



## **A questionnaire survey for General awareness amongst dentists in the Ahmedabad and Gandhinagar district regarding knowledge of intraoral porcelain repair systems**

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### **ABSTRACT**

*Intraoral porcelain repair systems for quick and painless repair of the fractured porcelain; without removal or fabrication of a new restoration. Various direct intraoral repair systems are available, and each repair system has its own guidelines for use as per the components. This survey attempts to assess the awareness and use of intraoral porcelain repair systems in dental clinics in Ahmedabad and Gandhinagar district through a questionnaire. A questionnaire was prepared with 12 questions on Google forms and distributed via email to random dentists in Ahmedabad and Gandhinagar districts. 147 responses were collected via email over a period of 20 days. The questionnaire contained questions regarding the general awareness and use of intraoral porcelain repair systems. Of the 147 responses gathered, over 69.4% of the patients complained of chipped/fractured prosthesis as the primary reason for seeking dental treatment. Only 44.9% of the dentists were aware regarding the availability of intraoral porcelain repair systems with Ivoclar ceramic repair kit being the most commonly used system (36.8%). From the dentists using the intraoral porcelain repair systems, 29.9% of the dentists would prefer laboratory repair of the prosthesis over the use of intraoral porcelain repair systems. All the responses obtained were analysed by Google forms. Not many practitioners are aware of the availability of these repair kits and its use. However, from the ones who are aware, majority of them are quite satisfied with the results obtained.*

**Keywords:** Porcelain fused to metal, Porcelain repair systems, Composites, Polishing systems

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### **INTRODUCTION**

The dental appearance has a major impact on facial beauty. Placement of a restoration, which improves dental appearance, results in a positive effect on the patient's self-esteem and quality of life [1]. The 'aesthetic revolution' in dentistry has created an upsurge in popularity of both porcelain and ceramic facings and aesthetic inlays/onlays. In Fixed Prosthodontics 90% of the restorations are fabricated in dental ceramics [2]. These restorations have the potential to fracture due to various factors such as impact load, occlusal forces, difference in the coefficients of thermal expansion between porcelain and metal substructures, using metal with low elastic modulus, use of excessive seating force during insertion or cementation of the prosthesis, improper design, micro defects within the material and trauma [3-7]. Such factors are said to be the second greatest cause of failure of the prosthesis after caries [8-10].

Porcelain fractures are the most common cause of prosthesis removal. Fractured porcelain affect function as well as aesthetics since they frequently occur in regions that are quite visible, which may warrant patients to seek immediate treatment. Removal & reconstruction of the prosthesis is a costly affair and also poses the risk of destroying the entire restoration or damaging the abutment teeth. Intraoral porcelain repair systems for quick and painless repair of the fractured porcelain; without removal or fabrication of a new restoration. Intraoral repair method is economic, time saving and involves bonding of composite to fractured porcelain. The technique of repair involves surface preparation of ceramic using diamond roughening and etching procedures most commonly using hydrofluoric acid, followed by application of a primer and a silane coupling agent to ensure chemical retention. An opaquer is usually provided to mask the exposed metal portion of the restoration. This opaquer should be homogenous and must have the ability to adequately mask the metal underneath. The clinical success these repair systems rely heavily on the bond formed between the ceramic and resin composite generally achieved through a combination of mechanical and chemical means. A wide range of bond strength values have been reported

in the literature ranging from 3-37.4 MPa for various porcelain repair systems [8-12]. Various direct intraoral repair systems are available, and each repair system has its own guidelines for use as per the components provided by the manufacturer.

The aim of this study was to assess the awareness and use of intraoral porcelain repair systems in dental clinics in *Ahmedabad and Gandhinagar district* through a questionnaire-based survey.

## MATERIAL AND METHODS

The study was conducted to evaluate the awareness and knowledge on porcelain repair systems among dentists in Ahmedabad and Gandhinagar districts. A questionnaire was prepared with 12 questions on Google forms and distributed via email to random dentists in Ahmedabad and Gandhinagar districts [Table: 1]. 147 responses were collected via email over a period of 20 days. The responses obtained were further analysed by Google forms and the following results were obtained. The questionnaire contained questions regarding the frequency of failure of fixed prosthesis due to ceramic fracture, awareness regarding the availability, success rate, cost effectiveness and drawbacks of the various commercially available porcelain repair systems and alternate methods used for repair of the chipped porcelain portion of the prosthesis.

