

ARTICLE ANALYSIS & EVALUATION

Low-level fluoride toothpastes are not as effective at preventing caries as high-fluoride toothpastes

Original Article

Ammari AB, Bloch-Zupan A, Ashley PF. Systematic review of studies comparing the anti-caries efficacy of children's toothpaste containing 600 ppm of fluoride or less with high fluoride toothpastes of 1,000 ppm or above. *Caries Res* 2003;37(2):85–92.

Level of Evidence

Ia

Purpose

To determine whether low-level fluoride-containing toothpastes (250–600 ppm) are as effective in caries prevention as high-level fluoride dentifrices (1000 ppm)

Source of Funding

Information not available

Type of Study/Design

Systematic review

Summary

SUBJECTS

Study duration ranged from 24 to 36 months. Geographical location, dates of recruitment, and disease characteristics are not specified in meta-analysis.

THERAPY

The primary "treatment" reported comparison of fluoride exposure between low-concentration and high-concentration toothpastes.

MAIN OUTCOME MEASURE

The main outcome measured from exposure to low- vs. high-fluoride concentration dentifrices was the caries increment (DMFT/DMFS).

MAIN RESULTS

The overall summary of the outcome variable measured (DFS/DFT) showed a significant difference ($P = 0.002-0.0005$) between the 250 ppm dentifrice and 1000 ppm in favor of the control (1000 ppm) in decreasing the caries increment. Tests for heterogeneity were nonsignificant ($P = 0.57-0.048$) indicating that the reported data were homogeneous.

Commentary

CONCLUSIONS

The meta-analysis of the available data indicates that 250 ppm fluoride toothpastes are not as effective at preventing dental caries in the permanent dentition as standard fluoride pastes (1000 ppm).

ANALYSIS

The merits of this article lie mainly in its attempt to collate and decipher the varied results of the chosen studies included in the systematic review and meta-analysis. The specific breakdown of the included articles was thorough, honest, and interesting. The downside was the detail left out that could have helped answer the stimulated questions the reader might have had from reading the author's reports. As such, this is to be expected in a systematic review and meta-analysis.

Some of the concerns with the article have to do with the extrinsic validity of this report. Specifically, caries epidemiology has had several clinically relevant changes in the last 3 decades. The studies included in the reported meta-analysis range from 30 years old (1973) to the most recent article of 12 years old (1991).¹⁻⁷ The management of caries through preventive measures has been significantly affected by the overall decreased caries rate in U.S. school children, a general slowing in the rate of lesion progression, and use of fluoride varnishes, iodine-based rinses, and xylitol.

The concern over fluorosis described in this article at least in part justified the systematic review in comparing the anti-caries efficacy of low (600 ppm) fluoride-containing pastes with high-concentration dentifrices (1000 ppm). Specifically, an infant or young child using a high concentrated or standard adult toothpaste might be exposed to an increased risk of fluorosis due to inadvertent consumption. Seven of the 8 studies reviewed in this article sampled a population of older children (6–13 years), in whom this concern, for the most part, is moot. "The average amount of dentifrice used in a single brushing is about 1 gram and does vary appreciably with age. However, the amount ingested varies considerably with age: chil-

dren swallow more dentifrice than adults. In one study, children 2 to 4 years of age swallowed about one third of the dentifrice (0.3 g), and children 11 to 13 years of age swallowed only 0.07 grams. Preschool children vary in their ability to expectorate toothpaste; however, those who can expectorate tend to do so consistently. Adults swallow very little dentifrice" (Newburn). The current standard for infants and very young children (<2 years) is to use fluoride drops/tablets in controlling optimal fluoride exposure in lieu of pastes because of concerns over fluoride toxicity with dentifrices.

The use of any therapeutic agent carries with it risks and benefits that must be weighed by the individual. The benefit of low-concentration fluoride dentifrices is questionable because the risk (e.g., fluorosis, toxicity) is low when used properly, and the benefits are low (decreased anti-caries effect) in comparison. The authors concluded that low fluoride-containing pastes are not as effective in preventing caries as standard pastes (1000 ppm). Therefore, this report only underscores what is already known.

REFERENCES

1. Adair SM. The role of sealants in caries prevention programs. *J Calif Dent Assoc* 2003;31(3):221-7.
2. Lynch H, Milgrom P. Xylitol and dental caries: an overview for clinicians. *J Calif Dent Assoc* 2003;31(3):205-9.
3. Holm AK. Effectiveness of fluoride varnish (Duraphat) in preschool children. *Community Dent Oral Epidemiol* 1979;7:241-5.
4. Haugejorden O, Nord A. Caries incidence after topical application of varnishes containing different concentrations of sodium fluoride: 3-year results. *Scand J Dent Res* 1991;99:295-300.
5. Sahni PS, Gillespie JM, Botto RW, Otsuka AS. In vitro testing of xylitol as an anticariogenic agent. *Gen Dent* 2002;50(4):340-3.
6. Makinen KK, Makinen PL, Pape HR Jr, et al. Stabilization of rampant caries: polyol gums and arrest of dentine caries in two long-term cohort studies in young subjects. *Int Dent J* 1995;45:93-107.
7. Barnhart WE, Hiller LK, Leonard GJ, Michaels SE. Dentifrice usage and ingestion among four age groups. *J Dent Res* 1974;53:1317-22.

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