

BRIEF REPORTS

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THE EARLY STAGE OF THE RECURRENT CHOLERA EPIDEMIC  
IN LUANDA, ANGOLA

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The recurrent cholera epidemic in Angola has been occurring in the rainy hot season since 1987. About 350 cases were registered in the Luanda province in the first quarter of 1992. Out of 110 analysed cases, 13 were positive for *V. parahaemolyticus* and 57 were positive for multiresistant *V. cholerae* O1. Such strains were also isolated in the Bengo river, which feeds the Luanda water supply.

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When the current cholera pandemic reached Africa in the early seventies, the first epidemic affected Angola, causing 2453 cases and 117 deaths in four years (1971-1975) (4).

In April 1987, a new outbreak started in the northeastern part of the country, an area of the epidemic cholera belt of Austral Africa which also includes Zambia, Malawi and Mozambique. Eventually, cholera spread throughout the 18 Angolan provinces. The disease is still spreading and in the past 5 years there have been 66,022 cholera cases and 4310 deaths, according to data furnished by the Angolan Ministry of Health to the World Health Organization (WHO) (6, 7, 8, 9, 10).

About 90% of these cases appeared in the six coastal provinces (Zaire, Bengo, Luanda, Cuanza Sul, Benguela, Namibe), where 34% of the Angolan population (estimated to be 9 million) lives.

The epidemic recurs in a strict seasonal pattern, characterized by a cryptic or endemic stage during most of the year with an epidemic stage in the hot

rainy season that lasts from January to June. The number of cases begins to rise in March, peaks in April-May, and decreases in June (B.D. Ferreira, D.N.S.P., unpublished report).

Laboratory data up to 1991 show that the prevalent epidemic strains have been *Vibrio cholerae* O1 El Tor, serotype Ogawa, with an increasing, and often multiple, resistance to ampicillin, tetracycline, cloramphenicol, sulfonamide, trimethoprim, and erythromycin (1).

In the first 12 weeks of 1992, about 350 cases and 15 deaths were registered in the Luanda province from an estimated population of 1.7 million. Cholera cases were clinically defined according to WHO guidelines: any patient above the age of 2 years with acute watery diarrhoea in an area where there is an outbreak of cholera (11).

During the first 7 weeks of the year, the epidemic trend showed 10-20 cases a week, with 2 deaths; the rate increased to 76 cases and 13 deaths by the 12th week after the beginning of the rainy season.

During this period a total of 110 cases, all of whom were adults suffering from acute watery diarrhoea and

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severe dehydration, were admitted to the cholera unit of the J. Machel Central Hospital of Luanda and were submitted to microbiological examination. Stool samples and/or rectal swabs were obtained, enriched in alkaline peptone water and selenite broth and subcultured on TCBS (thiosulfate-citrate-bile-sucrose), SS (Salmonella-Shigella) and MacConkey agar. Pathogenic bacterial strains were preliminarily identified on Kligler iron agar, and by the E API test (bioMérieux). *V. cholerae* was serotyped by specific antisera.

Drug sensitivity tests were performed routinely, using a disk diffusion technique in Mueller-Hinton agar. The results are shown in Tables 1 and 2.

Only 57 samples were positive for *V. cholerae* O1; other vibrios were identified in 16 samples, among which *V. parahaemolyticus* was prevalent (13/16). In one sample *E. coli* EPEC was isolated.

It should be emphasized that the Inaba serotype was prevalent among *V. cholerae* O1, whereas in an analogous screening carried out in 1988 (1), all 164 strains examined were Ogawa serotype.

All were multiresistant to drugs, and on the basis of this it was possible to identify two epidemic strains of *V. cholerae* O1. The most common showed a prevalent profile of resistance to penicillin, streptomycin, cotrimoxazole, kanamycin, ampicillin and cloramphenicol.

A second strain was characterized by resistance to penicillin, streptomycin, cotrimoxazole, erythromycin and tetracycline. The presence of this strain increased from 6% in the first two months of the year to 24% during the third month of the epidemic (total 19% of the strains examined). It should be mentioned that doxycycline, an analog of tetracycline with the same resistance mechanism, is utilized routinely for the treatment of cholera patients.

Multiresistance of *V. cholerae* O1 is not surprising, and such strains have been isolated worldwide in the last few years (2, 3, 5). Moreover, in a previous study on the intestinal flora of 117 children under observation for diarrheic conditions, we isolated and identified pathogenic and non-pathogenic enterobacteria resistant to tetracycline in 65% of the cases and multiresistant to drugs in 100% of the cases (manuscript in preparation).

To study the environmental factors involved in the dynamics of the outbreak, the presence of vibrios in the water of the Bengo river was investigated. This water is either pumped into the Luanda pipe system and treated for human consumption, or loaded into trucks and distributed to the urban population after a rough disinfection by chlorination whose effectiveness is disputable. About 3000 people are settled in the area 14 km upstream of this water pumping station. Twice a week water samples were collected and examined by membrane filtration on millipore filters (0.47 µm pore size), then cultured on TCBS agar plates. We found in all the examined samples more than 100 vibrios per liter. *V. cholerae* O1, serotype Inaba was identified, and it showed the resistance profile of the epidemic strain most commonly isolated from patients. *V. cholerae* in the river was also reported by Medecins sans Frontières (E-B) in April 1988 (unpublished report).

TABLE 1. - *Vibrio spp.* isolated from 110 patients suspected of cholera infection in Luanda province in 1992.

<i>V. cholerae</i> O1, Inaba .....	56
<i>V. cholerae</i> O1, Ogawa .....	1
<i>V. cholerae</i> non O1 .....	1
<i>V. parahaemolyticus</i> .....	13
<i>V. mimicus</i> .....	1
<i>V. vulnificus</i> .....	1
Negative .....	37 <sup>1</sup>
TOTAL .....	110 <sup>1</sup>

In 1 case *E. coli* EPEC was isolated.

TABLE 2. - Drug resistance of *Vibrio* strains. Penicillin (PEN), streptomycin (STR), cotrimoxazole (CTX), kanamycin (KAN), ampicillin (AMP), cloramphenicol (CAM), rifampicin (RIF), erythromycin (ERI) and tetracycline (TET).

STRAIN	PEN	STR	CTX	KAN	AMP	CAM	RIF	ERI	TET	
<i>V. cholerae</i> O1	57	56	54	53	52	56	44	10	8	11
<i>V. cholerae</i> non O1	1	1	1	1	1	1	1			
<i>V. parahaemolyticus</i>	13	13			2					
<i>V. mimicus</i>	1	1	1		1					
<i>V. vulnificus</i>	1	1	1	1						

We can conclude that the present recurrent epidemic, in comparison with the past, is characterized by the shift of the prevalent serotype of *V. cholerae* O1 from Ogawa to Inaba. Multiresistance is definitely a permanent feature and if resistance to tetracycline continues to increase, and such resistance becomes prevalent, antibiotic treatment of cholera cases in Angola will be problematic.

Moreover we found that at least 11% of all the clinically diagnosed cholera cases involved milder strains of vibrios, therefore the mortality rate for *V. cholerae* should be higher than the official figures, which include the milder cases.

In Luanda, it appears that the Bengo river is one of the most important sources for the diffusion of cholera in the outbreaks.

The present cholera epidemic in Luanda will be monitored until the end of the epidemic season; molecular characterization and plasmid content of the strains will be investigated.

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