COMPARISON OF COLOUR STABILITY, POST POLISHING OF VARIOUS HYBRID COMPOSITES AT VARIOUS PRICE POINTS. AN IN-VITRO STUDY.

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1. Introduction

Dental composites are widely used in restorative dentistry due to their aesthetic appeal and versatility. However, one of the major concerns with these materials is their color stability over time, which can lead to discoloration and compromise the esthetic outcome of the restoration.(Ruyter et al. 1987)

Color stability of dental composites refers to the ability of the material to maintain its original color over time when exposed to various environmental factors such as oral fluids, food, beverages, and sunlight. Several factors affect the color stability of dental composites, including the type and amount of fillers, polymerization technique, and surface finishing.(Sabatini et al. 2012)

Research has been conducted to evaluate the color stability of different dental composites, and various methods have been used to measure color changes, such as spectrophotometry and visual assessment. Several studies have reported that certain dental composites exhibit higher color stability than others, and factors such as the shade of the material and the location of the restoration can also influence color stability.(Ruyter et al. 1987)

Overall, understanding the color stability of dental composites is crucial for achieving long-term esthetic success in restorative dentistry. This paper will review the current literature on the color stability of dental composites, with a focus on the factors that affect color stability and the methods used to evaluate it.

Here are some factors that can affect the color stability of dental composite:

Exposure to light: Dental composite can change color over time when exposed to light, especially ultraviolet (UV) light. This is known as photo-degradation. To prevent this, dental composite materials may contain additives that help to block UV light.

Temperature: Exposure to high temperatures can cause dental composite to discolor or yellow. This is because high temperatures can cause the resin matrix in the composite to break down.

Moisture: Dental composite can absorb water over time, which can cause it to discolor or change in shade. This is known as water sorption.

Chemicals: Exposure to certain chemicals, such as hydrogen peroxide, can cause dental composite to change in color or shade.

Quality of the material: The quality of the dental composite material can affect its color stability. Higher quality materials are generally more resistant to color changes over time.(Malekipour et al. 2012)

To improve the color stability of dental composite, it's important to choose a high-quality material and to ensure that it is properly cured and polished. Additionally, patients should avoid exposing the restoration to excessive heat, moisture, or chemicals. Regular dental check-ups can also help to identify and address any color changes in dental composite restorations.

2. Materials and methodology

The materials used in this study are coltene brilliant everglow (coltene), Tetric EvoCeram (Ivoclar Vivadent AG, Schaan, Liechtenstein), Mani Micro (Mani Inc.,Japan) and Tetric Te Econom (Ivoclar Vivadent AG, Schaan, Liechtenstein). Details given in Table1. The polishing system used was Sof-lex abrasive disk system (3M ESPE, St. Paul, MN, USA). Details given in table 2

Table 1 Composites used in study

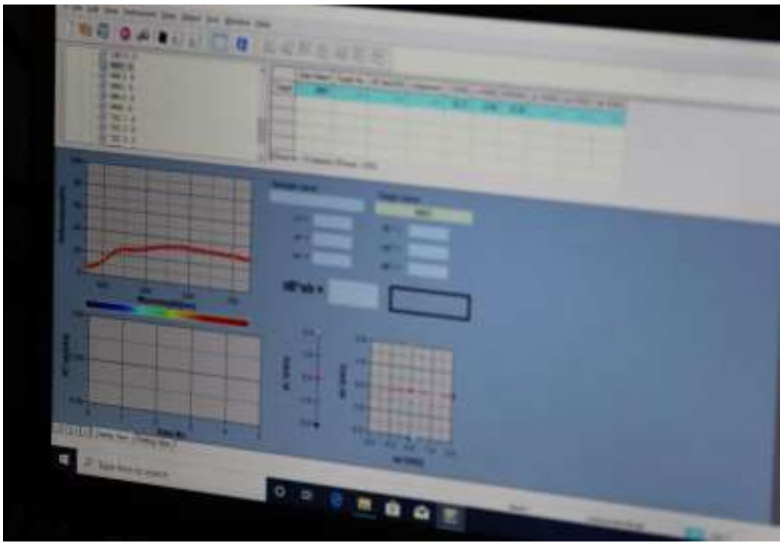
Material	Abbreviation	Classification	Composition	Filler Ratio (wt%/vol%)	Manufacture
Coltene Brilliant Everglow	CBE	Sub-Microhybrid	Methacrylates, Photoinitiators, Ethanol, Water		Coltene
Tetric EvoCeram	TEC	Nanohybrid	Dimethacrylate, barium glass,ytterbium fluride, oxides mixture, prepolimer	75-76/53-55	Ivoclar vivodent

