The SPRING Study: Severe acute respiratory syndrome-related coronavirus 2 prevalence in children and young adults in British Columbia: an observational study

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Introduction

- Pediatric COVID-19 cases are generally less severe than in adults with a varying proportion considered asymptomatic
- Differences in clinical presentation complicate estimates of disease burden by age based solely on reported surveillance data

This study aims to:
1) Estimate age- and sex-specific prevalence of SARS-CoV-2 infection in children and young adults <25 years of age in BC based on presence of serum anti-SARS-CoV-2 IgG antibodies
2) Define asymptomatic and symptomatic infection rates to support predictive modelling in BC and Canada

Methods

- Electronic survey conducted using REDCap
- Mailed a kit to provide a self-collected finger or heel prick dried blood spot sample
- Assays conducted at the provincial reference laboratory at the BCCDC

Inclusion Criteria:
- Parent/guardian/participant willing and able to give informed consent and/or assent
- Age <25 years
- Resident in BC
- Phase 2: Unvaccinated kids ages 0-9; vaccinated youth ages 12-24

Exclusion Criteria: none specific

Demographics

Phase 1
- 2535 participants enrolled; 2129 samples sufficient to analyse
- Gender: Female 56.5%; Male 43.5%
- 83% had no underlying health conditions
- Ethnicity: white 84%, Chinese 4%, South Asian 3%, Mixed 14%, Unknown 17%
- Geographic distribution: VCHA 33.7%, Fraser 26.3%, Interior 6.2%, Northern 2.3%, Island 8.8%

Phase 2
- 2040 participants enrolled
- Analysed 933 participants ages 0-9yo

Seropositivity

Phase 1
- 4.4% of participants were seropositive
- Higher seropositivity in young adults 20-24yo (Table 1)

Phase 2
- Overall, 6.29% of participants <10yo were seropositive
- In comparison: BCCDC data from April 3, 2021, showed approx. 1% of children under 10yo were seropositive (Table 2)

Phase 1 Exposure Sources

- 89% of participants reported no known COVID-19 exposures

Methods

Table 1: Seroprevalence by age

<table>
<thead>
<tr>
<th>Age</th>
<th>Phase 1 Seroprevalence (95% CI)</th>
<th>Phase 2 Seroprevalence (95% CI)</th>
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<tbody>
<tr>
<td>0 - 4</td>
<td>3.17% (1.78, 5.59)</td>
<td>7.65% (4.52, 12.64)</td>
</tr>
<tr>
<td>5 - 9</td>
<td>4.09% (2.57, 6.45)</td>
<td>5.72% (3.84, 8.44)</td>
</tr>
<tr>
<td>10 - 14</td>
<td>3.24% (1.97, 5.28)</td>
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<td>15 - 19</td>
<td>3.84% (2.44, 5.98)</td>
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<td>20 - 24</td>
<td>7.22% (5.21, 9.92)</td>
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Table 2: Comparison of study and BCCDC data

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<td>5-9yo</td>
<td>4.09% (2.57, 6.45)</td>
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<td>BCCDC (Apr 3, 2021): &lt;10yo</td>
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Table 3: Seroprevalence by health authority

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<td>FHA</td>
<td>5.85% (4.2, 8.1)</td>
<td>7.78 (4.6, 12.86)</td>
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<td>IHA</td>
<td>2.92% (1.14, 7.27)</td>
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<td>1.96% (0.35, 10.3)</td>
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<td>4.5% (2.39, 8.33)</td>
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Discussion

- Higher seropositivity in study data compared to provincially reported data
- High seropositivity amongst young adults, certain ethnicities in Phase 1 compared to other age groups

Limitations

- Sample is disproportionately white; numbers in some ethnic groups are relatively small
- May have unintended selection bias in who volunteered to participate in the study
- Over-representation of VCHA and FHA (69-78% of participants vs. 63% of BC population)
- Children & youth living in the north and identifying as Indigenous not adequately represented in cohort

Acronyms

• BCCDC: British Columbia Centre for Disease Control
• FHA: Fraser Health Authority
• IHA: Interior Health Authority
• NHA: Northern Health Authority
• VCHA: Vancouver Coastal Health Authority
• VIHA: Vancouver Island Health Authority

Figure 1: Exposure Sources (if known)

Figure 2: Distribution of participants by phase and age category

Figure 3: Distribution of participants by phase and ethnicity

Figure 4: Comparing seroprevalence across health authorities

Figure 5: Comparison of seroprevalence by age and phase

Figure 6: Comparison of seroprevalence by gender and phase

Figure 7: Comparison of seroprevalence by ethnicity and phase

Figure 8: Comparison of seroprevalence by travel history and phase

Figure 9: Comparison of seroprevalence by underlying health conditions and phase

Figure 10: Comparison of seroprevalence by exposure status and phase

Figure 11: Comparison of seroprevalence by antibody status and phase

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