

Cholera in children in Karachi from 1990 through 1995: A Study of Cases Admitted to a Tertiary Care Hospital

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Abstract

Although cholera is an endemic disease in Bangladesh, India and other countries, it was never a significant cause of gastroenteritis in Pakistan before 1988. Since then, cases of cholera are identified each year, both in adults and children in Pakistan. In order to see the contribution of *Vibrio cholerae* as a cause of gastroenteritis in children, we reviewed the cases of cholera admitted in the pediatric ward of the Aga Khan University Hospital, Karachi, Pakistan. Of 4346 children hospitalized with gastroenteritis during 1990 through 1995, 348 children (8%) were confirmed to have cholera. The youngest child with cholera was seven days old. The mean age was 31 ± 34 months. The cases of cholera were received from all over the city. Most cases were due to *Vibrio cholerae* Ogawa biotype ELTOR but the new strain, i.e., *Vibrio cholerae* 0139 was isolated in 14% cases in 1994. The sensitivity of *Vibrio cholerae* has also changed. In 1994, the organisms were resistant to commonly recommended antibiotics, i.e., tetracycline, ampicillin and erythromycin but sensitive to ceftriaxone, cefixime, ofloxacin and nalidixic acid. Adequate measures to improve hygiene and sanitation and supply of safe potable water is needed to prevent any future epidemic of cholera in the city (JPMA 48:171,1998).

Introduction

Cholera is an endemic disease in many parts of the developing world including India, Bangladesh and other Asian countries¹⁻⁴. The International Center for Control of Diarrhoeal Disease Research Bangladesh (ICDDR) treats 10000 to 12000 cases of diarrhoea each year, of which 12-14% are due to cholera¹. Imported cases of cholera occur in developed countries sporadically. In 1988, 14 cases of cholera were reported from four European countries¹. In addition to endemic cholera, epidemics and pandemics also occur periodically leading to high morbidity and mortality. Epidemics of cholera occurred in 1991 and 1992 in Latin America including Peru, Brazil and Ecuador^{5,6}. The causative organism for the disease is *Vibrio cholerae* which was first isolated in 1883. In 1905, another biotype called ELTOR was isolated which was responsible for the major epidemic of 1961-62. in South East Asia. The ELTOR variety is equally pathogenic and the disease caused by it is also as severe as by classical *Vibrio cholerae*^{7,8}. The ELTOR variety entered India in 1964 and appeared in Chittagong in 1963 and in Dhaka in 1964 where it completely replaced classical type in 1973⁹. Serologically, two types of *Vibrio cholerae* are common i.e., Ogawa and Inaba. However, in 1991 a new serological variety was isolated in Bangladesh which was not typable with¹⁰ sera and was called as *Vibrio cholerae* Non 01 sera and was named as *Vibrio cholerae* Non 01, 0139, Bengal^{2,10}. Clinically, this variety is also similar to Ogawa and Inaba in its severity¹¹.

Later it was reported from India^{12,13} and Thailand¹⁴. *Vibrio cholerae* 0139 was also isolated in Pakistan in 1994 at our hospital¹⁵. In Pakistan cholera has been suspected as one of the major causes of outbreaks of gastroenteritis each year during the monsoon season but never confirmed bacteriologically. In 1988 only two cases of cholera were reported in adults from Mansehra¹⁶. Since, 1988, cases of cholera are encountered each year during and after the monsoon season and have been reported mostly

in adults. We have encountered cholera not only in children but also in newborns and infants, which is rather uncommon. Although there have been a few reports^{15,17} about cholera in adults from Pakistan, there is hardly any report published about cholera in children. At the Aga Khan University we are encountering cases of cholera in children since 1989, when only ten children were admitted with the diagnosis of cholera. The number of cases increased subsequently each year. Hence, we reviewed the cases of cholera in children admitted to the pediatric ward of the Aga Khan University Hospital in order to see: the trend of prevalence of cholera in this group over the years, the prevalence of various types of *Vibrio cholera* and its sensitivity to the antibiotics and if the cholera was confined to any specific area of Karachi.