Mani Micro	MM	Microhybrid	Glass powder, diurethane dimethacrylate, silicon dioxide, Bis-GMA, Tetramethylene dimethacrylate	75/53	Mani Inc
Tetric Te Econom	TTE				Ivoclar vivodent

Table 2 Polishing System used in study

Polising Systems	Average Particle Size	Manufacture
Sof-Lex-SL Red (aluminum oxide)	60 micro metres (electrostatically coated)	3M ESPE
Sof-Lex-SL Medium orange (aluminum oxide)	30 micro metres (electrostatically coated)	3M ESPE
Sof-Lex-SL Light orange (aluminum oxide)	30 micro metres (slurry coated)	3M ESPE
Sof-Lex-SL Yellow (aluminum oxide)	3 micro metres	3M ESPE

Specimen preparation:
Each composite sample was placed in a stainless-steel mould (8mm diameter, 2mm thickness) and packed against a mylar matrix strip sandwiched between a glass slab. The samples were light cured for 60 seconds totally, with 30 seconds on each side with
All specimens were light cured for 60 s totally, each side for 30 s respectively with DTE O-Light Plus Light Cure Unit (Guilin Woodpecker, China). Ten samples were prepared per group: Group CBE (Coltene Brilliant Everglow), Group TTE (Tetric Te Econom), Group MM (Mani Micro) and Group TEC (Tetric EvoCeram). Samples with visible voids were discarded. The samples were then stored in distilled water at 37 degrees C for 24 h



Finishing and polishing procedures:
Each group was polished with the Sof-Lex disks (four-step system): Step 1 (course grit): The medium (red) disc was applied for 20 s, rinsed and dried with air/water syringe for a total of 10 s. Step 2 (medium grit): The medium (dark orange) disc was applied for 20 s, rinsed and dried with air/water syringe for a total of 10 s. Step 3 (fine grit): The fine (light orange) disc was applied for 20 s, rinsed and dried with air/water syringe for a total of 6 s. Step 4 (superfine grit): The superfine (yellow disc) was applied for 20 s, rinsed and dried with air/water syringe for a total of 6 s. All preparations were performed by one operator. Polishing disks were used using light hand pressure. Polishing disks were replaced after use on each sample. Samples were rinsed with distilled water and air dried before starting the next finishing or polishing step.

Colour Stability Tests:
In this particular study, the color stability of dental composite samples was evaluated using the Konica Minolta spectrophotometer CM-5. The samples were measured for color stability both before and after staining in coffee decoction for a period of one week, with one hour of exposure per day. This method of staining and exposure was chosen to simulate the effects of common dietary habits on the color stability of the dental composites.
The measurements obtained from the spectrophotometer were analyzed to determine the extent of color change that occurred in the samples after exposure to coffee decoction.

3. Result

Descriptives								
dE*ab								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
coltene brilliant everglow	20	4.8940	2.10372	.94081	2.2819	7.5061	2.22	7.39

tetric t economy	20	7.2700	.83220	.37217	6.2367	8.3033	6.49	8.38
mani micro	20	9.8680	4.77417	2.13507	3.9401	15.7959	3.28	13.45
tetric evo ceram	20	4.5680	.54177	.24229	3.8953	5.2407	3.63	4.97
Total	80	6.6500	3.27357	.73199	5.1179	8.1821	2.22	13.45

ANOVA					
dE*ab					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	90.791	3	30.264	4.292	.021
Within Groups	112.817	16	7.051		
Total	203.608	19			

4. Discussion:

Based on the results obtained in this study, it can be concluded that the composite Mani Micro exhibited the highest level of discoloration after exposure to coffee decoction for one week, followed by Tetric T Economy, Coltene Brilliant Everglow, and Tetric EvoCeram.

This finding is consistent with previous research that has suggested that the type and amount of fillers in the composite material can influence its color stability. In particular, composites with higher levels of filler content have been shown to exhibit greater color stability over time, while those with lower levels of filler content may be more prone to discoloration.

It should be noted that the results of this study are limited to the specific brands and types of composites that were tested, and may not necessarily generalize to other materials or clinical situations. Other factors, such as the shade of the composite, the thickness of the restoration, and the patient's individual habits and behaviors, may also play a role in determining color stability.

Despite these limitations, the findings of this study have important implications for clinicians and researchers in the field of restorative dentistry. By understanding the factors that contribute to color stability in dental composites, it is possible to select materials that are more likely to maintain their esthetic appearance over time and to develop improved techniques for assessing and measuring color changes in these materials.

5. References

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