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Original Research

Comparison of Microhardness of Giomer and Compomer Restorative Material- An Invitrostudy

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ABSTRACT:

Background: Composite resins make it possible to construct a restoration without the assistance of a dental laboratory by providing a conservative preparation of the tooth structure and aesthetic outcomes.The present study was conducted to compare the microhardness of Giomerand Compomer restorative material. **Materials & Methods:** This present invitro study comprised of two restorative materials. Group I had Giomer(Beautifil)and group II had compomer (Dyract®).Giomer and compomer were evaluated for microhardness in accordance with ASTM criteria. Using a universal testing machine, microhardness was assessed using Vicker's microhardness test. **Results:** The mean microhardness of Giomer was 56.8 MPI and of compomer was 41.4 MPI. The difference was significant (P< 0.05). **Conclusion:** Authors found that Giomer had highest microhardness as compared to compomer.

Key words: Giomer, Microhardness, Compomer

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INTRODUCTION

When comparing restorative materials, the hardness attribute is crucial. Composite resins make it possible to construct a restoration without the assistance of a dental laboratory by providing a conservative preparation of the tooth structure and aesthetic outcomes. Additional benefits include their inexpensive cost, ability to be repaired intraorally and/or replaced by ceramic or composite indirect restorations, strong marginal integrity, and wear resistance near the natural tooth structure.[1]Giomer is a relatively new, cutting-edge resin composite filler technology used as an aesthetically pleasing direct restorative material for the repair of anterior and posterior teeth. The chemical composition includes an organic-resin matrix and inorganic filler particles, much like a conventional methacrylate-based composite.[2]

The easiest way to characterize compomers is as composites that have some glass ionomer components added to them.[3] In general, their physical characteristics are better than those of composites but worse than those of conventional glass ionomers and glass ionomers treated with resin. Class V restorations are the primary application for them. Fluoride can be released by consumers, however this release is not continuous.[4] The most popular direct restorative materials that satisfy the needs of longevity, high aesthetic appeal, and tooth structure preservation are composite resins. Microhybrid composites are regarded as all-purpose, universal composite resins because they offer excellent mechanical qualities and high polishability.[5] The present study was conducted to compare the microhardness of Giomerand Compomer restorative material.

MATERIALS & METHODS

This present invitro study comprised of two restorative materials. The group I had Giomer(Beautifil)and group II had compomer (Dyract®).

Giomer and compomer were evaluated for microhardness in accordance with ASTM criteria. A stainless steelmold with cylindrical holes of 3 mm in height and 6 mm in diameter was used to create the samples (30) for microhardness testing. The compomer and Giomer were both single-component pastes that were firmly packed into the mold's

cylindrical perforations. After that, the samples were kept in distilled water for 23 hours at 37 degrees Celsius in an incubator (NSW, Mumbai). Using a universal testing machine, microhardness was assessed using Vicker's microhardness test.Results were subjected to statistics. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of materials

Groups	Group I	Group II
Materials	Giomer	Compomer
Number	15	15

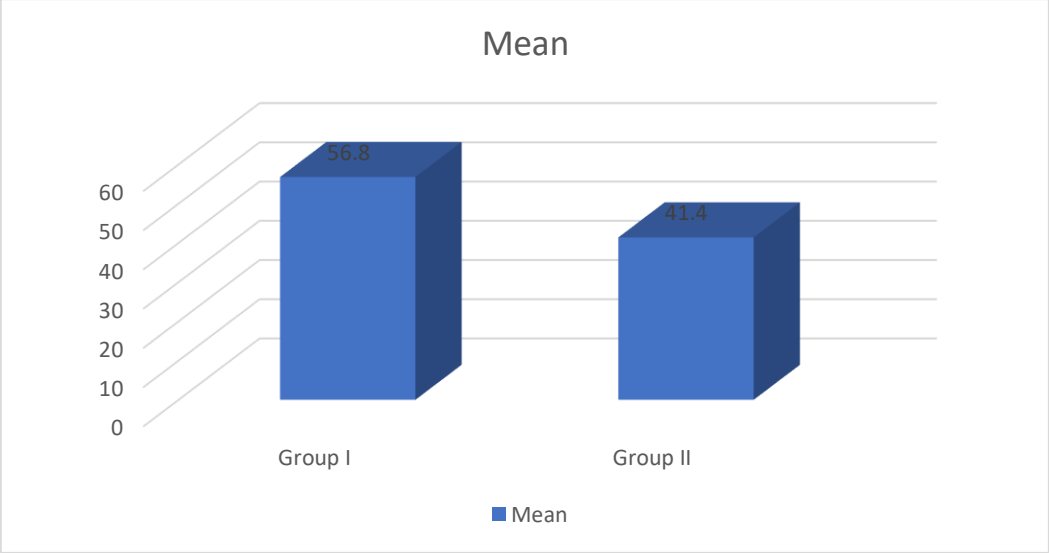
Table I shows that group I had giomer and group II had compomer as restorative material.

