



Cholera outbreak in a village in south India – Timely action saved lives

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Summary Cholera remains a public health concern in developing countries because of its high morbidity and mortality. This study was designed to assess the magnitude of and factors responsible for an outbreak in a South Indian village and to implement measures for containing and preventing the recurrence of such outbreaks. Data was obtained by surveying households in the village to identify cases and assess factors responsible for the outbreak. A sanitary survey of the water supply system was performed to identify the cause of the outbreak. Preventive measures were implemented by setting up a rapid response team to manage cases and provide safe drinking water and health education regarding the prevention of such outbreaks. A total of 73 cases were reported during the outbreak, an attack rate of 17.5%. Attack rates were similar among males and females, and the highest rates were observed among the elderly (33.3%), while the lowest rates were observed among adults (14.7%). There were no deaths reported due to cholera in the village. Most households (81%) surveyed did not use any method of water purification, 79.7% practiced open field defecation and 58.2% practiced inadequate hand washing, indicating poor sanitary practices. Cases were most commonly observed in houses which did not practice any method of water purification ($p < 0.001$) and among people living below the poverty line ($p = 0.02$). Despite the high attack rate, no deaths were reported, largely thanks to timely medical and preventive interventions.

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Introduction

Cholera remains a global threat to public health and a key indicator of a lack of social development

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[1]. Cholera outbreaks typically occur in developing countries that lack access to safe drinking water and proper sanitation [2]. More than 150 years after John Snow famously removed the water pump handle in London, outbreaks of cholera continue to be reported worldwide. In the year 2008, the World Health Organization (WHO) registered a total of 190,130 cases, including 5143 deaths, with a case-fatality rate of 2.7% [3]. In the Asian region, the Indian subcontinent continues to harbor a major percentage (78%) of the cholera cases. Outbreaks of cholera, including major epidemics, have occurred repeatedly in various places in India [4–8].

The availability of potable drinking water for a large proportion of the Indian population is a major public health concern [9]. Ageing subterranean pipelines with multiple breakages are a common phenomenon in India. In addition, in many parts of India with a piped water supply system, water pipes and sewage channels are laid beside each other, possibly for engineering convenience [9,10]. Cholera outbreaks have resulted in deaths in India when there is delay in the diagnosis and treatment of cases [6,11]. Therefore, an outbreak investigation was conducted when a cholera outbreak occurred in the village Chikkapura to assess the magnitude of and the factors responsible for the outbreak and to implement suitable medical and preventive measures for containing and preventing the recurrence of such outbreaks.

Methods

Case definition

The definition of cholera is “any person 5 years of age or older in whom severe dehydration develops or who dies from acute watery diarrhea; caused by *Vibrio cholera*” the age limit can be lowered to 2 years for cases associated with confirmed cholera outbreaks, as recommended by the WHO [12].

Epidemiological data collection

A cross-sectional study was performed in a rural area called Chikkapura, Kolar district, Karnataka, South India. On the 15th of February 2010, our index case, a 38-year-old pregnant mother from Chikkapura, Kolar, presented with acute gastroenteritis to R.L. Jalappa Hospital, Kolar. She reported that many others in the village were suffering from similar complaints and seeking treatment from various hospitals. A stool culture of the patient grew *Vibrio cholerae*, Ogawa serotype. A rapid survey of the

village was conducted by a team of doctors using a structured questionnaire. A house-to-house survey was performed to collect basic demographic information, including socioeconomic status, to identify cases with diarrhea and vomiting and to obtain detailed epidemiological information. The questionnaire contained information regarding the date of diarrhea onset, associated symptoms and nature of treatment undertaken. Residents were also questioned about food eaten outside the home in the week preceding the illness, their history of travel outside of the village and similar illnesses in other family members in the preceding week. The questionnaire also inquired into the source of drinking water, the method of drinking water purification, hand washing practices and the use of sanitary latrines for individual households. Stool samples were collected from five active cases to confirm the diagnosis. An area map of Chikkapura was drawn, and houses with cases were identified. The village was declared free of cholera when twice the incubation period, i.e., 10 days, had elapsed since the death, recovery or isolation of the last case.

Families were classified as below the poverty line (BPL) or above the poverty line (APL). BPL for rural areas in India is based on the degree of deprivation with respect to 13 parameters, with scores from 0 to 4: landholding, type of house, clothing, food security, sanitation, consumer durables, literacy status, labor force, means of livelihood, status of children, type of indebtedness, reasons for migrations and a family of five spending less than Rs 3905. Accordingly, families having less than 15 marks out of a maximum of 52 marks were classified as BPL, and the remaining families were classified as APL families [13].

Sanitary inspection of the water supply system

The source of the water supply, which was a borewell, a pipeline from the borewell to an overhead tank, valves, and a pipe system supplying the houses, was inspected. Water samples were taken from the borewell, tank, stand post, from a house where water is stored and from tankers temporarily supplying water. Water samples were tested for presumptive coliform counts and for the presence of *V. cholerae* using standard methods.

Key informant interviews

Interviews were carried out with the treating medical officer, a female junior health assistant, a health worker from the village, the Gram panchayat

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