

**Study review:**

**Microcrystalline hydroxyapatite is not inferior to fluorides in clinical caries prevention: a randomized, double-blind, non-inferiority trial**

[Schlagenhauf, U. *et al.*, *bioRxiv*, doi:<https://doi.org/10.1101/306423> (2018).]

Previous studies have shown that various forms of hydroxyapatite (nano or microcrystalline) in dentifrice can inhibit tooth tissue demineralization, promote remineralization, inhibit adhesion of bacteria to form biofilm on tooth surface as well as acts as a potent buffer neutralizing organic acids in a dose-dependent manner. There are scientific evidences supporting the efficacy of hydroxyapatite-containing products in controlling oral disorders such as dental caries, dentin hypersensitivity and periodontal disease. While there are strong clinical evidences in support of their effectiveness for dentin hypersensitivity and periodontal health, the evidences for their effectiveness in dental caries prevention are limited to *in vitro* and *in situ* studies. Thus, the present study specifically aimed to provide a high strength evidence in support of the effectiveness of fluoride-free hydroxyapatite in preventing caries among caries-risk individuals.

The study design tested the products under the best clinical scenario using high caries risk individuals. The development of whitespot lesions (initial caries) within 4 weeks of orthodontic treatment with fixed appliances has long been established. The presence of orthodontic appliances while inhibiting proper and adequate oral hygiene practice encourages plaque accumulation and growth of cariogenic bacteria maintaining a high acidic environment on tooth surface, thus placing the orthodontic patients at a high caries risk. Caries scoring using ICDAS II criteria is the current internationally established standard for caries assessment that can allow minor differences in the efficacy of caries-preventive measures to be detected, while the oral hygiene indices (Plaque and gingival indices) employed are long established methods.

With all outcome measures, there were no significant differences between the hydroxyapatite and the fluoride groups for either caries scores or oral hygiene indices, thus the study demonstrated that the microcrystalline hydroxyapatite-containing toothpaste is not inferior to the fluoride-containing toothpaste. Although the present study demonstrated that hydroxyapatite can serve as an alternative to fluoride, hydroxyapatite may be a better choice for children and high caries risk patients since the dosage can be increased to obtain higher efficacy without the risk of fluorosis and toxicity associated with high fluoride dose.

For the first time, the positive influence of hydroxyapatite on oral hygiene indices, plaque index and gingival index, was demonstrated, thus indicating the multifunctional nature of hydroxyapatite in controlling the two major oral diseases, dental caries and periodontal diseases, both of which are caused by bacterial plaque. By and large, the application of hydroxyapatite in oral care products may eliminate the need for combination of fluoride and antimicrobials in a dentifrice as well as having different dosages (and hence different products) for infants, children and adults.

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