



## CLINICAL ASSESSMENT OF SOME PHYSICAL AND MECHANICAL PROPERTIES OF DIFFERENT RESTORATIVE MATERIALS IN PRIMARY MOLARS

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### ABSTRACT

**Purpose** the present study directed to clinically assessment of bulk Fill composite, multicolored compomer and bioactive restorative Materia in primary molars. **Methods:** The study sample was divided equally into three groups group I comprises 20 primary molars received multicolored compomer, group II comprises 20 primary molars received bulk fill composite, group III comprises 20 primary molars received bioactive materials. The clinical evaluation of all restorations was carried out at baseline before preparation and directly after restoration, after 3 and 6 months. **Results:** comparing three groups there were About surface glass, Surface & Marginal Staining there were significance difference between groups at 6 mons. ( $P < 0.05$ ). Also, about Color match stability & translucency there were highly significance difference between groups ( $P < 0.000$ ). As regard there were non-significance difference between different groups at periods ( $P > 0.05$ ) in previous item of aesthetic properties. There was significance difference between groups in Postoperative sensitivity & tooth vitality ( $P < 0.05$ ) at baseline. As regard there were significance in periods in group3 about Tooth cracks & fractures between different groups at 6mns. **Conclusions:** Better surface gloss, color match and stability better for bulk fill and multicolored compomer. Major drawbacks of gingival margin of posterior class II multicolored compomer is recurrence of caries than bulk fill and bioactive material. The advent of bulk fill composites, would seem to be a significant turning point in posterior direct restorative dentistry.

### INTRODUCTION

Dental caries is a multifactorial chronic infectious disease that affects approximately 50% of children less than 12 years old worldwide. Untreated dental caries is associated with pain, difficulty eating, poor physical growth and development, difficulty sleeping, mood changes, learning problems, hospitalization, and in rare cases, death<sup>(1)</sup>.

Colored compomers have been available for use in the restoration of primary molars. In contrast to conventional polyacid-modified resin composites, they contain a small amount of glitter particles

which produce a color effect in shades of red, blue or gold. The filler content is similar to conventional compomers. Twinky Star is a light-cured, colored, radiopaque and fluoride releasing compomer filling system made specifically to be used in primary teeth<sup>(2)</sup>.

Conventional RBC's have typically been placed in layers not exceeding 2mm thick, the advent of newer high intensity lights, and the recent introduction by manufacturers of modified resin systems which claim bulk cure up to 4 mm may offer advantages to dentists in terms of simplicity and speed of Class II RBC placement. It is important

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however with these new bulk fill systems, that the physical properties, marginal adaptation and degree of conversion of the RBC restoration are not negatively affected<sup>(3)</sup>.

Bioactive Materials are moisture friendly, transport water, and release and recharge essential minerals such as calcium, phosphate, and fluoride. Bioactive Materials are dynamic, not passive, and in the presence of saliva they elicit a biological response that forms a layer of apatite and a natural bond between the material and the tooth<sup>(4)</sup>.

## MATERIALS AND METHODS

In this study 225 children were examined and 40 were included. The age of children was ranged from 4 to 8 years. The study sample was divided equally into three groups :- group I comprises 20 primary molars received multicolored compomer, group II comprises 20 primary molars received bulk fill composite, group III comprises 20 primary molars received bioactive materials.

### Restoration techniques

At the initial visit a complete health history questionnaire and parental consent form were completed. Hard and soft tissues were examined. Make radiographic preapical x-ray for evaluation.<sup>(5)</sup> According to ADA instructions<sup>(6)</sup> Take photographic image<sup>(7)</sup> Rubber dam isolation and suction were used for moisture control. Carious dentin removal was evaluated according to clinical criteria of Kidd et al (dental explorer should not stick in the dentine, it should not give a tug-back sensation and the cavity must be stain-free)<sup>(8)</sup> Cavo- surface angles were not beveled, and no retentive grooves were placed. The cavity was prepared with minimal invasive technique Class II resin composite restorations not extend beyond the proximal line angles<sup>(9)</sup>. A wedge and universal matrix system was placed interproximal<sup>(10)</sup>. Restorative materials were applied according to the manufacturer's directions. Following removal of the matrix band, diamond

