Early childhood caries – risk factors

Abstracted from

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Address for correspondence: Dr WK Seow, School of Dentistry , University of Queensland, 200 Turbot Street, Brisbane, Queensland 4000, Australia. E-mail: k.seow@uq.edu.au

Question: What are the risk determinants of early childhood caries in children?

Design This was an Australian case–control study.

Case–control selection Cases were recruited from children referred for dental treatment under general anaesthesia at free public hospitals in eight health service districts in the state of Queensland, Australia [early childhood caries (ECC) public cases], and three private specialist paediatric dental clinics (ECC private cases). Controls were selected from a full list of all childcare facilities in the area using a selection ratio of one in seven children. As dental health status of the children was unknown prior to recruitment, a subgroup of 62 children with ECC was recruited in the control cohort (ECC childcare) and formed the third source of ECC cases.

Ascertainment The teeth of children in dental clinics or childcare facilities were examined using lighting from an examiner's head-lamp, with the child placed on the laps of the mother and examiner. A child was considered to have ECC if at least one cavity was present. Caries was charted using the World Health Organization oral health survey basic methods criteria[1] and enamel hypoplasia using the modified Developmental Defects of Enamel index. Presence of *Streptococcus mutans* was also assessed. Mothers were interviewed and screened to determine their social, medical and dental histories; dental caries experience; absence or presence of plaque and gingival inflammation; and presence of *S. mutans*. Validated questionnaires were used to obtain social, medical, dental, dietary and toothbrushing histories of the mothers.

Data analysis Group comparisons of continuous variables (such as age and birthweight) were compared for statistical significance using analysis of variance. Categorical variables were compared for statistical difference across groups using contingency X^2 tests together with multinomial logistic regression modelling.

Results A large proportion of children tested positive for *S. mutans* if their mothers also tested positive. A common risk indicator found in ECC children from childcare facilities and public hospitals was visible plaque [odds ratio (OR), 4.1; 95% confidence interval (CI), 1.0–15.9; and OR, 8.7; 95% CI, 2.3–32.9, respectively). Compared with ECC-free controls, the risk indicators specific to childcare cases were enamel hypoplasia (OR, 4.2; 95% CI, 1.0–18.3), difficulty in cleaning the child's teeth (OR 6.6; 95% CI, 2.2–19.8), presence of S. mutans (OR, 4.8; 95% CI, 0.7–32.6), sweetened drinks (OR, 4.0; 95% CI, 1.2–13.6) and maternal anxiety (OR, 5.1; 95% CI, 1.1–25.0). Risk indicators specific to public hospital cases were presence of S. mutans in the child (OR, 7.7; 95% CI, 1.3–44.6) or mother (OR, 8.1; 95% CI, 0.9–72.4), ethnicity (OR, 5.6; 95% CI, 1.4–22.1), and access of mother to pension or healthcare card (OR, 20.5; 95% CI, 3.5–119.9). By contrast, a history of chronic ear infections was found to be protective for ECC in childcare children (OR, 0.28; 95% CI, 0.09–0.82).

Conclusions This case–control study showed that children of different socioeconomic backgrounds who have ECC share the common risk indicators of visible plaque, consumption of sugary snacks and presence of *S. mutans*. Additional risk indicators in children from childcare facilities were enamel hypoplasia, difficulty in cleaning the child's teeth, sweetened drinks and maternal anxiety, whereas ethnicity and mothers' access to pension or healthcare cards were specific to the public hospital cases.

Commentary

A case–control study is often used to identify several risk factors for a condition, more frequently a rare one, or to find this information quickly. The authors here explain that the aim of this research was to find some relationships worthy of further investigation with a prospective cohort study. So, this research has to be considered as an exploratory study.

