



## RESEARCH ARTICLE

### THE USE OF POSTERIOR COMPOSITE RESTORATIONS AMONG DENTAL PRACTITIONERS IN BENGHAZI-LIBYA

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#### ABSTRACT

**Objectives:** The aim of this study was to evaluate the attitudes of dental practitioners toward posterior composite restorations in terms of case selection and concerns.

**Materials and Methods:** 120 questionnaires were randomly distributed to the dental practitioners working in state and/or private dental clinics in Benghazi. The questionnaires were designed to elicit information regarding case selection criteria and main concerns while placing posterior composite restorations.

**Results:** 114 completed questionnaires were returned, 73 general dental practitioners and 41 specialists responded to the questionnaire. 36.8% of the dentists preferred composites for restoring only small defects and 35% selected composites for posterior restoration on patient demand. Conservation of tooth structure was the cause for placing 64.9%, esthetics for 57.8% and patient preference for placing 28% restoration by these dentists. 50% of the dentists reported concern in relation to isolation during composite placement, and 79.1% showed concern about polymerization shrinkage and microleakage. Differences in responses were not remarkable between general dental practitioners and specialists.

**Conclusion:** Conservation of tooth structure and esthetics were the main reasons for selection of posterior composites. Posterior composite restorations were chosen mainly for small defects. Patient preference was given weightage for material selection.

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## INTRODUCTION

Over the last decade, the use of particulate filler composite resins (PFCs) for the direct restoration of posterior teeth has been significantly increased due to aesthetic demands and the desire to preserve sound tooth structure during cavity preparation (DeGrang, 1997). With the improvements in the mechanical properties of PFCs, their use has been widened not only to the posterior intra-coronal area, but also to extra-coronal restorations (Fennis *et al.*, 2014). In spite of there are some limitations considered to be restrictions to the utilization of PFCs on the posterior teeth such as its sensitivity to moisture, bulk fracture and questionable wear resistance in

areas of high occlusal stresses, and polymerization stresses (Fennis *et al.*, 2014; Garoushi *et al.*, 2015). PFCs have replaced amalgam successively as a restorative in all indication areas (Heymann *et al.*, 1993). Composite restorations have been shown to perform favorably in posterior teeth in many clinical studies (Fennis *et al.*, 2014; Opdam *et al.*, 2012). Although amalgam still used in many practices around the world, it becomes facing its demise, due to increased concern of people about mercury toxicity and better esthetics. In addition, with the availability of improved generations of PFCs with the concomitant simplification of restorative techniques, have resulted in decline in the use of amalgam and increased use of posterior composites (Lynch, 2008; Gilmour *et al.*, 2009). Leaving PFCs as the most likely material for posterior restorations for widespread use in the near future. However, there is some confusion when the results of longevity-studies

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on amalgam and posterior composite resin restorations are compared. Longitudinal clinical studies on posterior composite resin restorations with an observation period of 8 years or more reveal a wide range of annual failure rates of between 1 and 6% compared to 0–7% for amalgam restorations (Opdam *et al.*, 2007). Another cross-sectional retrospective clinical studies, based on restorations placed in general practices, the longevity of amalgam restorations is more than twice as much as the longevity of composite resin restorations (Mjor, 1997; Mjor *et al.*, 2000). However, clinical related factors play an important role in restoration longevity and causes of failure (Opdam *et al.*, 2012). In some parts of the world amalgam is still a material of choice for posterior restorations because of its strength and durability, while in some other societies PFC is the first or only choice as a direct posterior restorative material with increased trend towards amalgam-free dental practice (Fennis *et al.*, 2014; Lynch, 2008). Thus, the aim of this study was to find out the reasons for selecting of composite as a posterior filling restoration, criteria of case selection, concerns regarding placing of this filling material among dental practitioners in Benghazi-Libya. In addition, to compare the questionnaire responses between dentists with different educations.

## MATERIALS AND METHODS

120 dentists were randomly selected from state and private dental clinics in Benghazi-Libya. A questionnaire was developed to elicit information regarding the gender and qualification of dentists, experience in years, case selection criteria for posterior composites, reasons for placing composite restorations and concerns when placing posterior composites. Each question had five options. The dentists could choose one or more than one options according to their choice. The questionnaire was adapted and modified from one reported in the literature for similar purposes (Naz *et al.*, 2012). Questionnaires were delivered to the dentists and later collected manually. The data were analyzed using Microsoft Excel. Descriptive statistics are reported.

## RESULTS

114 out of 120 dentists filled the questionnaire (95% response rate). 73 out of 114 were general dental practitioners, while 41 were specialists. 55 of participants were males and 59 Females. Out of 41 specialists, 12 had specialty in operative dentistry while 29 were specialized in fields, other than operative dentistry.

