CHOLERA OUTBREAK IN A VILLAGE OF KOLAR DISTRICT, KARNATAKA: LOST OPPORTUNITIES FOR PREVENTION?

E K DEEPA*, S R PRASAD, C.MUNINARAYANA

ABSTRACT

Outbreaks of diarrhoeal diseases are still public health emergencies in India. We investigated an outbreak of acute diarrhoeal illness in a remote village of Kolar district, Karnataka, India, to understand the epidemiological features and identify the aetiological agent. The investigation team visited the affected area and collected the epidemiological data, rectal swabs and water samples. A total of 47 cases were reported from Hosahudya village with an attack rate of 13.4% and two deaths. Nearly 83% of the cases were in the age group of 19-65 years. Epidemic curve showed bimodal distribution of cases with an initial cluster followed by a second peak. Four of the thirteen samples, collected from patients, yielded *V.cholerae*, biotype El Tor, serotype Ogawa. All the strains were found to be resistant to Co-trimoxazole and Nalidixic acid. They were sensitive to Ampicillin, Doxycycline, Ciprofloxacin, Norfloxacin and Gentamicin. The presumptive coliform counts on water samples indicated faecal contamination. We recommend timely administration of prophylactic antibiotics to the household contacts of acute gastroenteritis patients, in accordance with the sensitivity pattern of local strains, which might have prevented this outbreak from occurring. Measures to check the integrity of the water supply system, examination of water for contamination with faecal matter from time to time and instituting corrective measures are also essential to prevent such outbreaks. (J Acad Clin Microbiol 2010; 12(1): 19-28)

Keywords: cholera, outbreak, attack rate, chemoprophylaxis

INTRODUCTION

Cholera continues to be an important public health problem in India resulting in considerable morbidity and mortality; however, cholera cases are usually under-reported. [1,2] Several studies conducted on focal outbreaks have identified the responsible factors like lack of clean water, poor sanitation, overcrowding, as well as poor personal and domestic hygiene. [3] We describe, here, an explosive outbreak of cholera in a remote village of Kolar district, Karnataka. The investigation was undertaken to understand the epidemiological features of the outbreak and identify the aetiological agent.

MATERIALS AND METHODS

Hosahudya is a village with a population of three hundred and fifty. It is situated in

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Srinivaspura taluk of Kolar district, Karnataka State, bordering Mandanpalli of Andhra Pradesh State, in South India. The investigation team visited the affected and surrounding villages on hearing about the outbreak. The epidemiological data regarding morbidity, mortality and other details were collected from the records maintained in the Primary Health Centre at Kuregepalli. The patients with diarrhoea were interviewed, and clinical examination was done. A representative sample comprising of twelve rectal swabs and one stool sample were collected from both domiciliary and hospitalised patients in alkaline peptone water, transported at room temperature and cultured for *Vibrio cholerae* using standard methods.[4] Three water samples were collected from household taps from three different points in the village with standard precautions and transported to the laboratory on ice. Presumptive Coliform test was done (Table 2). Environmental survey was done to find out the reasons of the outbreak.

RESULTS

The outbreak of gastroenteritis was reported from the village Hosahudya on 16th June 2005. A total of 47 cases confined to the village were reported. The attack rate of diarrhoea was 13.4%. Out of 47 cases, two patients expired, amounting to a case fatality rate of 4.2%. The distribution of cases according to age and sex is presented in Table 1. Nearly 83% of the cases were in the age group of 19-65 years and almost equal distribution of the cases was observed among males and females.

The epidemic curve is shown in Fig.1. The first case (index case) was an old man who developed watery diarrhoea and vomiting on returning home after visiting a village in the neighbouring Chintamani taluk. Subsequently, four to five days after his illness, his 65 yr old sister and four of his neighbours developed severe watery diarrhoea. Later on, after a gap of one week, 38 people developed symptoms; the peak was on 16-06-05.Thus the transmission showed bimodal distribution. Initial cases were spatially clustered around the index case indicating person-to-person transmission. Later, there was an explosive outbreak, suggestive of a common source of infection.

All the cases presented with acute watery diarrhoea resembling cholera with or without vomiting. Out of the forty-seven patients with diarrhoea, 13 (27%) had severe dehydration requiring hospitalisation. Two male adults aged 90 years and 26 years expired due to gastroenteritis.

V.cholerae, biotype El Tor, serotype Ogawa was isolated from four (30.76%) of thirteen samples collected. All the strains were found to be resistant to Co-trimaxazole and Nalidixic acid; they were sensitive to Ampicillin, Doxycycline, Gentamicin, Ciprofloxacin, and Norfloxacin.

All the three water samples collected from the household and public taps, tested by multiple tube fermentation test, yielded *Aeromonas* species, coliforms: *Klebsiella* and *Enterobacter* species indicating faecal contamination, making it unsatisfactory for human consuption.

