

Epidemiological investigation of cholera outbreak in rural area of Amravati district, Maharashtra

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Abstract

Background: Cholera causes a substantial health burden in the developing world and is one of the oldest endemic diseases. **Objective:** 1.To investigate and describe the descriptive epidemiological characteristics of the outbreak. 2. To provide recommendations to prevent additional cases and future recurrence of the diarrheal disease outbreak. **Methods:** An observational descriptive study was carried out to investigate the outbreak in Supalwada village of Chandur Railway Block. The outbreak started on 21st June 2018 where 27 cases and no death were reported. Rapid Response Team was deployed on the same day in the affected village. Active search for cases in village was done. Description of the outbreak by time, place and person was done. Two stool samples were collected from cases tested for *Vibrio cholera* and seven water samples were also tested. **Results:** Incidence among <5 years was found 4.2% to be more than >5 years was 3.3%. The highest rates were observed among the females (5.1%), while the lowest rates were observed among males (2.3%). Overall attack rate was 3.4% (27/791). One stool sample was tested positive for *Vibrio cholera* O1. One water sample was found contaminated. **Conclusion:** Despite of high attack rate, no deaths were reported, due to timely medical and preventive interventions outbreak was under control in three days. There was progressive decrease in number of cases and successful control of outbreak was achieved due to implication of short and long term curative and preventive measures and management.

Key Words: Cholera, Descriptive analysis, Outbreak, Epidemiological investigation.

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INTRODUCTION

Health care problems faced by rural, tribal are similar to those of other disadvantaged populations. Poverty, mobility, compromised living and difficult working conditions, and also, cultural isolation put them at a higher risk for illness. Diarrheal diseases are one of the

major illnesses faced by these people. Contaminated drinking water continues to be the source for most diarrheal outbreaks recorded in India.¹⁻³ Diarrhea is a major public health problem in India. It is characterized by the passage of three or more loose or liquid stools per day, or more frequently than is normal for the individual.⁴ The infection may be spread through contaminated food or drinking-water, or from person to person as a result of poor hygiene.⁴ It is an important cause of morbidity and mortality in many regions of the world, with more than 4 billion cases and 2.5 million deaths estimated to occur annually.⁵ Supalwada is a village situated in rural area of Chandur railway Taluka, Amravati District in Maharashtra. Population of village is 791 and a majority person belongs to Class IV and V socio-economic status. On date of 21st June 2018, Medical Officer of Primary Health Centre informed of cluster of diarrhea cases with moderate and severe dehydration among adults, old age

people and few children. On same day rapid response team was deployed and initiated investigation.

AIMS AND OBJECTIVE

1. To describe the descriptive epidemiological characteristics of the outbreak.
2. To provide recommendations to prevent additional cases and future recurrence of the outbreak.

MATERIAL AND METHODS

An observational descriptive study was carried out during June to July 2018 to investigate the outbreak in Supalwada village of Chandur Railway Taluka of Amravati district in Maharashtra. The outbreak started on 21st June 2018 where 27 cases and no death were reported. Rapid Response Team was deployed on the same day in the affected village. Active search for cases in village was done.

Descriptive epidemiology: The outbreak was described in time, place and person characteristics. The spot map was drawn to show the distribution of cases of patients. The Incidence rate was calculated as per age and sex distribution. The epidemic curve was drawn to show the magnitude of outbreak. The first information report on outbreak was given by medical officer after which immediately Rapid response team at district level initiated the investigation of the outbreak. Cases were searched as per case definition by performing house-to-house survey in the affected village. The Health center and affected village Supalwada were visited and reviewed for case records of last years.

Case definition: A confirmed acute gastro-enteritis case was defined as passage of 3 or more loose or watery

stools in the past 24 hours with nausea, vomiting, of all ages residing in the Supalwada village since 21st June 2018.

Case ascertainment: Existing line list of cases, case sheets and confirmed case definition were reviewed. Additional cases from village and sub-district hospital were also searched.

Data collection: Collected data on socio demographic details, clinical data and potential exposures and Administered in households, in the local language.

Ethical consideration: Public health response to an outbreak and as such did not require ethical review.

Laboratory investigation: 02 Stool samples were collected from cases and were sent to the District Public Health laboratory Amravati Maharashtra for culture-sensitivity test. 07 water samples were also collected from different drinking water sources of the village and sent for examination to the Public Health Laboratory, Amravati, for portability examination. Descriptive analyses of all cases were done.

