



## Effect of fluoride varnish application on compomer restorations in primary teeth



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### Abstract:

**Objective:** The aim of this study was to evaluate the effect of topical fluoride varnish application on the conventional and colored compomer regarding surface roughness.

**Methods:** Class V cavities were prepared on the buccal surface of one hundred and twenty lower second primary molars. Teeth were divided into two main groups: group I (conventional compomer), Group II (colored compomer). Each main group was subdivided into two subgroups: control subgroup, application of distilled water, and test subgroup, application of fluoride varnish. Surface roughness was studied using 3D surface measurement using light sectioning vision system. Data was collected and statistically analyzed by SPSS software version 23.0.

**Results:** Surface roughness of conventional compomer was statistically significantly increased after application of fluoride varnish on their surface ( $p < 0.001$ ). Surface roughness of colored compomer was statistically significantly increased after application of fluoride varnish  $p = 0.005$ . There was no statistically significant difference between the surface roughness of colored and conventional compomer ( $p = 0.4$ ).

**Conclusion:** Both conventional and colored compomer restorations adversely affected with the application of fluoride varnish as its application caused increase in the surface roughness.

### Introduction

The restorative material available for primary teeth range from traditional amalgam to composites depends on clinical situations. Resin composite and compomers became popular for restoration of primary teeth because their low thermal conductivity and preservation of dental structure in cavity preparation and high esthetic properties<sup>1</sup>.

The major cause of failure of dental restoration is secondary caries. The use of fluoride agent is a common standard care for children to protect against future caries<sup>2</sup>. Fluoride releasing restorative materials are often combined with topical fluoride application in order to enhance fluoride effects<sup>3-5</sup>.

Fluoride varnish is preferred due to its ease of manipulation, safety and simplicity of application procedural steps, less treatment time, the exposure time between fluoride and tooth structure increase due to its adhesion to the tooth surface<sup>6</sup>. Fluoride may affect the restoration surface greatly. This depends on the pH and the composition of fluoride agent<sup>7</sup>.

The effect of topical application of neutral sodium fluoride gel and APF gel was assessed on conventional and colored compomer. The result showed that compomers showed significantly higher surface roughness when subjected to APF gel application<sup>8</sup>.

**Aim of study:** evaluate the effect if topical fluoride varnish on conventional and colored compomer regarding the surface roughness.

### Materials and methods

Class V cavities were prepared on buccal surface of one hundred and twenty extracted primary molars. Teeth were randomly divided into two equal main groups ( $n = 60$ ) according to the type of restorative material used, group I conventional compomer (Glassiosite, Voco, Cuxhaven,

Germany) and group II colored compomer (Twinky star, Voco, Cuxhaven, Germany).

Each main group (I, II) was further divided into two subgroups control subgroup ( $n = 30$ ) in which distilled water was applied and test subgroup ( $n = 30$ ) in which fluoride varnish (fluoro protector, Ivoclar, Vivadent) was applied by micro applicator brushes for four hours then teeth were rinsed with distilled water.

Specimens were photographed using USB Digital microscope with a built-in camera. Digital microscope images were cropped to 350 x 400 pixels using Microsoft office picture manager to specify/standardize area of roughness measurement. The cropped images were analyzed using WSxM software. All limits, sizes, frames and measured parameters were expressed in pixels. Therefore, system calibration was done to convert the pixels into absolute real world units. Calibration was made by comparing an object of known size (a ruler in this study) with a scale generated by the software.

A 3D image of the surface profile of the specimens was created. Five 3D images were collected for each specimen, in the central area and in the sides at area of  $10\text{-}\mu\text{m} \times 10\text{-}\mu\text{m}$  WSxM software was used to calculate average of heights (Ra) expressed in  $\mu\text{m}$ , which can be assumed as a reliable indices of surface roughness.

Data was collected, tabulated and then analyzed using SPSS (Statistical package for social science) version 23.0 to obtain Descriptive data. Student t-test was used to compare between different subgroups. P value  $< 0.05$  was considered statistically significant.

**Result: (table 1) Group I (conventional compomer):** mean value of surface roughness in control subgroup was less than that of test subgroup. There was high statistical significant

difference between control subgroup and test subgroup ( $p < 0.001^*$ ), **Group II (colored compomer)**: The mean value of surface roughness in control subgroup was less than that of test sub group. There was high statistical significant difference between distilled water subgroup and fluoride varnish subgroup ( $p = 0.005^*$ ).

**Table (1): Comparison of the surface roughness between studied groups**

		Restorative material				P1
		Conventional compomer		Colored compomer		
		Mean	±SD	Mean	±SD	
Ra(surface roughness)	Distilled water	.254	.002	.254	.002	0.4
	Flouride vanish	.258	.001	.258	.003	0.7
P2		<0.001*		0.005*		

