

An Epidemiological Investigation of Acute Diarrheal Disease Outbreak at Urban area in Borsad Taluka of Anand District

Dr. Harshvardhan K. Mehta¹, Dr. Mitesh K. Patel², Dr. Rajshree Bhatt³, Dr. Rajan K. Parmar^{4*}
^{1,3}Assistant Professor, ² Associate Professor, Community Medicine Department, B. J. Medical College, Ahmedabad, ⁴ Assistant Professor, Banas Medical College & Research, Palanpur, Gujarat, India.

*Corresponding author: Dr. Rajan K. Parmar

E mail: rajan61194@gmail.com

DOI:10.56018/20231212



ABSTRACT

Introduction: Acute Diarrheal Disease (ADD) is affecting millions of people around the world especially in second world nations now a days. Major pathogenic organisms that cause diarrhea, are transmitted through feco-oral route. We investigated an outbreak of Acute Diarrheal Disease at urban area of Borsad taluka, Anand District of Gujarat state with **Objectives:** 1. To confirm the existence of an outbreak, 2. To know the magnitude and distribution of the outbreak with reference to time, place and person, 3. To identify the source of infection, mode of transmission and implement control and preventive measures. **Method:** A Cross Sectional Epidemiological study was carried out to investigate the outbreak of acute diarrheal disease cases in urban area of Borsad taluka. We obtained required information from Chief District Health Office, Anand & Community Health Centre, borsad, conducted house to house survey and also inspected the sanitation and water supply of the affected area. **Results:** There were 72 cases of acute diarrheal disease. The overall Attack Rate was 0.43%. Majority of the affected population used non-chlorinated water for drinking. **Conclusion:** The underlying cause for the outbreak of acute diarrheal disease can be co-related by consumption of contaminated water and food.

Keywords: Acute Diarrheal Disease, Borsad, Chlorination, Epidemic Investigation.

INTRODUCTION

Diarrhea is becoming major cause of morbidity and mortality in developing nations. Despite many advances in Healthcare technology, improved management of diarrhea and increased use of Oral Rehydration therapy in last 15 years, deaths due to diarrhea has not shown a parallel decline in comparison to death trends in India.¹ There are numerous reasons for this, but mainly can be due to environmental and sanitation issues. Unfortunately, country data in morbidity and mortality from Diarrhea Disease is deficit in many ways. Most of the diarrhea diseases are caused by 20-25 pathogenic organisms, which is having transmission route preferably through feco-oral route (food borne, water borne, fomites).² Chlorine persist in water as residual chlorine after Chlorination and this helps to minimize the effect of recontamination by inactivating pathogenic organisms, which may enter the water supply after chlorination.³ Effective management of Diarrhea is by prompt rehydration of patients. Mild and moderate cases can be successfully treated with Oral Rehydration Solution.⁴

An Outbreak is defined as the unusual occurrence in a community or region of disease, specific health related behaviour or health related events clearly in excess of “expected occurrence”.²The prime motive of an outbreak investigation is to control, limit its spread and plan preventive strategies to reduce or eliminate the risk of such outbreaks in future.

Epidemiological description of the affected area:

On 7th March 2022, there was an outbreak of Acute Diarrheal Disease in Urban area (Fatepur, Vaghriwas, Hajim Tekra and Navinagari) of Borsad taluka, Anand district.

Affected urban areas (Fatepur, Vaghrivas, Hajim Tekra and Navinagari) had a total population of 26713. Furthermore 79.89% were Hindus and 11.04% were Muslims. 3786 people were affected population, among which 33.1% were Hindus and 66.9% were Muslims. Primary cases of diarrhea and vomiting were reported on 4th March 2022.

Administration of basic amenities like water supply and sewage disposal of this locality was managed by the Municipality. In the affected area water supply was done through an overhead tank by the municipality, but most of the people of this village preferred to buy water from 2 private water suppliers namely Madrasa & Jaldhara who did not chlorinate their water resources since 30th February 2022. Affected areas had both open and closed drainage systems. The hygienic condition of Sanitation and Excreta Disposal was not satisfactory.

MATERIALS & METHODS

First & Foremost, we went to CHC Borsad with Epidemic Medical Officer, Anand, where 13 patients were being treated. We spoke to Medical Officer, CHC Borsad and patients. Out of the 13 patients, two were male pediatric patients. Five male adults and six female adults were also admitted. At the Epidemic site, RRT contacted the Epidemic Medical Officer, Epidemiologist, Block Health Officer and other Medical Officers. All the details of area and the cases were obtained. The data has been collected from them with the due consent. Then we went to the Fatepur area. Fatepur was having poor sanitation. We have also visited few households, where diarrheal illnesses were reported. We talked to local residents of the area. We also checked for residual chlorine level in the available drinking water on the spot with the assistance of MPHW and discovered that chlorine level was NIL. We also saw that the chlorine tablets provided by health workers is not being used by the residents.