**Table 1: The questionnaire prepared for the survey**

Sr no.	Questions	Options	Answer
1	Participants	Private practitioners	
		Academician	
		Student	
		Practitioner and academician both	
2	How often in your clinical practice do you recommend PFM/All ceramic restorations?	Always	
		Most cases	
		Sometimes	
		Never	
3	What is the most common cause of failure of the fixed prosthesis provided by you?	Biological	
		Mechanical	
		Esthetics	
4	How often do you encounter chipped or fractured ceramics as the patient's complaint in the prosthesis delivered?	All /most patients	
		Several patients	
		Few patients	
		None	
5	What is the most common type of porcelain fracture that you come across in your clinical practice? (Freidman classification)	Static fracture (segment of porcelain fractures but remains intact)	
		Cohesive fracture (occurs within the body of porcelain)	
		Adhesive fracture (failure of the bonding interface between the porcelain and the substrate)	
6	Are you aware of the availability of intra oral porcelain repair systems?	Yes	
		No	
7	What treatment do you recommend for patient who presents with chipped/fractured restorations?	Remake the restoration	
		Laboratory repair of the restoration	
		In office repair using intraoral porcelain repair systems	
8	Which commercially available intraoral porcelain repair system do you use?	Angelus porcelain repair kit	
		Prevest ACE ceramic repair kit	
		P and R repair kit	
		Ivoclar ceramic repair kit	
		Other	
9	What according to you is the most prominent drawback of using them?	Poor colour stability in long term use	
		Poor shade matching due to insufficient shade availability	
		Low strength	
		Not cost effective	
10	Do you feel the results are better when intraoral porcelain repair systems are used FOR PFM restorations over layered all ceramic restorations?	Complicated intraoral procedure	
		Repair of PFM restorations give better results as compared to layered all ceramic restorations	

		Repair of layered all ceramic restorations give better results as compared to PFM restorations	
		Didn't know that it could be used for both PFM and layered all ceramic restorations	
		No difference seen in the results obtained	
11	Would you prefer using intraoral porcelain repair systems over extraoral ( or laboratory repair)	Yes	
		No	
12	Do you feel that the use of intraoral porcelain repair systems is a cost effective and a successful treatment option?	Yes	
		No	

## RESULTS

From the 147 responses gathered [Pie diagram: 1] it can be seen that 48.3% of the practitioners recommend PFM/All ceramic restorations for all their patients [Pie diagram: 2]. Over 27.9% of the dentists find esthetic failures to be the most common cause of prosthetic failure [Pie diagram: 3], with over 69.4% of the patients complaining of chipped/fractured prosthesis as the primary reason for seeking dental treatment [Pie diagram: 4]. 49.7% of the responding dentists choose to remake the entire prosthesis again, 27.9% of the respondents use indirect method of repair i.e. laboratory repair of the restoration and only 22.4 % of the responding dentists used intraoral porcelain repair systems for in office repair of the prosthesis [Pie diagram: 7].

42.2% of the respondents felt static fractures were the most common type of fracture they encountered followed by adhesive fractures (34.7%) and cohesive fractures at (23.1%) [Pie diagram:5].

Only 44.9% of the dentists were aware regarding the availability of intraoral porcelain repair [Pie diagram: 6] systems with Ivoclar ceramic repair kit being the most commonly used system (36.8%), followed by Prevest ACE Porcelain repair kit (28.4%), Angelus porcelain repair kit (20%) and 10.5% using P and R repair kit by Shofu [Pie diagram: 8].

Of the dentists using intraoral porcelain repair systems in their clinical practice, over 61.2% felt that low strength and poor shade matching to the pre-existing prosthesis were the most prominent drawbacks of using them, while 26.6% considered the complicated intraoral procedure and poor long term colour stability as the most prominent drawback with 11.1% dentists don't find these systems to be cost effective [Pie diagram: 9].

