

# OUTBREAK OF GASTROENTERITIS IN DIFFERENT AREAS OF PAKISTAN

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## Abstract

Outbreak of acute gastroenteritis occurred during July to August, 1988 in districts of Mansehra, Swat and Muzaffarabad. Thirty cases, clinically diagnosed as cholera, were investigated. On examination, 22 (73.3%) cases were bacteriologically confirmed as cholera due to *V. cholerae* Eltor, ogawa. All strains were sensitive to chloramphenicol (JPMA 39:151, 1989).

## INTRODUCTION

The Eltor biotype discovered in 1905 caused four outbreaks in Celebes (Indonesia) in 1937-38, 1939-40, 1944 and 1957-58. In 1961-62 Eltor caused major epidemics spread throughout Southeast and South Asia, then westward<sup>1</sup>. Since then Eltor biotype has not only swept previously uninfected areas but has also displaced the classical biotype from the Ganges river basin, where it remained endemic and epidemic until 1972<sup>2</sup>. The global cholera problem at present is almost exclusively caused by the Ogawa and Inaba serotypes of Eltor biotype of *V. cholerae* 01, though cases due to classical biotype still occur in Bangladesh<sup>3</sup>. The Eltor biotypes have greater "endemic tendency" than classical vibrio because higher infection-to-case ratio and longer survival in the environment<sup>4</sup>. The endemicity of *V. cholerae* is not known but sporadic cases of gastroenteritis due to these organisms were seen in both children and adults in different parts of the country. An outbreak of *V. cholerae* Eltor ogawa was also reported in the District Mansehra in 1986<sup>5</sup>. This study presents the results of investigations of the outbreaks of gastroenteritis during July to August, 1988 in different areas of Pakistan.

## CLINICAL AND EPIDEMIOLOGICAL INFORMATION

During July to August, 1988, outbreaks of gastroenteritis were reported from districts of Mansehra and Swat in North West Frontier Province (N.W.F.P.), Muzaffarabad in Azad Kashmir and Rawalpindi in Punjab. An increasing number of cases of gastroenteritis resembling cholera with the general complaints of watery diarrhoea and vomiting were reported in the month of July, 1988 in district Mansehra; 198 such cases were admitted in district headquarter hospital Mansehra, including 90 children and 108 adults. About 50 children had rice watery stools. Six children and two adults expired, while the rest were successfully treated. In the second week of August, 1988, increasing number of cases reported to Saidu Group of hospital, Swat, Bunir and Saidu Sharif subdivision of district Swat. In the third week of August, cases of gastroenteritis were reported from the villages Athmuqam, Dangli, Bagloota and Garrhi dopatta areas of Muzaffarabad district. In the same week gastroenteritis cases were also reported in and around Rawalpindi area. In all the above men- areas, cases were seen both in children and adults, Isolation procedures but generally gastroenteritis affected the adults. In total 30 patients were investigated of which 20 were males and 10 were females. All the patients presented with moderate to severe dehydration, watery diarrhoea of whitish or yellow colour of 1-3 days duration and vomiting. Severe dehydration and shock were seen in some cases. Few patients also complained of abdominal cramps. Fever (37-38°C) was seen in some cases. Stool was characteristically rice watery

and had varied frequency from 5-15/day and vomitus 2-5/day was seen in some patients. The faecal specimens from active cases of gastroenteritis and water samples from the diseased area were brought to the laboratory for the investigation of aetiological agent of this outbreak.

## **MATERIALS AND METHODS**

### **Collection or Specimens**

#### **Faeces**

Faecal specimens of 30 patients were investigated for causative agent of the outbreaks. The specimens collected in Cary-Blair and alkaline peptone water (pH 8.6) were sent to our laboratory for microbiological analysis. Samples were processed immediately after arrival.

#### **Water**

Twelve water samples were collected in sterilized containers from different water sources of the infected areas for possible bacteriological examination.