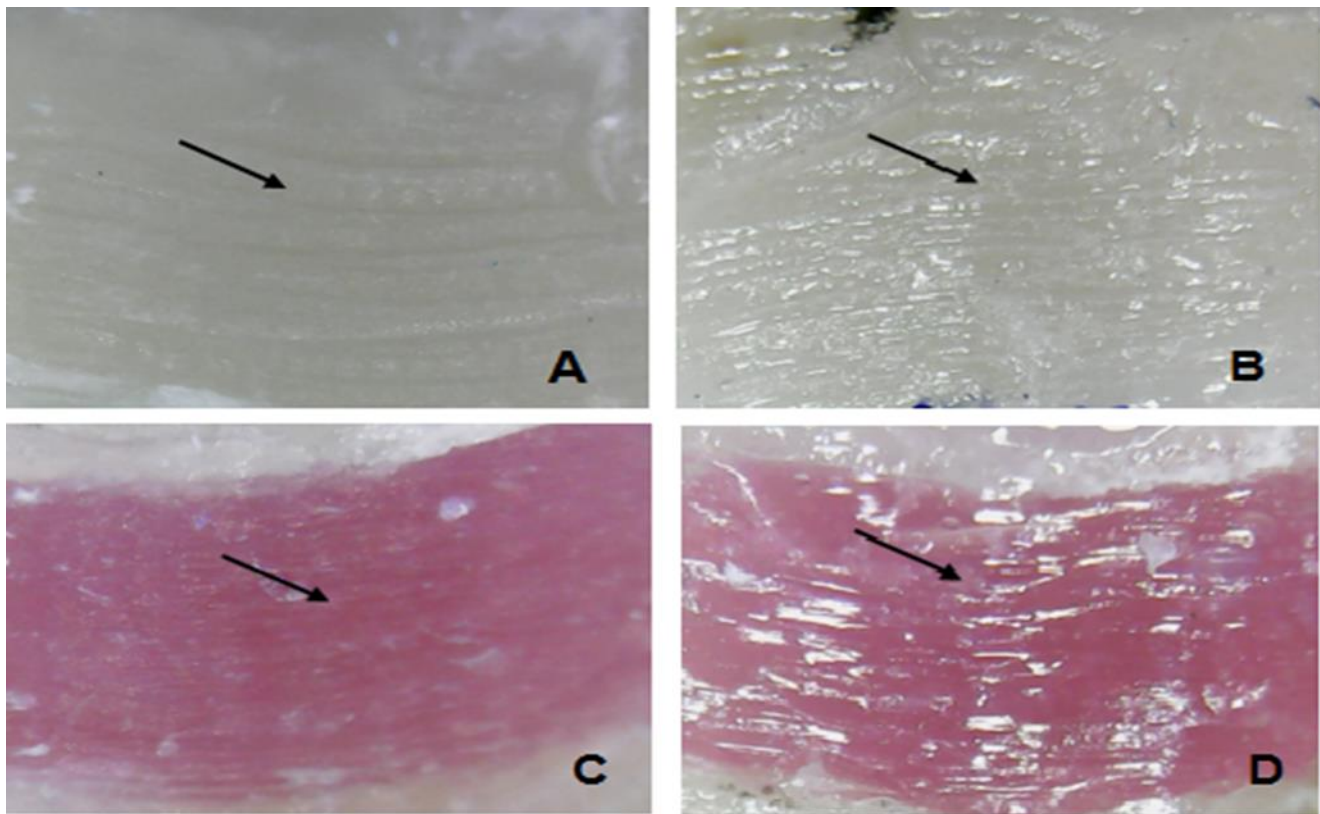


Figure (1): Surface roughness in conventional and colored compomer groups. Distilled water sub groups show little irregularities (A, C), Fluoride varnish subgroups show increase in surface irregularities (B, D)

**Discussion:**

Prevention of dental caries is an important factor rather than treatment of carious lesion. Various esthetic restorative materials are available in pediatric dentistry. Fluorides are powerful method of dental caries prevention.

Conventional compomers restorations were selected due to their esthetic appearance, fluoride release and short chair

side time. Colored compomer restorations were used as it has a positive emotional effect on the children. This lead to reduce stress and fear. Distilled water was used as control

group because it is inert which makes it ideal control component for science researches. Fluoride varnish was used as test group due to its ease of **manipulation, safe, simple** in application and its adhesion to tooth surface<sup>9-12</sup>.

Class V cavity was selected to be prepared it has enamel margin and cemental margin which considered a challenge during etching and bonding process. In addition, it was difficult to obtain intact occlusal surfaces for 120 lower second primary molars to standardize the size of cavity to obtain valid result. As the occlusal surfaces, especially the pits and fissures of posterior teeth have been related to their high caries susceptibility<sup>13</sup>

Surface roughness was measured by 3D surface roughness measurement using a light sectioning vision system because it is standard method, which measures surface roughness in three dimensions by combining a light sectioning microscope and a computer vision system. This approach has the advantages of being non-contact, fast and cheap<sup>14</sup>.

Regarding the result in this study, Surface roughness of both conventional and colored compomer was statistically significantly increased after topical application of fluoride varnish. This came in agreement with Avsar and Tuloglu<sup>8</sup>, Cehreli et al<sup>15</sup>, Salama et al<sup>17</sup>, and Setty et al<sup>18</sup>

Their explanation was that the pH of fluoride applied and its ability to form a complex structure with the metal ions of the restorative material. In addition, fluoride ions caused depolymerization of the resin matrix filler interface, breaking the chemical bond inside the compomer allowing water penetration and degradation of the resin matrix.

Controversy, Botta et al<sup>19</sup> result showed that the surface roughness of both RMGIC and composite resin were decreased after APF application. This may be due to different material and different type of fluoride applied. Ozdemir et al<sup>20</sup> found that single application for APF gel and NaF did not affect the surface roughness of compomer. This difference may be due to different period of application of fluoride agent.

Conclusion: Both conventional and colored compomer restorations were adversely affected with the application of fluoride varnish as its application caused increase in the surface roughness.

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