31.8% felt that these repair systems showed better results with pfm compared to layered all ceramic restorations, 12.5% didn't find any difference in the results obtained while 25% dentists weren't aware that these kits could be used to repair both PFM and layered all ceramic restorations [Pie diagram: 10].

70.1% dentists feel that they would continue using intraoral porcelain repair systems while 29.9% said that they would switch to laboratory repair of the prosthesis [Pie diagram: 11]. Over 84.5% of the dentists using intraoral porcelain repair systems considered it to be a cost effective and successful treatment option [Pie diagram: 12].

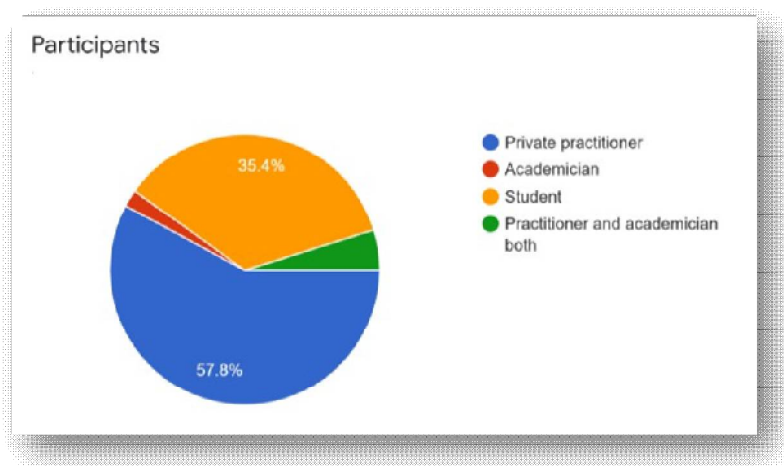


Figure 1. Percentage of different participants



Figure 2. Question & percent of answers

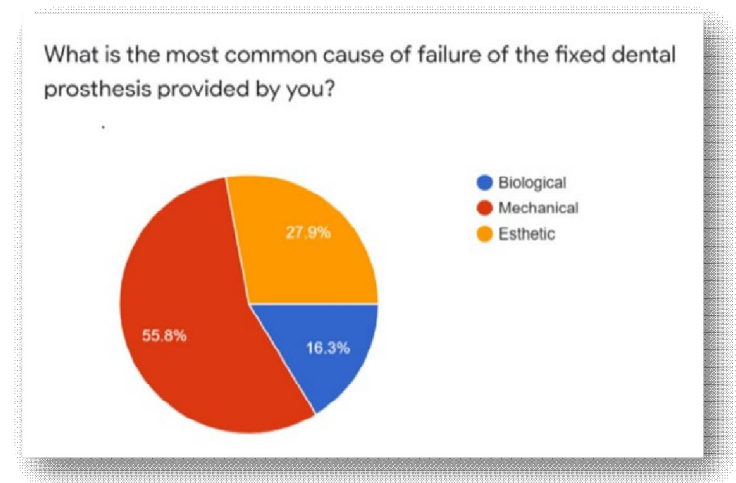


Figure 3. Question & percent of answers

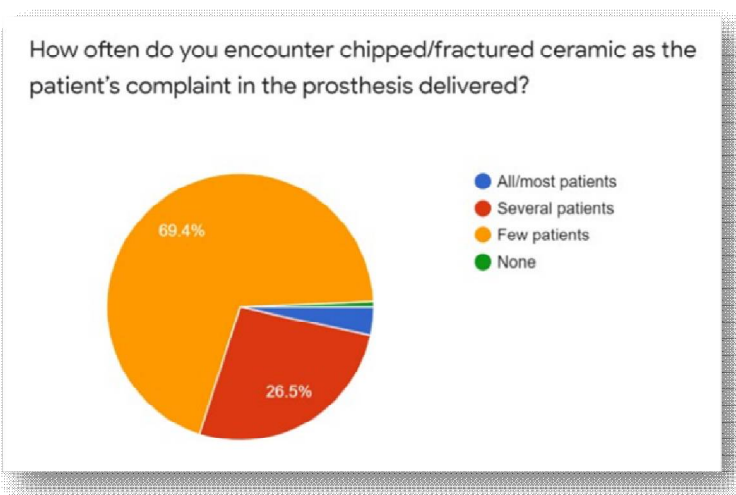


Figure 4. Question & percent of answers

What is the most common type of porcelain fracture that you come across in your clinical practice (Freidman classification)?