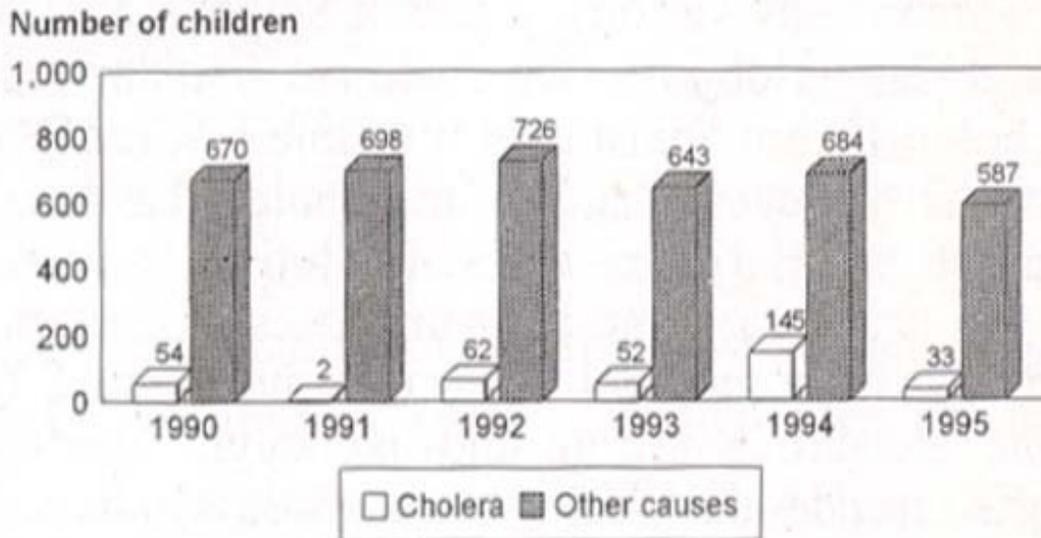
Subjects and Methods

All the children admitted to the pediatric ward with the diagnosis of gastroenteritis during 1990 through 1995 were included in the study. The stool samples of these children had been sent to the microbiology laboratory in Cary-Blair medium to isolate *Vibrio cholerae* in addition to the routine stool cultures. These stool samples were inoculated on Thiosulphate Citrate Bile Sucrose (TCBS) medium and incubated at 37°C for 24 hours. Any growth of flat colonies 2-3 mm in diameter were further subcultured on nutrient agar slope medium for oxidase test and alkaline peptone water media for motility. The suspected colonies on TCBS medium were confirmed using AP120E (Analytical Profile Index) strips. Agglutination tests were performed on all strains with standard *Vibrio cholerae* antisera ZM 05-07 prepared by Murex Diagnostics Limited Dartford England DAI 5LR.

The charts of the children admitted with cholera confirmed by stool culture during 1990 and 1994 were selected for detailed evaluation. These years were selected because in 1990 a good number of children were admitted with cholera for the first time at the Aga Khan University Hospital and 1994 was selected because of highest number of children admitted with cholera in 1994 during the past six years. Age, sex, date of admission, residences, degree of dehydration at admission, initial laboratory findings including hemoglobin, leucocyte count, platelet count and electrolytes were recorded. Type of *Vibrio cholerae* isolated and their sensitivity was also noted. The data so obtained was entered in the computer and analyzed using computer program EPI-Info version 6.02 WHOICDD October 1994.

Results

From January 1990 through December 1995, 4346 children were admitted with the diagnosis of gastroenteritis, of i.e., 145 (17% of children admitted with gastroenteritis) were admitted with cholera in 1994 (Figure 1).



