



Survey

# Knowledge, Attitude and Practice regarding use of resin cements for indirect restoration amongst general dentist and specialist – A Survey

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**How to cite:** Christy S, Nivedhitha MS. Knowledge, Attitude and Practice regarding use of resin cements for indirect restoration amongst general dentist and specialist – A Survey. *Int J Esth Res Dent*. Volume 2022, Article ID 22162567, 12 pages.

DOI: <https://doi.org/10.56501/intjsthresdent.2022.531>

Received: 05-05-2022

Accepted: 31-05-2022

Published: 06-06-2022

## Abstract

Resin cements are also known as bonding cement. They exhibit adherence to the inner or intaglio face of the restoration and the interface of the tooth. Initially, the mode of earlier resin cement was generally a type of micro-mechanical form of adhesion mechanism. Currently, cements lute to tooth facet surface and to restorative interface by a chemical bond. It was observed that the resin cement exhibited more retention as compared to the conventional luting cement, primarily due to inherent high bond strengths, but the limitation were multiple steps, difficulty in cleaning up the clingy cement and being highly technique-sensitive luting agents. The self-adhesive resin cement does not need another bonding procedure. An understanding, knowledge and awareness of clinical performance of a luting agent system is imperative prior to selecting the material for the requisite clinical scenario. Since different types of materials like cast metal, base metal, gold alloys, porcelain-fused-to-metal, ceramic infiltrated materials, resin or composited based, and all-ceramic indirect restorative alternatives are available, hence, an ideal luting agent will have to match the inherent physical, mechanical, chemical, biological, and handling prerequisites like adequate and optimal working time, improved compressive strength, optimal flowability, negligible microleakage, devoid of solubility in saliva, adhesiveness, compatibility to the tooth and tissue, aesthetics, ease of manipulation and removal of excess.

**Keywords:** Knowledge, attitude and practice; resin cements; total etch resin cements; self-etch resin cement; self-adhesive resin cement.

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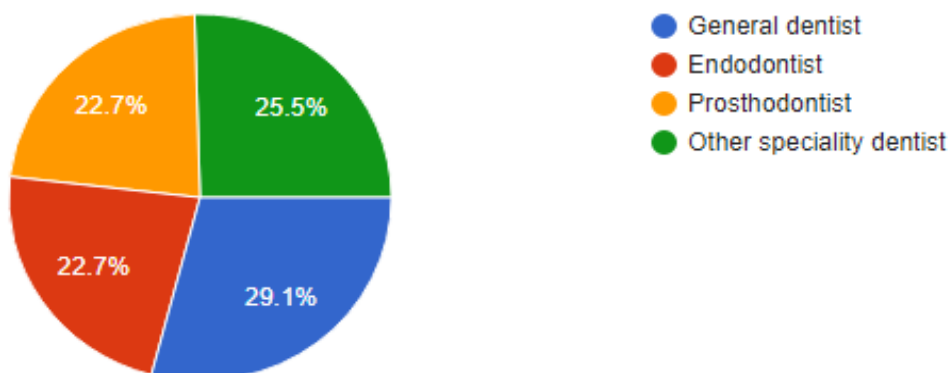
## INTRODUCTION

Cementation of an indirect restoration is a vital and pivotal procedural clinical step to warrant the retention and longevity of the restoration, and impervious marginal seal with the tooth. The commercially available luting cement is universally categorized into five classes: zinc phosphate cement, glass-ionomer based cement, resin-modified glass-ionomer cement, polycarboxylate cement and resin composite cement [1]. The operator's selection based on clinical application and indication is not well documented. No single cement can be found completely suitable or ideal for the wide range of indirect restorations. Therefore, their optimal application requires a thorough understanding and knowledge of all restorative materials, luting cement, their handling characteristics, the ideal preparation design and moisture control for optimal setting and properties [1]. Meticulous deliberation should be practiced when adopting and embracing an adhesion protocol for a particular clinical scenario and indication. Adhesive cement must intrinsically bond to an array of contrasting substratum, including dental hard tissues like dentin and enamel, different metal alloys, all type of ceramics, indirect composites and gold [2,3]. Resin cements are said to have increased adhesion durability, both to hard tissue substratum and indirect restoration, elevated tensile and compressive toughness and strength, and the nethermost solubility amongst the obtainable cements [4]. The objective of this survey is to evaluate the knowledge, perception, awareness and implementation and practice regarding the use of resin cements for indirect restoration amongst general dentist and specialist.