Description of control measures taken by the authority after 4th March 2022.

Total five water samples were sent to WASMO (Water and Sanitation Management Organization) for investigation and out of total, four (Fatepur, Vaghrivas, Hajim Tekra and Navinagari area) were found unfit for drinking.

Administrators have chlorinated the water tank of Nagarpalika and have asked private water distributors to do the same under their supervision. House to house chlorine tablets were distributed in affected areas by health workers and ORS distribution was done in affected houses. Health education regarding how to prevent occurrence of Diarrhea and hygienic practices was given to the people via different mass media like posters, loud speakers. The surveillance of newly detected cases has been undertaken by health authority.

RESULTS

Our study results identified 3786 affected population. There were 72 cases of Acute Diarrhea Disease with an attack rate of 0.43%, 13 cases out of them are hospitalized at present. As per the spot map (Fig 1) provided by the concerned authority the clustering of cases amounting to 30 (52.63%) were found in Fatepur, Vaghrivas, Hajim Tekra and Navinagari.

Table 1: Age Group Wise Comparison of Diseased and Non-Diseased.

Age group	Diseased	Non –diseased	Total	$\chi^2 = 87.05$ df=3 p value <0.05
<18 Years.	29 (1.57%)	1816	1845	
18-45 Years.	29 (1.14%)	2498	2527	
46-60 Years.	10 (0.003%)	2863	2873	
>60 Years.	4 (0.0004%)	9479	9483	
Total	72	16656	16728	

During the investigation cases were found between 0 to 60 years of age group mostly (Table 1). Out of total cases 30 (41.6%) were males and 42 (58.33%) were females, but the difference was not statistically significant.

Figure 1: Spot Map Showing Boundaries of Borsad (Urban) With Water Resources, Health Facilities and Clustering of Cases.

