Original Article

Adequate Crown Preparation for Porcelain Fused to Metal Csrowns Among Practitioners of Hyderabad

Crown Preparation For Porcelain Fused To Metal Crowns

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ABSTRACT

Objective: To determine the frequency of adequate crown preparation for porcelain fused to metal crowns among local practitioners.

Study Design: Descriptive study.

Place and Duration of Study: This study was conducted in clinics of private practioners and public sector hospitals of Hyderabad city from January to August 2018.

Materials and Methods: Data was collected from dies' of tooth prepared for porcelain fused to metal crowns; dies were collected from different clinics. Data was collected from die trimmed the plaster models after the delivery of porcelain fused to metal crowns to patients. Dies were stabilized in wax blocks, pictures were snapped in buccal and mesial view for convergence angles measurement and tooth placed with scale for height measurement. The pictures were processed through latest version of AUTOCAD software. All the data was entered in proforma. The data was analyzed by SPSS version 22.0. Chi square test was applied for checking the statistical difference.

Results: Males were 65% and females were 35%. General practitioners were 41%, P.G students were 48% and consultants were 11%. The mean Bucco-lingual convergence angle of dies was 25.79± 9.569. Mean Mesio-distal convergence angle of dies was 20.72 ± 7.180 and mean Height of dies was 5.789 ± 2.0165. Adequate crown preparation was done by 24.2% while 75.8% have not done adequate preparation. Association of adequate preparation with practitioners showed that 8% general practitioners, 32% Postgraduates students and 54% consultants prepared crowns with adequate preparation which shows statistically significant association.

Conclusion: It was concluded that adequate crown preparation standards were followed by consultants while general practitioners need to improve their skills for making proper fixed prosthesis preparation.

Key Words: Metal ceramic, convergence angle, practitioners.

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INTRODUCTION

In modern era, full coverage porcelain fused to metal crowns is one of the most common practices to treat the extensively damaged teeth. The effect of treatment and the period of lasting of treatment vary on the basis of dentist's ability to prepare teeth[1].

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Though the practice of using metal crown is very common for the treatment of damaged teeth but the retention has been identified as an important issue pertaining to metal crown[2]. The convergence angle is considered as a combination of two opposite axial walls[3,4]. The appropriate convergence angle plays a significant role for the purpose of retention for the metal crowns; the chances of retention fall whenever the angle goes above certain degrees; it is said that chances of retention decline as the angle increases[5,6]. According to Rosenstiel SF[7] the convergence angle of 4- 6º is considered ideal; whereas an angle of 6-14º is considered as acceptable though retention decreases after 6%.[8] Convergence angle of as great as 12 º have been seen for clinically opposing surfaces[9]. It was suggested by Good acre et al that 10- 20º is the ideal ocular convergence angle. The minimal occluso-cervical dimension for 10-20 degrees occlusal convergence is thought to be 3 mm for incisors and premolars, and 4 mm for molars. Axial reduction is 0.5 mm and occlusal 1mm deep for all metals, whereas it is 1 mm for axial and 2 mm for occlusal reduction in semi translucent and metal ceramic systems[10]. Many devices

have described for achieving recommended convergence angle in dental literature but none of them showed best results or achieved widespread acceptance[11].

The aim of this study is to evaluate the adequate crown preparation, prepared for porcelain fused to metal crowns. By doing this study we will be able to know about tooth preparation of crowns made by local practitioners, whether they consider recommended values for porcelain fused to metal crown preparation or not.

MATERIALS AND METHODS

This Descriptive study was carried out in clinics of private practioners and public sector hospitals of Hyderabad city from January to August 2018. Sample Selection Procedure was chosen as a convenient sampling technique. The inclusion Criteria were age of dentist from 25 to 60 years, both male and female dentist, crown preparation dies of permanent teeth, preparation done for porcelain fused to metal crowns, tooth should have enough structure for good prognosis, operator must be registered dental practitioner with at-least one-year practice experience after house job and operator must be unaware of the aim before or during the preparation. The exclusion Criteria were porous dies of prepared tooth, deformed, broken dies of prepared tooth, dies with flat or negative abutment height.