Total number of children admitted = 4346
 Total number of children with cholera = 348 (8%)

Figure 1 Number of children admitted with cholera and other causes of gastroenteritis during 1990 through 1995.

This seasonal variations of admissions is shown in figure 2

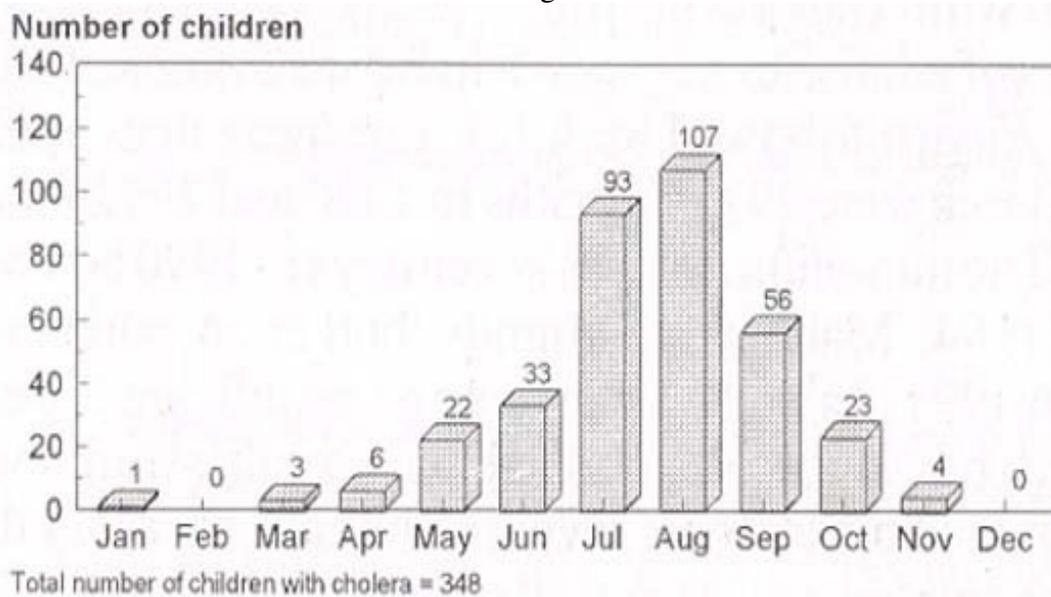


Figure 2. Number of children admitted with cholera in different months (cumulative) during 1990 through 1995.

(highest number being in August followed by July). The mean ages (\pm SD) of these children were 29 ± 35 months in 1990 and 27 ± 29 months in 1994. The minimum age was seven days in 1990 and was 27 days in 1994. Males were slightly higher in number than female in 1994 (Table I).

Table I. Children admitted with cholera during 1990 through 1995 in relation to age and sex

Age groups	Number of children						Total
	1990	1991	1992	1993	1994	1995	
≤1month	1	0	0	0	1	0	2
>1to 6 months	8	0	4	2	21	2	37
>6to 12 months	10	0	10	4	38	12	74
>1year to 2 years	14	2	15	16	31	11	89
>2 to 5 years	15	0	21	15	39	4	94
>5 to 10 years	3	0	6	12	11	4	36
>10 years	3	0	6	3	4	0	16
Total	54	2	62	52	145	33	348
Mean age±SD (Months)	29±35	12.2	38±40	44±39	27±29	21±19	31±34
95% Confidence interval	20-38	-	28-48	34-54	22-32	15-27	27-35
Sex							
Male	30	2	40	31	88	19	210
Female	24	0	22	21	57	14	138

There was no significant difference in hemoglobin, leucocyte count, platelet count, serum sodium, potassium and bicarbonate level in children admitted during 1990 and 1994 (Table II).

Table II. Admission characteristics of children admitted with cholera.

