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RESEARCH ARTICLE

WOULD NANO-ORMOCERES BE THE NEW ESTHETIC FILLING MATERIAL REPLACING CONVENTIONAL RESIN COMPOSITE?

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ABSTRACT

Objective: The increased demand for esthetic restorations contributed for their development to adequately meet the clinical requirements of direct and indirect restorations in anterior and posterior teeth. This study was conducted to assess the influence of commonly used types of drinks in Saudi Arabia, on color stability of nano-ormocer bulk filling material compared to nano-hybrid resin-composite. **Materials and methods:** two types of materials were used Nano-hybrid composite (Filtek Z250) and Nano-Ormocer (VOCO admira fusion x-tra). A total number of 40 cylindrical specimens with dimensions of (4 mm in thickness and 6 mm in diameter) were divided into two equal groups according to the material used. Then each group was subdivided into 4 equal subgroups according to storage media (Arabiana coffee, Nestle classic instant coffee, Pepsi and distilled water as control). For both materials: the initial color was recorded. After three week's storage, the deviation from initial color was recorded. **Results:** The results showed significant color change of nano-ormocer compared to nano-hybrid composite in Pepsi and Arbiana coffee storage media. **Conclusion:** Bulk fill Nano-Ormocer is a serious competitor to conventional Nano-Composite in the battle of esthetics.

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INTRODUCTION

Aesthetic failure is one of the most common reasons for the replacement of restorations. Discoloration of tooth-colored, resin-based materials may be caused by intrinsic or extrinsic factors (Um *et al.,* 1991; Yannikakis *et al.,* 1998). One of the factors that may affect the quality of the restorations is the consumption of certain beverages such as coffee, tea, soft drinks, alcoholic beverages and even fluoridated water. (Gaintantzopoulou *et al.,* 2005) the effect of these beverages on color and microhardness of composite resin materials varies depending on the intrinsic features of the composite, such as their chemical composition (Manhart *et al.,* 2000). Nano hybrid composite was developed with the size of the nanoparticles is approximately 40 micrometers. It has got an outstanding aesthetics, easy to polish and it possesses greater wear resistance, therefore they can be used for both anterior and posterior restorations (Al Kheraif *et al.,* 2013). In order to overcome various limitations and concerns associated with the traditional composites a new packable restorative material was introduced which are called ormocerthat is an acronym for organically modified ceramic technology.

They contain inorganic-organic-copolymer in addition to the inorganic silanated filler particles. Ormocer matrix is a polymer even prior to light curing. It has a capacity to double the conversion of monomer improving the physical properties of the material. Bulk fill composite is designed for the use in restoration of the posterior teeth which allow you to fill the prepared tooth and cure the restoration in fewer layer, the main advantage of its use is to reduce the procedure time without reducing the confidence. Several studies have been composites. The aim of this study was to investigate whether bulk filling nano-ormocercould be considered a better esthetic substitute for nano resin composite concerning the color stability of the restorations.

MATERIALS AND METHODS

Materials

Two types of restorative materials were used:

- The first was Nano-hybrid composite 3M ESPE Filtek™ Z250 XT shade A2

- The second was Nano-Ormocer VOCO admira fusion x-tra Universal shade.

Four types of solutions were used

- Distilled water.
- Instant coffeeNestle classic instant coffee .
- Arabic coffee Instant arbiana coffee
- Carbonated soft drink Pepsi

Developed to assess the effect of consumption of different beverages on the color stability of different types of composites. Color stability showed by nano resin composite was significantly higher compared to microhybrid composite.[5] In 2010 Wedad Y. Awliya et alshowed that ormoceres was more color stable than microhybrid composites but less than nanofilled. (Wedad Y. Awliya *et al.,* 2010)

Methods

Specimen preparation: Plastic mold was prepared from needle plastic caps was cut in sections with the following dimension 4 mm thickness and 6 mm in diameter

Dimensions was checked by a caliper: A total number of 40 specimens is used in the study, Two equal groups of 20 each.

Group I: 3M Filtek Nano-hybrid composite: The specimens were prepared by applying two oblique increments and one horizontal increment.

Group II: VOCO admira fusion x-tra Nano-Ormocer.
The specimens were prepared by applying one bulk

