

OUTBREAK OF CHOLERA IN SOME VILLAGES OF BOGINODI AREA IN LAKHIMPUR DISTRICT OF ASSAM

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ABSTRACT

Cholera becomes a major problem in different areas of Assam due to limited knowledge regarding safe drinking water, hygiene and sanitation to the community as a result of which many major outbreaks of cholera took place from last few years. In 2010, an outbreak of cholera took place in Lakhimpur district of Assam. Eight nos of rectal swab specimens were collected from the patients having complained of vomiting with rice watery stool in the acute stage of the disease, before antibiotics have been administered. Out of eight no's of suspected cholera cases, culture showed growth of *Vibrio cholerae* O1 serotype (Ogawa) in five nos of cases after aerobic incubation. Adult females were more affected as they were more getting in touch with water. There was an initial case on 28/10/2010 from kumarkata village in Boginodi area. The outbreak continues for eleven days. Many unprotected tube wells were observed without brim or platform in all the houses of the locality. Epidemiological observation also revealed poor sanitation as there was no latrine and the people having habit of open air defecation. Water samples collected from drinking water source were class IV which was unsatisfactory for domestic use. The outbreak was controlled immediately due to an adequate surveillance system and following a number of interventions by the district health team in Lakhimpur district of Assam

KEY WORDS

Boginodi, Ogawa, poor sanitation, unprotected well, *Vibrio cholerae* etc

INTRODUCTION

Cholera is an acute epidemic infectious disease affects 3-5 million people worldwide every year ^[1]. It continues to remain an important public health concern in developing countries and most frequently transmitted by water sources contaminated with the causative bacterium *Vibrio cholerae*, although contaminated foods, especially raw shellfish, may also transmit the cholera-causing bacteria. It was found that a soluble toxin elaborated in the intestinal tract by the bacterium activates the adenylate cyclase of the mucosa, causing active secretion of an isotonic fluid resulting in profuse watery diarrhea, extreme loss of fluid and electrolytes, and dehydration and collapse,

but no gross morphologic change in the intestinal mucosa.

Multiple outbreaks worldwide continue into the 21st century with outbreaks in India, Iran, Vietnam, and several African countries occurring over the last 10 years. Outbreaks occur when there are disasters or other reasons for a loss of sanitary human waste disposal and the lack of safe fluids and foods for people to ingest. Cholera was one of the earliest infections to be studied by epidemiological methods. Globally, the true number of cholera cases is known to be much higher than reported. The discrepancy results from underreporting and other surveillance

system limitations, including inconsistencies in case definitions and lack of a standard vocabulary ^[2].

If an epidemic of cholera is suspected, the most common causative agent is *Vibrio cholerae* O1. If *Vibrio cholerae* serogroup O1 is not isolated, the laboratory should test for *Vibrio cholerae* O139. A case of cholera is confirmed when *Vibrio cholerae* O1 or O139 is isolated from any patient with diarrhea ^[5]. From last few years it was found that there are many outbreak took place in Assam with a high case fatality rate ^[5,6]. Keeping in view of the above fact our study was conducted to put some more points regarding cause of infection and to establish effective surveillance system as well as to set up remedial control measures so that we can prevent an impending outbreak at an earlier stage.

MATERIALS AND METHODS

- A. **Study area and study population:** Lakhimpur district with a population of 1,040,644 (2011 census) lies on north bank of the mighty river Brahmaputra, included in Assam's most flood prone area list. A descriptive epidemiological study was conducted in Boginodi area (population -239785) of Lakhimpur district of Assam during an outbreak of cholera. Institutional review board (IRB/IEC) was informed about the investigation and permission for publication was obtained afterwards.
- B. **Case definition developed for cholera:** The cases of diarrheal diseases fulfilling the WHO Standard case definition of cholera were taken into attention for this study. A case of cholera should be suspected when: In an area where the disease is not known to be present: Severe dehydration or death from acute watery diarrhoea in a patient aged 5 years or more, In an area where Cholera is endemic: Acute watery diarrhoea, with or without vomiting in a patient aged 5 years or more and In an area where there is a cholera epidemic: Acute watery diarrhoea, with or without vomiting, in any patient. A rapid epidemiological survey was conducted in the Gharmora and Seajuli area of Lakhimpur district of Assam by rapid response team consist of a

