Outbreak of Cholera in Tilathi VDC Saptari Nepal

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ABSTRACT

Background

On 2011, Cluster of cholera cases was reported in the Tilathi VDC of Saptari, Nepal.

Objective

The outbreak was investigated to identify the etiological agent and possible source of infection and guiding the prevention and control measures.

Methods

Demographic and clinical details were collected from the suspected case-patients, and the outbreak was described by time, place, and person. Focus group discussion and Key informant interview were conducted to assess the practice of sanitation, source of drinking water and probable cause of diarrheal disease. Five stool samples and 10 water samples of tube well and ponds were collected and microbiological study was done in BPKIHS Dharan.

Results

A total of 111 persons suffered with diarrhea and 02 died of it (attack rate 3.05%, case fatality rate 1.8%). All age groups were affected with disease (median age 26 yrs) and males were affected more than females. Descriptive epidemiology suggested the clustering of cases were around the pond where they clean utensils, take bath and wash clothes. The Vibrio cholerae 01 El Tor, Ogawa serotype was isolated in 03 out of 05 suspected stool samples and in all three of the pond water samples. They reported that most of the houses do not have the toilet and people do not wash their hands regularly with soap and water after defecation.

Conclusion

Vibrio cholerae was the causative agent behind the outbreak and probable source of infection was the problematic pond water which they used for different purpose. Immediate chlorination of the pond was recommended to halt further spread of the epidemics.

KEY WORDS

Cholera, outbreak, tilathi, saptari

INTRODUCTION

Cholera is an acute secretory diarrheal disease caused by infection of the intestine with the bacterium Vibrio cholerae, either type O1 or O139. It is characterized by sudden onset of profuse painless watery diarrhea, often accompanied with vomiting, which can lead to hypotensive shock and death within hours of the first symptom.[1,2] It is a water-borne disease that is mainly transmitted through contaminated water and food.[1]

Diarrheal disease is endemic and epidemic in Nepal. Every year around two million cases are reported. In addition there are reports of outbreak of diarrhea in different parts of country. Recently, there was outbreak in Spatari (2008), Jajarkot (2009), Nepalgunj (2010). Most commonly diagnosed organism in these outbreaks was cholera.[3-5]

On 31st of October, There was a report of cluster of diarrheal disease cases in Tilathi VDC, by District Public Health Office Saptari. On further inquiry, we found that there were already two deaths and many patients were being treated on temporary camp. So after getting such information, a team of microbiologist and epidemiologist was formed and headed to the field in VDC of Tilathi. We investigated the outbreak with an objective of a) to assess the magnitude of

disease b) to identify the causative organism and possible source of infection c) guiding the prevention and control measures.

METHODS

Descriptive Epidemiology

We defined the case of diarrheal disease as those who were having loose stool more than three occasions in a day after 29th October. Demographic and clinical details of cases were collected from the Sub Health Post where temporary treatment camp was organized and the disease was described by time, place and person. Spot map was drawn with the help of local leader. Two focus group discussions were conducted to explore the practice of sanitation, possible source of infection and nature of outbreak. In focus group discussion, there were 9-10 participants that included the patients, family of patients, local leaders, and health personnel of village, moderator and record keeper. Eight interviews were also conducted with patient, local leader, and health worker.

Environmental Survey:

We inspected the pond and its condition, source of drinking water, and their sanitation practice. Water sample were collected from 07 tube well of affected family and 03 pond on purpose.

Laboratory Investigation:

Stool samples were collected from five patients before antibiotic treatment started and transported in Cary Blair (CB) transport media and Selenite F Broth (SFB) at room temperature to the Microbiological department of BPKIHS in Dharan. In the laboratory, routine microscopic examination and culture of the organism was done and the organism was identified by using biochemical methods. Water samples were collected from ponds and tube wells further tested for colliform by membrane filter method in water bacteriology laboratory at BPKIHS, Dharan.

RESULTS

Total of 111 persons were affected by diarrhea which was higher as compared to other part of the district and higher than that in the same area during the previous years. There was no record of recent influx of population. Thus, this episode was considered an outbreak. Total residents of the affected wards population was 3631, therefore, the attack rate was 30.5 per 1000 population. Two person died of the disease during outbreak therefore case fatality rate was 1.8%.

The first case was developed illness on 26th October and died on 31st of October. Two days after index case, her family members and then neighbors were started developing same illness. There was rapid rise in number of cases on 31^{s}t and peak of cases was reported on 3rd November. Then the number of cases started decreasing gradually following the use of treated water, practicing hand washing with soap and water, temporary closure of the pond's water from 2nd November and empirical antibiotic treatment of diarrhea since 3rd November. The epidemic curve suggest of the continuous common source epidemic (figure 1).

Most of the patient had frequent watery diarrhea without the mixture of blood, but some had nausea and few also had vomiting and fever. Twenty five percent of the diarrheal cases had moderate to severe dehydration requiring intravenous fluid treated in temporary camp. Almost all age groups were affected by diarrhea however the cases were concentrated more on the young population (<30 yrs) which was more than half of the total cases (table 1). The median age of cases was found to be 26 years. Males (68%) were affected more than females (38%). The cases were clustered inhabitant around the ponds (figure 2).

Table 1. Distribution of diarrheal cases by age of Tilathi VDC, Saptari, November 2011.