Environmental study: The affected areas, valve and pipe line leakages were inspected and observed for water supply sources. There was irregular and improper chlorination since one month. Due to rainfall there was rise in well's water level which precipitated the contamination of the well and Rim of the well was also seemed to percolate ground surface and underground water in the well. Following pictures depict the above mentioned points.

RESULTS

The spot map was drawn to show the distribution of cases of patients.

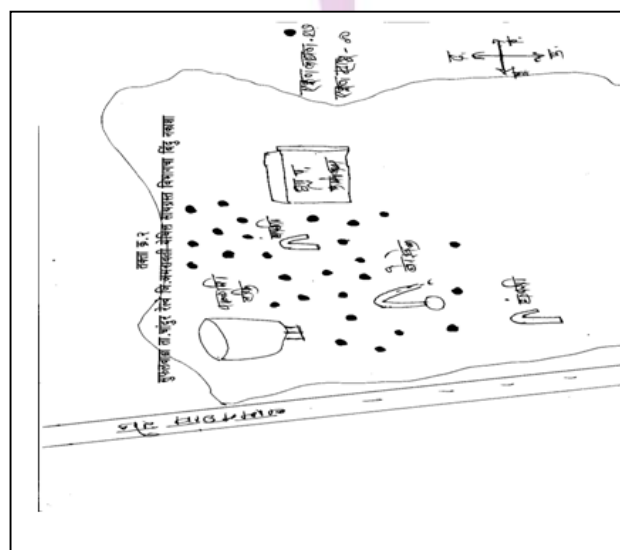


Figure 1:

Table 1: Age and Gender wise distribution of Incidence cases

Characteristics	Cases	Population	Incidence (%)
Age (in yrs)			
<5 yrs	02	47	4.2%
>5 yrs	25	744	3.3%
Gender			
Male	11	478	2.3%
Female	16	313	5.1%
Total	27	791	3.4%

It was seen from **Table 1** that incidence among female was 5.1% are more than male 2.3%. Incidence among >5

years 3.3% are found to be more than <5 yrs 4.2%. Overall attack rate was 3.4% (27/791). Male (11) and Female (16) were affected. Attack rate was highest among adults. 02 cases were detected below the age of 5 years, 25 cases were detected above the age of 5 years. 189 contact cases were observed and mass drug administration was done (tetracycline, Zinc supplementation, FD, ORS packets) during house to house survey visit. **Laboratory result:** One stool sample reports were tested positive for vibrio cholera. 01/06 water samples were found contaminated.

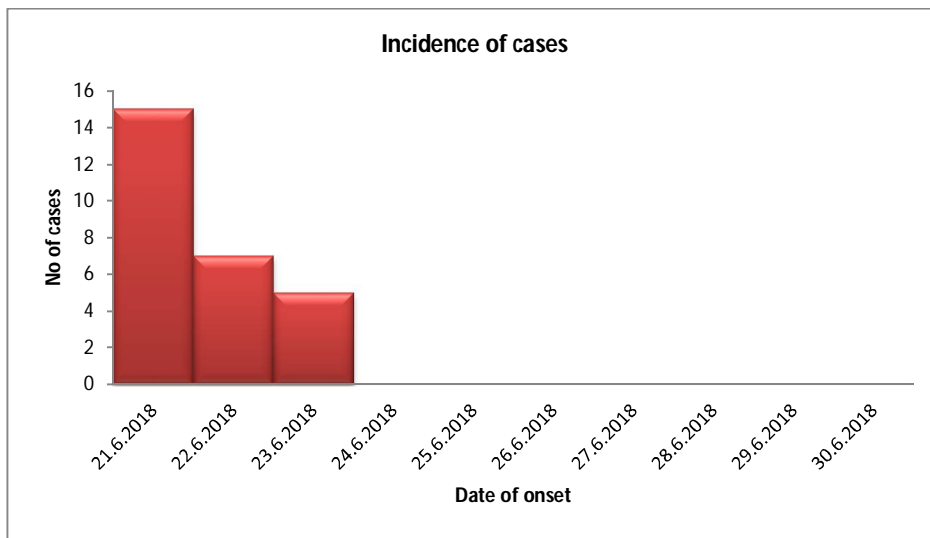


Figure 1: Epidemic curve was drawn to show the magnitude of outbreak

As seen from Figure 1 that when time of onset of symptom were plotted into an epidemiological curve, we noticed the resulting curve had one peak only, which suggested single point-source exposure as a likely transmission route for this outbreak. However, after we investigated several common factors that are normally in connection with point-source exposure. Epidemic curve indicate that there was sudden rise in number of cases on 21st June 2018 and gradually there was decrease in number of cases and no cases were found on 24th June 2018 and onwards. There was progressive decrease in number of cases due to implication of following immediate curative and preventive measures and management:-

Deduction of the source of infection/ preventive measures and management

1. Pipe line and valve leakages were repaired at priority basis.
2. We barred access to leaked pipe line and disinfected by Super-chlorination.

