Vibrio cholerae O139 in Calcutta

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Abstract
Vibrio cholerae O139 was recovered from 28 of 79 children with acute watery diarrhoea. Clinically, they presented with watery diarrhoea (100%), vomiting (79%), abdominal cramps (61%), anorexia (61%), dehydration (100%), and absence of fever. Both clinical and blood biochemical parameters of these cases were similar to the illness caused by the new strain in adults. Hypoglycaemia was seen in 40% of those screened.

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The aetiological agent of several cholera-like outbreaks in the Indian subcontinent^{1 2} has been identified as *Vibrio cholerae* that does not agglutinate with O1 antiserum and hence was categorised as non-O1. Serological studies have established the clonal origin of the *V cholerae* non-O1 strains from diverse geographical areas and a new serogroup O139 with the synonym Bengal was created to accommodate these strains. *V cholerae* O139 Bengal, much like the O1 serogroup, produces large amount of cholera toxin which is unusual for a non-O1 serovar. During a large epidemic that occurred in Calcutta, 84% of the cases were adults and the clinical profile of the cases infected with the new epidemic strain led us to designate the disease as cholera.³ While cholera has been thought not to be a problem in children below 2 years of age, we recently documented that as many as 31% of hospitalised children with watery diarrhoea in an endemic area had cholera.⁴ During September to November 1993 we isolated *V cholerae* O139 from 28 cases in children and the present report deals with the clinical presentation of O139 cholera in children in Calcutta.

Subjects and methods

Children below the age of 12 years suffering from acute diarrhoea with no history of prior antibiotic treatment, admitted to the Infectious Diseases Hospital, Calcutta, between 0600 and 1300 hours, during the period September to November 1993, were selected and included in the study. Upon admission, history was obtained from the patients or their accompanying mothers or other relatives, followed by a thorough physical examination, and the findings were recorded in a specially designed form. The children were assessed and treated according to World Health Organisation (WHO) guidelines for management of cholera.

Table 1 Clinical features of 28 *V cholerae* O139 cases

	No (%)
Median (range) age in months	48 (2-96)
95% CI	36 to 66
Male:female	13:15
Watery stools	28 (100)
Median stool frequency/day	8
95% CI	5 to 10
Vomiting	22 (79)
Median preadmission duration of diarrhoea (hours)	9
95% CI	7 to 12
Abdominal cramps	17 (61)
Fever (>38°C)	0 (0)
Anorexia	17 (61)
Dehydration:	
None	0
Mild to moderate	10 (36)
Severe	18 (64)

CI=confidence interval.

Before any antibiotic treatment a faecal sample was collected from each child using a sterile rectal catheter into a sterile McCartney bottle and immediately sent to the laboratory. *V cholerae* was isolated following a standard procedure and serogrouped using the slide agglutination technique as described previously. Production of cholera toxin was determined by a highly sensitive bead-enzyme linked immunosorbent assay (ELISA).¹ A blood sample was also obtained on admission for estimation of concentrations of sodium, potassium, chloride, total carbon dioxide, urea, and glucose from a representative number of cases.

Results

A total of 79 cases of acute watery diarrhoea were screened of which 28 cases were bacteriologically and serologically confirmed for *V cholerae* O139 and this group constituted the study population. All the 28 strains of *V cholerae* O139 recovered from the same number of cases were found to produce cholera toxin by bead-ELISA. The children had watery stools (100%), vomiting (79%), abdominal cramps (61%), anorexia (61%), dehydration (100%), and absence of fever (table 1).

The results of estimation of serum electrolytes in 13 cases and the same of blood urea and glucose in the peripheral blood of 10

Table 2 Biochemistry results of *V cholerae* O139 cases (serum/blood)

	Mean (SD)	Normal range
Sodium (mmol/l)	140.8 (5.3)	138-145
Potassium (mmol/l)	4.7 (1.1)	3.4-4.7
Chloride (mmol/l)	106.3 (4.2)	98-106
Total carbon dioxide (mmol/l)	14.6 (5.3)	20-28
Urea (mmol/l)	6.2 (4.1)	1.8-6.4
Glucose (mmol/l)	4.4 (1.9)	3.3-5.5

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cases are shown in table 2. Four patients had hypoglycaemia.

All the children studied were successfully rehydrated with oral (oral rehydration salt solution using the WHO formula) and/or intravenous fluid and electrolyte (Ringer's lactate) solution. Eighteen children (64%) were given intravenous fluids. None of the cases died. The average hospital stay was 40 hours.

Discussion

Since September 1993, when the O139 cholera epidemic was waning, we isolated *V cholerae* O139 from 28 cases of 79 children screened. Lindenbaum *et al* reported that cholera in children is similar to that in adults.⁵ The clinical features and biochemical changes in the blood of children infected with *V cholerae* O139 were similar to that already reported by us for adults infected by the same serogroup³ and were indistinguishable from cholera caused by *V cholerae* belonging to the O1 serogroup. A notable exception, however, was the presence of abdominal pain in 61% of the cases which was higher than that observed in O139 cholera in adults (44%).³ Abdominal cramps observed in these cases could not be attributed to hypokalaemia because even after correction of electrolyte imbalances abdominal cramps persisted. Abdominal cramp is not an unusual

feature of cholera-like illness caused by the non-O1 serogroups of *V cholerae* and of cholera caused by *V cholerae* O139 in adults as previously documented by us.³ It is, therefore, suggested that the differential diagnosis of children presenting with cholera-like illness should include cholera caused by *V cholerae* O139. Further, presence of abdominal cramps should not exclude cholera caused by the new serogroup. Hypoglycaemia, a well recognised complication of acute diarrhoea including cholera in children,⁶ was seen in 40% of cases screened.

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