	1990	1994
Haemoglobin		
Mean±SD (gm/dl)	12.0±2.2	11.5±2.7
95% confidence interval	11.4-12.7	10.8-12.1
Total leucocyte count:		
Mean±SD (x10 ³ per uL)	17.6±7.6	17.7±7.9
95% confidence interval (x 10 ³ per uL)	15.4-18.7	15.7-19.7
Platelet count:		
Mean±SD (x10 ³ per uL)	597±210	210±210
95% confidence interval (x10 ³ per uL)	530-662	574-584
Plasma sodium:		
Mean±SD (meq/L)	134±6	133±6
95% confidence interval (meq/L)	132-136	132-135
Plasma potassium		
Mean±SD (meq/L)	4.2±4	3.6±0.8
95% confidence interval (meq/L)	3-5	3.4-3.8
Plasma bicarbonate		
Mean±SD (meq/L)	10±4	12.6±4
95% confidence interval (meq/L)	9-11	11.8-13.4

The children came from all over Karachi including slum areas with poor hygiene such as Azam Basti and Korangi and highly developed areas like Clifton and Defence society. The number of cases admitted from different areas of Karachi is shown in Figure 3.

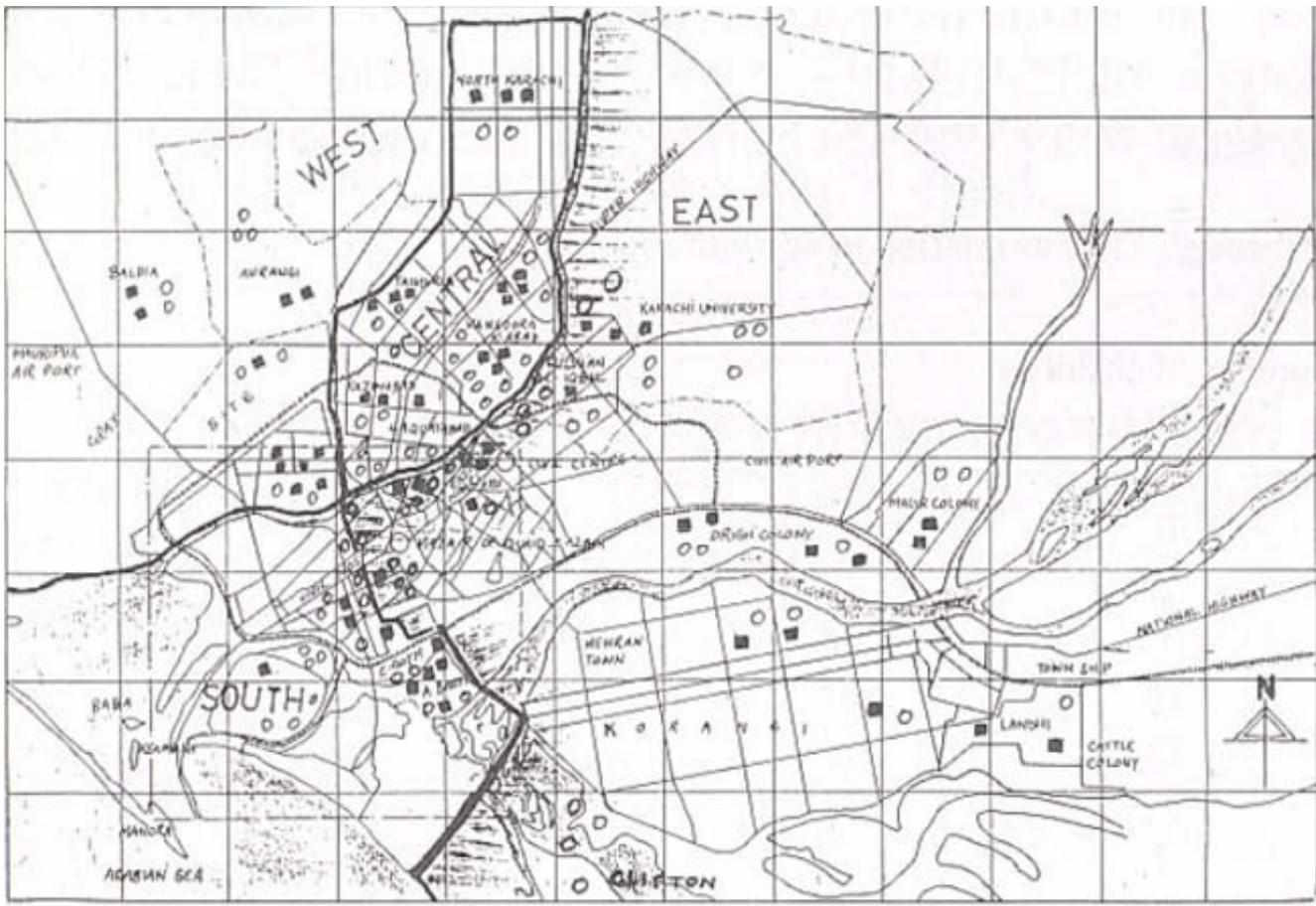


Figure 3. Children admitted with cholera and their residence during 1990 and 1994.

In 1990 all the isolates from stools were *Vibrio cholerae* biotype ELTOR but in 1994, 14% isoaltes were *Vibrio cholerae* 0139 type. Sensitivity of the organisms has also changed over the years. In 1990 all the isolates were sensitive to tetracycline, ampicillin and erythrocin but resistant to co-trimoxazole. In 1994, only 17% of all isolates were sensitive to tetracycline and 33% were . However, all the isolates in 1994 were sensitive to cefotaxime, ceftriaxone, cefixime, ofloxacin and nalidixic acid.

Discussion

Diarrhoea in children is still a major cause of morbidity and mortality in Pakistan. The common causes of childhood diarrhoea are viruses, various species of *Shigella*, *Salmonella*, *E. coli* and *Campylobacter*. We could not find any report of *Vibrio cholerae* from Pakistan in literature before 1988. The situation has however, changed and cholera has become a major cause of diarrhoea specially during the monsoon season. We are not getting as many cases of cholera as in Bangladesh, where cholera is an endemic disease but an annual prevalence of 