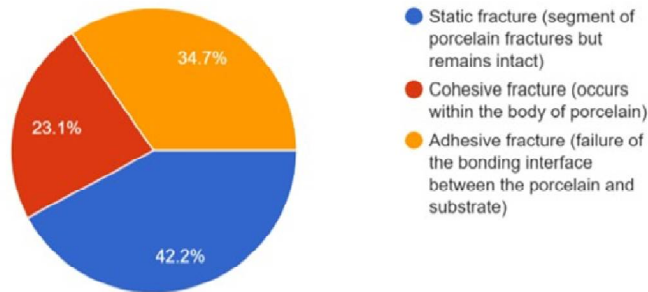


Figure 5.Question & percent of answers

Are you aware of the availability of intraoral porcelain repair systems?

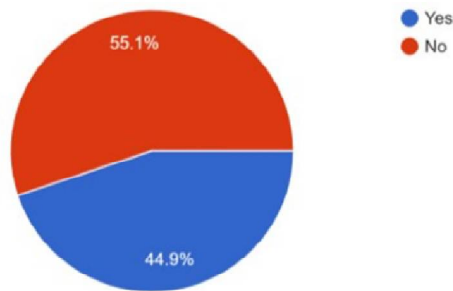


Figure 6.Question & percent of answers

What treatment do you recommend for patients who present with chipped/fractured restorations?

