

Comparison of Hardness between Injectable GC Composite and Tetric Flow Composite

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ABSTRACT

Introduction: Dental composite resins are dental cements made of synthetic resins. Synthetic resins evolved as restorative materials since they were insoluble, of good tooth-like appearance, insensitive to dehydration, easy to manipulate and inexpensive. Dental composites play a pivotal role in modern dentistry, offering versatile restorative materials for various clinical applications.

Materials and Methods: Sample preparation of High strength Injectable composite (A) and bulk fill Flowable composite (B). Thermocycler machine and Micro Vickers Hardness tester (SHIMADZU) used to find the hardness.

Results and Discussion: Flowable bulk-fill composites (Tetric EvoFlow Bulk Fill) and high-strength injectable composite (G-aenial Universal Injectable) show similar results in terms of hardness, which is statistically higher when compared with both traditional flowable composites (Filtek Supreme XTE Flowable Restorative and G-aenial Flo X) hardness. The same results were also reported by a previously done study by Luca Pezzato et al (2022). Injectable GC Composite: Injectable GC composites are typically made by GC Corporation. They often contain a combination of glass fillers and resin matrix.

Conclusion: The hardness comparison between injectable GC composite and Tetric Flow composite would typically depend on various factors, including the specific formulations of these materials, curing techniques, and testing methods.

Key words: Dental cements, Injectable GC composites, Tetric Flow composite.

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INTRODUCTION

Dental composite resins are dental cements made of synthetic resins. Synthetic resins evolved as restorative materials since they were insoluble, of good tooth-like appearance, insensitive to dehydration, easy to manipulate and inexpensive. Dental composites play a pivotal role in modern dentistry, offering versatile restorative materials for various clinical applications [1]. Among these composites, Injectable GC Composite and Tetric Flow Composite are widely used, each possessing unique characteristics that make them suitable for specific clinical scenarios. This comparison aims to evaluate and contrast

the hardness properties of these two dental composites, shedding light on their suitability for different restorative procedures [2].

MATERIALS AND METHODS

Injectable GC Composite, developed by GC Corporation, is a flowable composite material designed to provide excellent adaptability and ease of application. It is commonly used for small restorations, cavity lining, fissure sealing, and other minimally invasive dental procedures. The flowable nature of this composite makes it particularly useful in situations where precise adaptation to cavity walls and complex anatomy is required [3]. Tetric Flow Composite, manufactured by Ivoclar Vivadent, is another flowable composite material known for its versatility and esthetic properties. It is often used in a range of restorative procedures, including small to medium-sized cavities, class V restorations, and as a liner for larger restorations.

Tetric Flow offers a balance between flow ability and strength, making it suitable for a broader spectrum of applications [4].

The hardness of a dental composite is a critical property that influences its clinical performance, durability, and resistance to wear and occlusal forces. Various factors, including filler content, resin matrix composition, and curing technique [Figures 1-3]; can affect the hardness of these materials [5].

RESULTS

Micro vicker's hardness test

Samples placed over the Vickers hardness tester

Indenter fall on the sample

(Indenter- diamond)

This comparative study will assess and compare the hardness characteristics of Injectable GC Composite and Tetric Flow Composite using

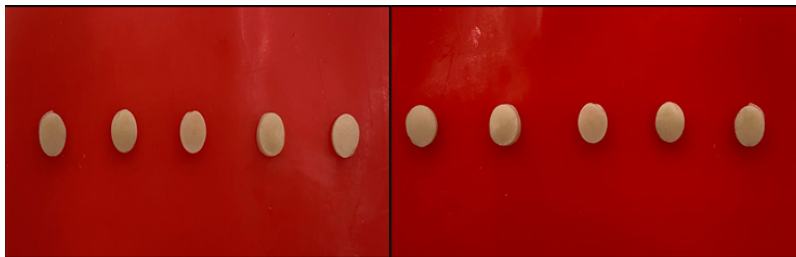


Figure 1: Sample preparation of High strength Injectable composite and bulk fill Flowable composite.

