A Survey of Rotavirus Antibody in Different Age Groups

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Abstract
A serosurvey was done to study the prevalence of rotavirus antibody in different age groups. Two hundred and twenty-four serum samples were assayed for rotavirus antibody by blocking enzyme immunoassay (EIA). The overall positivity rate of antibody to rotavirus was 75.4 percent. Percentage positivity was low (56%) in the 0-3 years age group and highest (96.2%) in the 3-5 years age group. There was a gradual decrease in percentage positivity from 5-20 years, which was followed by a rise (93.7%) in the >20 years age group. Similarly, a low geometric mean titre (GMT) (17-24) was observed in the 0-3 years age group and highest (99) in the 3-5 years age group. GMT also showed a rise (57-9) in the >20 years age group after a gradual decline from 5-20 years.

Key words: Rotavirus antibody.

Introduction
Rotavirus has been recognized as one of the major etiological agents of acute gastroenteritis in infants and young children throughout the world. It is responsible for 50 percent of acute diarrheal illnesses in children in the West but a considerable variation has been found in the incidence of rotavirus infection in tropical countries. The incidence of rotavirus diarrhea in India is reported to vary from 5-90 percent. In Chandigarh, rotavirus was found to be the etiological agent of acute diarrhea in 18 percent of infants and children. Serum antibodies to rotavirus are acquired after symptomatic and asymptomatic infections.

The present study was undertaken to investigate the seroepidemiology of rotavirus infection in different age groups.

Material and Methods
A total of 224 serum samples were collected from January to August 1983 from patients referred to the G E Virology Laboratory with diseases other than acute diarrhea. The ages of the patients varied from newborn to 45 years and the sexes were almost equally represented. Sera were stored at −20°C till tests were put up.

Simian rotavirus (SA-11) was propagated in MA-104 cells in the presence of trypsin (2 μg/ml) to a high titre. After eight passages SA-11 virus was grown in bulk amount and tissue culture fluid was harvested after 3 cycles of freezing and thawing. The cellular debris were removed by centrifugation at 20,000 rpm for 20 min in cold centrifuge. Supernatant fluid was tittered by enzyme immunoassay (EIA) and the highest dilution of antigen giving positive results was considered as one EIA unit.

Rotavirus antibody was determined by neutralizing EIA. Four fold dilutions of serum samples were prepared in dilution buffer (PBS: Tween 20: 0.05% BSA) starting from 1:10 to 1:2560. Seventy-five microlitres of each dilution was mixed with 75 μl of SA-11 antigen (8 units as titered by EIA). This mixture was incubated at 37°C for 2 hours, and tested for rotavirus antigen by direct EIA using DAKOPATTIS reagents according to the manufacturer's directions. The reciprocals of last serum dilution showing 50 percent reduction in colour as compared with antigen control was taken as the titre of rotavirus antibody. In each run reference antisera of known titre were included as controls. Sera showing a titre of 1:10 or more were considered positive for rotavirus antibody.

Results
Rotavirus antibody was detected in a total of 169 of 224 (75-4%) sera tested. In the 0-3 years age group, 28 of 30 (93.3%) children showed the presence of rotavirus antibody while in the 3-5 years age group 26 of 27 (96.3%) gave positive results; this rise in percentage positivity was statistically significant (p < 0.01). After 5 years of age there was gradual decline in percentage positivity. Rotavirus antibody was detected in 27 of 35 (88.5%) in the 5-10 years age group, 41 of 58 (68%) in the 10-15 years age group and 17 of 24 (70.8%) in the 15-20 years age group. In the more than 20 years age group 30 of 32 (93.7%) sera were positive for rotavirus antibody; this rise was statistically significant (p < 0.01).

Geometric mean titres (GMT) of rotavirus antibody as calculated in sera with titre of >10 is shown in Table 1, and the pattern was similar to the percentage positivity. Maximum GMT (99) was observed in the 3-5 years age group followed by a gradual decline till 20 years. In the >20 years age group also a rise in GMT was seen. To find out the most susceptible age in the <3 years age group, it was further analysed as shown in Table 2. The incidence of infection and GMT was highest in the 2-3 years age group, but the rise was not statistically significant.

