
Effect on caries of restricting sugars intake: systematic review to inform WHO guidelines

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CRD summary

The authors concluded that consistent moderate-quality evidence supported the relationship between the amount of sugars consumed and dental caries development. Dental caries were reduced when free-sugars intake was below 10% energy, and benefits may arise from limiting sugars to below 5% energy. This conclusion may be overstated, as it was based on a small subset of studies.

Authors' objectives

To evaluate the effect of restricting sugar intake on caries in adults and children.

Searching

Several sources were searched from 1950 to November 2011 including: MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL) and the South African Department of Health databases. Search strategies were provided separately. In addition, the archives at the World Health Organisation Collaborating Centre for Nutrition and Oral Health, and reference lists of reviews were searched. Experts were contacted to retrieve further studies. Abstracts and unpublished studies were not sought. There were no language restrictions.

Study selection

Eligible for inclusion were randomised controlled trials, intervention and observational studies published from 1950. Studies had to focus on people without acute illness in developing, transitional or industrialised countries. Eligible intervention studies had to compare interventions with different sugar content and report on dental caries, change in caries or comparisons of higher versus lower caries over a period of at least one year. Observational studies had to report absolute sugars or change in sugar intake over any timeframe.

Most included studies involved children; most were observational designs. There were no randomised controlled trials. Studies were conducted worldwide (six studies in the United Kingdom). Considerable variation was reported in terms of data-reporting on the range and type of outcomes; for example, decayed, missing, filled teeth (DMFT); decayed, missing, filled surfaces (DMFS); percentage caries; caries incidence; participant age, study length, intervention type, measurement timeframe, fluoride exposure and terminology used to report sugars.

Two independent reviewers selected the studies for inclusion. Disagreements were resolved by discussion.

Assessment of study quality

Study quality was assessed according to the Grading of Recommendations Assessment Development and Evaluation (GRADE) system. Studies were categorised as high, moderate, low or very low quality.

The authors did not state how many reviewers carried out the quality assessment.

Data extraction

Data were extracted on the various outcomes of interest by two independent reviewers. Where possible, data were extracted to calculate mean differences or risk ratios and 95% confidence intervals. Disagreements were resolved by discussion.

Methods of synthesis

A narrative synthesis was presented. Meta-analysis was carried out across study types using a random-effects model, where possible. Standardised mean difference or risk ratios and 95% confidence intervals were presented. I^2 was used to assess heterogeneity.

Results of the review

Fifty-five studies were included (three intervention studies, eight prospective cohort designs, 21 population studies and 23 cross-sectional studies). GRADE quality assessment was based on the cohort studies only.

The authors reported that overall, 42 out of 50 studies in children and five out of five studies in adults showed at least one positive association between sugars and dental caries.

Effect of reducing or increasing sugars (GRADE evidence: moderate): Seven cohort studies consistently reported higher dental caries with higher sugar intake. A meta-analysis of all study designs favoured lower sugar intake in terms of the DMFT score (SMD 0.82, 95% CI 0.67 to 0.97; three studies; $I^2=84%$) and for caries prevalence (RR 7.15, 95% CI 2.82 to 8.14; two studies; $I^2=71%$).

Effect of restricting free sugars intake to less than 10% energy (GRADE evidence: moderate): Results from five cohort studies showed consistently more caries with higher sugar intake (more than 10% energy) compared with lower intake (less than 10% energy).

Effect of restricting free sugars intake to less than 5% energy (GRADE evidence: very low): The analysis (based on three population surveys) showed lower caries progression when per capita sugars intake was less than 10 kg per year (approximately 5% energy).

Further results were reported in the review.

Authors' conclusions

Consistent moderate-quality evidence supported the relationship between the amount of sugars consumed and dental caries development. Dental caries were reduced when free-sugars intake was below 10% energy; there may have been a benefit in limiting sugars to below 5% energy.

CRD commentary

The review question was clear. Inclusion criteria were broadly specified which resulted in a highly variable study yield. Appropriate databases were searched with attempts to minimise language bias. Publication bias was a possibility (the authors acknowledged this was difficult to assess). The process of study selection and data extraction included steps to minimise error and bias; it was unclear whether the same rigour was applied to the application of GRADE quality assessment criteria. The authors appeared to make reasonable attempts to synthesise highly variable studies.

Given that the authors' conclusion seems to be based on a small number of cohort studies, the authors' conclusion may be overstated. The supporting evidence was derived from studies with potentially high risk of bias.

Implications of the review for practice and research

Practice: The authors did not state any implications for practice.

Research: The authors stated that well-designed controlled intervention studies were needed to evaluate the impact of reducing sugars through dietary intervention on caries, and health education in different age groups (including adults and older people) and in areas with and without exposure to fluoride. Standardised methods to assess free sugars intake were needed.

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