

An Epidemiological Investigation of Acute Diarrhoeal Disease Outbreak in Sojitra Village of Anand District by Rapid Response Team of B. J. Medical College, Ahmedabad

Nirav Patel¹, Akash Patel¹, Rahul Patel¹, Lakshmi N. ¹, Navin Raja Sekar ¹, Rajshree Bhatt ²

¹Resident Doctor, ²Assistant professor, Community Medicine Department, B.J. Medical College, Ahmedabad, Gujarat, India

Correspondence : Dr. Aakash Patel, E mail: drap227@gmail.com

Abstract :

Introduction : Acute Diarrhoeal Disease (ADD) affects millions of people around the world especially in second world nations. Most of the pathogenic organisms that cause diarrhoea, are transmitted primarily or exclusively through feco-oral route. We have investigated an outbreak of Acute Diarrheal Disease in Sojitra Village of Anand District-Gujarat, to identify the etiological agent, mode of transmission and various control measures taken by the authority. **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 diarrhoeal disease cases in Sojitra Village. We obtained required information from the CHC, conducted house to house survey and also inspected the sanitation and water supply of the affected area. **Results :** There were 57 cases of acute diarrhoeal disease. The overall Attack Rate was 1.51%, with higher attack rate among Muslims. The Attributable risk was found to be 40% among the Muslims who consumed non vegetarian feast post Ramadan Eid from 24th to 26th week of 2017. Majority of the affected population used non-chlorinated water for drinking. **Conclusion :** The underlying cause for the outbreak of acute diarrhoeal disease may be due contaminated water and food.

Keywords : Acute Diarrhoeal Disease, Epidemic Investigation, Ramadan, Rapid Response Team, Sojitra

Introduction :

Diarrhoea is an important cause of morbidity and mortality in developing nations. In spite of many advances in health technology, improved management and increased use of Oral Rehydration therapy in the past decade, morbidity due to diarrhoea has not shown a parallel decline in comparison to mortality trends in India.^[1] There are multiple reasons for this, but mainly it is due to environmental and sanitation issues. Unfortunately, Indian data in morbidity and mortality from Diarrhoeal Disease is deficit in many ways. Most of the diarrhoeal disease is caused by 20-25 pathogenic organisms that are transmitted primarily or exclusively through feco-oral route (water borne, food borne, fomites).^[2]

Chlorine persist in water as residual chlorine after dosing and this helps to minimize the effect of recontamination by inactivating microbes which may enter the water supply after chlorination.^[3] Effective management of Diarrhoea is by prompt rehydration of patients. Mild and moderate cases can be successfully treated with ORS.^[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".^[2] The prime purpose 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 July 2017, there was an outbreak of Acute Diarrheal Disease in Sojitra village, Anand district. The Rapid Response Team (RRT) from B.J. Medical College, Ahmedabad, reported to investigate this outbreak.

Sojitra village had a total population of 16713. 69.89% were Hindus and 29.04% were Muslims. 3786 was the affected population, among which 33.1% were Hindus and 66.9% were Muslims. Primary cases of diarrhoea and vomiting were reported on 26th June 2017.

Administration of basic amenities like water supply and sewage disposal of this village was taken care 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 Jaldhara and Madrasa who did not chlorinate their water resources till 30th June 2017.

The Village had both open and closed drainage systems. The hygienic condition of Sanitation and Excreta Disposal were not satisfactory.

Acute Diarrhoeal Disease outbreak occurred after Ramadan Eid. There was a mass feast for Eid celebration on 26th June consisting mainly of non-vegetarian food and the hygienic condition of the slaughter house from where the meat was distributed also didn't seem to be satisfactory.

Method :

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. No active case was observed during our field visit.

Description of control measures were taken by the authority after 30th of June.

Total five water samples were sent to WASMO (Water And Sanitation Management Organization) for investigation and from them two were found unfit for drinking (Khatkiwad and Chokshi Bazar area).

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 with ADD cases. Health education regarding how to prevent occurrence of Diarrhea and hygienic practises was given to the people via different mass media like posters, loud speakers and surveillance regarding new cases was undertaken by health team.

