EPIDEMIOLOGICAL LESSON LEARNT: DIARRHEA OUTBREAK INVESTIGATION IN A REMOTE VILLAGE OF DISTRICT REWARI (HARYANA), INDIA

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ABSTRACT

Diarrheal disease is endemic and epidemic in India and Cholera remains a major public health problem. Globally, Every year about 3-5 millions cases occur, out of which about 100,000 to 130,000 patients die. According to National health profile (2008) of India, 112,31,039 cases of acute diarrhea were reported. In the year 2010, an outbreak was reported in Orissa state. In this outbreak more than 1000 cases of cholera were reported and 38 cases died. After receiving information from health workers about an outbreak of diarrhea in the village Khaliyawas. A rapid response team was created by civil surgeon district Rewari and the epidemiological survey was carried by visiting house-to-house around local Mela (gathering of people for worship) site to assess water storage and drinking practices, sanitation practices, and to find out the probable cause of diarrheal disease. Five stool samples and 10 water samples were collected and culture was also carried out at microbiological laboratory of district Rewari. Total population of village Khaliyawas was 714 with 399 male and 315 female. In the present outbreak, 91/714 persons were affected with diarrhea, therefore, the attack rate was 127 per 1000 population. Descriptive epidemiology, epidemiological curve and clustering of cases around the place where the local Mela was held and the reports of culture of water and stool showed the Vibrio cholerae 01 El Tor, Ogawa serotype. After the intervention like distribution of halogen tablets, cleaning and chlorination of wells and water tanks, distribution of ORS packets, imparting health education like use of soap and water after defecation and cleaning of hands before preparing the meal, the incidence of new cases came under control. In this outbreak, Vibrio Cholerae 01 El Tor, Ogawa serotype was identified to be the main causative agent on stool and water culture. Immediate rapid response team was sent by district health authority and several interventions were carried to control this epidemic.

Keywords: Diarrhea Outbreak

INTRODUCTION

The water borne diseases are transmitted by contaminated water and food. The diarrheal diseases outbreaks are found in various parts of the country. Cholera is an acute diarrheal illness caused by toxogenic strains of Vibrio cholera serogroups O1 and O139. Presently, V. cholerae O1 belonging to the El Tor biotype is the most common serogroup in India. V. cholerae produces a toxin that stimulates the secretion of water and electrolytes in the intestinal tract. Patients with cholera may suffer from acute watery diarrhea, vomiting, and dehydration but rarely present with fever (World Health Organization, 1993). Globally, the actual burden of cholera is of 3 to 5 million cases and 100,000 to 130,000 deaths are reported per vear (Zuckerman et al., 2007). According to National health profile (2008) of India, 112,31,039 cases of acute diarrhea were reported (Central Bureau of Health Intelligence, 2008). In the year 2010, an outbreak was reported in Orissa state. In this outbreak more than 1000 cases of cholera were reported and 38 cases died (Cholera outbreak in India, 2010). Clustering of acute diarrhea cases are common but investigations are difficult to conduct. Many outbreak of diarrhea are not investigated using laboratory methods that could lead to the identification of an etiological agent. Thus, cholera, including the El Tor biotype, may be under-recognized, and many outbreaks are simply recorded as 'diarrhea outbreaks' (Zuckerman et al., 2007). Ineffective antimicrobial treatment, poor storage and drinking practices and bad peridomestic sanitation were the factors associated with the persistence and spread of

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the pathogen, leading to the outbreak of cholera, resistant to commonly-used antimicrobials. The importance of collecting the epidemiological data helps in formulating the preparedness of action plans to control an outbreak. The main target of the investigation was to determine the causative factor for this outbreak in village Khaliyawas, District Rewari, so that remedial actions could be taken in time for its control.

MATERIALS AND METHODS

Methodology

After receiving information from health workers about an outbreak of diarrhea in the village Khaliyawas having population of 714, a rapid response team from general hospital, District Rewari undertook the investigation and management of the outbreak in the month of May 2014. An operational definition for case of diarrhea in this outbreak was defined as the occurrence of more than three watery stools a day among villagers (Integrated Disease Surveillance Project, India, 2006; Kanungo et al., 2010). The village Khaliyawas is located half kilometer inside on national highway no 8 (Gurgaon to Jaipur) and 12 kilometer from district Rewari. The village has one anganwadi, one registered medical practioners and one water work. The Community Health Centre (CHC) Meerpur provide health services to this village. The epidemiological survey was carried by visiting house-to-house by Rapid response team consisting of 6 members and help was sought from health workers, ASHA, Anganwadi worker and voluntaries. Information regarding age, sex, place of residence, date of onset and the information of mass gathering in any Mela in the village and exposure to mass food consumption was also collected. The investigators also met and interviewed water supply department personnel and villagers to enquire about the water supply and sanitation facilities. The hypothesis was generated based on the characteristics of the person, time and place of the outbreak. The epidemic curve was constructed to describe the development of the outbreak over time and cases were plotted on the geographical map of the town to plan action for control of the outbreak. Oral informed consent was taken from case, if case is minor consent was sought from their parents and objective of the study was explained and ensured that confidentiality of the information was maintained. Ten water samples were collected from storage tanks used in local Mela, households and common tube well from where drinking water was consumed. Five stool samples were also collected and were transported at room temperature to microbiology laboratory at District Rewari for stool culture. Winchester bottles were used for water samples and transported to the laboratory for analysis of coliform and fecal coliform using membrane filter method. It was also that ensured that water and stool samples reached the laboratory on the same day.

