledge about CAD/CAM technology amongst undergraduate students. Of the 225 questionnaires given to the undergraduates, the entire group of students responded equally to the basic questions about CAD/CAM. Overall, the knowledge about CAD/CAM in undergraduates had improved, but they should be made aware of the clinical usage of it to make them equipped to meet the future digital dentistry.

CONCLUSION

CAD/CAM in dentistry and has advanced rapidly than we think. It has helped to enhance the production efficiency; labour issues and provides better services to the patients. However, the various factors on which the uniformity of the restoration depends upon excellent preparation, a good detailed impression, and a welldesigned aesthetic and functional restoration. CAD/CAM could be used to facilitate the restoration of oral implants. The precision or accuracy of fit, aesthetic material application, durability, and simplicity are the main advantages of CAD/CAM in the field of implant dentistry. Hence in the given set of participants, the level of knowledge and awareness amongst dental undergraduate students regarding CAD-CAM technology was found to be satisfactory. However, to make them more effective continuing dental education programs on recent advances in digital prosthodontics and techniques should be conducted, and hence we need to incorporate more technologies into the field of dentistry for a better future.

REFERENCES

1. Al Essa HA. CAD/CAM in prosthodontics: A gate to the future. Int J App Dent Sci 2019; 5:394-397.
2. Chatham C, Spencer MH, Wood DJ, et al. The introduction of digital dental technology into BDS curricula. Bri Dent J 2014; 217:639-42.
3. Goodacre CJ, Garbacea A, Naylor WP, et al. CAD/CAM fabricated complete dentures: concepts and clinical methods of obtaining required morphological data. J Prosthet Dent 2012; 107:34-46.
4. Jain R, Takkar R, Jain GC, et al. CAD-CAM the future of digital dentistry: A review. Ann Prosthodont Restorat Dent 2016; 2:33-36.
5. Miyazaki T, Hotta Y, Kunii J, et al. A review of dental CAD/CAM: Current status and future perspectives from 20 years of experience. Dent Mat J 2009; 28:44-56.
6. Davidowitz G, Kotick PG. The use of CAD/CAM in dentistry. Dent Clin North Am 2011; 55: 559-570.
7. Rekow D. Computer-aided design and manufacturing in dentistry: A review of the state of the art. J Prosthet Dent 1987; 58:512-516.
8. Palanisamy SV, Hegde C. Awareness among dental undergraduate students regarding CAD/CAM technology—A survey report. J Health Alli Sci 2019; 9:57-63.
9. Ettinger RL, Beck JD, Jakobsen J. Removable prosthodontic treatment needs: A survey. J Prosthet Dent 1984; 51:419-427.
10. Aslam K, Nadim R. A review on cad cam in dentistry. J Pak Dent Assoc 2015; 24:112.
11. Bührer Samra AP, Morais E, Mazur RF, et al. CAD/CAM in dentistry-A critical review. Rev Odonto Cienc 2016; 31.
12. Li RW, Chow TW, Matinlinna JP. Ceramic dental biomaterials and CAD/CAM technology: State of the art. J Prosthodont Res 2014; 58:208-216.
13. Infante L, Yilmaz B, McGlumphy E, et al. Fabricating complete dentures with CAD/CAM technology. J Prosthet Dent 2014; 111:351-355.
14. Pascu NE, Dobrescu T, Opran C, et al. Realistic scenes in CAD application. Procedia Eng 2014; 69:304-309.