## MATERIALS AND METHODS

A questionnaire was designed on application of resin cements for indirect restoration amongst general dentist and specialist and a cross sectional survey was conducted amongst the general dentist and specialist (Figure 1). The sample size was 220 participants. 15 close ended questions were asked. The questionnaire consists of questions related to knowledge and awareness among the general dentist and specialist regarding use of resin cements for indirect restoration (Table 1). Data collection was done and the results were statistically analysed (Table 2).

**Figure 1: Specialization of the demographic surveyed**



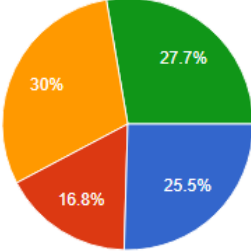
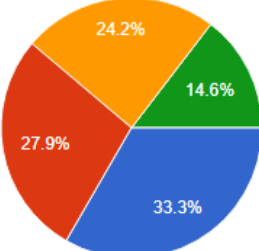
**Table 1: Knowledge and awareness among general dentists and specialists regarding use of resin cements for indirect restoration**

| S.No | Question  | Options  |
|------|---|--|
| 1    | Do you know that resin cements can be used as luting cements for indirect restorations? | Yes<br>No<br>Maybe<br>No idea  |
| 2    | Resin cements have high bond strength when compared to other luting cements.            | Yes<br>No<br>Maybe<br>No idea  |
| 3    | Do you know in which type of resin cement self-prime adhesive is present?               | Total-etch Resin cements<br>Self -etch Resin cement<br>Self-adhesive Resin cement<br>No idea |
| 4    | Self-etch resin cements have good bond strength to                                      | Enamel<br>Dentin<br>No idea  |
| 5    | Pre-treatment of tooth is required for self-adhesive resin cement.                      | Yes<br>No<br>May be<br>No idea   |
| 6    | Will pre-treatment procedures increase the bond strength of resin cements?              | Yes<br>No<br>May be<br>No idea   |

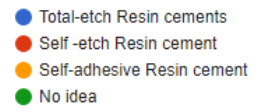
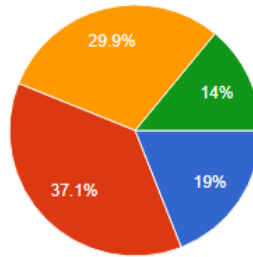
|    |   |   |
|----|---|---|
| 7  | Proper isolation is mandatory for luting of indirect restoration of resin cements | Agree<br>Strongly Agree<br>Disagree<br>Strongly disagree                                      |
| 8  | Do you use tack curing technique in resin cements?                                | Yes<br>No<br>No idea  |
| 9  | In your practice have you ever used self-adhesive resin cements?                  | Yes<br>No   |
| 10 | Does the type of restoration interfere with the bonding of resin cements?         | Yes<br>No<br>May be<br>No idea  |
| 11 | In high esthetic demand regions, the choice of resin cements would be?            | Total-etch resin cements<br>Self-etch resin cement<br>Self-adhesive resin cement<br>No idea   |
| 12 | Which technique is best in resin cements?   | Total-etch resin cements<br>Self -etch resin cement<br>Selective-etch resin cement<br>No idea |
| 13 | Which surface of the tooth is etched in selective-etch technique?                 | Enamel only<br>Dentin only<br>Both<br>No idea   |

|    |   |   |
|----|---|---|
| 14 | If the taper of your preparation is less than 14 degree, then what will be your choice of resin cement? | Self-adhesive<br>Self-etch resin cements<br>Total etch resin cements<br>No idea |
| 15 | Do you know that there is special cement available for the luting of veneers?                           | Yes<br>No<br>Maybe  |

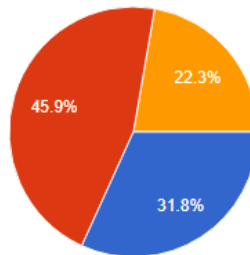
**Table 2: Results of the Survey**

| S.No | Questions   | Response   |
|------|---|--|
| 1    | Do you know that resin cements can be used as luting cements for indirect restorations? |  <ul style="list-style-type: none"> <li><span style="color: blue;">●</span> Yes</li> <li><span style="color: red;">●</span> No</li> <li><span style="color: orange;">●</span> Maybe</li> <li><span style="color: green;">●</span> No idea</li> </ul>  |
| 2    | Resin cements have high bond strength when compared to other luting cements.            |  <ul style="list-style-type: none"> <li><span style="color: blue;">●</span> Yes</li> <li><span style="color: red;">●</span> No</li> <li><span style="color: orange;">●</span> May be</li> <li><span style="color: green;">●</span> No idea</li> </ul> |

