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OUTBREAK INVESTIGATION OF CHOLERA AT TERTIARY CARE HOSPITAL - PREVENTION AND CONTROL WITH WATER, SANITATION AND HYGIENE (WASH) INTERVENTIONS

Microbiology

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ABSTRACT

Background: Global, regional, national estimates clearly place diarrheal disease as a major. Cholera is an acute secretary diarrheal infection caused by ingestion of food or water contaminated with bacterium *Vibrio cholerae.* The objective of this study was outbreak investigation of cholera at a tertiary care hospital and its nearby areas as IDSP laboratory. Hence it was decided to investigate the outbreak with objectives to determine the causes and source of acute diarrhoea outbreak and to suggest control measures. **Methods:** Four cases(2 Male and 2 Female)got admitted with History of acute severe watery diarrhea with dehydration at a tertiary care hospital on successive days. Their stool samples were collected and sent to Department of Microbiology. On receipt of specimen motility testing by hanging drop method was done and it showed darting motility which became non motile on adding H antisera. **Results:** Cultural characteristics & biochemical reactions of all the 4 isolates were consistent with *Vibrio cholerae.* Biotype was found to be El Tor and serotype was found to be Ogawa. All the 4 isolates were sent to National Institute of Cholera & Enteric Diseases Kolkata for phage typing. It was then confirmed by them as *Vibrio Cholerae* O1 (Serogroup) EL Tor (biotype) Ogawa (serotype) T27 (phage type). Antibiogram of all four isolates were sensitive to Tetracycline, Ciprofloxacin, and Cotrimoxazole. Water analysis showed recent fecal contamination of water. Attack rates of the disease were computed, epidemic curve drawn and the results were analyzed to draw conclusions. Control measures were applied simultaneously. **Conclusions:** We reported outbreak of cholera to District Public Health Authorities. Provision of safe water and sanitation is critical to control the transmission of cholera.

KEYWORDS

Cholera, Outbreak investigation, *Vibrio cholerae* O1 biotype El Tor serotype Ogawa strain, Antibiogram

INTRODUCTION

Cholera is an acute diarrheal infection caused by ingestion of food or water contaminated with the bacterium *Vibrio cholerae*. Cholera remains a global threat to public health and an indicator of lack of social development. Cholera outbreaks mainly occur in developing countries that lack access to safe drinking water and proper sanitation [(1).] More than 160 years after John Snow famously removed the water pump handle in London; outbreaks of cholera continue to be reported worldwide.

Since the 19th century, the world has experienced 7 cholera pandemics, which have caused millions of deaths. The current pandemic, 7th overall, started in South Asia in 1961 and has spread to all World Health Organization (WHO) regions [(2).] Researchers have estimated that every year, there are roughly 1.3 to 4.0 million cases, and 21 000 to 143 000 deaths worldwide due to cholera[(3)] During 2019, 923037 cases, 1911 deaths were notified from 31 countries.

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 at a tertiary care hospital 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

A *suspected case was a case, which* had an onset of acute watery diarrhea, admitted in Tirunelveli Medical college Hospital, Tirunelveli from 7th January to 10th January, 2020; a *confirmed case* was a suspected case with *Vibrio cholerae* cultured from a stool specimen.

Specimen collection and Processing

On 7th January, our index case, a 28 year old male from Tirunelveli presented with acute watery diarrhea to Tirunelveli Medical College hospital. On successive days, another male patient and 2 female patients admitted with same complaint from the same place (Tirunelveli). Their stool samples were collected and send to Department of Microbiology, Tirunelveli Medical College. On receipt of specimen, Motility testing by hanging drop methods was done and it showed darting motility which became non motile on adding H antisera. Presumptive identification was conveyed to the clinical team.

The four samples were inoculated directly and after enrichment in alkaline peptone water on nutrient agar plate, Blood agar plate, Thiosulfate citrate bile salt sucrose agar plate and incubated overnight at 37*c. Thiosulfate citrate bile salt sucrose agar showed yellow colored colonies. Standard biochemical reactions were performed. Cultural characteristics &biochemical reactions of all the 4 isolates were consistent with *Vibrio cholerae*. Biotype was found to be EL Tor and serotype was found to be Ogawa as they were agglutinated with corresponding antisera.