**Table 1. Demographic characteristics of participant dentists**

Characteristics	Data	
Total Dentists	114	
General dental practitioners	73	
Specialist (other than restorative dentistry)	29	
Specialist (restorative dentistry)	12	
Clinical experience	<5 years	>5 years
Total dentist	46	68
General dental practitioner	39	34
Specialist other than restorative	4	25
Restorative specialist	3	9

**Table 2. Case selection for posterior composite restorations**

Options	Response %
A. For Every posterior Restoration	21.9%
B. Only for small defects	36.8%
C. For occlusal only and not proximal	28%
D. Only when centric contacts are not involved	14.9%
E. Always when patient demands	35%

**Table 3. Most preferred combinations of responses for posterior composites case selection**

Order of preference	General dental practitioners no=73	Specialist(non restorative) no=29	Restorative specialist no=12
1	BE 8	BCE 3	-----
2	BC 7	-----	-----
3	BD 3	-----	-----

**Table 4. Reason for choosing composite for posterior restoration**

Options	Response %
A. Easy Procedure	10.5%
B. Esthetics	57.8%
C. conservations of tooth structure	64.9%
D. patients preference	28%
E. Better Skills In Composite restorations	22.8%

**Table 5. Most preferred combination of responses for posterior composite placement reasons**

Order of preference	General dental practitioners	Specialist other than restorative	Restorative specialist
1	BC 11	BC 7	BCD 3
2	BD 5	-----	BC 2
3	BCE 5	-----	-----

**Table 6. Concerns regarding posterior composite restoration**

Options	Response
A. wear	10.5%
B. bulk fracture	13%
C. polymerization shrinkage and microleakage	71.9%
D. contact point	15.7%
E. isolation	50%

**Table 7. Most preferred combination of responses for concerns regarding posterior composite restoration**

Order of preference	General dental practitioners	Specialist other than restorative	Restorative specialist
1	CE 15	CE 7	CDE 2
2	CDE 4	CD/BCE 2	-----
3	CD/BCE 2	-----	-----

**Table 8. Data distribution on the basis of education and experience**

	General dental practitioner		Specialist other than restorative		Restorative specialist	
	<5 No=39	>5 No=34	<5 No=4	>5 No=25	<5 No=3	>5 No=9
<b>1. Case selection for posterior composite</b>						
A. For Every posterior Restoration	8	9	1	3	1	3
B. Only for small defects	15	17	2	7	0	1
C. For occlusal only and not proximal	10	10	0	10	0	2
D. Only when centric contacts are not involved	8	4	0	3	1	1
E. Always when patient demands	12	12	2	8	1	5
<b>2. Reason for choosing composite</b>						
A. Easy procedure	6	3	0	3	0	0
B. Aesthetic	19	27	2	12	2	5
C. Conservation of tooth structure	24	21	3	17	2	7
D. Patient preference	7	12	1	8	1	3
E. Better skills in composite restoration	5	11	0	7	0	3
<b>3. Concern regarding composite restorations</b>						
A. Wear	3	1	0	6	1	2
B. Bulk fracture	6	2	0	6	0	1
C. Polymerization shrinkage and microleakage	22	29	4	18	2	7
D. Contact point	3	7	0	6	1	1
E. Isolation	18	19	2	13	1	4

68 dentists (56.6%) had a working experience of more than 5 years while 46 (38.3%) had that of less than 5 years. 21 dentists were working in state supported clinics (public) and 39 in private clinics while 54 were working in both. Table 1 shows the demographic characteristics of responders. 36.8% of the dentists preferred to use posterior composites only for

restoring small defects. However 35% also chose these for any restoration on patient demand. 38% of practitioners didn't prefer to use posterior composites when proximal surfaces were involved (Tables 2 and 3). Conservation of tooth structure was the priority of 64.9% of the dentists. 57.8% of the dentists were concerned with the esthetics and 28% of the

dental practitioners choose composites for posterior restorations on the basis of patient's preference (Tables 4 and 5). 50% of the dentists took special precautions to achieve isolation while placing composites. Only 15.7% of dentists worried about contact point generation while 71.9% of dentists considered polymerization shrinkage and microleakage as the great problem with composites (Tables 6 and 7). Table 8 shows the preferences of each sub-group in detail. Most of the respondents selected more than one option for their answers because of which different combinations of options were also reported.

## DISCUSSION

Scientific developments in cariology, dental materials and diagnostic system have change dentistry's approach to be more minimally invasive. The use of resin composites increased tremendously during the last two decades. Today, resin composites are selected on a regular basis for direct and laboratory made posterior restorations, as an extension to their original indication, which was limited to direct restorations in anterior teeth. Many developed societies in different countries of the world started to have amalgam-free practice. However, whenever durability of posterior restoration is concerned, there should be a proper case selection for a choice of restorative material. Even though, the use of dental composites as posterior restorative materials is very popular among dental specialists and general dental practitioners in Benghazi-Libya as per the responses obtained. The results showed that only 21.9% of dentists were used composite for every posterior restoration. This is in accordance with NAZ F *et al.*, who found that most of the dentists in Lahore-Pakistan did not prefer the composite restorations for large defects especially when centric contacts had to be shared by proposed restoration (Naz *et al.*, 2012).