8% in our study is enough to qualify it for labelling as an endemic disease. As diarrhoea is more common in children less than five years of age, same trend was seen in cholera as well. However, it was unusual to see cholera in an infant as young as a seven days. Since a significant mortality can be expected in cases of cholera in a country where adequate health facilities are not available to the general population, preventive steps are more important. Hence adequate precautions in terms of improved hygiene and sanitation and supply of clean potable water is very important to prevent gastroenteritis and avoid cholera. Another significant cause of worry is that even the new strain, i.e., *V. cholerae* 0139 Bengal was isolated here. This shows a rapid transmission of

the *Vibrio cholerae* from one country to another. Since the cases of cholera were received from different areas of Karachi including well developed localities such as Clifton and Defence society, it cannot be attributed only to poor hygiene. Perhaps the water delivery system of the whole city is contaminated with the organisms. *Vibrio cholerae* has the nature of disappearing during non-epidemic seasons and reappearing during the monsoon season. Thus, it remains dormant during non-rainy season of the year¹⁸. We have also noted the same periodicity in our study as most of the cases were identified during May to October each year.

Treatment of cholera is mainly prompt rehydration and not antibiotic therapy. Antibiotics may reduce the transmission of the organisms from patient to contacts. The antibiotics which are recommended for use in cholera include tetracycline and furazolidone¹⁹. However, the sensitivity of organisms has changed over time. The organisms are now resistant to tetracycline, co-trimoxazole and ampicillin and sensitive to third generation cephalosporins, ofloxacin and nalidixic acid. Hence if any antibiotic is to be used then nalidixic acid seems to be the antibiotic of choice at present for children in Karachi.

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