The role of skin infections and scabies in the aetiology of acute rheumatic fever

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Overview

• Brief overview of ARF epidemiology

• Observations overseas to suggest scabies may be important

• Cohort study

• Conclusions
Acute Rheumatic Fever
ARF in hospital, by ethnicity

Craig et al (2011) The Health Status of Children and Young People in the Northern District Health Boards
ARF cases in Auckland...
Trends... Pacific
Trends... Māori
From Australia...

- “In this setting, skin breaks due to scabies, insect bites, and minor trauma in children are almost universal”

Scabies
Scabies → ARF

• Trinidad
  • 1970s, “outbreak of ARF followed scabies outbreak”

• Ethiopia & East Timor
  • echo findings of CRHD associated with scabies


Scabies: Global prevalence

Scabies: *an itch worth scratching*

- Solomon Islands
  - Ivermectin program halved skin infection & haematuria

- High prevalence of scabies in Pacific and Indigenous Australians
  - Skin infection
  - PSGN
  - Rheumatic fever

Scabies and rheumatic fever
Hypothesis

Scabies infection → Streptococcal pyoderma → Acute rheumatic fever
Cohort study

3 to 12 years; \( n = 213,957 \)

Mean 5.1 years follow-up

Scabies in hospital

First dental exam

Scabies in hospital; \( n = 440 \)

Rheumatic fever in hospital; \( n = 214 \)

Scabies in hospital

\( n = 624 \)

Confounders
Age, gender, ethnicity, SES, rotten teeth

\( n = 214 \)
Kaplan-Meier plot
## Cox model

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Crude HR (95% CI)</th>
<th>Adjusted† HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (female vs. male)</td>
<td>0.76 (0.63 to 0.92)</td>
<td>1.03 (0.57 to 1.87)</td>
</tr>
<tr>
<td>Ethnicity (ref: NZ European &amp; Other)</td>
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<tr>
<td>Pacific</td>
<td>34.9 (23.3 to 52.2)</td>
<td>20.0 (13.1 to 30.6)</td>
</tr>
<tr>
<td>Māori</td>
<td>21.1 (13.9 to 32.1)</td>
<td>14.4 (9.35 to 22.1)</td>
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<tr>
<td>Deprived (deciles 9 and 10 vs. other)</td>
<td>7.08 (5.77 to 8.69)</td>
<td>2.23 (1.80 to 2.77)</td>
</tr>
<tr>
<td>Scabies (ref: No scabies diagnosis)</td>
<td></td>
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<tr>
<td>Diagnosis before enrolment only</td>
<td>11.3 (6.33 to 20.2)</td>
<td>1.64 (0.68 to 3.97)</td>
</tr>
<tr>
<td>Diagnosis after enrolment</td>
<td>26.0 (14.2 to 47.4)</td>
<td>8.98 (4.79 to 16.8)</td>
</tr>
<tr>
<td>Total caries (per 4 affected teeth)‡</td>
<td>1.76 (1.59 to 1.94)</td>
<td>1.26 (1.12 to 1.42)</td>
</tr>
</tbody>
</table>
Use learning Bayesian networks

Deprivation  Gender  Ethnicity

scabies  Dental caries

Rheumatic fever
Thanks to Ron King, ARPHS
ARF ∼ Permethrin | Pacific & dep.
Scabies & Impetigo

- Accepted treatment these days... topical and systemic antibiotics

- What about scabies?

Scabies diagnosis agreement study
Is there a causal relationship?

- **Bradford-Hill criteria**
  - Strong association (X – strongest association I’ve seen)
  - Dose-response (X – after, vs. before)
  - Biological plausibility (X – path to Group A strep, complement)
  - Coherence (X – Pacific has high prev. scabies)
  - Consistency (X – West Indies, Ethiopia, East Timor)
  - Temporality (X – cohort study)
  - Analogy (X – post-streptococcal GN linked to scabies)
  - Experiment (Missing)
Conclusion

• I believe scabies is very likely to be a cause of acute rheumatic fever

• Scabies explains:
  • link between skin infection & ARF;
  • high prevalence among Pacific people;
  • risks associated with overcrowding & poverty.

• I believe scabies should be treated like other communicable diseases with emphasis on:
  • improved diagnosis;
  • public health support for treatment;
  • follow-up.
Thank you

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