

CLINICAL BIOCHEMICAL PROFILE AND OUTCOME OF CHOLERA OUTBREAK IN A RURAL POPULATION OF KASHMIR VALLEY NORTH INDIA: A RETROSPECTIVE OBSERVATIONAL STUDY

WANI ABDUL AHAD, MUZAFAR AHMAD NAIK, SHARIK MEHRAJ, AMAN ALA, AAMIR SHAFI*

Department of General medicine SKIMS MCH Srinagar Jammu and Kashmir India. Email: amirshafi400@gmail.com

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ABSTRACT

Objective: The aim of the study was to investigate the outbreak of a cholera epidemic that occurred in one of the rural areas of Kashmir valley.

Methods: Data were gathered from the medical records for this cross-sectional epidemiological investigation. The inquiry started with the development of a case definition. Line listing, sampling of the patient's water source and feces, prompt referral, and treatment of those who were vomiting and/or had loose stools were all carried out.

Results: About 26 patients that were suspected to have a cholera like illness were line listed, mostly between 20 and 40 years of age with male-to-female ratio being 1.16:1. The case fatality rate was 0%. The source of water supply was river Jhelum in all cases and on sampling the water source it turned out to be unsatisfactory for drinking purposes.

Conclusion: Preventive strategies for reducing cholera epidemics can include immunization, improving water conditions, along with the sanitation and hygiene.

Keywords: Cholera, Diarrhea, Epidemiology, Outbreak investigation.

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INTRODUCTION

Consumption of contaminated food and water source with *Vibrio cholerae* bacterium can lead to acute diarrheal illness called "Cholera." Cholera transmission has been stopped by improving water and sanitary facilities in the developed countries. However, cholera is still a serious threat to public health in many developing countries including India [1]. It can be sporadic, endemic, epidemic, or pandemic in nature [2]. Worldwide, it is estimated that cholera causes between 1.3 and 4.0 million infections and 21,000–143,000 fatalities/year. The World Health Organization reports that during 2016 alone 132,121 cases from 38 countries were documented with 2420 fatalities. Only 5–10% of the cholera cases that occur each year are reported due to societal, political, and economic factors that discourage reporting in addition to the restricted capacity of epidemiological monitoring and investigational support [3].

The cholera toxin that is released by the bacterium attaches to the host's enterocytes and causes severe electrolyte and water loss in the form of copious diarrhea. The majority of infected people will have no symptoms or rather minor ones and oral rehydration solution (ORS) can effectively treat them. Severe form of the disease is associated with severe dehydration and can lead to death if not treated [4]. Intravenous fluids and antibiotics are the main stay of treatment and should be started immediately. Cholera can be identified using rectal swabs and stool samples. To make a diagnosis, clinical examination and patient history are used and therapy is usually started before a diagnosis has been confirmed in a laboratory [5]. Mild and asymptomatic diarrhea is most commonly caused by the *V. cholerae* El Tor biotype and is the primary cause of cholera cases in a large portion of the world [6]. Moderate-to-severe diarrheal illness is most commonly caused by the O1 and O139 serogroups of *V. cholerae*. *V. cholerae* O1 serogroup is most commonly found in India.

Cholera epidemics continue to spread across the nation with significant death rates despite being a predictable, preventable, and treatable

disease. Similar incidents were observed in the surrounding areas of river Jhelum in Kashmir in mid June and July, where a number of individuals with loose stools, fever, and vomiting that started suddenly were documented. A thorough investigation of the outbreak was conducted to identify the additional cases; the source of cholera infection and necessary steps was taken to contain the outbreak.

METHODS

A descriptive research was carried out in Sumbal area of Bandipora district of Jammu and Kashmir.

An outbreak

In the middle of June and July period, cases of loose stools with or without vomiting and fever were reported and admitted in SKIMS Medical college and Hospital. One of these cases was reported to be positive for *V. cholerae* mainly Ogawa strain discovered in the stool sample.

Study settings

Approximately 24 km from Srinagar city is where the Sumbal area is located with a population range of about 5000 families residing in the area. Most of the people work as dairy farmers. River Jhelum is considered to be the intermittent source of water for the local population.

Case definition

Any patient with acute watery diarrhea (at least three episodes in 24 h period with change in stool volume and consistency) and dehydration with or without vomiting was considered to be a suspected case of cholera. *V. cholerae* was isolated from fecal samples which confirmed the cases.

Laboratory testing

Using rectal swabs fecal samples were transported to the laboratory using Cary-Blair medium. Rapid diagnostic tests were also performed

at the site. For stool culture confirmation, samples were taken to the Microbiology department of SKIMS Medical college and Hospital Srinagar.

Case detection and data gathering

Any suspected cases of cholera were notified to the cholera treatment centers and health departments. Retrospective clinical demographic and epidemiological data were gathered using a case report. An excel database was prepared of all the patients with confirmed cases of cholera.

Investigation team

The investigation team mostly included the hospital epidemiologists from the Department of Community Medicine which included faculty members, postgraduate medical students, interns, auxiliary nurse midwives (ANMs), social workers, and sanitation inspector who visited the particular region. The team cooperated with the ASHA, ANM, and medical officer of the Primary Health Center (PHC) who were authorizing the particular area.