Data Collection Procedure: Informed consent was taken from operator before the execution and no special instructions were given to clinician at the time of tooth preparation that might result in biasness. Data was collected from dies' of tooth prepared for porcelain fused to metal crowns; dies were collected from different clinics. The die was prepared by trimming the plaster models after the delivery of porcelain fused to metal crowns to patients. Pin-indexed crown prepared teeth was removed from plaster model and mounted on square-shaped rigid wax block to stabilize in a fixed vertical position on horizontal table with white background. Then, the picture was snapped in buccal and mesial view for convergence angles measurement of the tooth preparation with scale placed parallel to the height of contour for height measurement, using the Nikon DSLR D500 and tripod stand at 20cm distance in a way that it should be perpendicular to long axis of tooth. The pictures were processed through latest version of AUTOCAD software to analyse those pictures. Buccal surface view was used for mesial and distal axial walls convergence angles and mesial surface view was used for buccal and lingual axial walls convergence angles. It was made sure that the tooth structure should not be less, shouldn't be carious, operator should not be given any instructions, there should be no faulty impression taking and die making keeping confounding variables limited to none. All the data was recorded in proforma. The data was entered and analysed by SPSS version 16. Quantitative variables like age, CA, height are presented as mean and standard deviation. Qualitative variables like gender, appropriate crown preparation are presented as frequency and percentage. Post stratification chi square was applied for significance results by taking p vale $\leq$ 0.05 as significant.

RESULTS

Males were 65.0% and females were 35.0%. General practitioners were 41%, P.G students were 48% and consultants were 11%. Out of 120, dies prepared for porcelain fused to metal crowns, 52.5% were of mandibular arch and 47.5% dies were of maxillary arch. Frequency of site of arch showed as mandibular right side 21%, mandibular left side 32%, maxillary right side 20% and maxillary left side 27.5% (Table-1)

In this study, mean age was 34.54± 8.55. Mean Bucco-lingual convergence angle of dies was 25.79± 9.569. Mean Mesio-distal convergence angle of dies was 20.72 ± 7.180. Mean Height of dies was 5.789 ± 2.0165 (Table-1).

Table No.1: Descriptive statistics of gender, Practioners, Type and site of Arch

Variables	Frequency	%
Gender		
Male	78	65
Female	42	35
Practioners		
General Practioner	49	40.8
P.G Student	60	50.0
Consultant	11	9.2
Type of Arch		
Mandibular	63	52.5
Maxillary	57	47.5
Site of Arch		
Mandible Rite side	25	20.8
Mandible Left Side	38	31.7
Maxilla Right Side	24	20.0
Maxilla Left Side	33	27.5

Table No.2: Descriptive statistics of Age, Bucco-lingual, Mesio-distal convergence angle and Height of Dies

Characteristics	N	Minimum	Maximum	Range	Mean	Std. Deviation
Age of Participants	120	26	59	33	34.54	8.55
Bucco-lingual Convergence Angle	120	9	50	41	25.79	9.59
Mesio-distal Convergence Angle	120	8	40	32	20.72	7.18
Height of Prepared tooth	120	2	11	9	5.78	2.01

Table No.3: Association of adequate preparation with practitioners

		Adequate preparation		Total	P-value
	Operator qualification	Yes	No		
	General practioner	4	45	49	
		8.2%	91.8%	100.0%	
	P.g student	19	41	60	
		31.7%	68.3%	100.0%	0.001
	Consultant	6	5	11	
		54.5%	45.5%	100.0%	
Total		29	91	120	
		24.2%	75.8%	100.0%	

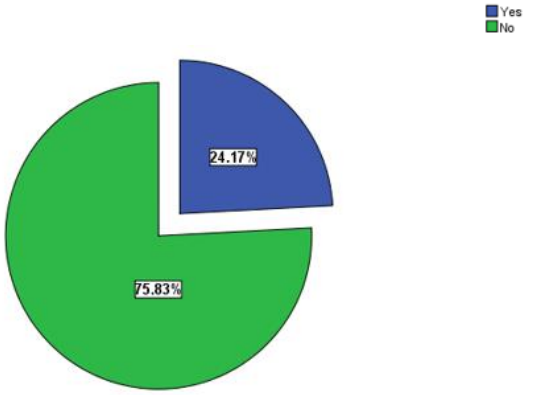

Figure No.1: Frequency of adequate crown preparation

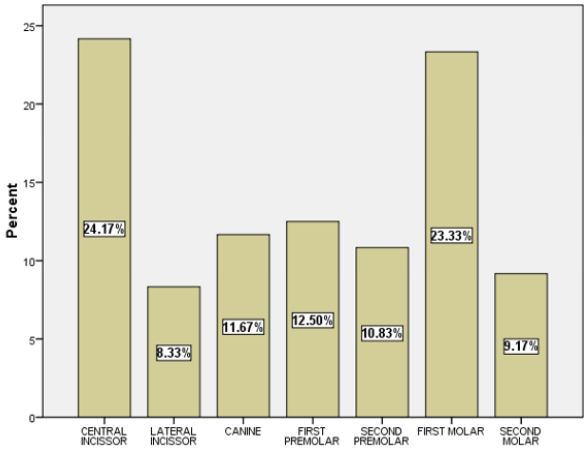

Figure No.2: Frequency of tooth type

Adequate crown preparation was done by 24.2% while 75.8% have not done adequate preparation as shown in (Figure-1).

