

Dentists' Perception about Chair-side CAD/CAM; a cross-sectional study in Riyadh, Saudi Arabia

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Abstract

The usage and implementation of computer-aided layout and computer-aided building (CAD/CAM) technologies in dentistry have significantly developed during the last two decades. Computer-aided design/CAM innovation has recently been utilized to make decorates, trims, crowns, facades, multi-unit fixed halfway false teeth (FPDs), and embed projections alongside different false teeth. The cross-sectional study was conducted between the professionals of Saudi dental making use of the online platform to perform the survey. Two hundred and sixteen (216) dentists from the Riyadh metropolis were utilized in this study. An analysis reported that all participants were 19-25 years old and had experienced less than 10 years. The significant proportion was male (66.7%) and Saudi nationals (96.3%). The majority of participants were working in the government sector and had qualifications of BDS. 88.9% of participants never operated chair-side CAD/CAM, do not have this set up at their workplace but want it in the future. The majority of them have used CAM/CAD for crowns' fabrication (74.1%). The majority of participants do not know the overall quality of CAD/CAM restorations. Overall satisfaction was exemplary in both dentists and patients. CAD/CAM was imperative in terms of laborsaving, income, and boosting visits. Most participants wanted to invest time for future learning.

Keywords: CAD/CAM, Prosthodontics, Dentists, Perceptions

INTRODUCTION

In dentistry, the usage and implementation of computer-aided design and computer-aided modeling (CAD/CAM) technologies devour significantly advanced during the last two decades [1]. During the 1960s, PC-supported plan and assembling (CADM) was initially created for use in aviation and auto ventures [2].

In 2008, the E4D Dentist™ technology, which is identical to the CEREC system, was introduced, allowing in-office dental restorations to be completed in one appointment [3].

Chair-side systems, laboratory systems, and centralized production are the three CAD/CAM systems categories depending on their manufacturing techniques. The dental technician is responsible for creating dental restorations using CAD/CAM milling equipment. In general, CAD/CAM systems include three components [4].

Computer-aided design/CAM innovation has recently been utilized to make decorates, trims, crowns, facade, multi-unit fixed halfway false teeth (FPDs), and embed projections, alongside different false teeth [1, 2].

CAD/CAM technology has also been used in orthodontic therapy, occlusal splint fabrication, removable denture and maxillofacial prosthesis fabrication, guided implant surgery,

orthognathic surgery, and guided healing [5-7]. This cutting-edge technology is still in its infancy, but it has much potential in the dentistry sector. According to studies, CAD/CAM-generated dentistry implants produced dentures in high accuracy, mechanical and physical properties, and expense [8, 9]. Aside from these benefits, CAD/CAM innovation, especially the seat side framework, offers dental specialists an assortment of benefits, remembering diminished dependence for the dental professional, lower frequency, less complex procedures, negligible texture utilization, further developed proficiency, and reasonable dental reclamations [2].

Besides, CAD/CAM innovation has enormous limitations. For example, the cost of getting the hardware and the time

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and cash fundamental for the dental specialist/expert to dominate the strategy; obtaining correct digital impressions for multiple unit prostheses can be difficult [10].

Literature Review

In a similar report completed in Saudi Arabia 2021, the review's discoveries exhibit broad fulfillment and a good disposition among taking part dental specialists. The majority of citizens prefer chair-side CAD/CAM to traditional techniques [11].

Another study in Switzerland reported that the majority of dentists (97%) had a personal computer and utilized it for both personal and professional purposes. The survey found that the more youthful the dental specialist, ii) the later the business's opening, iii) the more prominent the patient catchment region, and IV) the more significant the treatment rooms, the higher the degree of digitization of the dental office [12].

According to a study conducted in the United Kingdom, most technologists use some kind of CAD/CAM in their work that was more popular among technologists employed in different research labs. The corporation provides most of the training [13].

The results of another study reported that the Navy's CAD/CAM production is predicted to increase. Since CAD/CAM repairs contribute to a more significant percentage of full protective measure, the following clinical studies should focus on various elements of CAD/CAM utilization: the duration or life expectancy of CAD/CAM repairs in armed environments [14].

MATERIALS AND METHODS

Study Design

The cross-sectional study was conducted between professionals of Saudi dental making use of an online platform to perform the survey.

Sample of Study

The study obtained 216 dentists from Riyadh metropolis.

