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study

Treatment of dentine hypersensitivity with stannous fluoride (SnF₂) toothpaste

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Background

Dentine hypersensitivity occurs when dentine tubules are exposed because of gingival recession or enamel wear, causing pain when subject to a stimulus (thermal, chemical, tactile, or osmotic). When this occurs, it can negatively impact oral health and quality of life.

To reduce the discomfort, various treatments seek to occlude the dental tubules or block the impulse of transmission. Dentine hypersensitivity can be treated by using a desensitising toothpaste with either a focused toothbrushing or a direct application by the fingertip on the sensitive teeth.

Different components have been added to toothpaste to help achieve the occlusion of the dentin tubules, one of which is stannous fluoride (SnF₂). This component has been studied in vitro and in short-term (three days) treatments, but the results have been controversial.

Aims

The objective of this study was to evaluate the effects of a 0.454% stannous fluoride (SnF₂) test toothpaste – applied by the fingertip and followed by three days of use via toothbrushing – on dentine hypersensitivity, versus a control toothpaste based on sodium monofluorophosphate.

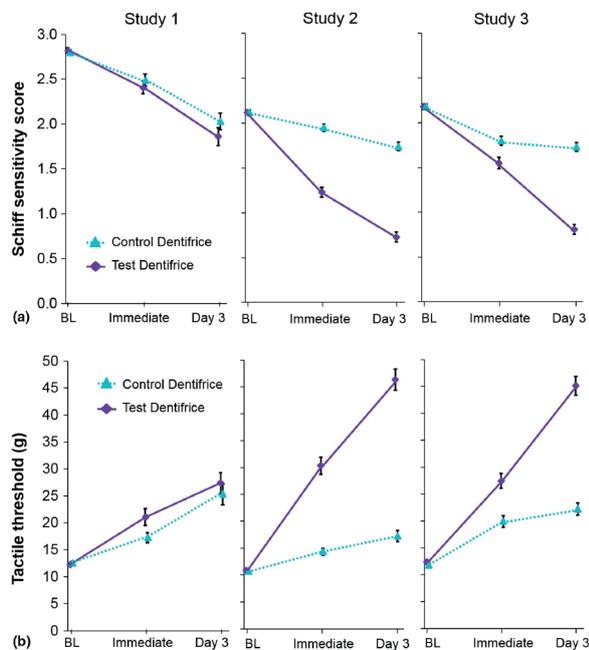
Materials & methods

- This study compared three blinded, randomised trials that each compared two treatments on a total of 667 patients.
- The studies enrolled healthy subjects aged between 18 and 65 with more than 20 natural teeth and a self-reported history of dental hypersensitivity on at least two non-adjacent teeth with dentine exposure at the cervical margin, an MGI score of 0, and no mobility.
- Exclusion criteria were: pregnancy; breastfeeding; allergy to the study materials; xerostomia; medication affecting pain perception; dental prophylaxis within four weeks, vital-tooth bleaching within eight weeks, or scaling within three months of screening; periodontal disease; dental implants; full-coverage restorations; orthodontic brackets; caries.
- Four to eight weeks before the baseline visit, eligible participants were supplied with a specific toothpaste and toothbrush to use twice daily.
- At baseline, eligibility was confirmed. Clinical measurements were performed after a single fingertip application and three days later. Dentine hypersensitivity was assessed using evaporative (Schiff scale) and tactile (Yeaple probe) stimuli, and two non-adjacent teeth were selected and randomised in two treatment groups according to the toothpaste used.
- The test toothpaste contained 0.454% SnF₂ (1,100 ppm fluoride) and 5% pentasodium triphosphate in an anhydrous glycerine-based formulation. The control toothpaste contained 0.76% sodium monofluorophosphate (1,000 ppm fluoride) in a conventional aqueous formulation. Patients were instructed to use either toothpaste twice a day for three days after a single fingertip application at baseline.

Figure

Mean (\pm standard error)
a) Schiff sensitivity scores and b) tactile threshold (intent-to-treat population). Data offset for clarity; BL, baseline; tactile threshold values range from 0 to 80 g

Three randomised studies of dentine hypersensitivity reduction after short-term SnF₂ toothpaste use



Results

- Dentine hypersensitivity was statistically significantly reduced with both treatments in all studies.
- The test treatment reported better results, in terms of statistical significance and clinical relevance, than the control treatment at both timepoints in two of the three studies when comparing Schiff scores.
- The test treatment also produced a statistically significant greater increase in tactile-threshold scores compared to the control treatment at both time points, in two of the three studies.
- Pooled data from the three studies showed that both the single fingertip application and the three days' use of the test toothpaste induced a significant decrease in Schiff sensitivity and a significant increase in the tactile threshold that were greater in magnitude than those obtained with the control toothpaste. The differences between the two treatments increased over time.
- A single fingertip application of the test dentifrice was 4.4 times more likely to lead to a reduction in the Schiff score of at least one point than a similar application of the control toothpaste. Using the toothpaste over three days almost doubled the likelihood. These differences were statistically significant.
- Some treatment-emergent adverse events (TEAE) occurred, but none was considered to be related to the treatment. Few of them were oral, and most were mild and resolved by the end of the studies. Three TEAE were serious, two of which led to participant withdrawal (prostate cancer and nasopharyngitis).

Limitations

- The follow-up time of three days may be too short to declare the results clinically relevant.
- Repeated painful stimulation, the Hawthorne effect, placebo and nocebo effects, and the episodic nature of dentine hypersensitivity might influence outcomes.
- Treatment may not be equally effective in patients with higher Schiff sensitivity score (i.e. more severe dentine hypersensitivity).
- Potential conflict of interest, as the study was sponsored by GSK Consumer Healthcare.

Conclusions & impact

- Within the limitations of these studies, it can be established that the proposed formulation of 0.454% SnF₂ significantly reduced dental-hypersensitivity pain when applied once directly by the fingertip to hypersensitive teeth, at least in two of the three samples analysed.
- Three days of twice-daily brushing has the potential to extend the dental-hypersensitivity relief obtained.
- Dental hypersensitivity, a common condition, may significantly benefit from this experimental formulation, possibly improving the oral-health-related quality of life of patients.

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