### **Laboratory Investigations**

#### **Faeces**

Faecal specimen was analysed for enteric pathogens according to methods described in "WHO Manual for Laboratory Investigation of Acute Enteric Infections"<sup>4</sup>. The brief outline is given as follows:

##### **1) Microscopic examination**

Saline and iodine preparations examined for parasites.

##### **ii) Bacteriological analysis**

Faecal specimens examined for the presence of *Escherichia coli*, *Salmonella*, *Shigella*, *Vibrio cholerae*, *Campylobacter* and *Yersinia enterocolitica*. MacConkey agar plate was used for *E. coli*, *Salmonella* and *Shigella* species. Faecal sample was also inoculated on Thiosulphate citrate bile salt sucrose agar (TCBS) for *Vibrio cholerae* and Butzler's agar plates for *Campylobacter*. *Yersinia* selective agar base was used for *Yersinia enterocolitica*. Subcultures were made from selenite broth and alkaline peptone water on salmonella shigella agar (SSA), and TCBS respectively. *Yersinia* selective agar base plate was incubated at 32°C while Butzler's agar plate was kept at 43°C. All other plates were incubated at 37°C.

#### **Identification**

The suspected colonies were identified on the above mentioned media and characterized by using special differential media, e.g., triple sugar, iron agar or through a combination of standard biochemical tests. API 20E rapid system was also used where required. The following specialized determinations<sup>5</sup> were made after preliminary identification.

##### **i) Salmonella/Shigella**

Serovarieties were determined by slide agglutination with specific antisera (Difco).

##### **ii) Enterotoxigenic E.coli**

Four lactose fermenting colonies (after biochemical identification) were examined for enterotoxin production (LT and ST).

##### **iii) Enteropathogenic E.coli**

Sero-groups were first determined by polyvalent and monovalent OK antisera (Difco). The 'O' serogroup was confirmed by tube agglutination test using heated suspension and specific monovalent antisera.

##### **iv) Vibrio cholerae**

Slide agglutination test with polyvalent 01, Inaba and Ogawa antisera (Difco) were done. Haemolysin test was also performed for biotyping of *V. cholerae* (ELTOR).

##### **v) Campylobacter**

Hippurate hydrolysis and other biochemical tests were performed.

##### **vi) Virological examination**

Virological investigations were carried out by Electron Microscopy<sup>6</sup>.

#### **Antibiotic Sensitivity**

Antibiotic susceptibility test of *V. cholerae* isolates' was done by Kirby-Bauer method<sup>6</sup> against chloramphenicol, tetracycline, Co-trimoxazole, Amoxil, Furoxone and Streptomycin.

#### **Water**

Water samples were analysed according to WHO criteria, for the presence of coliforms and other pathogenic organisms<sup>7</sup>. Coliforms were detected by multiple-tube method in which measured volume of sample was inoculated into a series of tubes containing MacConkey broth with Durham tube. The 10 ml volume of water was added to the same quantity of double strength medium (5 tubes). One set of five tubes each containing 5 ml of single strength broth were inoculated with 1ml volume of water and the other set of five tubes were inoculated with 0.1 ml volume of water. After incubation at 37°C for 24-48 hours acid and gas positive tubes were counted and most probable number (MPN) of coliforms were obtained. The samples were also examined for the presence of vibrio, salmonella and shigella organisms.

## **RESULTS**

The distribution of cases during outbreak of acute gastroenteritis in the 4 districts is shown in Table 1.

**TABLE I. Pathogens recovered from Faecal specimens of the patients from diseased area.**

Diseased area	Month of out break	No. of cases examined n = 30	Cases positive for <i>V. cholerae</i> Eltor Ogawa
Mansehra	July	9	8 (26.6%)
Swat	August	7	4 (13.3%)
Muzaffarabad	August	9	5 (16.7%)
Rawalpindi	August	5	5 (16.7%)
			22 (73.3%)

**Note: Figures in parenthesis indicate percentage.**

Districts Mansehra and Muzaffarabad were the most affected areas, followed by Swat and Rawalpindi areas. The fatality rate in the patients admitted in District headquarter hospital of district Mansehra was 4%. This table also presents the results of bacteriological investigations of 30 faecal samples from the hospitalized cases. The overall isolation rate of *V. cholerae* was 73.3%. All the strains isolated belonged to Eltor biotype Ogawa. One sample of vomitus from Muzaffarabad was also positive for the same *V. cholerae* biotype. The water samples from the diseased area of Muzaffarabad did not yield any *V. cholerae* Eltor biotype (Table II).