All the 4 isolates were sent to National Institute of Cholera and enteric diseases, Kolkata for Phage typing. It was then confirmed by them as *Vibrio cholerae* O1 (Serogroup) ELTor(Biotype)Ogawa(serotype) T27 (Phage type). Antibiotic susceptibility test was done. We reported the details to District Public Health Authorities in Tirunelveli. Common source water was sent for water analysis. Water analysis report confirmed the Recent Fecal contamination of water.

RESULTS

All the confirmed cases of cholera admitted in Tirunelveli Medical College Hospital during the period of 7th January to 10th January were included in the study. Total 4 cases of Cholera occurred during this period were taken as sample. Table 1,2,3 shows Distribution of patients according to the age, sex, complaints and clinical findings. Table 4 shows Antibiotic susceptibility pattern of isolates.

Table 1: Distribution of patients according to the Age, Sex

Variables		Number	Percentage
Age	20-40 years	2	50%
	40-60 years	2	50%
Sex	Male	2	50%
	Female	2	50%

Table 2: Distribution of patients according to complaints

Complaints	Number	Percentage
Watery diarrhea (Rice water stool)	4	100%

Vomiting	2	50%
Increased thirst	1	25%
Myalagia	1	25%

Table 3: Distribution of patients according to Clinical findings

Clinical findings	Number	Percentage
Mild diarrhoea	3	75%
Severe dehydration with oliguria	1	25%
Hypotension	2	50%

Table 4: Antibiotic susceptibility pattern of isolates

Drug	Dosage	No of sensitive isolates	Percentage
Tetracycline	30mcg	4	100%
Ciprofloxacin	5mcg	4	100%
Cotrimoxazole	23.75/1.25 mcg	4	100%
Ampicillin	10mcg	4	100%
Amikacin	30mcg	4	100%
Cholramphenicol	30mcg	4	100%
Cefotaxime	30mcg	4	100%

Fig. 1 shows the epidemic curve of the cholera outbreak and indicates the key actions taken at outbreak area.

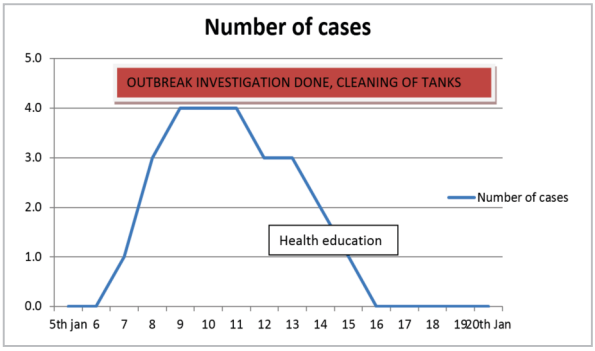

Figure 1: Epidemic curve of Outbreak

DISCUSSION

In the present study, male and female patients are equally distributed. Watery diarrhea (Rice water stool was the main complaints (100%).Most of the patients (75%) presented with mild diarrhea only. only 25% of the patients presented with severe dehydration.

All the 4 isolates were consistent with *Vibrio cholerae*. Serogroup 01 Biotype was found to be EL Tor and serotype was found to be Ogawa. From 1961, outbreaks were caused by 01 - El Tor biotype only. It replaces the classical biotype. El Tor biotype produced a much milder cholera, but it was associated with more carrier rate than the classical, this is due to EL Tor was capable of surviving in the environment much longer.

Our investigation demonstrated that the cholera outbreak in Tirunelveli during January 2020 was a point-source outbreak caused by drinking contaminated water collected from water-collection site. The outbreak completely stopped after 15th January 2020 after control measures were aggressively implemented by the District Public health.

Water collected from the site of consumption also showed coliforms, a problem that is exacerbated because households did not practice any water purification method. Most of the households did not practice adequate hand hygiene. In rural areas in Tamilnadu, water disinfection mainly relies on single point chlorination. Irrespective of the source of drinking water, water purification and good hand hygienic practices play a major role against acquiring disease among individuals. A Roadmap to 2030- in 2017, WHO launched strategy for cholera control; which aims to reduce cholera deaths by 90% and to eliminate cholera in as many as countries by 2030.

CONCLUSION

Early identification of the epidemic outbreak and timely interventions, such as early diagnosis and prompt treatment, are essential in all outbreaks. Health education on the use of purified drinking water, adequate hand hygienic practices and the use of sanitary latrines should be conducted on a regular basis to encourage behavioral change. WHO recommends using oral cholera vaccine during epidemics and outbreaks. It provides protection against cholera for 2-3 years.

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