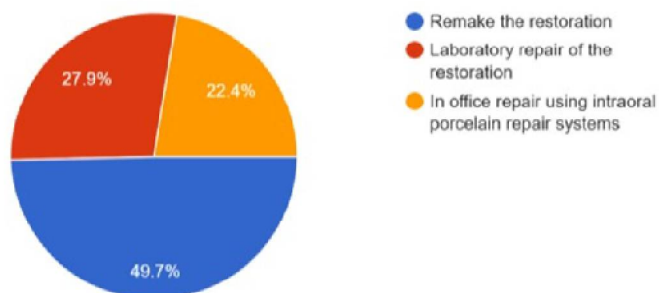


Figure 7.Question & percent of answers

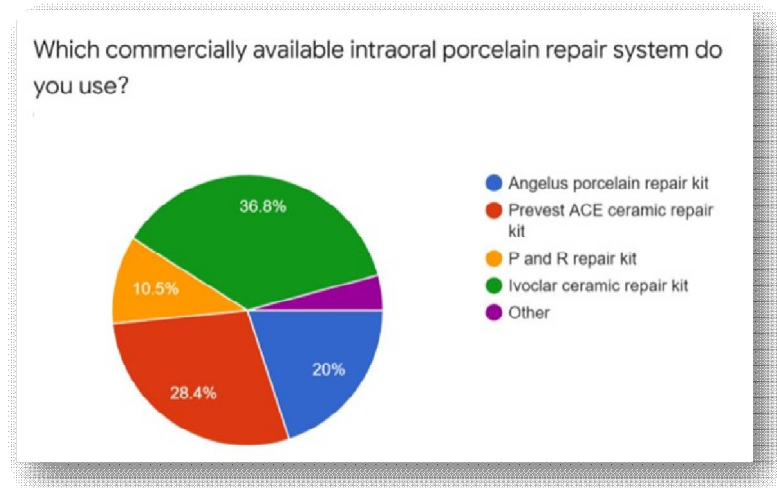


Figure 8. Question &amp; percent of answers

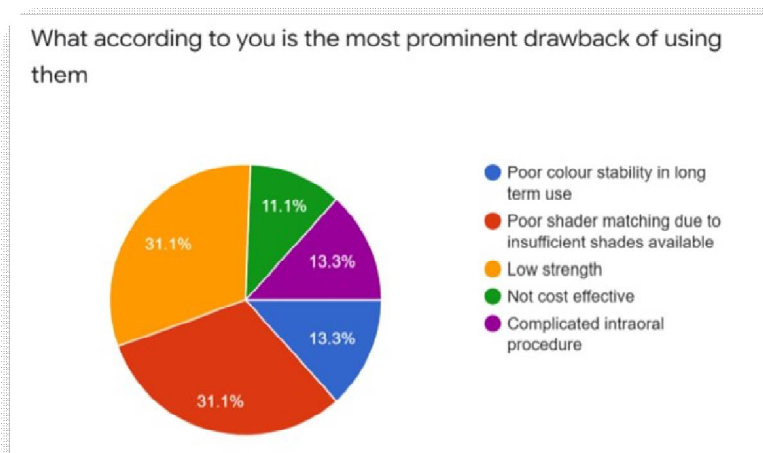


Figure 9. Question &amp; percent of answers

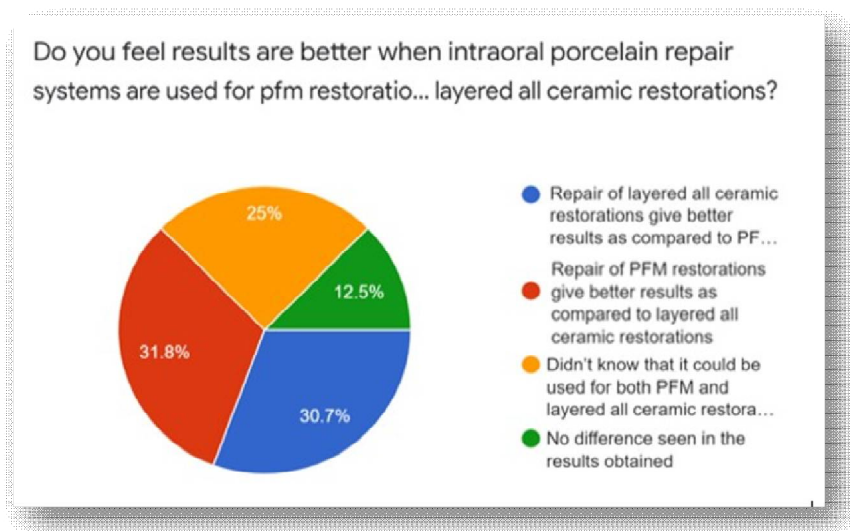


Figure 10. Question &amp; percent of answers



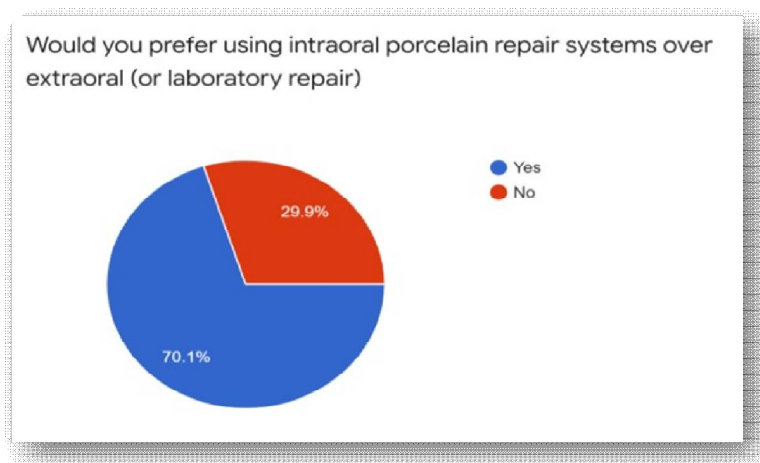


Figure 11 Question &amp; percent of answers

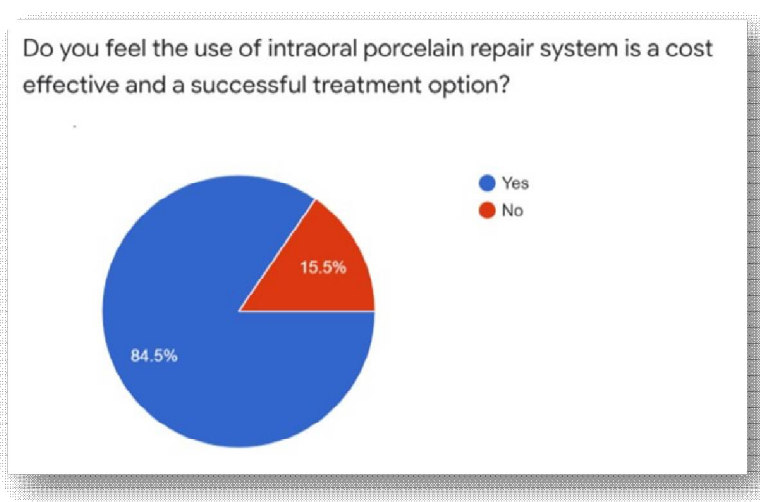


Figure 12 Question &amp; percent of answers

## DISCUSSION

The current survey included 12 questions aimed at assessing the awareness, knowledge and practice of intraoral porcelain repair systems. As per the results obtained in this survey while chipped/ fractured ceramic of the prosthesis is a very common complaint only a feeble portion of the dentists choose to use porcelain repair systems as a treatment of choice. On, further analysis, a prime reason for this can be the lack of knowledge regarding these systems (only 44.9% were aware of the existence of these intraoral porcelain repair systems). 70.1% of the dentists who used the intraoral porcelain repair systems felt that they would continue using them and considered them to be a successful option of treatment. This result is similar to a survey carried out by B John Rozar Raj *et al* wherein they found 72% of their participants were satisfied with the success rate obtained by their use [11]. A similar study was conducted by Highton RM *et al* where the effectiveness of different repair systems was analysed. And he found acrylic resin repair systems to have the best success in porcelain to porcelain repair [11-13]. However, significant improvements have been made in the field since then and currently the most popularly used material remains composite resin with 10-methacryloyloxydecyl dihydrogen phosphate (MDP) added which promotes adhesion of resin to the fractured metal ceramic restoration. A study was done by Creugers N.H *et al* about the success rate.<sup>14</sup> The fractured crowns were repaired in situ with an experimental porcelain repair system. While initially the results were satisfactory both aesthetically and functionally, only 50% of the repairs were intact by the end of the 12-month follow-up period [11]. 