group of medical officers in Lakhimpur district during the outbreak. A house to house survey was done in the residential areas of the affected villages including the index case. Patient's demographic, socio-economic and environmental information were collected. Clinical investigation of all cases were conducted along with sample collection for laboratory investigation. Qualitative epidemiological data was collected by observation of water sources, visiting eating places, hospitals, examining the prescription pattern of health care providers.

- C. **Sample collection:** Eight no's of rectal swab specimens were collected from initial patients as well as those patients in the acute stage of the disease, before antibiotics have been administered. Rectal swab specimen were collected in a carry blair media and sent to AMCH, Dibrugarh and examined in the department of microbiology, AMC for confirmation of the causative agent. Water samples using aseptic measures were collected from drinking water sources and sent for bacteriological testing at AMC, Dibrugarh.
 - D. **Protocol for sample processing**
 - ❖ Stool inoculation done on MacConkey's agar (Mac Agar) and Thiosulphate Citrate Bile Salt Sucrose Agar (TCBS Agar).
 - ❖ Incubation overnight at 37°C
 - ❖ Enrichment in Alkaline Peptone Water (APW)
 - ❖ Growth of *bacilli* in Mac and TCBS agar media observed by gram staining and found gram negative bacilli.
 - ❖ Growth of *Vibrio cholerae* in Mac and TCBS agar media showed darting motility by hanging drop motility tests.
 - ❖ Growth showed Oxidase test, Methylene Red Test, string test, cholera red reaction and V.Cholera Antisera O1 Positive.
1. **Oxidase test:** *Vibrio Cholerae* oxidized phenylenediamine and form deep purple color.
 2. **Methylene Red Test:** When *Vibrio cholerae* cultured in buffered glucose peptone water it ferment glucose to produce sufficient acidity, which gives red color with methyl red indicator (color change red to yellow).

3. **String test:** V.Cholera (TCBS growth) reacts with 5 g/dl Sodium deoxycholate and formed mucus like string which was seen by lifting a loop of the mixture.
4. **Cholera red reaction:** V. Cholera on APW with 2-3 drops H_2SO_4 formed nitroso-indole which showed reddish pink color.
5. **Vibrio Cholera Antisera (Poly O1) test:** A small portion of Growth of bacteria in TCBS media was mixed with Poly o1 V Cholera Antisera in a slide showed agglutination which specified the presence of V Cholera o1 serotype in the collected specimen.

RESULT

Culture showed growth of *Vibrio cholerae* O1 serotype (Ogawa) after aerobic incubation. Out of

eight nos of suspected cholera cases five no of cases were found positive for *Vibrio cholerae* O1 (Ogawa). Age ranged from 19 to 70 years. Adult females were more affected. There was an initial case on 28/10/2010 from kumarkata village in Boginodi area was staying at Basagaon, Nowboicha at the time of infection suggesting that the patient carried infection from that place. The last case occurred on 8/11/2010. Many unprotected tube wells were observed without brim or platform in all the houses of the locality (**Figure 1**). Observed poor sanitation as there was no latrine and the people having habit of open air defecation. Laboratory result also showed all the water samples were class IV which was unsatisfactory for domestic use (**Figure 2**).



Figure 1: Epidemiological observation of poor sanitation profile In the affected village



Figure 2: Water samples collecting for H₂S test from drinking water sources

DISCUSSION

Previous study revealed that during 2010, 877 cases and 22 deaths due to cholera outbreak were reported

from tea gardens in Sonitpur district of Assam^[5]. Again In May 2012, Bagjan division of Borbham tea estate of Sivasagar district of Assam was affected by

an outbreak of acute watery diarrhea subsequently confirmed to be caused by *Vibrio cholerae* O1^[6].