Table II Assessment of microhardness in both groups

Groups	Mean	P value
Group I	56.8	0.01
Group II	41.4	

Table II, graph I shows that mean microhardness of Giomer was 56.8 MPI and of compomer was 41.4 MPI. The difference was significant (P< 0.05).

Graph IMicrohardness in both groups



DISCUSSION

Glass ionomers provide a number of benefits, including the capacity to adhere to dental hard tissues, the release of fluoride, and a thermal expansion coefficient that is comparable to that of tooth structure. In order to address the shortcomings of traditional GIC, Resin Modified Glass Ionomer Cements (RMGIC) were developed in the 1990s. They have a longer working period, better translucency, a quicker set time, and the ability to achieve early strength.[6] The Giomer uses inorganic fillers made by the whole or partial reaction of ion-leachable fluoroboroaluminosilicate glasses with polyalkenoic acids in water before being interfaced with the organic matrix, as opposed to using only glass or quartz as the usual fillers.This produced a stable glass-ionomer phase on a glass core that grew into a pre-reacted glass ionomer (PRG) filler by inducing an acid-base reaction between acid reactive fluoride-containing glass and polycarboxylic acid in the presence of water.[7] The pre-reaction can affect nearly the whole particle, known as full reaction type PRG (F-PRG), or just the surface of the glass particles, known as surface reaction type PRG (S-PRG). Beautifiluses S-PRG (surface reaction type), in which polyacrylic acid attacks the glass filler's surface exclusively, leaving a glass core intact.Heating direct composites before to application may enhance their marginal fit.[8] Adhesion to enamel is great and to dentine is getting better with contemporary composites and proper technique. The hue and translucency of genuine teeth can be closely replicated thanks to the optical characteristics. Glass ionomers are another class of direct restorative materials that are known to provide strong protection against the formation of new carious lesions by releasing fluoride. The glass-ionomers stop the marginal micro-leakage of fluids and microbes toward the repaired surface by chemically adhering to the tooth structure. Nevertheless, the glass-ionomers have extremely little mechanical resistance.[9,10]The present study was

conducted to compare the microhardness of Giomerand Compomer restorative material.

In present study, group I had Giomer and group II had compomer as restorative material. Vijayan et al[11] evaluated microhardness of a relatively new material Giomer as compared to other commonly used resin based restoratives; Compomer, Hybrid Composite and Resin modified glass ionomer(RMGIC).Ten sample discs were made from each of the four restorative materials using stainless steel moulds.The surface microhardness of the Giomer, Compomer, Hybrid Composite and RMGIC were measured on each side using a Vicker's microhardness tester at a magnification 500X. A 100gload with a holding time of 15 seconds was used for all the samples. The size of the indentations was used to measure the microhardness of the test materials.The microhardness of all the four materials differed significantly from each other ($p<0.001$). The highest value was given by Giomer which was significantly harder than Hybrid Composite which in turn was significantly harder when compared to RMGIC. The Compomer showed the lowest value among the four test materials.The order of hardness from highest to lowest is as follows:Giomer> Composite> RMGIC> Compomer.

We found that mean microhardness of giomer was 54.2 MPI and of compomer was 40.5 MPI. Attin T et al[12]evaluated the physical properties of four resin-modified glass-ionomer cements (Fuji II LC, Ionosit Fil, Vitremer, Photac-Fil) and two polyacid-modified resin composite materials (Dyract and Variglass VLC)). They were compared with a hybrid resin composite (blend-a-lux) and a chemically cured glass-ionomer cement (ChemFil Superior). The compressive strength, flexural strength, modulus of elasticity, and surface microhardness of the resin-modified glass-ionomer materials and the polyacid-modified resin-composite materials were inferior to those of the hybrid resin composite and similar to those of the conventional glass-ionomer cement. The hybrid resin composite exhibited the lowest resistance to wear caused by brushing. Some of the materials showed a marked decrease in hardness at depths exceeding 2.0 mm. Generally, the strength properties of the tested resin-modified glass-ionomer materials and the polyacid-modified resin composite materials were inferior to those of the hybrid resin composite.

Ulvestad[13]suggested thatone of the methods of evaluating a material's resistance to attrition is to apply a hardness test.The value of hardness often referred to as hardness number depends on the method used for its evaluation. Common methods used for hardness evaluation include Vickers, Knoop and Brinell. The Vickers test is suitable for determining the hardness of quite brittle materials.

The limitation of the study is small sample size.

CONCLUSION

Authors found that Giomer had highest microhardness as compared to compomer.

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