61.2% of the dentists who use these repair systems felt that low strength and poor shade matching remain the most prominent drawbacks of using them. Several studies have been conducted comparing the shear bond strength of

various intraoral porcelain repair systems[3,4,15]most of the literature about the same seems to suggest that strength of >10 MPa indicates clinically satisfactory results which these systems have been shown to obtain quite easily with majority of these systems strength being >25MPa[15-22].

Majority of the participants believed that these repair systems could be used for both PFM and layered all ceramic restorations, but 31.8% felt that better results were obtained when used for PFM as compared to all ceramic restorations.26.6% also felt that these systems had poor long term colour stability. Saygil *et al* in their study on effects of accelerated ageing on porcelain repair systems concluded that while there is significant colour change it is less than the acceptable clinical range ( $\Delta E < 3.3$ ). He also concluded that colour change is more noticeable when microfilled composite resins were used as compared to hybrid composites [23,24]. Overall 84.5% of the dentists found the use of these repair system to be a successful treatment option.

## CONCLUSION

Not many practitioners are aware of the availability of these repair kits and its use. However from the ones who are aware, majority of them are quite satisfied with the results obtained. While these materials have several drawbacks their usefulness in daily practice cannot be underestimated. Since it is a cost efficient and a simple method, porcelain repair system can be preferred than other expensive and complicated methods. Dentistry is a constantly evolving field with increasing importance being given to Rand D and evidence based model of practice. For clinicians to be able to provide the best possible treatment plan to the patient it is necessary to be updated with the recent advances in the field.

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