Sugar, dental caries and acute rheumatic fever: what is the link?

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Overview

• How could sugar be related to dental caries?
• A cohort study
  • Results
  • Conclusion
  • What next?
• A new strategy for preventing rheumatic fever?
The hypothesis
How could sugar cause rheumatic fever?

- *In Vitro* microbiological evidence
- Enhanced culture conditions for growth of Group A streptococci
  - Group A streptococci throat infection
  - Rheumatic fever
- Sugar (sucrose) intake
  - Ethnic group
  - Association in national dental survey; Consensus for sugar causing dental decay
- Dental caries
- Career case-series described by Weston A. Price
Statistical evidence of association?
The study
Compare children, by caries

\[ P(\text{ARF} \mid \text{Decayed teeth}) = P(\text{ARF} \mid \text{Good teeth}) \]
Other explanations…

Age
Gender
Ethnic group
Socioeconomic status

Spurious
Cohort study

- 20,033 Māori and Pacific children (ARDS)
- Aged 5 to 6 years
- Free of chronic disease at baseline
- Exposure: dental caries
- Outcome: rheumatic fever \( (n = 96) \)
Results

<table>
<thead>
<tr>
<th>Demographic factors</th>
<th>Crude Hazard ratio</th>
<th>Adjusted Hazard ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (male vs. female)</td>
<td>1.37 (0.91 to 2.06)</td>
<td>1.35 (0.89 to 2.03)</td>
</tr>
<tr>
<td>Ethnicity (Pacific vs. Maori)</td>
<td>1.47 (0.39 to 5.57)</td>
<td>1.17 (0.76 to 1.79)</td>
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<tr>
<td>Deprivation (deciles 8 to 10 vs. other or missing)</td>
<td>2.54 (1.50 to 4.30)</td>
<td>2.26 (1.32 to 3.87)</td>
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<table>
<thead>
<tr>
<th>Caries (per 5 affected teeth)</th>
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<tbody>
<tr>
<td>Primary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>decayed</td>
<td>1.83 (1.39 to 2.40)</td>
<td>1.83 (1.12 to 2.97)</td>
</tr>
<tr>
<td>missing</td>
<td>0.86 (0.15 to 5.03)</td>
<td>0.60 (0.09 to 4.12)</td>
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<tr>
<td>filled</td>
<td>1.22 (0.64 to 2.32)</td>
<td>1.37 (0.70 to 2.66)</td>
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<tr>
<td>Permanent</td>
<td></td>
<td></td>
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<tr>
<td>DMF</td>
<td>2.52 (1.37 to 4.64)</td>
<td>2.70 (1.33 to 5.48)</td>
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Summary

- Teeth provide an indicator of cumulative exposure to sugar
- Caries strongly linked to ARF incidence
- Limiting sugar may reduce disease incidence
- Intervention study would be next step
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