



Comparative Evaluation of the Fluoride-Releasing Ability of Normal Compomer V/S Color Tinted Compomer V/S Resin Modified GIC

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ABSTRACT

Fluoride is an important and powerful compound that helps reduce tooth decay. The term compomer was made by the producers of the first commercial material of this kind like, polyacid-modified composite resin. This term recalls composite resins and glass-ionomer cement. Some features of composite resin and some features of glass-ionomer are found in the compomer. Nowadays new

compomer are available, which have properties of color changing that we can use in pediatric dentistry. The study aims to check and compare the fluoride-releasing ability of Normal compomer Vs Color tinted compomer Vs Resin modified GIC at the end of 7, 14 and 21 days. The materials selected for the study were Resin modified GIC, Normal Compomer, Color tinted Compomer, deionized water, Teflon molds and test

tubes. Five specimens of each material were manipulated according to the manufacturer's instructions and placed into Teflon molds. All three materials were cured with an LED light cure unit for 30 seconds. Then place these cured specimens into separate test tubes containing deionized water and fluoride estimation was done after 7, 14 and 21 days under an ICPA test. GIC released the highest amount of fluoride compared to compomers. Hence it proved that conventional material has a better ability to release fluoride than newer material.

Keywords

GIC, Compomer, Colour changing, Fluoride releasing, Prevention.

INTRODUCTION

Fluoride is a crucial element in Pediatric Dentistry, playing a pivotal role in preventing dental caries and promoting oral health in children. Scientific evidence consistently supports the use of fluoride in various forms, such as toothpaste, mouthwash, and professional applications, to strengthen tooth enamel and inhibit the progression of cavities in the Pediatric population.¹ Numerous studies emphasize the effectiveness of community water fluoridation in reducing dental caries prevalence, showcasing its widespread impact on oral health.² Additionally, systematic reviews and meta-analyses underscore the significance of fluoride-releasing material applications in reducing early childhood caries among young children.³ Pediatric dentists often recommend age-appropriate fluoride toothpaste, tailored to the child's

developmental stage, to ensure optimal fluoride exposure without the risk of fluorosis.⁴ Furthermore, dental professionals advocate for parental education on proper fluoride use and dietary habits to enhance the preventive effects of fluoride in Pediatric dental care.⁵ In summary, fluoride stands as a cornerstone in Pediatric Dentistry, supported by a wealth of scientific literature affirming its efficacy in preventing dental caries and promoting oral health in children. Traditionally Glass Ionomer Cement was used for restoration in Pediatric patients but nowadays Compomer is used for restoration as it is easy to use and also has the potential to release fluoride ions.

MATERIALS & METHODOLOGY

The materials selected for the study were normal compomer, color-tinted compomer and resin-modified GIC. Total five specimens of each material were manipulated according to the manufacturer's instructions.

Then prepared specimens were filled in plastic molds (Figure 1) of standardized dimensions (3mm x 1.5mm). Each filled mold was placed on the bottom of a standard test tube (Figure 2) which was filled with 15ml of de-ionized water at 37°C. The stored water was collected for calcium analysis (Figure 3) and replaced at 7, 14, 21, 28 days respectively.

After each interval 5ml of sample from each specimen was carried out for ion analysis and quantification by Atomic Absorption Spectrophotometer was done to get the values in the designated part per million (ppm) units.

