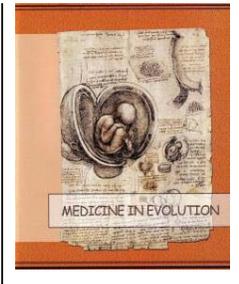


# INFLUENCE OF FOOD PIGMENTS ON RESTORATIONS



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## Abstract

**Aim and objectives:** to observe the influence of food pigments on composite diacrylic resin restorations and to evaluate the chromatic stability of the aesthetic materials that we used.

**Material and methods:** discs of a single type of DRC shade A2 and A3 were used. Initially, pre-immersion color measurements of the composite samples were performed. The composite samples were immersed in various pigmented solutions (tea, coffee, distilled water) for 24 hours and 7 days, the evaluation and observation of the degree of discoloration of the restorative materials being done every 24 hours and 7 days

**Results:** According to the results, it was found that the largest color change on the surfaces of the composite material was recorded for tea and coffee after immersion for 7 days. Tea and coffee significantly affected the color of the composite samples used in the study.

**Conclusions:** The effect of pigmented solutions (tea, coffee) that caused discoloration in the composite diacrylic resin was closely related to both the established immersion time (24 hours and 7 days) and the shade of the material used (A2 and A3).

**Keywords:** discoloration, DRC, immersion, food

## INTRODUCTION

An increasing interest in aesthetic dental treatments has led to the development of new materials, namely composite diacrylic resins. The latter were the most popular materials used in cosmetic dentistry in the 1960s due to their excellent aesthetics, adequate mechanical properties (mechanical strength), moderate costs compared to those of ceramics and the ability to be chemically bound to dentin and enamel. ( 1)

Unfortunately, unacceptable color change is why these aesthetic materials need to be changed over time. Aesthetic restorative materials should mimic the appearance of the natural tooth in both the right color and color stability. However, composite diacrylic resins have a tendency to discolor in contact with the oral environment. The discoloration of these composite-based restorations can be caused by intrinsic and extrinsic factors. (2)

The aim of this study is to observe the influence of food pigments on restorations from composite diacrylic resins and to evaluate the chromatic stability of the aesthetic materials used.

## MATERIAL AND METHODS

The study is based on the chromatic stability of composite samples (discs) using shades A2 and A3 of a single type of composite diacrylic resin. Initially, pre-immersion color measurements of the composite samples were performed at 24 hours and 7 days. Thereafter, these composite samples were immersed in various pigmented solutions (tea, coffee, distilled water) for 24 hours and 7 days and finally the evaluation and observation of the degree of discoloration of the restorative materials at 24 hours and 7 days. The evaluation method of this study was a digital one, this being performed with the Easyshade Vita device (digital spectrophotometer) which allows the exact determination of the chromaticity of aesthetic materials by electronic measurement.

The aesthetics of teeth and their color is an important topic for more and more people. The intrinsic color of a tooth is determined by how light is absorbed at the surface and structures of the tooth. Composite diacrylic resins are currently among the most widely used materials in aesthetic restorative dentistry by direct technique and represent the most complex types of materials in terms of finishing and polishing, which can achieve a high gloss because they contain a matrix of relatively soft resin and hard filler particles in their structures. Each composite material contains a different microstructure and the retention of gloss over time can vary considerably due to microstructural differences.

The color stability of current composites was studied by artificial aging in a room exposed to UV light, high temperatures of 70 degrees C and by immersion in solutions of coffee, tea and distilled water.

Din acest studiu efectuat a rezultat ca materialele compozite sunt rezistente la modificările de culoare cauzate de oxidare, dar sunt susceptibile la colorare (3).

In this experimental study, 100 composite samples with shades A2 and A3 were manufactured using a single type of composite material (50 copies each) using a plastic mold. The samples were divided into five groups of ten samples each and immersed in the following pigmented solutions for 24 hours and 7 days: coffee, tea, distilled water.

Table 1. Pigmented solutions used in the study

Tea	To prepare the tea solution, a prefabricated tea bag was immersed in 300 ml of boiling water for 5 minutes.
Coffee	To prepare the coffee solution, 3.6 grams of coffee powder were dissolved in 300 ml of boiling water.
Distilled water	The original packaging was used at room temperature.

The analysis of the initial shade of the composite diacrylic resin was performed at 24 hours and 7 days using a digital spectrophotometer (Vita Easyshade). Two layers of celluloid were placed under the composite samples and to obtain the shape of the composite samples, two glass plates were placed between the two surfaces. The composite discs were light-cured for 40 seconds using an LED lamp and all their surfaces were polished with a low-speed manual part. Each composite disc was then dried with a paper towel.

## RESULTS

In the study based on the *in vitro* experiment on composite samples with shade A2, it was found that the highest coloration of the composite material was found in the sample immersed in the tea solution for 7 days followed by the sample immersed in the coffee solution that also caused an increased color change for 7 days.

The discoloration caused by the distilled water on the surfaces of the composite samples was not significant for 24 hours and 7 days.

Statistical analysis showed that the drinks had a significant effect on the translucency of the composite samples. Pigmented solutions based on tea and coffee produced the largest change in translucency. The change in translucency was not significant between coffee and tea, with distilled water causing the slightest change in translucency.

The tea was the pigmented solution that led to the highest coloration of all groups of composite samples, followed by the coffee solution for 7 days and finally in the last place is the distilled water that caused the slightest change in color at the surface of the composite sample surfaces.

All specimens showed visual changes.

## DISCUSSIONS

There is a growing interest in the ability of restorative aesthetic materials to withstand discoloration because chromatic stability is an important factor in the success of treatment, especially in the aesthetic area. Numerous studies have shown that factors that affect tooth color can exert similar effects on composite diacrylic resins (4).

As highlighted above, the etiology of discoloration of composite diacrylic resins is multifactorial, ie caused by an intrinsic and an extrinsic mechanism. In fact, the discoloration of composite materials remains the major cause of the aesthetic failure of restorations and can be a major reason for their replacement. Recently, numerous studies have been carried out to evaluate the chromatic changes of composites *in vitro* and the color has then been analyzed according to some color systems in the world (5).

## CONCLUSIONS

It was found that the pigmentation of coffee comes from both absorption mechanisms, on the dye on the surface and absorption in the inner layer of the composite material but the discoloration is probably related to the compatibility of the polymer and the organic phase of the composite resin.

This effect of the pigmented solutions (tea, coffee) which caused the color change in the composite diacrylic resin was closely related both to the established immersion time (24 hours and 7 days) and to the shade of the material used (A2 and A3). Shade A2 was selected because it is considered a light shade and susceptible to larger color changes. Color stability is an important consideration in dento-facial aesthetics.

In the present *in vitro* experimental study, the influence of pigmented solutions (tea, coffee, distilled water) on composite diacrylic resins after immersion for 24 hours and 7 days

was analyzed and the chromatic stability of the immersed composite samples (discs) was evaluated. in the aforementioned colored solutions.

According to the results, it was found that the largest color change on the surfaces of the composite material was recorded for tea and coffee after immersion for 7 days. Tea and coffee significantly affected the color of the composite samples used in the study.

An insignificant discoloration value of the composite samples was measured in distilled water. Hot drinks (tea and coffee) caused a fairly significant discoloration, followed by drinks used at room temperature (distilled water).

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