

Does dental caries lead to stunting and wasting in children?

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A commentary on

Tanner L, Craig D, Holmes R, Catinella L, Moynihan P.

Does Dental Caries Increase Risk of Undernutrition in Children? *JDR Clin Trans Res* 2022; **7**: 104–117.

Abstract

Design This was a systematic review of the evidence on the impact of dental caries severity and prevalence on undernutrition (wasting and stunting) in children.

Study selection The systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines and registered with PROSPERO (registration number CRD42018091581). A database search of Medline and Embase was conducted in March 2018 with an updated search in July 2019. Participants were children aged 0–18 years from countries of different income groups. The exposure variable was dental caries reported as prevalence, incidence and/or severity, or changes in those variables. The outcome variable was undernutrition; specifically, wasting (low weight-for-height) and stunting (low height-for-age) in children.

Data analysis Evidence was grouped into caries of the permanent dentition, primary dentition, early childhood caries and severe early childhood caries as a risk factor for undernutrition. A best-available-evidence approach was applied to narrative synthesis. Evidence synthesis by vote counting was depicted using harvest plots. The heterogeneous nature of the data prevented a meta-analysis from being appropriate.

Results Of the 2,690 studies identified, 117 underwent quality assessment, resulting in 46 studies for narrative synthesis and 38 pertaining to wasting or stunting included in vote counting. The majority of studies were cross-sectional (33 studies).

For the permanent dentition, the balance of evidence showed generally no association between caries prevalence or severity with wasting. For the primary dentition, positive associations between dental caries prevalence and severity with wasting, as well as between dental caries prevalence and severity with stunting, were reported.

Conclusions Overall, the authors concluded that the balance of evidence favoured an association between dental caries in the primary dentition and undernutrition in children but highlighted the complexity of synthesising dental and nutritional data along with dentition type, age of child participants and income status of countries.

Practice points

- Dental caries may be a risk factor for undernutrition, stunting and wasting in children.
- To strengthen the proposal for causality, further studies should investigate the impact of dental caries management and preventative caries management on children with undernutrition.

Commentary

The authors begin their paper by defining undernutrition and raise awareness of the high mortality it poses, resulting in the deaths of nearly half of all children under five years of age.¹ As well as highlighting numerous medical complications as a result of undernutrition, such as compromised immune function and stunting, the authors also focus on dental anomalies. Delayed eruption and exfoliation of teeth, enamel hypoplasia and impaired development and function of the salivary glands are described, alongside the associated increased risk of caries development as a result of suboptimal enamel and saliva.²

The causes of undernutrition are acknowledged as being multifactorial and in conjunction with the United Nations' Sustainable Development Goal to end all forms of malnutrition by 2030,¹ the authors call to action the dental community to address if dental caries is a determinant contributing to undernutrition in children. The authors postulate that dental caries could reduce the ability of a child to consume an adequate diet due to dental pain or decreased chewing ability. Therefore, the aim of the review was to assess if dental caries increased the risk of undernutrition, defined as wasting (low weight-for-height) and stunting (low height-for-age) in children.

The authors were inclusive with their eligibility criteria, seeking to include all relevant systematic reviews and observational studies with quantitative data. Studies from low-, middle- and high-income countries were included and age-appropriate groupings were made for the permanent and primary dentitions, with consideration of standardised definitions for early childhood caries and severe early childhood caries as per the American Academy of Paediatric Dentistry (2016)³ thus increasing the representativeness of findings. The exposure variable, dental caries, was measured using decayed, missing, filled teeth/decayed, extracted, filled teeth/decayed, missing, filled surfaces, as applicable, while for undernutrition, the outcome variable, studies needed to demonstrate a measure of growth, such as body mass index, body weight, height and/or growth centiles/trajectories.

The search strategy appears to have been conducted in a robust manner, including hand searches of citation lists. However, despite all full texts undergoing screening by two independent reviewers, only 10% of the original retrieved records were screened this way based on title and abstract. The authors note that data extraction

GRADE rating



and quality assessment was checked by a second reviewer but do not comment on how resolution of any discrepancies were achieved.

With regards to study quality assessment, the authors demonstrated efforts to mitigate against the overall low-quality evidence in the literature on this topic using the quality assessment tool, previously published by Hooley *et al.* (2012).⁴ The tool was noted to have removed a sizeable body of studies (60%) from data analysis due to insufficient quality. Also, only 4% of included studies were classified 'A', indicating a need for future high-quality studies to be conducted.

Moving onto the results, findings were mixed, except for a generally positive association found for dental caries severity and prevalence in the primary dentition with wasting and stunting of growth. A previous systematic review reported a negative association but the authors highlight that this review was inclusive of the entire body mass index spectrum, not necessarily specific to underweight, and included all studies irrespective of quality.⁴ Nevertheless, interpretation of the results of this review is offered with a caution due to the heterogeneity between studies and the inability to rule out reverse causality. However, an interesting finding from this review, suggestive of strengthening the proposal for a causal effect between dental caries and undernutrition, is that clinical intervention studies showed dental rehabilitation resulted in catch-up weight.^{5,6}

Overall, this systematic review offers an interesting and unique insight into undernutrition and dental caries in children, with the balance of best available evidence suggestive of an association between dental caries severity in the primary dentition and risk of stunting and wasting in children. As well as future studies

with quality study design and analyses to investigate causality further, clinical studies that monitor the impact of dental caries management and preventative caries management in children with undernutrition would be of benefit to determine if dental caries is a determinant for undernutrition in childhood.

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Ethics declaration

The authors declare no conflicts of interest.

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