Instrument of Study

The demographic data related to questions are among the online questionnaire including knowledge and attitude towards CAD/CAM and its applications. The questionnaire consisted of closed-ended questions. Consent was taken from the participants before beginning with answering the

questions. Google forms were utilized as a mode of questionnaire building and distributing. Data were kept confidential and stored until their use.

Reliability and Validity of Instrument

A pilot of research was performed by sending the survey to twenty candidates. The data were inserted in SPSS software to ascertain the reliability using Chronbach's coefficient alpha (value: 0.821). The validity of the questionnaire was evaluated by sending it to skilled researchers in PSMC, and modifications had been made according to their comments and remarks.

Statistical evaluation: accrued records were analyzed using SPSS software, wherein descriptive as well as inferential statistics had been carried out. Comparisons between groups had been made with the value of importance kept underneath 0.05 using the Chi-square test.

RESULTS AND DISCUSSION

The study evaluated the perception of dentists on chairside dental CAD/CAM systems. Significant differences were reported across gender and qualification (**Tables 2 and 4**) while non-significant differences across practice areas (**Table 3**). Frequency analysis reported that all participants were 19-25 years old and had experienced less than 10 years (**Table 1**). The significant proportion was male (66.7%) and Saudi nationals (96.3%). The majority of participants were working in the government sector and qualified BDS. 88.9% of participants never operated chair-side CAD/CAM, do not have this set up at their workplace but want it in the future. In response to being asked if they would suggest this operation to friends or coworkers, 25.9% said they would. 66.7 percent believe CAD/CAM is vital for saving time and increasing money, while 59.3 percent believe it is important for increasing patient vs' visits. 40.7% think it is imperative to have training for CAD/CAM, and 81.5% were willing to give their time for learning this technology (**Table 1**). The major proportion of both groups thinks is imperative in terms of laborsaving, patients' improvement visits, and income improvement. Male and females think training is essential and are willing to learn further (**Table 2**). In qualification, MDS and BDS operated a chair-side CAM/CAD and have it at their workplace. BDS have used it for CROWN majorly while MDS' also used it for bridges and all others too. MSD' thinks overall quality is much better than those of technicians, while BDS answered do not know in the majority. Both groups think training is very important. All BDS' are willing to give their time for further learning while another group was not (**Table 4**).

Table 1. Frequency Percentage

Variable	Frequency Percentage
Age 19-25	216(100%)

Gender		
Male		144(66.7%)
Female		72(33.3%)
Nationality		
Saudi		208(96.3%)
Non-Saudi		08(3.7%)
Current Practice		
Private		32(14.8%)
Government		184(85.2%)
Working Experience		
Less than 10 years		216(100%)
Qualification		
BDS		200(92.6%)
MDS/ PhD		16(7.4%)
Do you have any experience with chair-side CAD/CAM?		
No		192(88.9%)
Yes		24(11.1%)
Does your current workplace possess a chair-side CAD/CAM?		
No		160(74.1%)
Yes		56(25.9%)
Have your current workplace does not possess a chair-side CAD/CAM, Are you willing to have one in the future?		
No		16(7.4%)
Yes		200(92.6%)
Have you used a chair-side CAD/CAM for the construction of any of the following repairs, please indicate		
Crests		160(74.1%)
Implant abutments		08(3.7%)
Onlay		08(3.7%)
Veneers		08(3.7%)
Inlay		08(3.7%)
Bridges		24(11.1%)
How would you assess the initial value of chair-side CAD/CAM restorations? encompassing marginal fit, axial contour, proximal contact, and occlusal contact,		
I do not know		104(48.1%)
Very good		24(11.1%)
Good		24(11.1%)
Excellent		64(29.6%)
How would you rate your contentment with chair-side CAD/CAM restorations process?		
Pleased		16(7.4%)
Strongly Pleased		32(14.8%)
Very Pleased		56(25.9%)
I do not know		112(51.9%)
How probable would you suggest a chair-side CAD/CAM technology to a pal or associate?		
Very Often		56(25.9%)
Extremely Often		32(14.8%)
I do not know		72(33.3%)
Often		56(25.9%)
Do you think that chair-side CAD/CAM technology is essential for laborsaving at a dental practice?		
I do not know		72(33.3%)
Yes		144(66.7%)
Do you think that chair-side CAD/CAM technology is essential for income improvement?		
No		72(33.3%)
Yes		144(66.7%)
Are you determined to devote time to acquire the knowledge on chair-side CAD/CAM systems and keen to advance?		
Yes		176(81.5%)
I do not know		32(14.8%)
No		08(3.7%)

