Prevalence and serotype distribution of Streptococcus pneumoniae colonization in infants too-young to be immunized in Nepal

Brian Wahl¹, Jyoti Kumari Yadav², Rashmita Deshari³, Madhav Chandra Gautam², Meenu Gurung², Sarah Kelly³, Stephen Thorson⁴, Imran Ansari⁵, David Murdoch⁶, Bradford Gessner⁶, Michael J Carter⁶,⁷, Rama Kandasamy³,⁴, Dominic Kelly³,⁴, Andrew J Pollard³,⁴, Katherine L O’Brien¹, Shrijana Shrestha²

1 International Vaccine Access Center (IVAC), Department of International Health, Johns Hopkins Bloomberg School of Public Health; 2 Patan Academy of Health Sciences (PAHS); 3 Oxford Vaccine Group, Department of Paediatrics, University of Oxford; 4 NIHR Biomedical Research Centre, Oxford; 5 Department of Pathology, University of Otago; 6 Agence de Médecine Préventive (AMF)

INTRODUCTION

- In August 2015, Nepal introduced 10-valent pneumococcal conjugate vaccine (PCV10) using a 2+1 schedule as follows: 6 weeks, 10 weeks, and 9 months. Children less than 1 year were eligible for catch-up immunization at the time of introduction.
- Several studies have demonstrated the impact of PCV on vaccine-type nasopharyngeal carriage in unvaccinated individuals (i.e., indirect effects). However, such data are lacking in Asia and there is little evidence available in children too-young to be immunized.
- To establish a comparator for assessing PCV10 indirect effects in this population, we measured prevalence and serotype distribution of pneumococcal colonization in young infants prior to the introduction of PCV10 in Nepal.

METHODS

- Participants: Asymptomatic children or children with minor upper respiratory tract infections less than 8 weeks who were attending the outpatient clinic Patan Hospital for routine immunizations or accompanying a family member were recruited to the study.
- Nasopharyngeal swabs were obtained using updated World Health Organization methods.¹
- Pneumococcal carriage was cultured and identified phenotypically; serotyping was by the Quellung reaction.

RESULTS

- 600 infants were recruited from July to December 2014. The median age was 6.4 weeks (IQR: 6.3–6.7). Of these children, 55.7% (334/600) were male and 44.3% (266/600) were female.
- Overall pneumococcal colonization prevalence in this population was 18.8% (113/600).
- We identified 38 different serotypes—see Figure 1.
- Most common serotypes among the 79 (69.9%) typeable pneumococci:
  - o 19F (n=9, 8.0%)
  - o 10A (n=7, 6.2%)
  - o 6A (n=4, 3.5%)
- PCV10 and PCV13 serotypes accounted for 26.5% (30/113) and 29.2% (33/113) of isolates, respectively.

CONCLUSIONS

- Pneumococcal colonization among very young infants in Kathmandu is somewhat less common compared with that of similarly aged children in other Asian settings—see Table 1.
- Vaccine-type pneumococcal accounts for a minority of colonizing strains in this age group.
- The data we present will form the basis for an assessment of indirect effects on carriage among very young infants who may be too young to be vaccinated in Nepal.

Table 1: Estimates of colonization prevalence and serotype distribution in children less than or equal to 6 weeks of age in Asia

<table>
<thead>
<tr>
<th>Country</th>
<th>Setting</th>
<th>Age group</th>
<th>Colonization prevalence</th>
<th>PCV10 carriage</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nepal</td>
<td>Rural</td>
<td>0–4 weeks</td>
<td>18.8% (113/600)</td>
<td>PCV10-23.3% (27/113)</td>
<td>Current study</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Rural</td>
<td>0–4 weeks</td>
<td>29.4% (109/370)</td>
<td>Not provided*</td>
<td>[3]</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Rural</td>
<td>0–6 weeks</td>
<td>18.3% (3/16)</td>
<td>Not provided*</td>
<td>[3]</td>
</tr>
<tr>
<td>India</td>
<td>Rural</td>
<td>0–4 weeks</td>
<td>29.4% (109/370)</td>
<td>Not provided*</td>
<td>[3]</td>
</tr>
<tr>
<td>Philippines</td>
<td>Rural</td>
<td>0–2 weeks</td>
<td>39.6% (111/281)</td>
<td>Not provided*</td>
<td>[5]</td>
</tr>
<tr>
<td>Thailand</td>
<td>Rural</td>
<td>0–4 weeks</td>
<td>27.3% (26/95)</td>
<td>Not provided*</td>
<td>[6]</td>
</tr>
</tbody>
</table>

- See the distribution data provided, but not for children less than 6 weeks of age.

References:


Funding Statement:

The project is supported by the Gavi Alliance.