COMMENTARY

BLEACHING AGENTS WITH VARYING CONCENTRATIONS OF CARBAMIDE AND/OR HYDROGEN PEROXIDES: EFFECT ON DENTAL MICROHARDNESS AND ROUGHNESS

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This in vitro study aimed to evaluate the effect of different bleaching agents, used as at-home or in-office protocols on bovine teeth—enamel and root dentine. Tooth bleaching has become a common treatment over the last years, and much research has been reported on the effects of those procedures on tooth structure. Microhardness and surface roughness are the most common methods used to evaluate possible changes on enamel and dentin. Nevertheless, one question that comes to the mind of the dentists when they read those articles is: what is the clinical significance of these microhardness and surface roughness changes, and what are the clinical consequences for the patients treated with dental bleaching agents?

In this paper, the authors presented some data concerning the potential morphological and chemical changes on enamel and root dentin of bovine teeth when treated with different agents and protocols of dental bleaching. For doing so, they used 100 bovine enamel and 100 bovine root dentin slabs. Bleaching agents were applied according to the manufacturers' instructions. During bleaching intervals, specimens were stored in artificial saliva, which was changed daily, trying to simulate clinical conditions; however the authors did not consider the presence of glycoproteins, such as mucins, present in natural saliva, just considering the mineral content of saliva.

After bleaching, microhardness values in enamel increased, and the authors tried to explain this increase as caused by the use of artificial saliva or the remineralizing effect of some gel composites; however, the same result was not observed in dentin and none of the explanations presented by the authors are conclusive. Also, the authors did not present a good explanation for why the untreated group, not submitted to bleaching, exhibited reduction in microhardness. They present a contradictory explanation when trying to explain these data using the argument that the pH of the remineralizing solution had dropped over time, but they did not present any data showing this pH decrease; also according to them this solution was changed daily, which would not allow much time for this pH to decrease.

As mentioned by the authors, there has been considerable literature devoted to the investigation of bleaching effects on the tooth structure. Therefore, the results showed in this paper are just confirmatory, as there is no additional finding or explanation as to how dental tissues are affected by the bleaching process. Despite the authors having raised this question as a hypothesis for this study, they limited their discussion to only describing that, for bovine root dentin, the microhardness values decreased.

Also it is important to consider that the authors measured microhardness immediately after bleaching; it would be more clinically meaningful if the bovine samples had been left in artificial saliva for a longer period of time mimicking in vivo conditions (i.e., 2 to 4 weeks after bleaching) and then the microhardness evaluated, making it possible to confirm whether the microhardness loss could be reversed by artificial saliva and other remineralizing agents such as mouth rinses, fluoridated dentifrices, or even fluoridated water.[1–3]

In an in situ study, Rodrigues et al in 2005[4] evaluated the effect of in-office and at-home bleaching agents on human dental enamel. No differences among initial or final microhardness values were found ($p < 0.05$); however, significant differences occurred between initial and final values for each group ($p < 0.01$). In-office bleaching with 37% carbamide peroxide, an at-home bleaching with 10% carbamide peroxide, and a combination of both resulted in lower enamel microhardness when measured immediately posttreatment. However, long-term effects of these treatments are not known and are believed to be clinically insignificant because of the relatively small reductions observed in enamel

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microhardness. That still remains an open question: what is the clinical significance of these microhardness and surface roughness changes and what are the long-term clinical consequences for the patients treated with dental bleaching agents?

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