COMMENTARY

Effect of Three Indigenous Food Stains on Resin-Based Microhybrid and Nanocomposites

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This interesting study was an in vitro laboratory study of three different foods and their staining effects on three different resin composites. The foods used were those most commonly used in the geographic region—turmeric, found in curry; tea; and tobacco. Each of the foods was prepared as they would be for daily use to simulate in vivo conditions, and then a solution was made with each. It seems that the making of these solutions may deviate from the normally used form of the materials, and the reason for this technique was not made clear. Disks of the three composites were prepared in plastic molds 10 × 2 mm in size, covered on both ends with Mylar strips and glass slides and polymerized with a curing light that was tested at 450 mW/cm^2 intensity. The authors make no mention of how the curing light was tested or what radiometer was used. This was probably the value of light intensity at 0 mm from the end of the light guide, which was placed on both sides of the specimens, yet it is not known what the intensity was 1 to 2-mm deep in the composite. In clinical situations, it is often not possible to cure composite from both sides, especially on posterior teeth. This seems to be a relatively low-intensity light, yet the authors state that they cured the specimens for 40 seconds on both sides of all specimens.

The specimens were placed in a desiccator until a "constant weight was achieved" and then placed in distilled water at body temperature for 24 hours to simulate clinical conditions and to "ensure complete polymerization." Neither of these steps are employed in clinical practice when placing composites. Following baseline color determination and documentation, the specimens were placed in the prepared solutions of the food products and immersed for 3 hours per day for 15 days with storage between staining sessions in distilled water. As would be found in vivo, the staining solutions were prepared daily and were fresh. Upon conclusion of the 15-day staining procedures, the specimens were again color tested and compared with the baseline, and conclusions were made.

This study is intended to have clinical relevance in the geographic region where the products tested are most commonly used. Tea is more commonly used in some countries, where coffee would have been good to test in order to have application to a wider population. Turmeric is uncommon in most of the world, and tobacco is used in various forms, but not usually in solution. Although this is an interesting study and presents thought-provoking reasons for why the universal composite had less staining than the micro- or nano-hybrid composites, there are conclusions that may be drawn. If this study were to be duplicated, there are some parts of the description of the procedures that need to be discussed in more detail so that scientific method could be followed. One important issue in this study could be the degree of conversion/polymerization of the specimens because of either the chemistry of each composite or the light intensity, which is on the low end of acceptable. Depending on the amount of each composite's degree of conversion, which could vary with batches, storage and expiration dates, immersion in distilled water and/or the food solutions could result in varying amounts of plasticization or degradation of components of the composites and effect staining properties. Also, the surface of each sample was resin rich, as Mylar strips were the final finish. In clinical practice, composites are almost always polished with decreasing grit to achieve smoothness, resulting in a surface that

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This commentary is accompanied by article, "Effect of Three Indigenous Food Stains on Resin-Based, Microhybrid-, and Nanocomposites" Neeraj Malhotra, MDS, Revathi P. Shenoy, MSC, PhD, Shashirashmi Acharya, MDS, Ramya Shenoy, MDS, Shreemathi Mayya, MSC, PhD, DOI 10.1111/j.1708-8240.2011.00431.x.

 DOI 10.1111/j.1708-8240.2011.00432.x

is less resin rich than this study—this may also change the rate and amount of uptake of stains in this study. In clinical practice, many clinicians etch and seal all surfaces of composites with a composite sealer, which increases longevity and appearance, but if used in some samples in this study, may have solved some of the problems of staining, enhancing appearance and the need for replacement solely because of esthetic appearance as mentioned by the authors. The samples were placed in the solutions and left to soak without turbulence, while in clinical use, they would be abraded, worn, and subjected to changes in temperature and pH, all of which may have had different results than the study. Finally, how did the color change of $\Delta E \geq 3.3$ become defined as the point of unacceptable appearance—from a survey of patients or an arbitrary point? Composite technology has evolved dramatically over the last decade, and more than half of the references were more than 10 years old.

This paper is a good start toward understanding how different foods potentially effect composites in vitro. It could be a good starting point from which to design studies that have greater amounts of clinical relevance. This could be done through fine tuning the experimental design, manipulating composites closer to the clinical environment, and finally, doing in vivo studies. It would be important to study the effects of the same solutions with natural teeth along with composite materials. This study hints that selection of composites in clinical practice may be based on staining properties of material, but one would not make these decisions based on the findings in this paper. Selection of composites is usually determined by handling, lifelike appearance, polishability, filler size and load, and shrinkage.

 DOI 10.1111/j.1708-8240.2011.00432.x