In this study, the dies for central incisors were 24%, lateral incisors were 8%, canines were 12%, first premolars were 12%, second premolars were 11%, first molars were 23% and second molars were 9% (Figure-2)

Association of adequate preparation with practitioners showed that 8% general practitioners, 32% Postgraduates students and 54% consultants prepared crowns with adequate preparation and there was significant association between adequate preparations and practitioners (p-value 0.001) (Table-3).

DISCUSSION

Porcelain fused to metals crowns are usually practiced as treatment of partially or fully damaged teeth. The success of such treatment depends on the ability and skills of practioner[12-14]. According to the results obtained in this study, the percentage of convergence angles and adequate preparation was done by 24% which are in agreement with El-Mubarak et al[15], and not in agreement with Ow et al[16], the possible explanation could be lack of experience, limited access, visual error and anatomical variation.

In this study, the average convergence angles i.e mesio distal 20.72 and bucco-lingual 25.79 of groups observed were considerably greater than the recommended ones. These results are in agreement with the studies conducted by Ayad MF et al[17] who have reported mean convergence angles of 19.2 mesio-distally and 23.0 bucco-lingually on vital teeth. The observed higher mean convergence angles could be due to the minimal clinical experience of the local practioner and lack of skills.

Goodacre et al[10] who regarded 10-20º as acceptable clinical range, and were even higher than what was recorded from other studies, however in this study majority of general practioner and postgraduate students did not made crowns with adequate preparation. The crown preparation has been evaluated by several investigators to see how much it is far from the ideal. Such type of studies are done by professional students of dentistry[18-20], teaching staff[21], general practitioners[20,22], residents[18], and prosthodontists[20,22] and the results obtained have been different. The probable reason for the same could be that the general dentists and postgraduate trainees had minimal short clinical experiences.

The height of prepared dies showed mean score than the previous studies measuring preparation height which cannot be compared because the definition of height has not been adequately addressed[23,24]. In this study, post graduate students have prepared the crowns more adequately than general practioner, this is in agreement with study results of Safa Hinnara et al[25] the difference cannot be considered tangible. The GPs had recorded the highest total occlusal convergence (TOC) values. The available literature is also in support of this study in terms of adequate crown preparation values which are rarely achieved in dental practice, are in agreement with Ghafoor R et al[10], Patel PB et al[26] and Nordlander J et al[27]. The clinical researches spanning longer duration are required to assess the influence of

TOC on the longevity of fixed prosthodontics. The values of TOC obtained in laboratory studies were smaller as compared to the clinical studies [28,29]. The appropriate TOC is essential for proper tooth preparation because it can affect the overall acceptability during crown preparation. Recommendations have been made for optimal axial wall taper of tooth preparations for fixed prosthodontics to prevent undercuts, compensate for inaccuracies in fabrication, and permit more complete seating during cementation[30,31]. Every tooth is different according to shape and angles that is why no tooth should be subjected to the same recommended values. Each tooth needs to be prepared according to its own clinically recommended value for better retention of crowns.

CONCLUSION

It was concluded that adequate crown preparation standards were followed by consultants while general practioners need to improve their skills for making proper fixed prosthesis preparation. Further clinical studies spanning longer duration with sufficient sample size are necessary to assess the longevity of fixed prosthesis, to assess the influence of less/more than ideal taper on the success of these restorations and to test all the parameters like height, width, convergence angle, line angles together and to test how they influence each other and the resulting survival of the crown.

Author's Contribution:

Concept & Design of Study:	Aqsa
Drafting:	Abdul Bari Memon, Kashif Ali Channar
Data Analysis:	Muhammad Rizwan Memon, Irfan Ahmed Shaikh, Abdul Hayee Shaikh
Revisiting Critically:	Aqsa, Abdul Bari Memon
Final Approval of version:	Aqsa, Abdul Bari Memon

Conflict of Interest: The study has no conflict of interest to declare by any author.

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