Re-emergence of El Tor vibrio in outbreak of cholera in & around Nagpur

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Contrary to earlier outbreaks of cholera due to Vibrio cholerae O139 during 1993 and its re-emergence in 1998 in and around Nagpur and only sporadic episodes thereafter for next couple of years, a large outbreak was encountered between June and October 2003. V. cholerae 01 El Tor were isolated in 198 cases, of which 152 were Ogawa, 3 Inaba, 4 Hikojima and 39 were non agglutinating (NAG) vibrios. No isolate of V. cholerae O139 was detected during the entire outbreak. The isolates were multi drug resistant to antibiotic susceptibility tests. This points to the resurgence of V. cholerae El Tor Ogawa causing outbreaks of cholera with a discernible increase in the incidence of multi drug resistant strains.

Key words Cholera - Ogawa - vibrio

During the monsoon outbreaks of cholera are encountered almost every year. El Tor Vibrio cholerae have replaced their classic counterpart over the last few decades1-3. Outbreaks due to V. cholerae O139 have been reported from various places in India4-13. Outbreaks of cholera have also been regularly reported from Nagpur14,15. The pattern of outbreaks shifted from V. cholerae 01 to V. cholerae O139 in 199314, resurgence of V. cholerae during subsequent years followed by re-emergence of O139 strains in 199815. In 2003, there was an outbreak of gastroenteritis in Nagpur during June to October. We undertook this study to investigate the outbreak to identify V. cholerae and study their antimicrobial resistance profile.

A total of 455 stool specimens from patients admitted to Government Medical College, Nagpur were received in the laboratory during the study period. Of these, 229 had rice water consistency. Direct plating of samples was done on blood agar, McConkey and thiosulphate citrate bile salt sucrose (TCBS) agar plates (HI-Media, Mumbai). The samples were also inoculated in alkaline peptone water and incubated overnight at 37°C. Subcultures were made from alkaline peptone water on TCBS agar. The isolates of V. cholerae were identified morphologically and biochemically using standard recommended procedure16. The confirmation of isolates was done by seroagglutination using Vibrio polyvalent O1, monospecific Ogawa, Inaba and O139 antisera16 (Central Research Institute, Kasauli).

Of the 455 stool specimens, V. cholerae was isolated in 198, Aeromonas in 2 and Plesiomonas in 3 specimens. Of the 198 vibrio isolates, 152 (76.8%) were V. cholerae (El Tor) Ogawa, 4 (2.02%) Hikojima, 3 (1.52%) Inaba and 39 (19.7%) NAG vibrios. None of the isolates was identified as V. cholerae O139.
Table I. Year wise distribution of *Vibrio cholerae* isolates

<table>
<thead>
<tr>
<th><em>Vibrio cholerae</em></th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ogawa</td>
<td>18</td>
<td>10</td>
<td>4</td>
<td>21</td>
<td>152</td>
</tr>
<tr>
<td>Inaba</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Hikojima</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>NAG</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>39</td>
</tr>
<tr>
<td>O139</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>13</td>
<td>4</td>
<td>22</td>
<td>198</td>
</tr>
</tbody>
</table>

NAG, non-agglutinating

Table II. Per cent sensitivity pattern of *Vibrio cholerae* isolates from 1999 to 2003

<table>
<thead>
<tr>
<th>Year(n)</th>
<th>T(%)</th>
<th>Ce(%)</th>
<th>Cf(%)</th>
<th>G(%)</th>
<th>A(%)</th>
<th>Fep(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999 (28)</td>
<td>71.4</td>
<td>85.7</td>
<td>92.9</td>
<td>96.4</td>
<td>57.1</td>
<td>NT</td>
</tr>
<tr>
<td>2000 (13)</td>
<td>76.9</td>
<td>84.6</td>
<td>84.6</td>
<td>92.3</td>
<td>53.8</td>
<td>NT</td>
</tr>
<tr>
<td>2001(4)</td>
<td>75.0</td>
<td>75.0</td>
<td>100</td>
<td>100</td>
<td>50.0</td>
<td>NT</td>
</tr>
<tr>
<td>2002 (22)</td>
<td>54.6</td>
<td>68.1</td>
<td>59.1</td>
<td>68.1</td>
<td>40.9</td>
<td>100</td>
</tr>
<tr>
<td>2003 (198)</td>
<td>31.8</td>
<td>34.9</td>
<td>37.9</td>
<td>50.5</td>
<td>15.2</td>
<td>92.9</td>
</tr>
</tbody>
</table>

NT, Not tested

T, tetracycline; Ce, cefotaxime; Cf, ciprofloxacin; G, gentamycin; A, ampicillin; Fep, cefipime

Of the 198 isolates, 108 were from patients from urban areas and 90 patients were from nearby villages. There were 101 males and 97 females. This outbreak has almost equally affected rural as well as urban population of this region. Males and females were equally affected.

*V. cholerae* Ogawa was the predominant isolate during this outbreak. There was not a single isolate of O139 and this strain seems to have been completely replaced by *V. cholerae* (El Tor) Ogawa. Subsequent to the re-emergence of O139 serogroup in 1998 in this region, review of records of our hospital showed that for about 4 yr sporadic cases of cholera were encountered. These were mainly due to *V. cholerae* (El Tor), but with persistence of serogroup O139 (Table I).

Antibiotic sensitivity testing of *V. cholerae* isolates was done on Muller Hinton agar by disc diffusion method of Kirby & Bauer. The antibiotics tested were tetracycline (T) (30 µg), cefotaxime (Ce) (30 µg), ciprofloxacin (Cf) (5 µg), gentamycin (G) (30 µg), ampicillin (A) (10 µg) and cefipime (Fep) (30 µg) (HI-Media, Mumbai). The *Escherichia coli* ATCC 25922 was used as the quality control strain. The antibiotic sensitivity profile showed that 184 (92.9%) isolates were susceptible to cefipime, followed by 100 (50.5%) to gentamycin, 75 (37.9%) to ciprofloxacin, 69 (34.9%) to cefotaxime, 63 (31.8%) to tetracycline and only 30 (15.2%) to ampicillin (Table II). The resistance encountered is alarming. They have gradually acquired the resistance to various antibiotics over the years. The antibiotic susceptibility profile now shows considerable resistance to tetracycline as well as other antibiotics. The emergence of resistance to various antibiotics amongst vibrios is now well documented. For management, tetracycline was used as the first line drug; however the antibiotic was changed according to culture and sensitivity report, if required. The emergence of such resistance amongst *V. cholerae* may significantly influence the control strategies in the future outbreaks.

In conclusion, the present outbreak was due to *V. cholerae* El Tor which seems to have completely replaced O139 serogroup of the previous outbreaks during the last decade. Continued monitoring and surveillance of all cholera outbreaks becomes a necessity.

**References**