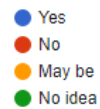
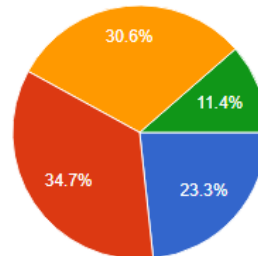
3 Do you know in which type of resin cement self-prime adhesive is present?



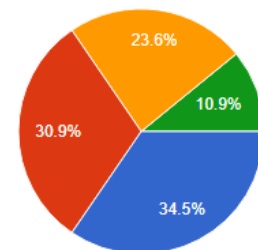
4 Self-etch resin cements have good bond strength to



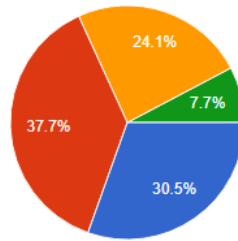
5 Pre-treatment of tooth is required for self-adhesive resin cement.



6 Will pre-treatment procedures increase the bond strength of resin cements?

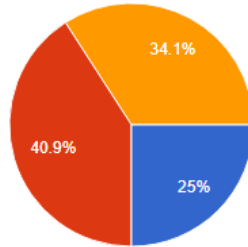


7 Proper isolation is mandatory for luting of indirect restoration of resin cements



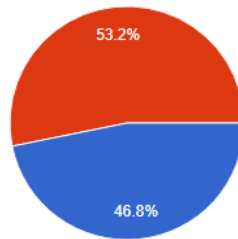
● Agree  
● Strongly agree  
● Disagree  
● Strongly disagree

8 Do you use tack curing technique in resin cements?



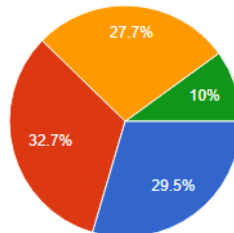
● Yes  
● No  
● No idea

9 In your practice have you ever used self-adhesive resin cements?



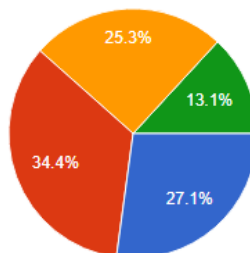
● Yes  
● No

10 Does the type of restoration interfere with the bonding of resin cements?



● Yes  
● No  
● Maybe  
● No idea

11 In high esthetic demand regions, the choice of resin cements would be?



● Total-etch resin cements  
● Self-etch resin cement  
● Self-adhesive resin cement  
● No idea



## DISCUSSION

Resin cement is also known as bonding cements. They adhere primarily to both the intaglio facet of the restoration and the prepared tooth substratum. The initially developed resin cement mechanism of adhesion relied primarily on micromechanical, but currently, it has been observed that these newer cement exhibit chemical adhesion both with the restorative interface and the tooth surface interface. The resin cement, due to its high bond strength is apparently more retentive than traditional and customarily applied luting systems. However, they engage manifold procedural steps, are highly technique sensitive cement and are difficult to clean up after manipulation [4-6].



Resin cement contain the similar fundamental constituent as the resin based composite restorative or reparative material but the number of fillers increments is lesser than that of restorative materials. These cement exhibit enhanced compressive toughness, ductile and tensile durability with compounded strength in flexure when they are compared to conventional cement. However, these cements are highly technique sensitive. Thus, a properly cured resin cement will have high and optimal compressive and flexural strengths, and will be to a certain extent insoluble in oral fluids [4,7-9].

In contemporary objective clinical restorative practice, mainly three types of resin cements are commercially available and are classified based on their adhesive patterns and character. They are etch-and-rinse resin cement called total-etch luting adhesives, the self-etch resin cements, and the self-adhesive resin luting agents [10,11].

Total etch cements are the etch-and-rinse adhesives in which 36–37 % phosphoric acid is used to etch both the surface enamel and deeper dentin surface succeeded by an administration of single layer of bonding agent. This is followed by cementation with resin luting system [6-9,12-14]. Total etch cement can be self-cured, light cured, or be dual-cured. The etching of the enamel and dentin with phosphoric acid yields the highest bond strengths in enamel and even in dentin high bond strength can be achieved when stringently applied [15-24].