finishing burs, yellow rubber cups and aluminum oxide discs were used for finishing and polishing of the restorations. Post-operative imaging as in figure no(1) and preapical x ray. The restorations were assessed according to the FDI criteria.<sup>(11)</sup> Repair of the restorations is recommended according to the FDI criteria, the repaired restorations were also evaluated as a subgroup 4 (codes 41, 42, 43 and 44 represent the respective codes of 1, 2, 3 and 4 after the restoration has been repaired).



FIG (1)

## RESULTS

Group I the mean Surface gloss, marginal staining, color matched stability & translucency were  $1.0 \pm 0.0$  at baseline,  $1.00 \pm 0.00$  after 3 months and  $1.2 \pm 0.3$  after 6 months. There was non-significance difference between different periods. Group II The mean Surface gloss, marginal staining, color matched stability & translucency were  $1.0 \pm 0.0$  at baseline,  $1.00 \pm 0.00$  after 3 months and  $1.0 \pm 0.0$  after 6 months. There was non-significance difference between different periods in group II. Group III The mean Surface gloss was  $1.0 \pm 0.0$  at baseline,  $1.00 \pm 0.00$  after 3 months and  $1.8 \pm 0.3$  after 6 months. There was none significance difference between different periods but there was significance between baseline & 6mns. in group III. The mean surface & Marginal Staining was  $1.0 \pm 0.0$  at baseline,  $1.0 \pm 0.00$  after 3 months and  $1.0 \pm 0.0$  after 6 months. There was none significance

difference between different periods in group III. The mean color matched stability &translucency was  $2.54 \pm 0.87$  at baseline,  $2.4 \pm 0.2$  after 3 months,  $1.54 \pm 0.55$  after 6 months. There was significance difference between baseline & each of 3mns., 6mns. ( $P < 0.001$ ), periods in group III.

Group I the mean fracture of restorative material & restoration, marginal adaptation, proximal contact point and food impaction were  $1.0 \pm 0.0$  at baseline,  $1.00 \pm 0.00$  after 3 months and  $1.8 \pm 0.7$  after 6 months. There was non-significance difference between different periods in group I. But significance in the mean radiographic examination.

Group II the mean fracture of restorative material & restoration, marginal adaptation, proximal contact point, food impaction and radiographic examination was  $1.0 \pm 0.0$  at baseline,  $1.00 \pm 0.00$  after 3 months and  $1.2 \pm 0.3$  after 6 months. There was non-significance difference between different periods in group II. Group III the mean fracture of restorative material & restoration, marginal adaptation, proximal contact point and food impaction was  $1.2 \pm 0.3$  at baseline,  $1.00 \pm 0.00$  after 3 months and  $2.4 \pm 0.8$  after 6 months. There was non-significance difference between baseline & 3mns and between 3mns. & 6mns. ( $P > 0.05$ ).

<i>Properties</i>		<b>Group I</b>	<b>Group II</b>	<b>Group III</b>
<b>Aesthetic properties</b>	Surface loss/lustre and roughness	Non-significant	Non-significant	Significant after 6 months.
	Surface and Marginal staining	Non-significant	Non-significant	Non-significant
	Colour match/stability and translucency	Non-significant	Non-significant	Significant at base line and 6 months.
<b>Functional properties</b>	Fracture of restorative material and retention	Non-significant	Non-significant	Non-significant
	Marginal adaptation	Non-significant	Non-significant	Non-significant
	Proximal contact point and food impaction	Non-significant	Non-significant	Non-significant
	Radiographic examination	Significant after 6 months	Non-significant	Non-significant
<b>Biological properties</b>	Postoperative sensitivity and tooth vitality	Significant at base line	Non-significant	Non-significant
	Recurrence of initial pathology (secondary caries)	Significant after 6 months.	Non-significant	Non-significant
	tooth cracks and fractures	Non-significant	Non-significant	Non-significant
	Oral and somatic/ psychiatric symptoms	Non-significant	Non-significant	Non-significant