3. Water tanker was made available after super-chlorination till arrangement of alternate source.
4. Super-chlorination was done of all water sources in village.
5. We educated the population about risk associated with unhygienic practices.
6. House to house rapid survey was undertaken in search of new cases.
7. Drug administration to contacts was given to 189 contacts.
8. Isolation ward was established.

All the above long term interventions like environmental interventions, health education, short term interventions like immediate curative treatment, surveillance, and management resulted in controlling the progress of outbreak and break of chain of transmission.

DISCUSSION

An investigation of diarrheal outbreak was conducted by NICED (ICMR), Kolkata at different blocks of Uttar Dinajpur District; West Bengal. The rapid

epidemiological survey was conducted at the 9 affected blocks to understand the clinical presentation and transmission dynamics of this outbreak. It was observed that the character of stool was watery. Maximum no. of cases 12 out of 15 (80%) were associated with vomiting. Similar cases in family were found in 8 out of 15 (53.3%) cases. Degree of dehydration was severe in 10 out of 15 (66.7%) cases which were being treated with I.V. fluid. Rest of the cases (5 out of 15) received ORS solution.⁶ This present study revealed the same findings regarding watery stool and vomiting. Degree of dehydration was also found severe in 80% cases. Govt. of West Bengal a team of the Institute investigated the outbreak of diarrheal diseases from 8th to 11th November, 2003. There were 62 deaths up to 11.11.03. Case fatality rate was 0.18% among total diarrhea cases and 0.36 % (0-0.57%) among hospitalized cases. Majority of the deaths occurred in children and young adolescents. Large number of diarrhea cases was clinically examined and stool samples were collected from 34 diarrhea cases of which 30 cases already received antibiotics. Most of the cases had the symptoms of frequent passage of watery stools (about 40% cases had presented clinical signs and symptoms of typical rice water stools), vomiting and severe dehydration. Nineteen (56%) stool samples were positive for Vibrio cholera Eltor O1, serotype Ogawa. None of the water samples was found to be positive.⁷ Similar findings were observed regarding case fatality ratio and sign and symptoms. 01 stool sample was found positive for vibrio cholera.

CONCLUSION

Diarrhea/Cholera remains a major public health problem in India. Its lethal potential in underdeveloped, remote and malnourished population should not be undermined. The outbreak of Cholera in a village affected 27 persons of all age groups and both gender. Exposure to the contaminated drinking water from water source well was found significantly associated with the disease. Pipeline and valve leakages were found. It was found that there were irregular chlorination practices. All these factors indicated water contamination and source of outbreak. This outbreak was likely caused by contaminated drinking sources in Supalwada village. Following Preventive and control measures undertaken after descriptive epidemiological study helped in terminating the outbreak viz. Inter-sectoral co-ordination; Water supply sources disinfection; Water pipe lines should be regularly checked for leaks and cracks. Repair of cracked pipelines and leakages and closures of man-made holes; Prompt surveillance of cases for early detection and effective management of diarrhea cases; Chlorination of all drinking water sources, and safe disposal of excreta

RECOMMENDATIONS

Emphasis must be given on surveillance of diarrhea cases for early detection and effective management of diarrhea cases. Involvement of all Govt. sectors working particularly in remote areas. Water supply sources should be disinfected periodically and monitored closely by responsible authority. Water pipe lines should be regularly checked for leaks and cracks. Repair of cracked pipelines and leakages and closures of man-made holes. Chlorination of all the tube wells and drinking water sources, and safe disposal of excreta were suggested. Regular supply of ORS and intravenous fluids including buffer stock for epidemic preparedness at the district /PHC level should be maintained. People should be motivated to promote the early health seeking behavior. Emphasis should be given for health education to maintain personal, domestic and food hygiene. Hand washing after defecation and before handling food should be encouraged. Hygienic measures should be taken for the fair and festival with adequate safe water supply and temporary latrines. Quality of water should be improved at the source itself. Common household ways: Vigorously boiling water for one minute can kill most microorganisms. Common household items such as chlorine bleach, tincture of iodine, and iodine tablets can be used to disinfect water.

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