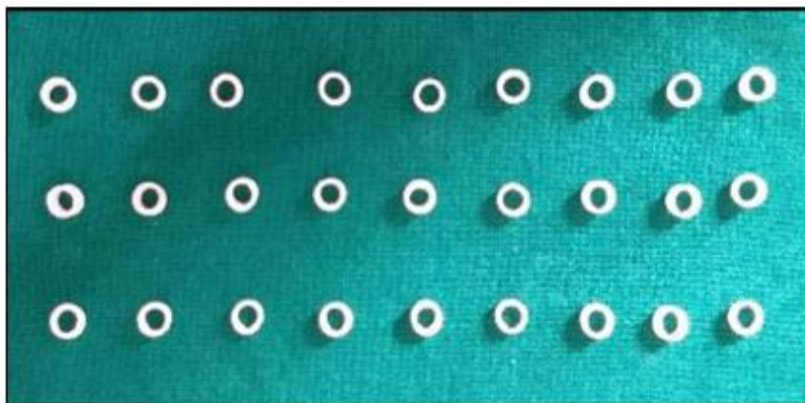


Figure 1: Plastic Molds



Figure 2: Specimen stored in de-ionized water



Figure 3: Ion Analysis

RESULT

The data was collected and analyzed using IBM SPSS software version 20. The Shapiro-Wilk test was used to determine the normality of the data. ONE WAY ANOVA test was used to compare calcium ions between 3 groups on various days.

On Average after 7 days, GIC discharged 39 ppm, Normal Compomer 9.22 ppm, Color tinted Compomer 9.3 ppm ions. At the end of 14 days, GIC (36.48 ppm) released comparatively less than ions released at the end of 7 days whereas Normal Compomer (9.52 ppm)

and Color tinted Compomer (9.44 ppm) on the contrary released more ions as compared to day 7. After 21 days, GIC released less ions (20.32 ppm) compared to 7 and 14 days, Normal Compomer (9.36 ppm) and Color tinted Compomer (9.24 ppm) released more number of ions compared to 7 and 14 days. At last, after 28 days, lesser number of ions were released

by GIC (26.36 ppm), Normal Compomer (8.82 ppm) and Color tinted Compomer (9.06 ppm). Based on this study, GIC is a better option for the choice of restorative material in Pediatric Dentistry. Statistical analysis was done and significant difference was found in inter-group comparison.

Anova: Single Factor			
Group	Count	Average	Variance
RM GIC	5	31.053333	26.006933
Nor. COMP	5	9.233333	0.134533
Col. COMP	5	9.2466666	0.036133
ANOVA			
	SS	P-value	F Crit
Between group	951.643288	0.000141801	
Within group	52.3552		
Total	1003.998489		

DISCUSSION

Many studies have been conducted on the release of fluoride from dental materials. Different methods and experimental protocols make it impossible to compare the results of different experiments. In this study, three materials were compared. All materials evaluated in our experiments release fluoride but the ranking by fluoride release varies with time. This means that the pattern and rate of fluoride release are not similar between different fluoride-releasing materials.

Karantakis *et al* in 2000 did a similar study and they found that fluoride release from the materials is directly proportional to the pH of the storage medium

also they found that traditional GIC releases more fluoride ions than resin-modified GIC. In the present study, pH of de-ionized water is neutral.⁶

Asmussen *et al* in 2002 did a study on fluoride release from traditional GIC and compomer for a long period and found that the traditional GIC released more fluoride for a short period compared to the compomer which is almost same as present study.⁷

Vermeersch *et al* in 2001 did a study on comparison of traditional GIC, compomers and resin composites and found that the sequence of fluoride release was traditional GIC > compomer > resin composites.⁸

Gao *et al* in 2001 did a study on the ratio of fluoride

release and fluoride uptake of conventional GIC, resin-modified GIC and compomer. They found that conventional GIC releases more fluoride ions followed by resin-modified GIC and compomer.⁹

CONCLUSION

Based on the research performed and results obtained, it was found that the Resin-modified GIC releases the highest amount of fluoride ions followed by Colour tinted compomer and Normal compomer. Resin-modified GIC performs better in terms of ion release compared to Normal and Color tinted Compomer. In conclusion, the study demonstrates that Resin-modified GIC exhibits the highest fluoride-releasing capacity, followed by Color tinted compomer and Normal compomer, suggesting Resin-modified GIC as the preferable choice for restorative material in Pediatric Dentistry.

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