Activities carried out

The team went door-to-door for finding additional cases of cholera. Physical examination, along with the history taking, was conducted for all suspected cases. For all possible cases of diarrhea, stool samples were taken and ORS packets were given, along with instructions on how to use them. Antibiotics were used to start the treatment and some of the patients were also referred to a district hospital and medical college as well.

Sanitary survey

All of the water sources were inspected by the sanitary inspector which was used for drinking purposes and water samples were taken from a number of the homes where members of the family had the same symptoms as well as from the pipe water that was circulated in the nearby residential area. In addition, a field-based estimate of the chlorine demand was made. The interviews with the ASHA and ANM as well as in-depth interviews with residents and those living outside were conducted to bolster the data. For the Department of Microbiology to confirm, the causal agent samples of water and feces were delivered in reverse cold chain. General knowledge of sanitation and hygiene was raised through health education utilizing Information Education Communication resources. On many occasions, women, teenagers, and kids participated in hand washing demonstrations. Under the direction of the social workers, the ASHA performed an ORS demonstration. Microsoft Excel was used to enter and evaluate all of the gathered data.

Ethical consideration

Ethical clearance was not required as it was a retrospective study.

RESULTS

Twenty-six suspected cholera cases were listed. 20–40 years of age was the range (Table 1). Mean age of the population was 39.11 years. Fourteen cases out of 26 were male patients and rest were female (Table 2). 0% of cases resulted in death.

Clinical signs and symptoms

In almost all patients, symptoms of cholera were observed (Table 3). Patients received Azithromycin prescriptions after antibiotic sensitivity was done. Exposure to the untreated/contaminated water exposure was mentioned in almost every case.

Epidemic curve

Food poisoning was put on the list of differentials, but there was no history as such that could suggest the same. The water of river Jhelum which was used for drinking purpose was 100% raw. Pipe water is also supplied in the surrounding areas where there were few cases of loose stools, but cholera was not diagnosed in their stools samples. *V. cholerae* O1 biotype El Tor serotype Ogawa was found to be the dominant strain

Table 1: Sociodemographic characteristics of suspected cholera cases

	N	%
Age (in years)		
<5	0	
≥5	26	100
Gender		
Male	14	53.84
Female	12	46.15

Table 2: Clinical symptoms of suspected cholera cases

	Age group	
	<5 n (%)	≥5 n (%)
Fever (>37.5°C)		
Yes	0	2 (7.69)
No	0	24
Vomiting		
Yes	0	23 (88.46)
No	0	3 (11.53)
Dehydration		
Mild	0	15 (57.69)
Moderate	0	5 (19.23)
Severe	0	6 (23.07)

in all stool samples. The outbreak was managed to be kept under check with the help of the PHC, district hospital, and the medical college.

DISCUSSION

In the developing countries, cholera outbreaks are still the major cause of deaths as compared to the developed world. Bacteriological investigation and examination of the stool sample revealed *V. cholerae* O1 biotype El Tor serotype Ogawa as the causative organism in our setting. Many other outbreak investigations [7-9] carried in different parts of India at different time intervals also reveal the same organism responsible for cholera of the hospitalized 26 suspected cases of cholera male-to-female ratio in our study which was 1.16:1 with the age group between 20 and 40 years of age. We also followed up the cases again for recovery and any complications. We did not find any history of travel in the past 15 days in most of the suspected cases and a similar finding was seen in other studies too [10]. The sources of contaminated water were often reported as the sources of infection during outbreak of cholera in India [11,12].

Recommendations to prevent such outbreaks in near future

Panchayat needs to be informed regarding the unsatisfactory nature of water used for drinking purposes. Health awareness is required among the local population for maintaining hygienic conditions in their houses. Practicing hand washing after defecation and before taking meals is of utmost clinical importance. Rigorous steps to be taken to avoid defecation in open environment. Sanitary latrines should be built for the local population.

In that particular area, where raw water is used for drinking purposes, pipe water should be introduced and supplied to the local population residing in the area, along with the chlorination of the water sources especially during rainy seasons. Swachh Bharat Abhiyan was recently proclaimed by the Prime Minister of India on the occasion of independence day [13] and it was officially launched on October 02, 2014. Some aims included raising awareness among the people regarding negative effects of open field defecation and encouraging the usage of appropriate sanitary latrines.

Table 3: Clinical/laboratory parameters and their mean values

Average motions	Mean pulse	Mean Blood pressure	Mean HB	Mean TLC	Mean urea	Mean creatinine	Mean pH	Mean HCO3	Mean Na	Mean K	Mean duration of stay
10.53 per patient in 100% of patients.	96.69 with maximum heart rate of 120 bpm and minimum heart rate of 65 bpm in 100% of patients.	108/72 mmHg in 100% of patients.	13.3	13.36	61.57	1.85	7.19	14.0	144.07	3.69	3.69

CONCLUSION

Contamination of water and sanitation, poor hygiene, and weak public health system are some of the majors that we need to tackle to prevent the outbreak of cholera. Other measures to help control the outbreak include investigation of a cholera outbreak which will help in identifying the cause of the outbreak. Proper allocation of resources for timely detection through surveillance along with health awareness among the people can help in the prevention and preparedness against diseases such as cholera [14,15].

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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