Table 2. Gender Evaluation

Variable	Male	Female	P-value
Have you had experience with chair-side CAD/CAM?			
Yes	00%	33.3%	.000
No	100%	66.7%	

Does your current workplace possess a CAD/CAM?				
	No	88.9%	44.4%	.000
	Yes	11.1%	55.6%	
Do you wish to have a chair-side CAD/CAM at your workplace in the future?				
	No	00	22.2%	.000
	Yes	100%	77.8%	
How can you tell the difference between the whole standard of chair-side CAD/CAM repairs association with that contrived by a lab technician?				
	Less than replicate	33.3%	55.6%	.000
	More than replicate	00%	11.1%	
	As good as replicate	38.9%	11.1%	
	Far less than replicate	11.1%	00%	
	I do not know	5.6%	00%	
	Extremely Better than replicate	11.1%	22.2%	
How would you rate your contentment with chair-side CAD/CAM restorations process?				
	I do not know	44.4%	66.7%	.000
	Very pleased	33.3%	11.1%	
	Extremely pleased	11.1%	22.2%	
	Pleased	11.1%	00%	
How probable would you suggest a chair-side CAD/CAM technology to a pal or associate?				
	Often	22.2%	33.3%	.000
	Very Often	33.3%	11.1%	
	I do not know	27.8%	44.4%	
	Extremely Often	16.7%	22.2%	
Do you think that chair-side CAD/CAM technology is essential for laborsaving at a dental practice?				
	I do not know	27.8%	44.4%	.000
	Yes	72.2%	55.6%	
Do you think that chair-side CAD/CAM technology is essential to increase the number of patients visiting the dental practice?				
	No	11.1%	11.1%	.000
	Yes	72.2%	55.3%	
	I do not know	16.7%	33.6%	
How essential do you think to have trained with chair-side CAD/CAM?				
	Very significant	50%	33.2%	.000
	Extremely significant	22.2%	22.2%	
	Slightly significant	11.1%	00%	
	I do not know	5.6%	22.3%	
	Significant	11.1%	22.2%	
Are you determined to devote time to acquire the knowledge on chair-side CAD/CAM systems and keen to advance?				
	No	00%	11.1%	.000
	Yes	94.4%	55.6%	
	I do not know	5.6%	33.3%	

Table 3. Comparison across Practice

Variable	Private	Government	P-value
Do you have any experience with chair-side CAD/CAM?			
No	100%	65.7%	.007
Yes	00%	34.3%	
Does your current workplace possess a chair-side CAD/CAM?			
No	89.9%	43.4%	.003
Yes	10.1%	56.6%	
Do you wish to have a chair-side CAD/CAM at your workplace in the future?			
No	00	23.2%	.006
Yes	100%	76.8%	
Please indicate If you have ever used a chair-side CAD/CAM for the replication of the following repairs.			
Bridges	4.6%	22.2%	.007
Veneers	00	11.1%	
Onlay	00	11.1%	
Implant abutments	00	12.1%	
Inlay	00	11.1%	
Crowns	95.4%	32.3%	

How would you assess the initial value of chair-side CAD/CAM restorations? encompassing marginal fit, axial contour, proximal contact, and occlusal contact,			
I do not know	44.4%	55.6%	
Very good	11.1%	10.1%	.004
Outstanding	38.9%	12.1%	
Good	5.6%	22.2%	
How would you rate your contentment with chair-side CAD/CAM restorations process?			
I do not know	45.4%	66.7%	
Very happy	32.3%	10.1%	.073
Extremely happy	12.1%	23.2%	
Happy	10.1%	00%	
How probable would you suggest a chair-side CAD/CAM technology to a pal or associate?			
I do not know	26.8%	43.4%	
Very Often	33.3%	11.1%	.004
Extremely Often	16.7%	11.1%	
Often	23.2%	34.3%	
Do you think that chair-side CAD/CAM technology is essential for laborsaving at a dental practice?			
I do not know	26.8%	43.4%	.005
Yes	73.2%	56.6%	
Do you think that chair-side CAD/CAM technology is essential to increase the number of patients visiting the dental practice?			
No	12.1%	12.1%	.067
Yes	72.2%	32.3%	
I do not know	15.7%	55.6%	
Do you think that chair-side CAD/CAM technology is essential for income improvement?			
Yes	76.8%	45.4%	.008
No	23.2%	54.6%	
Are you determined to devote time to acquire the knowledge on chair-side CAD/CAM systems and keen to advance?			
Yes	93.4%	56.6%	.263
No	00%	10.1%	
I do not know	6.6%	33.3%	