DISCUSSION

The outbreak reported here was explosive and occurred in a remote village; no cases were reported from any of the neighbouring villages. The attack rate was 13.4% and case fatality rate was 4.2%, both of which were significantly higher than that

reported from other outbreaks. [1,5] Phukan *et al* reported an attack rate of 11.6% which is similar to that found in the present study, however, the case fatality rate in their study was 0.8% which was low.[6]

In the present study most of the cases were adults (83%) similar to that seen in a localised outbreak reported by Sur *et al*,[5] while other studies have documented a sizeable proportion of cases among children.[6,7] Thus there appears to be considerable variation in the age groups (Fig. 1) involved, attack and case fatality rates during outbreaks of cholera. These may depend on the conditions of spread and the availability of health facilities.[3] The equal distribution of cases between sexes observed in this study has also been reported by others during outbreaks of cholera. [6,7]

We observed bimodal distribution of cases in this outbreak. Cholera spreads easily among close contacts; [8] this explains the initial clustering of cases seen around the index case. The second peak was highly explosive: on a single day, thirty eight people developed diarrhoea, which involved the entire village suggestive of a common source of infection. The time interval between the initial cluster of cases and the subsequent outbreak was 7-8 days which fits the incubation period of cholera, indicating that these episodes were temporally related. Thus there could have been contamination of water supply to the village by the faecal matter of the initial cluster of cases accounting for the outbreak.

The water supply to the village was from two bore-wells and the water was distributed through pipes. It was noticed during the survey that a pipe carrying water to the village from one bore-well was broken for the past one and a half months; there were pools of water around the place of disruption, due to leakage. It is possible that people with diarrhoea during the first episode may have used the water in these pools for ablutions after defaecation. The contaminated water might have got sucked into the water supply pipe due to back siphonage. We found thermo-tolerant coliforms in the drinking water from the piped water supply of the village. These observations indicate breakdown in sanitation and supply of contaminated water, which explains the explosive outbreak of the disease.

The epidemic of cholera reported here illustrates the genesis and development of the epidemic in an isolated village. Our observation of bimodal distribution of cases may also be true with other isolated rural outbreaks. This pattern seems to present a window of opportunity for prevention. Prophylactic administration of Doxycycline or Norfloxacin to the close contacts of the index case would have prevented the initial cluster of cases.[9] Severe watery diarrhoea in an adult amply defines a case of cholera and one need not wait for laboratory confirmation.[10] Following the initial cluster of cases, survey of water distribution system and prompt correction of leaking pipes along with chemoprophylaxis among close contacts might have also prevented the second peak of the outbreak.

The onus of prevention of cholera in villages seems to rest mainly on the health team of the primary health centre, and the local administration.[11] Safe water supply should not mean just providing a tube-well to the village. It should include survey, prompt repair of pipes and upkeep of safe water supply. These measures are more easily taken up in rural areas, than towns and cities.[10] Preventive measures, instituted promptly, may stem village epidemics of cholera.

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Table - 1 : Age & Sex-wise distribution of cholera cases

Age Group (Yrs)	Male		Female		Total	
	No	%	No	%	No	%
0-18	1	4.35	2	8.33	**3**	**6.38**
19-45	14	60.87	15	62.50	**29**	**61.70**
46-65	6	26.09	4	16.67	**10**	**21.28**
=66	2	8.70	3	12.50	**5**	**10.64**
Total	23	100.00	24	100.00	**47**	**100.00**

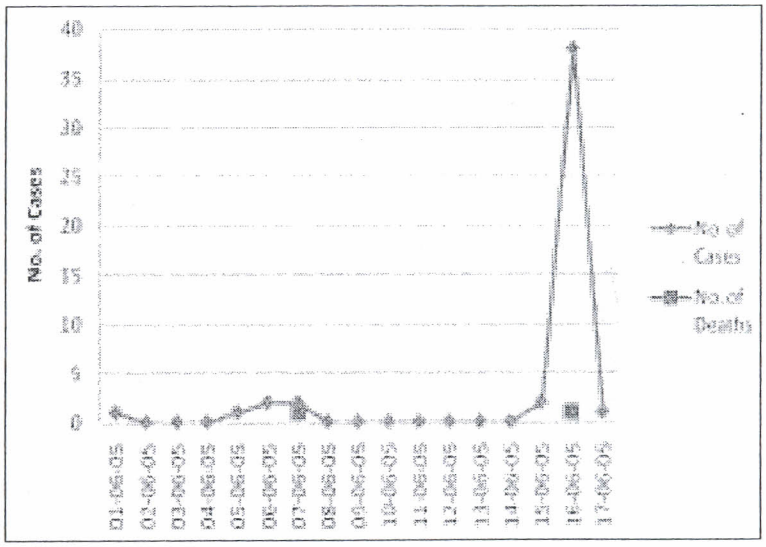
Table 2: Results of the analysis of water samples collected from community

Sample	50 ml (1 tube) + 50 ml Sample	10 ml (5 tubes) + 10 ml Sample	5 ml (5 tubes) + 1 ml Sample	**Presumptive Coliform count /1000 ml
Sample 1	1*	5	1	35
Sample 2	1	4	0	13
Sample 3	1	5	0	25

* Tube showing acid and gas

** According to McCrady's probability table.

Figure 1. Epidemic Curve



Incidence of mortality associated with cholera during the outbreak