Surveillance and prompt reporting facilitate in controlling cholera epidemics rapidly. Cholera exists as a seasonal disease in many endemic countries, occurring annually mostly during rainy seasons. Understanding the seasonality and location of outbreaks provides guidance for improving cholera control activities for the most vulnerable^[4]. Surveillance systems can provide early alerts to outbreaks, therefore leading to coordinated response and assist in preparation of preparedness plans. Efficient surveillance systems can also improve the risk assessment for potential cholera outbreaks. In consequence, it is of paramount importance to be able to rely on accurate surveillance data to monitor the evolution of the outbreak and to put in place adequate intervention measures. Coordination of the different sectors involved is essential, and WHO calls for the cooperation of all to limit the effect of cholera on populations. For prevention to be effective, it is important that cases be reported to national health authorities^[3].

An outbreak of cholera affected some villages in Boginodi during the month of October-November, 2010. Five cases occurred with no death. Adult females were more affected as they were more getting in touch with water. After epidemiological investigation we identified many unprotected wells with no brim or platform in all the houses of the locality might be the cause of outbreak. As soon as getting the information district health society focused on the prevention of cholera spread in the affected areas to the neighbouring villages. The outbreak was under controlled following a number of interventions by the district health team as well as proficient surveillance system. The initial case was staying at Basagaon, Nowboicha at the time of infection suggesting that the patient carried infection from that place. So, all the control measures were undertaken in Basagaon also. Although, after adequate surveillance no new case with similar symptoms was reported from that area.

Our study showed all the cases were from rural areas. This is because of poor access to potable water in areas with poor access to health care knowledge among the people. Although our study did not

reported any cases from urban area but sometimes outbreak might occur in urban areas due to high population density combined with poor quality of drinking water, pipe leakage etc.

Containment measures undertaken:

The following mentioned activities were undertaken -

1. Isolate severe cases.
2. IEC (awareness camp, street play) done regarding safe drinking water, hygiene and sanitation to the community.
3. Mobilization and capacity building of health care workers for early intervention.
4. Provisions of prompt referral services for the patients to the nearby government hospitals (North Lakhimpur civil hospital).
5. Contain all excreta (stool and vomit).
6. Always wash hands with chlorinated water (ensure correct concentration).
7. Disinfect feet when leaving the centre.
8. Educate the population about the risk associated with unhygienic use of wells
9. Follow up families and relatives of the patient to ensure that: there are no other cases; they have the means to chlorinate their drinking water; they have soap available for hand washing; and they have information about cholera prevention measures.

CONCLUSION

Cholera outbreak affected some villages of Boginodi area in Lakhimpur district of Assam. The most likely source was many unprotected tube wells that might had been contaminated by an initial source. The cholera outbreak will continue to happen in this part of Assam until and unless the safe water and food is made available to local people as well as considerable awareness regarding minimum hygiene and sanitation is being created among the affected population.

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REFERENCES

1. www.who.int/mediacentre/factsheets/fs107
2. World Health Organization. Cholera: Global surveillance summary, 2008. Wky Epidemiol Rec. 2009; 84:309–24.
3. Sack DA, Sack RB, Nair GB, Siddique AK (2004). Cholera". *Lancet* 363 (9404): 223–233.
4. Cholera: prevention and control". *Health topics*. WHO. 2008. Retrieved 2008-12-08.
5. WHO. 2004. Cholera outbreak, assessing the outbreak response and improving preparedness, Global task force on cholera control. p.15.
6. Mahanta BN, Mahanta TG, Sinha R , Dutta A , Payeng DJ and Jawed MQ (2013) Cholera outbreak in tea garden of Sivasagar district of Assam. *J. Acad. Indus. Res.* Vol. 1(8): 493-496



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