Discussion
In the present study highest percentage positivity and GMT of rotavirus antibody was observed in the 3-5 years age group. This shows that the maximum incidence of rotavirus diarrhea was in children below 3 years of age. In our earlier study we had shown that rotavirus diarrhea is common up to 3 years of age. The pre-
Table 1: Geometric mean titre (GMT) of rotavirus antibody in different age groups.

<table>
<thead>
<tr>
<th>Age group (yrs)</th>
<th>No tested</th>
<th>No of sera with reciprocal titre of</th>
<th>Reciprocal GMT*</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&lt; 10</td>
<td>10</td>
</tr>
<tr>
<td>0—3</td>
<td>50</td>
<td>22 19 7 2 0 0</td>
<td>17.24</td>
</tr>
<tr>
<td>3—5</td>
<td>27</td>
<td>1 6 7 7 2 4</td>
<td>99.00</td>
</tr>
<tr>
<td>5—10</td>
<td>33</td>
<td>6 9 11 2 2 3</td>
<td>54.4</td>
</tr>
<tr>
<td>10—15</td>
<td>58</td>
<td>17 12 4 3 1 1</td>
<td>21.3</td>
</tr>
<tr>
<td>15—20</td>
<td>24</td>
<td>7 14 2 1 0 0</td>
<td>13.7</td>
</tr>
<tr>
<td>&gt;20</td>
<td>32</td>
<td>2 11 10 4 0 5</td>
<td>57.9</td>
</tr>
</tbody>
</table>

* Calculated in sera with titre >1:10.

Table 2: Rotavirus antibody in 0—3 years age group

<table>
<thead>
<tr>
<th>Age group (yrs)</th>
<th>No tested</th>
<th>No of sera with reciprocal titre of</th>
<th>Reciprocal GMT*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&lt; 10</td>
<td>10</td>
</tr>
<tr>
<td>&lt;1</td>
<td>12</td>
<td>7 5 0 0 0 0</td>
<td>41.66</td>
</tr>
<tr>
<td>1—2</td>
<td>18</td>
<td>9 5 4 0 0 0</td>
<td>18.3</td>
</tr>
<tr>
<td>2—3</td>
<td>20</td>
<td>6 9 3 2 0 0</td>
<td>20</td>
</tr>
</tbody>
</table>

* Calculated in sera with titre >1:10.

sence of low percentage positivity and GMT in children below 3 years of age further confirms this to be the most susceptible population. In volunteer studies serum antibodies have been shown to correlate with resistance to diarrheal illness.14 On further analysis of the below 3 years age group a gradual increase in percentage positivity and GMT was observed, indicating that rotavirus infection starts early in life and continues up to three years of age. The highest incidence of rotavirus antibody in the 3-5 years age group in the present study is in broad agreement with the findings reported by others.15,16 On the other hand Elias17 and Blacklow et al18 reported maximum prevalence of rotavirus antibody in the 1-3 years age group. This difference may be due to the different types of antibodies detected as well as due to variability in study groups. In a study from South India 68.4 percent of children by 5 years of age were shown to have rotavirus antibody by counter immune electron immunofluorescence (CIEOP).19 In the present study, however, blocking EIA has been used, which is more sensitive as compared to CIEOP.

A significant rise in GMT as well as percentage positivity in adults above 20 years of age may suggest that asymptomatic infections are common in this age group. Earlier studies have shown that asymptomatic rotavirus infections are common in parents of children suffering from rotavirus diarrhea.20 In a study from Bangkok also an increase in percentage positivity was noted in the 20-29 years age group as compared to the 10-19 years age group.21

Vaccination against rotavirus is therefore indicated before 3 years of age as this population is most susceptible to symptomatic infection.

References

RotaVirus Antibody Survey—SINGH ET AL.

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