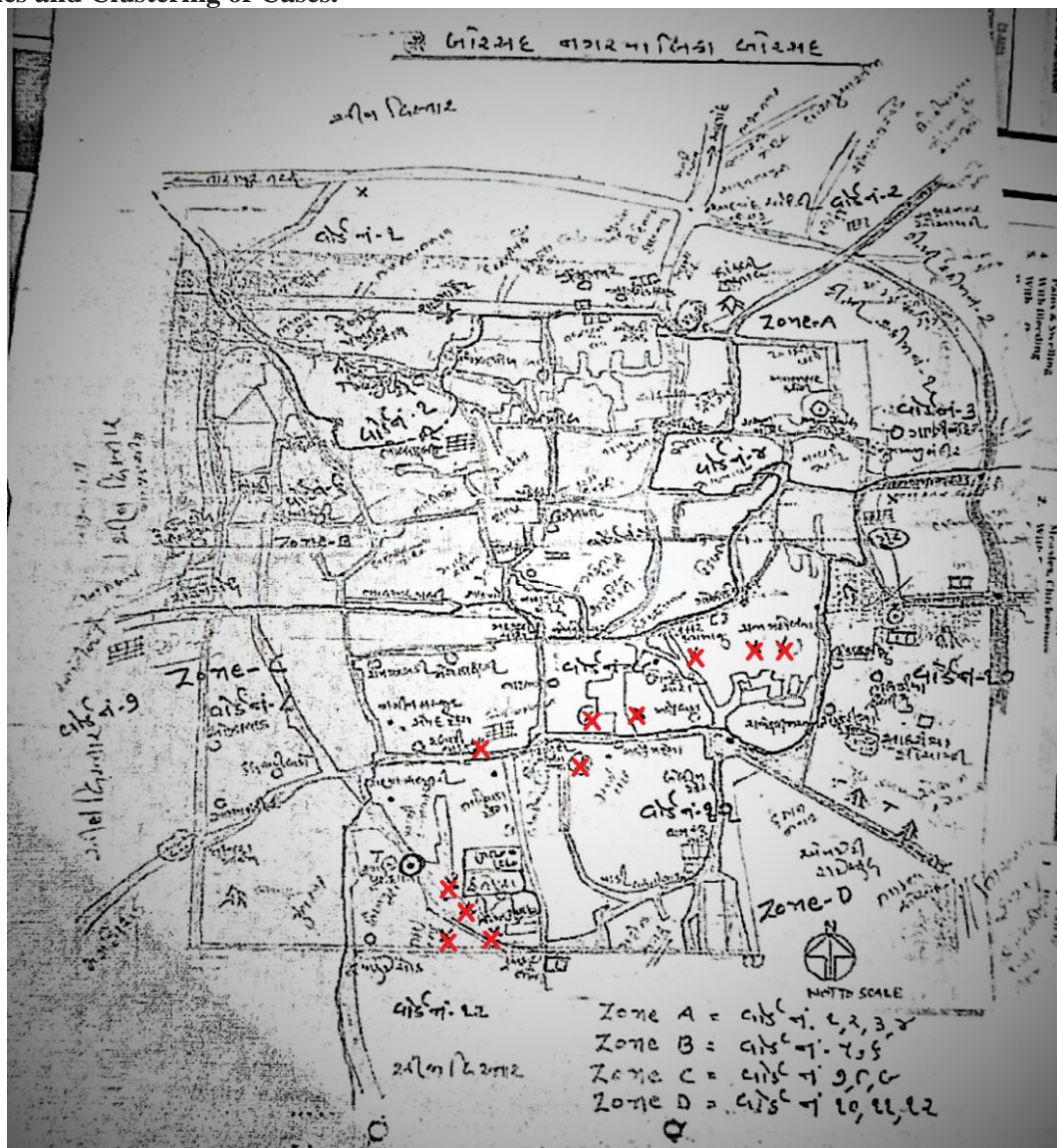
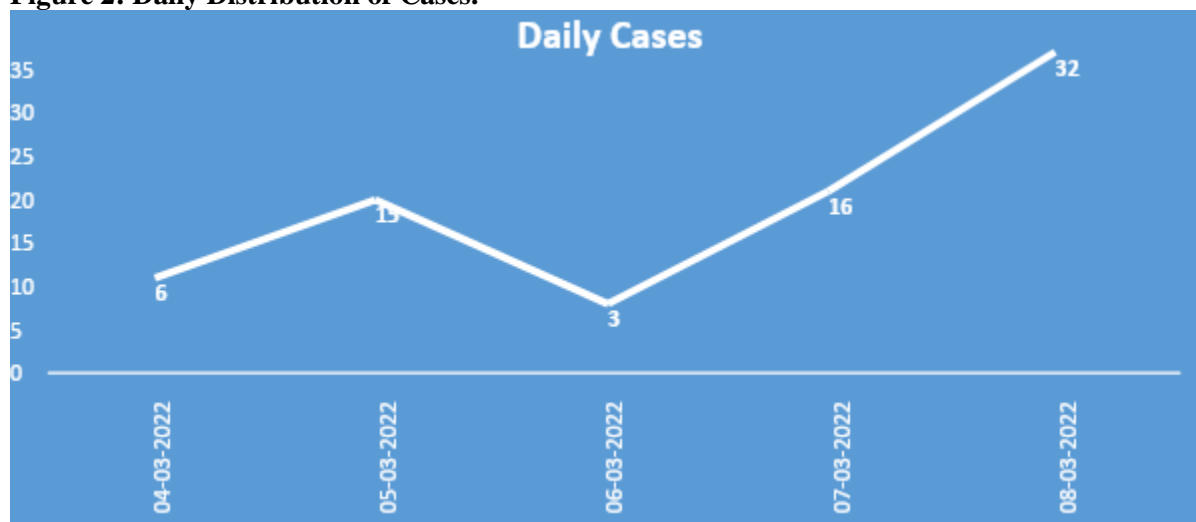


Table 2: Preventive measures taken by the authority at affected area (Sojitra village)

Date	Residual Chlorine test		Chlorine tablet distribution	ORS distribution
	Positive	Negative		
4/03/2022	110	35	800	46
5/03/2022	51	9	350	19
6/03/2022	117	33	180	19
7/03/2022	106	13	350	31
Total	384	90	5380	265

Chlorination was done throughout the affected area by the authority after the outbreak but still residual chlorine testing showed that there was ineffective chlorination in 90 samples (18.98%) as on 07/03/2022. ORS was also distributed in the affected population efficiently. (Table 2)

Figure 2: Daily Distribution of Cases.

DISCUSSION

Anand is known as milk capital and is situated 60 km from Ahmedabad city. Anand district is divided into 8 Talukas or sub district, one of them is borsad which has 1 CHC (borsad) and 11 PHCs (alaska, badalpur, bhadrans, bohasan, davol, dahevan, kanbha, nava-talpad, sisva, virsad, zarola). Anand district is more prone towards water borne disease. Our study was done at urban field area of borsad taluka as a part of an epidemic investigation done on a rapid basis with short duration exposure to that area. Total 72 cases of acute diarrheal disease were confirmed by the authority till the day of visit. There was a single death reported (6 years old female). The cases ranged from the age of 6 months to 48 years with the mean age of 29 (SD±19.22). Age wise distribution of affected cases compared to the general population was found statistically significant with the chi square value of 87.05 ($p < 0.05$, $df = 3$). A hospital based study of Bangladesh reported that diarrheal cases were more common in children greater than 5 years of age.⁶ There were 30 (41.6%) males and 42 (58.33%) were females. Nearly similar distribution of males and females was found in a study done by Arti et al in Madhya Pradesh.⁷ Total affected population was 3786 with the attack rate of 0.43%. In a study done at Dharmashala (Himachal Pradesh) overall was found to be 14% among the residing hostellers.⁸