Self-etch cement has a simplified technique as the acidic based monomers etchant and esters of phosphates, are conjoint with the primer, hence named self-etch primers. These cements are usually dual cured and preferred by most clinicians [9]. Bonding to the enamel is less effective than that of total-etch based systems. During the entire adhesive procedure, the smear layer is altered, modified but not eliminated hence, precluding both the influx and out flux of exudates from the dentinal tubules. The adhesion protocol is that the bonding solution layer should be dehumidified for about 5–10s to remove the residual acrid hydrogen ions and ethanol, else the hydrogen and ethanol will persist in the set cohesive coat if not dehumidified [1,2].

The self-adhesive resin cement is termed one or single component of “universal adhesive cements,” primarily because they do not need or require a dedicated bonding protocol dental hard tissue substratum as the phosphoric acid is replaced with phosphoric esters [1,2]. Self-adhesive cements are primarily dual-cured. Self-adhesive resin cement thus can lead to adequate bonding both to the dentin and enamel. But they exhibit decreased bond strengths when compared total-etch techniques. These luting systems are not so exacting in acuity because the inherent risk of contamination is much lesser [1,2].

Self-adhesive resin luting agent is alternative to technique-sensitive total-etch and self-etch resin cement. 33.5% in the survey were aware of this finding. For extremely tough porcelain ceramics such as zirconium oxide derivatives and alumina, self-adhesive resin luting agent are the luting adhesive of choice. They are also indicated when retention is compromised with little tooth structures and walls remaining when crown height is less or the preparation is too tapered in onlay preparations, table tops and also when isolation is not achievable and time is a constraint [3,23,25,26]. Approximately 27 percent in the survey were aware that compromised taper and height could be obviated by the resin cement. 37% were aware that isolation is an important step to improve upon the properties of luting cement [23].

The physical and mechanical properties of the resin cements affect their clinical performance [8,24,26-28].

They are as follows:

- a. Compressive strength
- b. Flexural strength
- c. Film density thickness
- d. Solubility and water sorption

Resin adhesive luting systems adhere tooth hard substratum and the intaglio facet of the restoration, and due to the elevated compressive strength, the luting agent also compounds the resistance to fracture of the indirect materials, especially in the case of brittle materials like ceramics [24, 27-29].

Flexural strength is the characteristic of a dental medium to withstand and resist bending, deforming forces without disintegrating. The luting agent should have ample strength of flexure in order to transfer and dissipate the stresses from the restorative material to the hard tissues to prevent any catastrophic fractures or fractures at the tooth cement interface [24,27]. The stress assemblage at the luting agent interface with the hard substratum will be less if the elastic modulus of the luting agent is similar to that substrate of dentin with a resultant durable and reinforced bond. Adhesive luting agents are relatively 130 times resilient in flexure and 20 times more durable and tougher and when compared to traditional luting agents, which makes adhesive the ideal luting agent for the cementation of all-ceramic restorations [27].

Decreased thickness of the luting cement film will not only improve the seating of the restoration but also will decrease marginal discrepancies and lead to a reduction of biofilm accretion, periodontal disease, dissolving of luting agent, and eventually prevent and inhibit secondary carious lesion initiation [24,27]. Though the resin cement has a higher film thickness than conventional cement, they are barely dissolvable in saliva, which will be an added advantage in the seating of the restoration in a moist environment like that of the mouths.

## **CONCLUSION**

Luting cement are the dental mediums and materials which facilitate the adhesion of indirect restorative material affixing to hard tissue substratum. With the advancement in the evolution of plethora of esthetic material and hence arduous task to develop and selecting, adopting and determine the correct luting agent that will concur with the characteristic for the tooth replacement indirect material and withstand the challenges of the intraoral environment. The most kaleidoscopic luting systems are the resin based and self-adhesive resin cements as they have variegated clinical applications and indications. These two adhesive luting systems provide bonding to dental hard tissue substratum, and while self-adhesive systems have the clear-cut advantage of clinical simplification, they cannot be contemplated as a substitute for traditional luting agent in all clinical situations. Hence it is imperative that each clinician is well informed about the composition, characteristics, indications, advantages, limitations, and challenges of each system for a predictable esthetic outcome.

**Conflict of Interests:** Nil

**Source of funding:** Nil

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