

Critical Appraisal

TOOTH WHITENING IN CHILDREN AND ADOLESCENTS

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The popularity of vital tooth whitening has increased significantly over the past two decades. Professionally supervised "in-office" and "at-home" tooth whitening methods have been documented in the literature with evidence of safety and effectiveness. Although the literature includes considerable information about vital tooth whitening in adults, minimal information is available concerning vital tooth whitening in children and adolescents.

The need to provide vital tooth whitening for children might be infrequent owing to the natural whiteness of children's teeth. However, there are circumstances when tooth whitening can be desirable for children, such as fluorosis discoloration, generalized tooth darkening, post-traumatic injury discoloration, and postorthodontic tooth discoloration.

Few well-controlled clinical trials evaluating the safety and effectiveness of vital tooth whitening in children are available in the literature. Furthermore, these published clinical trials were carried out by the same principal investigator. This review examines these trials and offers recommendations accordingly.

TOOTH WHITENING IN CHILDREN

K.J. Donly, A. Segura Donly, L. Baharloo, et al Compendium of Continuing Education in Dentistry 2002 (23[Spec issue]:22-28)

ABSTRACT

Objective: This clinical study evaluated the efficacy and tolerability of tooth whitening in children and adolescents, using a marketed, traybased tooth-whitening system and a disposable polyethylene strip system. Materials and Methods: A study population of 106 children and adolescents, ages 11 to 18 years, participated in this study. There were 61 girls and 45 boys, with a mean age of 14.7 years. Subjects were divided into two experimental treatment groups, the groups being balanced with respect to demographic characteristics and baseline tooth color. All subjects had to have all permanent anterior teeth erupted, a baseline Vita shade (Vita Zahnfabrik, Bad Säckingen,

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Germany) score of A2 or darker, and the desire to whiten their teeth. One experimental group included 71 subjects who used a 6.5% hydrogen peroxide strip system (Crest Whitestrips Professional Strength, Procter & Gamble, Mason, OH, USA) for 30 minutes twice daily. The other experimental group included 35 subjects who used a 10% carbamide peroxide tray system (Opalescence, Ultradent Products, South Jordan, UT, USA) overnight. Subjects who had previously vital bleached their teeth, exhibited apparent caries or periodontal problems, had orthodontic appliances or anterior restorations, or reported dentin hypersensitivity were excluded.

The study population was treated in two separate cohorts, by two independent investigations, to minimize the effects of examiner bias. Digital images were collected for all subjects at baseline, 2 weeks, and 4 weeks, with the maxillary and mandibular arches being treated separately for 4-week intervals. An oral examination was conducted at baseline and at all recall intervals. Subjects reported any adverse events in interviews.

Color change was calculated from digital images where L* indicated

lightness, a* redness, and b* yellowness. Comparisons between the two experimental groups were made using a two-sided analysis of covariance with a 5% significance level.

Results: Both experimental systems exhibited significant (p < .001) tooth-whitening improvement relative to the baseline. Color change was greater in the maxillary teeth than in the mandibular teeth for both systems evaluated. The color change for maxillary teeth was not significantly different between the two systems evaluated; however, the tray system demonstrated significantly (p < .05) greater toothwhitening effectiveness for the mandibular teeth.

Both treatment regimens were well tolerated. Minor tooth sensitivity and oral irritation were the most commonly reported adverse events, being reported by 49% of the subjects assigned to the strip group and 43% of the subjects in the tray group. All reported that adverse events were relieved immediately upon discontinuance of product use.

Conclusion: The 6.5% hydrogen peroxide gel strips and the 10% carbamide peroxide gel delivered overnight in customized trays effectively whitened teeth, and both treatment regimens were well tolerated.

COMMENTARY

This study was the first controlled, randomized clinical trial to evaluate whitening effectiveness and tolerability of vital tooth bleaching in children. The results indicated that, indeed, children's teeth can be significantly whitened and that the bleaching regimens used were tolerable. The sensitivity reported by the children was mild and at no higher level than that expected for an adult population.

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CLINICAL TRIALS ON THE USE OF WHITENING STRIPS IN CHILDREN AND ADOLESCENTS

K.J. Donly, R.W. Gerlach General Dentistry 2002 (50:242–245)

ABSTRACT

Objective: This article reported the cumulative findings from three controlled, randomized clinical trials evaluating the efficacy and tolerability of tooth whitening in children and adolescents using disposable polyethylene strip systems.

Materials and Methods: The study population included 132 children and adolescents, ages 10 to 18 years. (Please note that 71 of these subjects were identified in the previous review.) Fifty-three percent of the subjects were female and 47% were male, with a mean age of 14.4 years. Subjects were divided into experimental treatment groups by balancing groups with respect to demographic characteristics and baseline tooth colors.

Subjects were treated with either 5.3% or 6.5% hydrogen peroxide gel polyethylene strips. All subjects had to have all permanent anterior teeth erupted, a baseline Vita shade (Vita Zahnfabrik, Bad Säckingen, Germany) score of A2 or darker, and a desire that their teeth be whitened. One study included subjects who had previously received comprehensive orthodontic treatment.

Digital images were collected for all subjects at baseline, 2 weeks, and 4 weeks. Oral examinations and interviews were conducted at each appointment to evaluate adverse events.

Color change was calculated from the digital images in the same manner previously described.

Results: The 5.3% and 6.5% hydrogen peroxide strips used for 30 minutes twice a day yielded significant tooth whitening (p < .0001) after 14 days. For the primary whitening parameter, Δb^* , continued treatment during the 14- to 28-day period resulted in significant additional reduction in yellowness (p < .0001). Subjects treated with 6.5% hydrogen peroxide strips experienced significantly (p < .03)greater reduction in yellowness (approximately $0.8 \Delta b^*$ units) compared with those who used the 5.3% hydrogen peroxide strips.

The hydrogen peroxide strips were tolerated well in all of these studies, with minor tooth sensitivity and oral irritation being the primary complaints. Eighteen subjects (14%) reported oral irritation, whereas 30 subjects (23%) reported tooth sensitivity. All adverse events were relieved upon discontinuance of product use.

Conclusion: The 5.3% and 6.5% hydrogen peroxide gel strips used

for 30 minutes twice a day effectively whitened teeth, and both regimens were well tolerated.

COMMENTARY

This article indicated the effectiveness of the original Crest Whitestrips and Crest Whitestrips Professional Strength in whitening teeth. The 6.5% version (Crest Whitestrips Professional) demonstrated a better whitening effect. Both systems exhibited good tolerability, with minor tooth sensitivity and oral irritation being the most common complaints. Although there is little controlled research focusing on bleaching with children, these clinical trials, in addition to numerous case reports, indicate that vital tooth bleaching in children is safe and effective.

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THE BOTTOM LINE: TOOTH WHITENING IN CHILDREN AND ADOLESCENTS

Presently the literature supports vital tooth bleaching in children. Concerns that the pulp is larger in newly erupted teeth and more susceptible to sensitivity are not supported by the clinical trials and case reports published at this time. In fact, the sensitivity associated with vital tooth bleaching reported by children is comparable to, or less than, that reported by adults.

Although routine vital tooth bleaching may not be warranted in many children, since most children have relatively white teeth, there are certain indications for tooth whitening. These include generalized or individual tooth yellowing or darkening, post-traumatic enamel discolorations, postorthodontic tooth whitening, mild fluorosis discoloration, white spots on anterior teeth of unknown etiology, and mineralized white spot lesions.

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