Age categories(yrs)	Frequency	Percentages
0-4	8	7.21%
5-14	19	17.12%
15-29	31	27.93%
30-44	16	14.41%
45-60	18	16.22%
>60	19	17.12%
Total	111	100%

During focus group discussion (FGD), they reported that they were used water from tube well for drinking. However they did not filter or boil water before drinking. Cleaning of utensils and bathing was done with tube well's water however they also used pond water sometimes. For washing the clothes they use pond water. Most of the families did not have the toilet. The children defecated around the houses whereas, adults went to field for defecation which is nearby house and also near to the pond. They did not practice hand washing with soap and water after going to toilet. The animals were kept at backyard of the house and dumping of the manure and wastes were done at the corner of backyard.

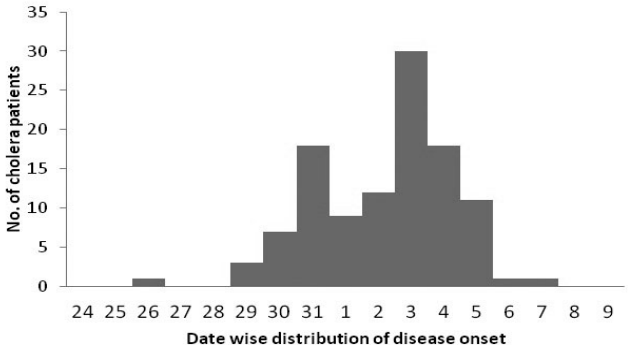

Figure 1. Epidemic curve of diarrheal outbreak in Tilathi VDC, Saptari , November 2011.

Laboratory Investigation

Three out of five stool samples were culture positive for Vibrio Cholera 01 El Tor biotype Ogawa serotype on Thio-sulphate Citrate Bile salt Sucrose (TCBS) agar. The water samples of all 03 pond contained colliforms, indicating fecal contamination and also culture positive for Vibrio cholera 01 El Tor biotype Ogawa serotype. On other hand, all tube well water was found free of colliforms.

Environmental survey

The ponds were very dirty and algae had grown at the corner of the pond. The open field area where people went for defecation was within 100 m from the pond and above pond level. So there was high chance of contamination of the pond especially during floods in monsoon. As this outbreak was also after monsoon, it could be the reason for contamination of the pond with fecal matter and cholera. The tube wells were dug very near to the pond, so there was chance of cross contamination, though the water was found to be free of the organism.

Figure 2. Diarrheal cases and details place of residence in Tilathi VDC, Saptari.

DISCUSSION

Cholera is a major public health problem in developing countries, especially among children and the elderly. In the present study, young populations were affected (15 to 30 yrs) at most. This study is in agreement with study done in Kathmandu in which most affected population was 20 to 29 yrs.[6] Similarly, in an outbreak study at Jajarkot, adult (15 to 44 yrs) were affected more.[3] However our study contrast with other studies which reported the prevalence of cholera in the children.[7,8]

The possible source of the infection could be the pond where villagers washed their clothes, cleaned their utensils and faces. The supporting points include: First, the cases were concentrated around the pond and the epidemic curve suggest the common source epidemic. Second, water samples from pond were contaminated and culture was positive for Vibrio cholerae which was phenotypically identical to the isolate from stool sample. Third, decline of cases was observed, once people stopped using the pond and used chlorinated drinking water. In a similar study done in West Bengal, they have also found that washing utensils, bathing, drinking, washing faces were the significant risk factors for the outbreak of cholera.[9]

Cholera outbreak exhibits seasonal pattern and that pattern differs by latitude. In Pakistan, several studies have reported, classical strain is most incident from November to January and from April to May while in Kolkata, India, seasonal pattern of cholera cases peak in April, May, and June. Whereas, In Bangladesh, the study has describe that El Tor cholera typically increases from September to November, just after the monsoon.[10] Our investigation has also shown that outbreak of El Tor cholera occurred in October and November, post monsoon period. However, other studies from Nepal have reported outbreak of cholera from May-July, during monsoon season.[3,11]

V. cholerae can survive in some aquatic environment for months to years, in association with zooplankton and other aquatic organisms.[12] V. cholerae O1 El Tor and O139 are able to form a three-dimensional biofilm on surfaces which provide a microenvironment, facilitating environmental persistence within natural aquatic habitats during interepidemic periods.[13] The dirty pond with growth of algae could be the reservoir of organism. In an outbreak study done by school of public health in 2008 in same district found the Vibrio cholera El Tor as the causative organism and contaminated well and tube well as the source of infection.[5] Similarly we also found V. cholerae El Tor in stool as well in pond water. This implies that the Vibrio cholerae might be persisting in the environment resulting in the two outbreaks within four years period.

Our study had certain limitation. First, we did not use quantitative study design to identify the risk factors of the outbreak, so it could be imperfect reflection of reality. Second, we only obtained limited number of the stool samples, so we could not exclude that the outbreak could have been caused by more than one microorganism.

CONCLUSION

Vibrio cholerae 01 El Tor, Ogawa serotype was the causative agent for the outbreak of diarrhea in Saptari. The probable source of infection was contaminated pond which people use for domestic and personal purpose. We made a number of recommendations and engaged several interventions. First, we educated the people not to use the pond till outbreak was over. Second, immediate and periodic chlorination of the pond was recommended. Third, we educated the villagers regarding importance of good hygiene practice and recommended the need of focus health education on hygiene and sanitation to the villagers.

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