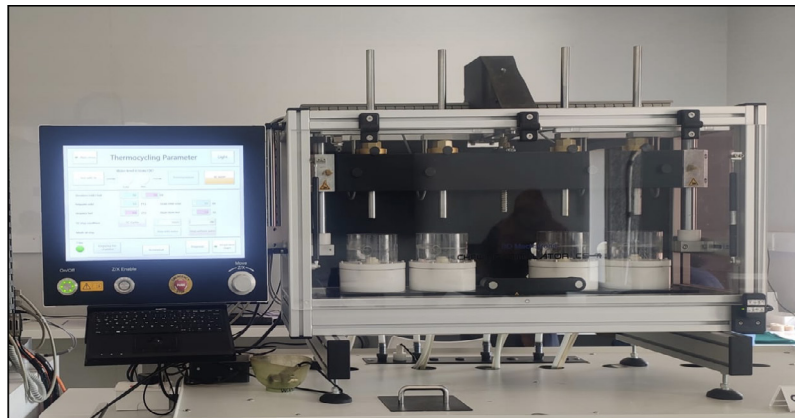


Figure 2: Thermocycler machine.



Figure 3: Micro vicker's Hardness tester (SHIMADZU).

Table 1: Micro vicker's hardness test.

S. No	TETRIC FLOW COMPOSITE	INJECTABLE GC COMPOSITE
1	24.3	16.7
2	21.7	18
3	22.1	24.9
4	29.7	28.9
5	32.1	20.9
Mean average for Tetric flow composite = $24.3+21.7+22.1+29.7+32.1 / 5 = 25.98$		
Mean average for Injectable GC composite = $16.8+18+24.9+28.9+20.9 / 5 = 21.88$		

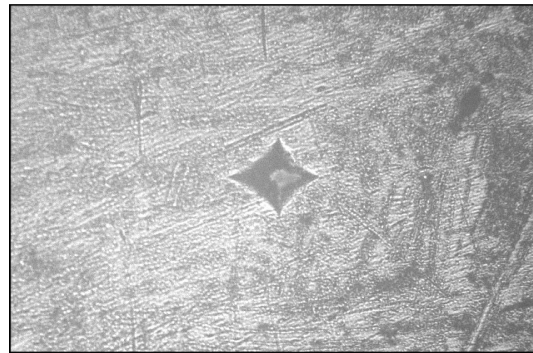


Figure 4: The above figure represents the indentation

Parameter	Materials	Mean SD	p Value
Hardness Kg/mm2	Bulk fill Flowable composite	25.98±3.55	0.010
	High strength Injectable composite	21.88±2.87	

Independent t test, p<0.05 considered as significant, 95% CI

Figure 5: The above figure represents the Mean comparison of Micro hardness value.

standardized testing methods, such as Vickers or Knop hardness testing [Table 1]. The results will provide insights into how these composites perform under load and their resistance to wear and abrasion [6] [figure 4, 5].

DISCUSSION

Flowable bulk-fill composites Tetric EvoFlow Bulk Fill and high-strength injectable composite G-aenial Universal Injectable show similar results in terms of hardness, which is statistically higher when compared with both traditional flowable composites Filtek Supreme XTE Flowable Restorative and G-Aenial Flo X hardness. The same results were also reported by a previously done study [7].

Injectable GC Composite

Injectable GC composites are typically made by GC Corporation. They often contain a combination of glass fillers and resin matrix.

Tetric Flow Composite

Tetric Flow composites are a product of Ivoclar Vivadent and have their own unique composition, which typically includes a combination of fillers, resins, and other proprietary components [8].

To compare the hardness of these composites, tests like Vickers hardness or Knop hardness can be conducted. These tests measure the material's resistance to indentation. The choice between the two composites often depends on their intended clinical application. Injectable GC composite is suitable for various restorations, while Tetric Flow is often used for minimally invasive restorations and smaller cavities due to its flowable nature [9]. Injectable GC composite is more viscous and may require some sculpting, whereas Tetric Flow composite is flowable and can adapt well to cavity shapes. Both composites can offer good esthetic results, but the choice may depend on factors like shade matching and

blending with natural teeth. Curing processes may vary between these composites, affecting hardness [10]. The curing time and method should be considered when comparing their hardness properties. Dentists often rely on their clinical experience and preference when choosing between these materials, considering factors like ease of use and long-term performance [11]. Research studies and clinical trials may provide valuable data on the hardness and performance of these composites in different clinical scenarios.

In summary, the comparison of hardness between injectable GC composite and Tetric Flow composite is a multifaceted consideration that involves material composition, clinical application, handling, esthetics, curing, and clinical experience. Dentists typically evaluate these factors to make informed decisions on which composite to use for specific cases [12].

FUTURE SCOPE

More studies have to be done to compare the strength of bulk fill composite and injectable Composites.

CONCLUSION

The hardness comparison between injectable GC composite and Tetric Flow composite would typically depend on various factors, including the specific formulations of these materials, curing techniques, and testing methods. The present study concludes that the bulk fill flowable composite has higher hardness as compared to High strength Injectable composite.

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