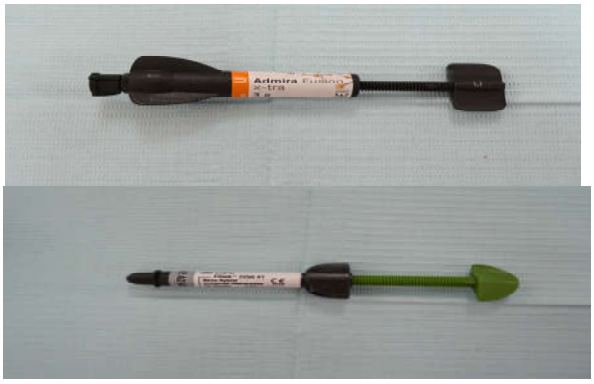


Figure 2. Nano-hybrid composite 3M ESPE Filtek TM Z250 XT shade A2

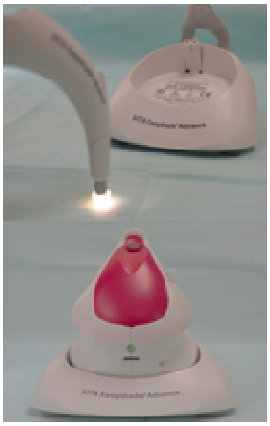
Specimens grouping: Each group was sub divided into 4 equal subgroups of 5 each E_1, E_2, E_3 and E_4 according to the storage medium.

- Shade of the specimens was taken before storage by VITA easy shade advance.

The standard shade for the composite was A2 and for the ormocer was C2. Then all the specimens were stored in the following solution for 3 weeks (Wedad Y. Awliya *et al.,* 2010) to test the color stability

- G_2E_1 was stored in instant coffee
- G_2E_2 was stored in Arabic coffee
- G_2E_3 was stored in Pepsi.
- G_2E_4 was stored in distilled water.

G_2E_4 was constructed from Nano Resin Composite and stored in distilled water to be used as control.



Testing procedures: After the 3 weeks' incubation period in different storage media (distilled water, instant coffee, instant Arabiana coffee and Pepsi) the color was tested.

RESULTS

All results were tabulated and statistically analyzed by SPSS program Version 24.0.Statistical analysis for the effect of storage media on change of color of both resin composite and ormocere revealed that: the mean difference of resin composite group stored in carbonated soft drink was and ormocere group stored in the same storage medium was (5.0) with a significant difference between them at ($p<0.05$).,Statistical analysis for the effect of storage media on change of color of both resin composite and ormocere revealed that: the mean difference of resin composite group stored in Arabian coffee was and ormocere group stored in the same storage medium was (2.40) with a significant difference between them at ($p<0.05$).Statistical analysis for the effect of storage media on change of color of both resin composite and ormocere revealed that: the mean difference of resin composite group stored in Instant coffee was and ormocere group stored in the same storage medium was (1.68) with a insignificant difference between them at ($p<0.05$).

DISCUSSION

Statistical analysis for the effect of storage media on color stability of nano Resin-composite and Ormocer revealed that the highest mean value of change in color was related to the instant coffee for both materials with no significant difference between them. These results agreed with (Fulya *et al.,* 2009,

Topcu *et al.,* 2009) who investigated the effect of both instant and Turkish coffees on color stability of three different resin composites including nano-hybrid composite and ormocer. He stated that: for resin composite, the highest staining capacity was made by coffee and his justification was that coffee might be both adsorbed and absorbed onto/into the organic phase of resin composite and added that it is due to the high hydrophobic monomers in resin composite. This justification agreed with both (Canay *et al.,* 1999 and Dietschi *et al.,* 1994). Moreover, these results were also addressed by (Ertas *et al.,* 2006) who stated that coffee contains yellow colorants so, the dark color and the concentration of instant coffee might be the reasons for the significant color change of nano resin composite stored in such type of coffee.

The Arabian coffee came second in staining nano-resin composite while the carbonated soft drink came last with no significant difference between them but there was a significant difference when comparing both to instant coffee. Moreover, statistical analysis for the effect of carbonated soft drink (Pepsi) storage medium on color stability of both nano resin composite and ormocer showed higher effect on ormocer compared to nano-composite with a high significant difference between them. Since the used ormocere in the study was bulk filled the significantly high staining effect of carbonated soft drink on ormocer can be contributed to the insufficient polymerization of the resin matrix. This explanation was in agreement with (Adriana *et al.,* 2017) who stated that the efficiency of polymerization may influence discoloration, since the higher the degree of conversion; the smaller the amount of residual monomers available to form colored degraded products. One other reason for the high degree of staining produced by the carbonated soft drink could be due to the high acidity of such drinks; this explanation agreed with (Bansal *et al.,* 2017). The fact that ormocer has higher filler content than nono composite can explain the more color derangement resulted. (Bansal *et al.,* 2017) attributed to this high degree of staining to the filler content of the resin material, as the interface between resin and filler particles is one of the weakest points of the composite materials, with a high sensitivity to sorption. Finally, color, shape and surface texture are very important in aesthetics as they are the key elements for characterization and personalization of a smile so color stability could be the difference between success and failure.

Conclusion

- Conventional incrementally packed nano-resin composite still the material of choice whenever aesthetics was a main concern.
- Bulk fill Nano-Ormocer represented a serious compotator to conventional Nano-Composite in the battle of esthetics.

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Conflict of interest: All authors declared that they do not have any conflict of interest.

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