*Table for statistic results for three groups*

**DISCUSSION**

**Aesthetic properties:** in the present study there was no significance difference between different periods in surface gloss measurements in the two groups, group I(multicolored compomer) and group II (bulk fill) and this result was agreement with

Arora, and et al <sup>(12)</sup>, who reported that after evaluation of multicolored compomer for anatomical shape, marginal integrity, marginal discoloration, surface quality, approximal contacts, secondary caries and postoperative sensitivity it was excellent after 12 months. There were significance between baseline & 6mns in group III (bioactive material).

This interpreted as surface gloss might be affected by the type of the composition of the monomer,<sup>(13)</sup> and the degree of conversion of the resin non significance difference between different periods in surface marginal staining in the three groups.

In this study color matched stability & translucency were non-significance difference between different periods in group I and group II. It is come with result of sengul et al<sup>(14)</sup>; reported that no color change was recorded for restorative materials by the end of the 24<sup>th</sup> month for compomer and composite resin and disagreement with Hugar ,and et al<sup>(15)</sup>; reported that examination of the margins showed discoloration with loss of glitter particles there was no incidence of secondary caries. In group III there was significance difference at baseline due to using single shade (A2) for all cases and changes of color after 6mns in group III this may be due to the structure of the analyzed composite resin, the organic matrix prevails, in volumetric ratios, comparatively with the an organic compound, which renders the material more susceptible to the abrasive action of the finishing and polishing systems. An organic compound contains a mixture of non- agglomerated/non-aggregated particles of silicium oxide and zirconium oxide with nanometric size, dispersed among the clusters of particles with micrometric size. Possibly, the nanometric particles from the surface layer had been the first one to be eliminated during finishing and polishing and more reliable for future staining<sup>(16)</sup>.

**Functionl properties:** in radiographic examination there non significance difference between different periods in group II and group III in all periods and significant after 6 min. for group I showed statistically significantly lower mean pathological changes this comes with result for Sengul & F Gurbuz, T reported that<sup>(14)</sup>; According to the radiographic evaluation results, RMGIC was the best and compomer was the worst material .and in another hand for our study Pascon et al<sup>(17)</sup>; it was found that compomer materials (Dyract AP, F2000) showed a better clinical performance in

comparison with a resin composite (Heliomolar) in primary molars at 2 years **Biological properties:** in the present study after 3 months and 6 months; there was no statistically significant difference between effects of the restoration on the periodontium measurements in the three groups as reported in study for El-Kalla, Ibrahim H García-Godoy, Franklin<sup>(18)</sup>; the bonded restorations preserve tooth structure, normal contact area and provide an esthetic restoration, It also provides a unique feature in certain cases in which there was migration of adjacent teeth into the proximal carious cavity. For Recurrence of initial pathology after 3 months and 6 months; there was no statistically significant difference between Effects of the restoration on the periodontium measurements in the three groups .as no marginal staining ,and good marginal integrity, as reported that Marginal staining results from seepage or leakage of oral fluids between the restoration and tooth structure and initial cause for secondary caries<sup>(19)</sup>.

No significant for Postoperative sensitivity & tooth vitality in group II and group III but in group I there is significant between base line and after three month this postoperative sensitivity relieved might be for expansion of restoration and seal gap like what reported in study for Alves dos Santos et al<sup>(20)</sup>;reported better marginal adaptation of compomers than composites, result to the chemical composition, which allows the compomers undergo more hygroscopic expansion than the composites, rather than the wear characteristics of the material.

## CONCLUSIONS

1. Better surface gloss, color match and stability better for bulk fill and multicolored compomer.
2. Major drawbacks of gingival margin of posterior Class II multicolored compomer is recurrence of caries than bulk fill and bioactive material
3. The advent of bulk fill composites, would seem to be a significant turning point in posterior direct restorative dentistry.

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