This may be due to non-chlorinated, contaminated water supply or eating of contaminated non vegetarian food. Chlorine persists in water after dosing and this helps in minimizing the effect of recontamination. When there is a risk of acute diarrheal disease outbreak, residual chlorine should be maintained at all points above 0.5mg/L.⁹ In borsad, only 20% used chlorinated water supplied to them by the municipality. Nearly 5380 chlorine tablets were distributed in affected households yet 18.98% dwellers were not using chlorinated water due to its odd taste.

As found in Bholakpur, India, bacteriological pollution of drinking water supply, due to infiltration of contaminated water through cross connection, leaking points and back siphoning cause diarrheal illness. The significant risk factor was water transportation and poor handling of water at house hold levels.¹⁰

Although diarrheal disease with known etiologies are under regular surveillance by Intensified Diarrhea Control Fortnight, India, Only limited food borne/ water borne outbreaks were subjected to epidemiological study. Nearly 1.7 billion cases of diarrheal disease are reported every year which are significantly clustered in summer & monsoon months.^[11] In, India mortality rate of diarrhea was 9.1% and estimated projection of year of life lost (YLL) due to diarrheal diseases will increase to 1,95,046 in 2023.¹¹

The results of our study suggest that non chlorinated drinking water might be the source of infection in this village. On the contrary, the cases were clustered in a particular areas called Fatepur, Vaghrivas, Hajim Tekra and Navinagari where majority of the population were Muslims. Secondly, children were less affected here.

CONCLUSION

The most probable cause of acute diarrheal disease could be consumption of contaminated non chlorinated drinking water. This outbreak affects substantially Muslims, clustered in Fatepur, Vaghrivas,

Hajim Tekra and Navinagari areas but could not be confirmed due to lack of laboratory evidence during epidemic.

RECOMMENDATIONS

Effective chlorination of all water sources plays a crucial role to prevent outbreaks. Distributing chlorine tablets in affected and unaffected households can reduce the incidence of cases. Proper surveillance and prompt treatment can reduce the mortality and disease burden. Periodic inspection of all slaughter houses for proper hygiene by concerned authority should be done to maintain hygienic slaughtering practices. Relevant health education and continuous surveillance in the areas are pivotal.

REFERENCES

1. 24th, Jabalpur: Banarasidas Bhanot Publishers, 2017. p 236- 240 and 98.
2. Disinfection session objectives-world health organization, www.who.int/dwq page 4. [last accessed on 2022, March 16]
3. WHO. Prevention and control of cholera outbreaks: WHO policy and recommendations [http://www.who.int/ cholera/technical/en](http://www.who.int/cholera/technical/en). [last accessed on 2022, March 16].
4. IDSP, weekly reporting, <http://idsp.nic.in/index4.php? lang=1&level=0&linkid=406&lid=3689> [last accessed on 2022, March 16]
5. Fahima Chowdhury, Iqbal Ansary Khan, Sweta Patel, Ashraf Uddin Siddiq, Nirod Chandra Saha, Ashraful I. Khan, Amit Saha, Alejandro Cravioto, John Clemens, Firdausi Qadri, Mohammad Ali. Diarrheal Illness and Healthcare Seeking Behavior among a Population at High Risk for Diarrhea in Dhaka, Bangladesh. PLOS one: 2015;10:1-14
6. Arti Gupta, B. Venkatesh Reddy, Surya Bali, and Arun M. Kokane, J Nat. Outbreak of gastroenteritis among medical students, Madhya Pradesh, Central India. Sci Biol Med. 2015;6:25–28.
7. Surender Nikhil Gupta, Naveen Gupta, Department of Health and Family Welfare, Regional Health and Family Welfare Training Centre (RHFwTC), Chheeb, Kangra, Himachal Pradesh, Indian Journal Of Community Medicine. 2009;34:97-101
8. WHO seminar pack for drinking water quality.WHO. [last accessed on 2022, March 16]
9. Abdul R M , matnuri L, dattatreya PJ , Mohan D A. Assessment of drinking water quality using ICP-MS and microbiological methods in the Bholakpur area, Hyderabad, India. Environ monit assess 2011;1841:1581-9
10. IDCF 2014 Intensified Diarrhoea Control Fortnight 28 July–8August 2014 operational plan for states, UTs and districts Ministry of Health & Family Welfare, Government of India.
11. WHO. Estimation of burden of diarrheal disease in India available from [http://www.who.india.org /commission](http://www.who.india.org/commission). [last accessed on 2022, March 16]