Is personal oral hygiene advice effective in preventing coronal dental caries?

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A Commentary on

Hujoel P P, Hujoel M L A, Kotsakis G A.
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Practice point

Brushing without toothpaste might not prevent caries.

Abstract

Data sources PubMed, EMBASE, and the Cochrane Central Register of Controlled Trials databases.

Study selection PubMed, EMBASE, and the Cochrane Central Register of Controlled Trials databases were searched for studies published in English between January 1950 and February 2017.

Data extraction and synthesis Data were extracted independently by two reviewers and risk of bias assessed using a modified Jadad scale. Heterogeneity was evaluated using the chi-squared statistic and meta-analysis performed.

Results Three randomised trials were included, involving 681 participants; all children 10–13 years old. Two trials were conducted in the USA and one in the UK. Two studies tested school-based, daily supervised oral hygiene (including plaque staining and removal and supervised flossing) against control groups; one study tested the same intervention every two weeks against controls. Two studies measured decayed, missing or filled surfaces (DMFS) scores at three years and one trial at 29 months. Personal oral hygiene interventions failed to influence the incidence of dental caries, (DMFS = -0.11; 95% CI -0.91, 0.69: P value <0.79). Four non-randomised trials were retained to conduct sensitivity analyses.

Conclusions Personal oral hygiene interventions delivered to school children failed to show a reduction in coronal dental carious lesion incidence over three years when compared to control groups.

Commentary

Dental caries remains a highly prevalent global condition[1,2] which is largely preventable, with evidence that effective long-term dental plaque control can lead to reductions in caries experience.[3]

Modern concepts in cariology promote the theory that the regular exposure of plaque to fermentable dietary sugars results in repeated conditions of low pH within the oral biofilm. These conditions favour the growth and metabolism of acid-tolerating bacteria while inhibiting beneficial organisms that preferentially grow at neutral pH.[4] Dental caries can be considered a consequence of an ecological shift in the balance of the normally beneficial oral microbiota, driven by lifestyle factors such as diet and cleaning; these oral environment conditions, in turn, drive dysbiosis and subsequent reduction in biofilm pH,[4] promoting dental hard tissue net mineral loss.[5]

GRADE rating 

The authors of this paper refer to two conflicting hypotheses in caries aetiology: the oral hygiene hypothesis which suggests mechanical biofilm removal from dental surfaces is preventive; and the dental defect hypothesis,[6] which suggests dental carious lesions start in microscopic cracks or crevices in teeth and that biofilm removal from these crevices is ineffective. The aim of this review was to assess the effect of personal oral hygiene interventions on the incidence of dental caries as a way of resolving the conflict between these hypotheses.

The authors searched for studies published between 1950 and 2017, with the three included studies published between 1976 and 1981. None of the included studies were considered low-risk of bias for random sequence generation or allocation concealment, while participant blinding was not possible given the intervention under investigation.

A table of included studies is presented, but there are significant deficiencies which lead to uncertainty for readers when assessing the quality of these studies. Details on the recruitment of schools and participants, and on the included populations are lacking, limiting the generalisability of results. Specifics of the interventions and controls are not reported, and there is no definition of personal oral hygiene interventions provided. There is no detail on the use of fluoridated, non-fluoridated or of any toothpaste in the included studies, and no detail on adherence to the interventions. Without details on the control groups, it is left to the reader to infer what these might be. These deficiencies prevent assessment of the appropriateness of measures to prevent contamination between participants in different intervention arms. Drop-out rates of 15–39% are reported, with no detail on the differences between intervention arms.

The outcome measure decayed, missing or filled surfaces (DMFS) was extracted for each study and the standardised mean difference pooled in a random effects model. There is no detail at what diagnostic threshold caries was reported. It is recognised that the DMF index is not a perfect epidemiological tool,[7] as it is unable to discriminate between advanced and initial carious lesions, and the missing component may overestimate the caries increment.

This study concludes that there is a lack of evidence to support the efficacy of personal oral hygiene in preventing or controlling coronal dental caries, and as the authors have presented only two hypotheses, they state support for the dental defect hypothesis. The included studies have shown that school-based personal oral hygiene programmes did not influence the incidence of

dental caries in a population of 681 school children. It is possible that small therapeutic effects of personal oral hygiene remain undetected in statistically underpowered trials, but this would indicate that the effect was perhaps also not clinically important. It is also difficult to extrapolate the findings in school children to adults with different dental restorative status, gingival recession, saliva flow or systemic diseases.

The results of this review contrast with current concepts in cariology and attempt to question the effectiveness of biofilm removal in the absence of fluoride supplements on reducing caries experience. However, without adequate information relating to the primary studies, it is not possible to rule out deficiencies in primary study methodologies that led to the introduction of a combination of selection, performance, intervention adherence and attrition bias, making it difficult for readers to accept the study conclusions. Equally, it also fails to support the theory that brushing alone reduces carious lesion incidence.

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