The target disease is ECC, a very aggressive caries that can develop in children of <3 years of age, which is more prevalent in low-income and ethnic minority children.[2] In this study, the cases are precisely defined, although the timeframe of the recruitment is not specified. The authors decided to include five psychological questionnaires to detect some maternal psychological scores than can serve as risk indicators for ECC. It is not clear if the sample size is appropriate for such a large number of variables (>20). The tables are detailed and show some interesting issues, but there are some typographical errors, eg, the sum of the percentages from mother's education and private general anaesthetics clinic attendance in Table 1 is more than 100%.

The authors found several statistical associations: presence of hypoplasias, presence of *S. mutans*, and depression and anxiety scores from the mothers. The presence of hypoplasias was a strong risk indicator, as other cohort studies also show.[3] It is interesting that none of the more educated mothers whose children had ECC declared that they gave their children sweetened drinks. There could be a response bias here, however, since this risk factor could be known to these mothers and this behaviour might therefore be denied by them. Also of note is the authors' finding that *S. mutans* in the mothers is a risk factor: the range of *S. mutans* presence in moth-

ers in the three ECC groups was very large indeed, from 11–86%.

The relationship between diet, *S. mutans* scores and ECC is not yet clear, but a recent review emphasises the role of the diet in the early colonisation by *S. mutans*. [4] Inappropriate bottle and breast-feeding behaviours also increase the risk, however, without showing a direct causal relationship. The authors found that a child with *S. mutans* from childcare group has a relative odds of being an ECC case of 4.76 [95% CI, 0.70–32.56] vs 7.68 (95% CI, 1.32–44.63) for child from public clinic group. In contrast, for the mothers, the relative odds were 0.37 (95% CI, 0.03–4.46) vs 6.47 (95% CI, 0.82–50.87) respectively. Unfortunately, the authors merely mention this finding without explaining these differences, also the case for many other interesting statistical associations.

An interesting finding is the protective OR of a history of chronic ear infections. As the authors note, this is related to the use of antibiotics for the treatment of the ear infection. Another recent publication found that children who used systemic antibiotics during the first year of age had a significantly greater risk of ECC compared with children who did not use antibiotics, but after the first year of life, only children who used systemic antibiotics at 13–18 months old showed a significant increase in the risk of ECC.[4] Keeping in mind that, for a true causality relationship, we need a theory that not only describes and explains a phenomenon but is able to make predictions. If we agree that caries is a bacterial disease, these findings are the first evidence in humans that shows that caries is really a pathological process driven by bacteria, since neither antimicrobials nor vaccines have showed any effectiveness.

The most interesting results lie within the psychological scores, and herein lies a key issue with any case–control study. How does one explain the time relationship between a risk factor and an outcome? In this case, does the exposure to a mother's depression or anxiety precede the ECC in the children? Or does the presence of ECC in the children cause some depression or anxiety in their mothers? Unfortunately, the authors do not explain in more detail the relationship between these variables. Future research is needed to address these issues: a cohort study would provide the evidence we need. Overall, the most important finding from this research is that there are different risk indicators in children from different socio-economic backgrounds. This highlights the need for different preventive strategies for every group.

Sergio Uribe

School of Dentistry, Universidad Austral de Chile, Valdivia, Chile

1. World Health Organization: Oral Health Surveys: Basic Methods. Geneva, World Health Organization, 1987.
2. Shiboski CH, Gansky SA, Ramos-Gomez F, Ngo L, Isman R, Pollick HF. The association of early childhood caries and race/ ethnicity among California preschool children. *J Publ Health Dent* 2003; **63:** 38–46.
3. Oliveira AF, Chaves AM, Rosenblatt A. The influence of enamel defects on the development of early childhood caries in a population with low socioeconomic status: a longitudinal study. *Caries Res* 2006; **40:** 296–302.
4. Vadiakas G. Case definition, aetiology and risk assessment of early childhood caries (ECC): a revisited review. *Eur Arch Paediatr Dent* 2008; **9:** 114–125.Alaki SM, Burt BA, Garetz SL. The association between antibiotics usage in early childhood and early childhood caries. *Pediatr Dent* 2009; **31:** 31–7.

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