The data of this study showed that 36.8% of the participants preferred to use posterior composites only for restoring small defects. Restoration of such small cavity fulfills the objectives of minimally invasive dentistry (Chalmers, 2006) and it resulted in a stronger restoration and due to the adhesion as it reinforces the tooth improving its resistance form (Cenci *et al.*, 2005; Coelho-De-Souza *et al.*, 2008). Even a material with a lower strength could perform equally well as a material with higher strength, if a conservative design is chosen for placing the restoration (Anand *et al.*, 2011). Also it has been well documented in many other studies radical removal of tooth structure results in reduction of fracture strength of teeth, and increased marginal gap formation (Fonseca *et al.*, 2007; Mondelli *et al.*, 1980). It is in agreement with some evidence based reviews that don't recommend the use of composites for very large restorations (Opdam *et al.*, 2007; Opdam *et al.*, 2007; Lucarotti *et al.*, 2005).

On other hands, the study showed that 35% of the participants choose the composites for any posterior restoration whenever it was demanded by the patient for aesthetic reason or because of apprehension of mercury toxicity of dental amalgam (Christensen and Child, 2010). This is in accordance with the studies that determine the patient's preference to be an important factor for making treatment decision (Alomari *et al.*,

2010). About 38% of the dentists were against the placement of composite resins in areas of heavy occlusal contact. This is in agreement with the previous studies that do not encourage the use of composites in these situations (Gilmour *et al.*, 2009; Naz *et al.*, 2012). Also, the use of composite restoration in class II cavity with heavy contacts was not preferred by dentists in the present study. This is in accordance with the previous published evidence in which low success rate of composites in proximal restorations was reported. Class II restorations, especially large ones require more efforts in terms of bonding and placement techniques, contact point generation and maintaining adequate moisture control (Chalmers, 2006) and to build up contact point (Cenci *et al.*, 2005). In this study, the most frequent reason for selection of posterior composites by the dentists was found to be the conservation of tooth structure 64.9% followed by 57% of dentists for aesthetics and patient's preference. This shows increased trend of dentists towards minimum interventional dentistry. This result was in harmony with a previous study performed in Northern Saudi Arabia (Ifthikhar, 2015). On other hands, the results were opposite to the findings of Glimmer *et al.*, who found patient preference followed by conservative procedure for choosing posterior composites amongst the participants (Gilmour *et al.*, 2009). A study conducted on the undergraduate European dental students in England reported that the most common factors influencing the choice of posterior restorations were esthetics and conservation of tooth structure (Lynch *et al.*, 2010). This is because of increased trend towards esthetics and people don't like anything in their teeth that doesn't match tooth color.

Polymerization shrinkage is one of the greatest drawbacks of composite materials. It is one of the main factors that determine the longevity of composite restorations (Demarco *et al.*, 2012). Polymerization shrinkage is an inherent problem of 2-4% volumetric shrinkage during polymerization process of composites (Demarco *et al.*, 2012). It remains a challenge and still imposes limitation in the application of direct techniques. Stresses arising from polymerization shrinkage can result in bond failure and has been shown to have great effect on marginal gap formation, post-operative sensitivity and adverse pulp reaction than bond strength (Mathew *et al.*, 2001). A gap free direct composite restoration is possible only if the adhesive forces to the tooth overcome the interfacial stress generated during curing (Christensen, 2012). In the present study, the polymerization shrinkage represented the major concern on using composite among the participants 71%. This result was against the finding of previous study performed in Lahore for placing of composite restorations, where only 32.6 % of dentists in the study were concerned with this problem and seeing it as a material drawback and not technique related problem (Naz *et al.*, 2012). Various clinical methods have been recommended to reduce the effect of polymerization shrinkage including small incremental placement into cavities, control of curing light radiance and flowable resin liner application is recommended to avoid such a problem (Christensen, 2012). Other concerns associated with posterior composite restorations in this study were isolation and build up of contact point in case of class II restoration which were 50% and 15.7% for these problems respectively among participants. This was in agreement with the findings of previous study that found 79% and 37% for the above mentioned problems respectively

(Gilmour *et al.*, 2009). Proper isolation with rubber dam is pre requisite for composite restoration. According to American Dental Association, composites should not be placed in sites where isolation cannot be maintained (American Dental Association, 2005-06). Establishment of proper contact with composites in class II restoration is also a great problem. The durability of restoration may be decreased in patients having history of bruxism, although different techniques of restoration and matrix systems have been introduced to overcome this problem (Kampouropoulos *et al.*, 2010; Ritter, 2008). The responses given by the dentists for all the options given in this study were almost same for all the three groups of dentists with different level of education. However the greatest variety of selected options was seen in the group of general dentists. This might be related to differences in the level of knowledge in this group. The effect of experience couldn't be evaluated for Operative specialist group because the number of dentists within this group was low.

Finally, authors would like to emphasis that extensive research has been conducted to improve the reinforcing phase of restorative composites in order to increase their safety for use in high stress bearing areas and some products have lunched recently claimed to have better physical properties to overcome polymerization and fracture related failures.

## Conclusion

The study showed case selection was important factor for composite restoration in which all the groups preferred to use composite restoration only for small defects and on patient demand. The reason for choosing composite for posterior restoration for all the groups was for conservation of the tooth structure followed by aesthetic demand. The highest concern regarding posterior composite options among participants in all groups was polymerization shrinkage of the composite followed by isolation.

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