Laboratory Analysis: Results of laboratory investigation of water samples were found to be contaminated with coliform. Out of 10 water sample, two samples which were taken from water storage tank in local Mela were contaminated with coliform organisms and after culture, the samples were positive for Vibrio cholera 01 El Tor biotype Ogawa serotype. Out of five stool samples, in four samples Vibrio Cholera 01 El Tor biotype Ogawa serotype was found on stool culture.

Ethical Justification

The ethical approval was not obtained prior to the survey because the outbreak is an emergency response and its investigation was carried out by rapid response team. The survey was undertaken as a public health exercise rather than a research (Washington State University Institutional Review Board (IRB); Snider and Stroup, 1997). The objectives of survey was well explained to each cases and ensured that their privacy and confidentiality was maintained during and after the survey.

RESULTS ANDF DISCUSSION

Results

Total population of village Khaliyawas was 714 with 399 male and 315 female. In the present outbreak, 91/714 persons were affected with diarrhea; therefore, the attack rate was 127 per 1000 population. The number of diarrheal cases was much higher than the diarrhea cases in previous year in same village or any village of the same district. Also there was no recent influx of population hence this event was considered

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as an outbreak. The first diarrheal case was noticed on 4th May 2014. One day after identification of index case, other family members of index case and his neighbors started developing same symptoms. After that there was steep rise in diarrheal cases on 6th May 2014 and maximum numbers of cases were reported on 9th May 2014. The clustering of diarrheal cases was reported on 7th, 8th and 9th May 2014. After 9th May 2014, the number of cases gradually started falling down, by the action taken by the rapid response team of District.

After the intervention like distribution of halogen tablets, cleaning and chlorination of wells and water tanks, distribution of ORS packets, imparting health education like use of soap and water after defecation and cleaning of hands before preparing the meal, the control over the number of cases was observed. The epidemic curve showed the clustering of cases in a short span of time (figure 1). The investigation shows that most of the cases had frequent watery diarrhea, with this few patients complained of nausea, vomiting and mild fever. Seventy three percent of patients were of no or some dehydration and were treated with home available fluids, oral rehydration solution and antibiotics. The patients of severe dehydration were treated with intravenous fluid and referred to district hospital for further management.



Figure 1: Epidemic curve of diarrheal outbreak in village Khaliyawas, District Rewari

The present outbreak affected all age groups but most common age group was 0-10 and >60 age group. The median age of the cases was found to be 19.5 years. Sex wise 53 (58.2%) were females and were more affected than the males 38 (41.8%) (Table-1). The cases were clustered around that place where local Mela was held (Figure-2).

Table 1: Age wise distribution of diarrheal cases in the village Khaliyawas (n=91)		
Age (Years)	Diarrheal cases	Percentages
0-10	20	21.9%
10-20	12	13.2%
20-30	11	12.2%
30-40	10	10.9%
40-50	14	15.3%
50-60	07	7.8%
>60	17	18.7%
Total	91	100%

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Figure 2: Spot map showing clustering of diarrheal cases in village Khaliyawas district Rewari

After focus group discussion with villagers, it was revealed that a local Mela was organized on 3rd May 2014 and villagers told that water tank which was used for drinking purpose in local Mela was neither clean nor chlorinated. The investigators also noticed that the villagers had low level of awareness regarding the sanitary hygiene and water storage practices. During survey, it was also noted that, the villagers were less concerned about cleaning of hand with soap before drinking, eating or preparing the meal.

Discussion

Cholera is a major public health problem in India, especially among children and the elderly. In the present study, children 0-10 years and elderly age group (> 60 years) were commonly affected. Same finding was reported by Bhandari *et al.*, (2009) and Kansakar *et al.*, (2011). In the present outbreak, water storage tank which was used in local Mela for drinking purpose was found to be the source of infection and mostly children and elderly were affected. The study also reported that lack of hygienic practices led to this diarrheal outbreak. The cluster of cases was seen in short span of time around the place where local Mela was held and the laboratory finding of the causative agent in both stool and water was consistent with it. After intervention like chlorination of house hold water, destruction of water storage tank, health education about hygienic practices and medication by the rapid response team, the number of cases declined and situation was under control. The hypothesis of this outbreak was generated based on the time, place and person which showed cholera outbreak. An epidemic curve was made which also showed an outbreak and also spot map was prepared for drafting plan of action to control the outbreak. In the present outbreak, water storage tank which was used in local Mela for drinking purpose was found to be the source of infection because cluster of cases was observed around that place where local Mela was held.

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The immediate remedial action was taken at local level like health education regarding safe drinking water and proper household water storage practices, use of halogen tablets and medication, water disinfection by boiling, proper hand washing before and after defecation and home available fluids or Oral Rehydration Solution (ORS) in case of dehydration and proper sanitation measures. The other measures like super chlorination of water sources, and halogen tablets were distributed to each household in the affected village by health workers. The team also advised to health workers and Village Health and Sanitation Committee to keep proper check on water sources and send report on a monthly basis. Thus after taking all control measures, chlorination of water supply, health education, medication and demonstration of hygiene practices to community by the rapid response team, health workers and health voluntaries, the number of cases declined.

Conclusion and Recommendations

The main source of outbreak of diarrhea in the village Khaliyawas, District Rewari was due to contamination of water storage tank used for drinking purpose at local Mela and Vibrio Cholerae 01 El Tor, Ogawa serotype were identified to be the main causative agent in stool and water culture. Rapid response team was sent immediately by district civil surgeon and several interventions were carried to control this epidemic like distribution of Halogen tablets, and ORS packets, medication, impart health education regarding water and sanitation hygiene and practices etc.

The study recommends following suggestion:

- The districts health authority should continue with health education and social mobilization on water storage and drinking practices and sanitation practices.
- The districts should strengthen the integrated diseases surveillance project system (IDSP) to be able to detect outbreaks and notify others in a timely manner.

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