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## **Flowable Resin Composites-A Systematic Review and Clinical Considerations**

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**Aim:** To review the features of flowable composite materials in comparison to conventional composites and discuss in detail understanding of the advantages, drawbacks, indications and contraindications based on composition and physical/mechanical properties.

**Keywords** -Composite, Fracture toughness, Micro leakage, Polymerization shrinkage

## **INTRODUCTION**

The initial composites were usually quartz-filled with large filler particles, making restorations rough and difficult to polish. Composite resins derive their physical properties/handling characteristics from the reinforcing filler particles and viscosity from the resin matrix. [1]. The purpose of increasing the filler load is to improve the resistance to functional wear and physical properties. Viscosity increases with increase in filler loading. Most direct restorative composite have a putty like consistency which is desirable for clinical situations but there is a need to have a less viscous composite resin for better adaptability with the cavity wall[2]. For this reason, a new class of “flowable composite resins” was introduced in late 1996 [3]. Most literature discusses conventional composite materials at large, giving minimal emphasis to flowables in particular.

### **Why use flowable composites?**

Flowable resin-based composites are conventional composites with the filler loading reduced to 37%-53% (volume) compared to 50%-70% (volume) for conventional minifilled hybrids[4]. This altered filler loading modifies the viscosity of these materials. Most manufacturers package flowable composites in small syringes that allow for easy dispensing with very small gauge needles[5].

## **MAJOR CLINICAL INDICATIONS OF FLOWABLE COMPOSITES**

- i. **Preventive Resin Restorations (for minimally invasive occlusal Class I):** Help to restore what have been termed, “Preventative Resin Restorations” (PRR’s) because these are the most

minimal of the Class I types and the needle tip placement into these small preparations assures a well-adapted restoration. Nonetheless, angled incremental deposition is important in order to minimize the contraction force from the setting composite [6].

- ii. **Pit and Fissure Sealants:** The flowables are the first choice of materials for pit and fissure sealants . Effective placement and long-term retention of these materials proper cleaning of pits and fissures, appropriate acid etching of surfaces and maintaining a dry field uncontaminated by saliva until the sealant is placed and cured is mandatory.
- iii. **Cavity Liners-**The flowable composites as cavity liners are latest in dentistry. However, a major concern is postoperative sensitivity [7].
- iv. **Minimally invasive Class II restorations and inner layer for Class II posterior composite resin placement in sealing the gingival margin to avoid deficiencies:** Flowable composites are the
- v. **Ideal option for facial approach Class II cavity preparations [8].** Another use for flowable composites is in conjunction with placement of viscous packable composites[9].
- vi. **Class V Abfraction lesions-** Using a flowable composite resin with a lower biaxial flexural strength than traditional hybrid composites was assumed to improve the clinical success of these restorations[10]. Many studies have concluded that the use of flowable composites for non-carious Class V lesions is a good choice [11].

#### **OTHER APPLICATIONS OF FLOWABLE COMPOSITES INCLUDE**

- i. Repairing temporary restorations and adding to margins of temporaries fabricated using bis-acryl composite resins..
- ii. Repair of small porcelain fractures in non-stress-bearing areas.
- iii. Emergency reattachment of fractured anterior tooth segment[12] .
- iv. Bonding of orthodontic brackets and lingual orthodontics retainers
- v. Opaquing metal substrates for example, porcelain fused to metal (PFM) repairs[13].
- vii. Repair of ditched amalgam margins [14].
- viii. Repair of crown margins and composite restoration margins[15] .
- ix. To block out small undercuts in indirect cavity preparations[16] .

x. Minimally invasive Class III restoration[17] .

xi. Luting porcelain and composite resin veneers .

xii. According to Helvey et al., flowable composites when used as luting agents form an acid base resistant zone (ABRZ) in dentine also termed as super dentine, which helps in preventing secondary caries .

xiii. As a protective base in non-vital dental bleaching[18] .

xiv. Bonding of fibre posts in the restoration of endodontically treated teeth[19] .

Ideal Property	Clinical Significance	Clinical Indications
Flow ability	for easy manipulation and adaptability to cavity	<ul style="list-style-type: none"> <li>♦ Minimal occlusal class I cavities</li> <li>♦ Preventive Resin Restorations</li> <li>♦ Pit &amp; Fissure sealants</li> <li>♦ Minimally invasive Class II proximal boxes</li> <li>♦ Cavity Liners</li> <li>♦ Minimally invasive class III restorations</li> <li>♦ Class V abfraction lesions</li> <li>♦ Bonding of orthodontic brackets/ lingual orthodontics retainers</li> <li>♦ Splinting fractured and mobile teeth</li> <li>♦ Emergency reattachment of fractured anterior tooth segment</li> <li>♦ Repairing temporary restorations</li> <li>♦ Denture repairs</li> <li>♦ Repair of ditched amalgam margins</li> <li>♦ Repair of crown/composite restoration margins</li> <li>♦ To block out small undercuts in indirect cavity preparations</li> <li>♦ Repair of small porcelain fractures in non-stress-bearing areas</li> <li>♦ Luting porcelain/composite resin veneers</li> <li>♦ As a protective base in non-vital dental bleaching</li> <li>♦ Bonding of fibre posts in the restoration of endodontically treated teeth</li> </ul>
Increased strength	for better wear resistance and fracture toughness	
Low shrinkage	for reduced microleakage and better marginal adaptation	
Radiopacity	to differentiate between the material and secondary caries	
Shades corresponding to conventional composites	colour adaptative qualities when used in combination with conventional composites	
Polishability and long-lasting shine	for better aesthetics	
Colour stability	for better aesthetics	
Bio-compatibility	less toxic to the pulp and surrounding soft tissues	

Table-1[20]

## **CONCLUSION**

The sole objective of this paper was to exclusively review the most salient features of flowable composite materials and to give dentists a detailed insight to the advantages, drawbacks, indications and contraindications based on composition and physical/mechanical properties. Dentists are able to correlate this knowledge during case selection, manipulation and placement for better longevity of restorations. They surely do claim to be a promising material for the future[21].

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