Table 4. Comparison across Qualification

Variable	BDS	MDS/PhD	P-value
Have you ever operated a chair-side CAD/CAM?			
Yes	4%	100%	.000
No	96%	00%	
Do you have a chair-side CAD/CAM at your current workplace?			
Yes	20%	100%	.000
No	80%	00%	
Do you wish to have a chair-side CAD/CAM at your workplace in the future?			
Yes	100%	100%	.000
No	00	00%	
Please indicate If you have ever used a chair-side CAD/CAM for the replication of the following repairs.			
Crowns	95.4%	32.3%	
Bridges	4.6%	22.2%	
Implant abutments	00	12.1%	.000
Veneers	00	11.1%	
Onlay	00	11.1%	
Inlay	00	11.1%	
How would you assess the initial value of chair-side CAD/CAM restorations? encompassing marginal fit, axial contour, proximal contact, and occlusal contact,			
Outstanding	38.9%	00%	
Very decent	11.1%	00%	.000
Decent	5.6%	50%	
I do not know	44.4%	50%	
How would you rate your contentment with chair-side CAD/CAM restorations process?			
Extremely happy			
Very happy	12.1%	50%	
Happy	32.3%	00%	.000
I do not know	10.1%	00%	

	45.4%	50%	
How probable would you suggest a chair-side CAD/CAM technology to a pal or associate?			
Extremely Often	16.7%	00%	
Very Often	33.3%	00%	
Often	23.2%	50%	.001
I do not know	26.8%	50%	
Do you think that chair-side CAD/CAM technology is essential for laborsaving at a dental practice?			
Yes	73.2%	50%	.000
I do not know	26.8%	50%	
Do you think that chair-side CAD/CAM technology is essential for income improvement?			
Yes	76.8%	50%	.000
No	23.2%	50%	
How vital do you think to have trained with chair-side CAD/CAM?			
Extremely vital	22.2%	00%	
Very vital	50%	50%	
Slightly vital	12.1%	00%	.028
Vital	10.1%	00%	
I do not know	5.6%	50%	
Are you determined to devote time to acquire the knowledge on chair-side CAD/CAM systems and keen to advance?			
Yes	100%	00%	
No	00%	50%	.000
I do not know	00%	50%	

In the current research, which was mainly conducted to evaluate the perception of dentists about chair-side CAD/CAM, chi-square was used to evaluate the comparison across groups, which reported non-significant differences across practice areas. In our study, participants want this setup in the future, which was also seen in a previous study. According to the Saudi Dental Society, 29.8% of respondents utilize a CAD/CAM system in their clinical practice. More than a quarter of the dentists polled (27.2 percent) said their current workplace has a chair-side CAD/CAM system. This matches the findings of a British survey, in which the majority of dentists asked expressed an interest in incorporating CAD/CAM technology into their future clinical practice [11, 15].

In our study majority of participants have used CAD/CAM for crowns' fabrication across all group comparisons too which was also seen in previous researches where a majority of dentists used this for fabrication of crowns; in the previous study, it was used for inlays/Onlays also in considerable proportion, but in our study, this usage was minute in general and across all group comparisons too, [11, 15].

The overall quality was reported as well as lab technicians in the previous study. In contrast, initial quality was reported as excellent, which goes along with our responses from male and MDS' qualified. The majority of dentists in the study assessed the dental restorations' overall quality produced using a CAD/CAM machine attached to the chair favorably, contrasting to dentists' opinions in the UK survey. On the other hand, specialist dentists appear to be concerned about the effectiveness of CAD/CAM chair-side repairs [11, 13].

Chair-side CAD/CAM are more preferable to conventional techniques by the majority of participants. The advantages of

the chair-side CAD/CAM system, which included time savings, more significant revenue, and growth in the rate of visitors in the hospital are appreciated by them. The majority of dentists in our research [11] would suggest the chair-side CAD/CAM system to a friend or colleague.

CONCLUSION

In the present study, the overall response in terms of operating chair-side CAD/CAM was low, and the majority did not have the facility at their workplace but wanted it in the future except those having MDS qualifications. CAD/CAM used for fabrication of crowns in majority, overall and initial quality was moderate. Overall satisfaction was acceptable in both dentists and patients. CAD/CAM was important in terms of time-saving, income, and boosting visits. Most participants wanted to invest time for future learning.

Recommendations

Dentists can carry out further studies regarding other factors affecting patient satisfaction and operating it in practice. Generalizability and internal consistency issues arise due to self-reported inventory and an online survey.

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