**TABLE II. Bacteriological Analysis of water collected from District Muzaffarabad.**

Source	Area	Total Samples examined	Results
Well	Bagloota	6	1609 <sup>+</sup> /100ml
Not Mentioned	Malsi, Holian Sani Kot (Garrhi Dopatta)	3	1609 <sup>+</sup> /100ml
Tap. Spring,	Shahkote,	3	1609 <sup>+</sup> /100ml
Tank	Chowa Guttli		

However, a heavy growth of coliform (1609 +/-100ml) in these samples indicates the contamination of water sources which can act as a source of diarrhoeal agents. The antibiotic susceptibility of all the 22 strains of Eltor is shown in Table III.

**TABLE III. Antibiogram of V.cholerae Strains isolated during the outbreak. n = 30**

Antibiotics	Sensitive	Resistant
Chloramphenicol	22 (100%)	0
Tetracycline	21 (95%)	1 (5%)
Co-Trimoxazole	17 (77%)	5 (23%)
Amoxil	16 (73%)	6 (27%)
Streptomycin	6 (27%)	16 (73%)
Furoxone	7 (23%)	15 (77%)

All the strains were found sensitive to chloramphenicol. 95% of strains were sensitive to tetracycline; followed by co-trimoxazole (77%), and Amoxil (73%). The resistance against furoxone and streptomycin was high.

## DISCUSSION

The findings in the present studies suggest that the increasing incidence of Eltor ogawa cholera in the different areas of N.W.F.P. and Punjab is of significant public health importance. The clinical course of the disease in all cases present typical cholera like picture and the outbreak caused panic in local population. Similar outbreak caused by Eltor ogawa in District Mansehra in 1986<sup>5</sup> suggests possible endemic tendency of Eltor ogawa in this area. In 1988 outbreaks extended to the districts of Swat of N.W.F.P., MuzalFarabad of Azad Kashmir and Rawalpindi of Punjab.

The aetiological relationship of V.cholerae biotype Eltor ogawa is established by 73 percent isolation rate from the hospitalized cases of acute gastroenteritis. The age and sex distribution of the cases did not show any significant finding. The outbreak was proceeded by wide spread rainfall in these districts in the early part of the month of outbreak. The ogawa serotype was the only aetiological agent (73.3%) found responsible for this outbreak and this is similar to study reported earlier<sup>5</sup>. Eltor ogawa serotype was also the major causative agent (87.5%) in an outbreak reported from Manipur India.<sup>7</sup> These findings suggest the endemic tendency of Eltor ogawa in these particular geographical locations. The source of infection and spread might be a human carrier, which is the main source of spread of Eltor cholera infection<sup>8</sup>. It is possible that carriers might have contaminated rivers, streams and other water sources. Majority of the people in these areas do not get proper drinking water supply and hence depend on river, stream and pond water for drinking and other domestic purposes. The water samples of the diseased area of Muzaffarabad did not yield V.cholerae but they were heavily contaminated with coliform bacteria (1609+/100ml) which is an indicator of faecal pollution and could be a source of diarrhoeal agent.

All possible measures should be taken to supply safe drinking water in order to minimize the outbreaks of gastroenteritis. All the 22 strains of Eltor were found sensitive to chloramphenicol (100%), Tetracycline (95%), Co-trimoxazole (77%) and Amoxil (73%). Similar type of results were reported in another study from India<sup>7</sup>. The resistance against furoxone and streptomycin is found in this study.

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