Result :

Our study results identified 3786 affected population. There were 57 cases of Acute Diarrhoeal Disease with an attack rate of 1.51%, 27 of them were hospitalised. As per the spot map (Fig 1) provided by the concerned authority the clustering of cases amounting to 30(52.63%) were found in Khatkiwad which is predominantly populated by Muslims.

Figure 1 : Spot map showing boundaries of Sojitra village with water resources, health facilities in the village and Clustering of 33 cases in Khatkiwad area

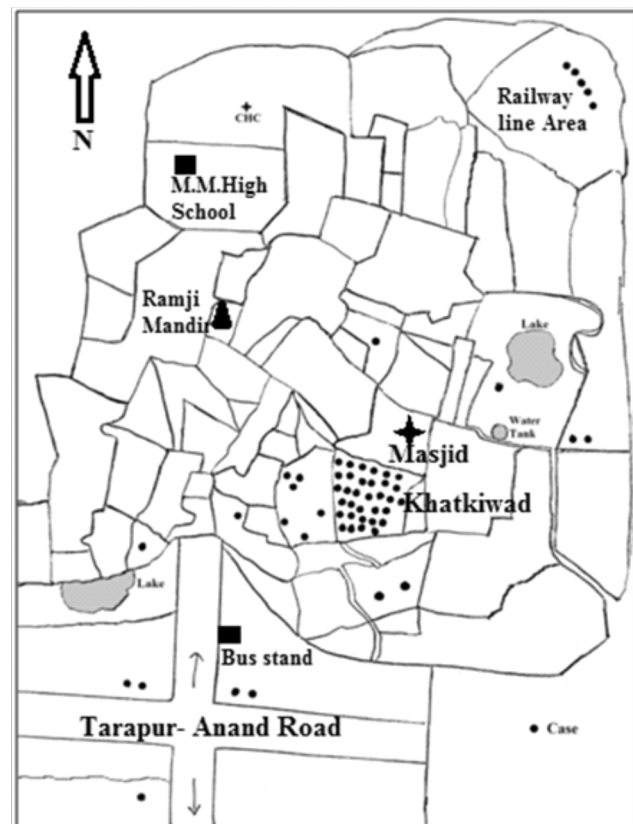


Table 1: Age group wise comparison of Diseased and Non-diseased among total population

Age group in years	Diseased	Non -diseased	Total	$\chi^2 = 87.05$ df=3 p value <0.05
0-5	7(0.38%)	1816	1823	
6-14	3(0.12%)	2498	2501	
15-49	36(1.24%)	2863	2899	
>50	11(0.11%)	9479	9490	
Total	57	16656	16713	

(Table 1) Majority of cases were found between 15 to 49 years of age group. (n=36; 63.15%). Among total cases 27(47.37%) were male and 30(52.63%) were female, but the difference is not statistically significant. Attack rate in male and female was found to be 1.29 and 1.76 respectively.

Affected population had high proportion of Muslims (2534; 66.9%). Attack rate among the Muslims and Hindus was 1.7% and 1.03%, respectively. As per the figure 3 we found that, there was a sudden rise of acute diarrhoeal disease cases from 24 to 26 weeks of 2017 as compared to 2016. [5]

Figure 2: Age wise distribution of cases. (N=57)

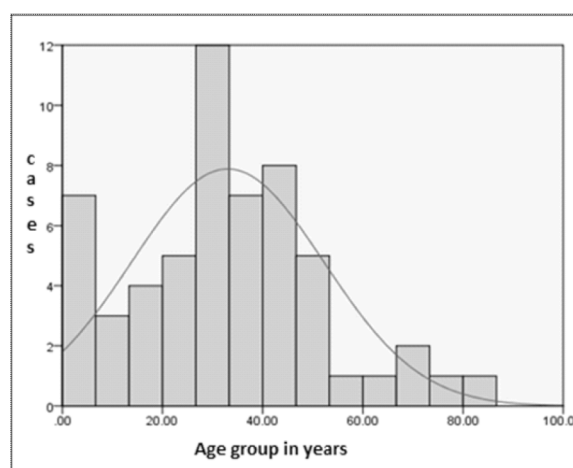
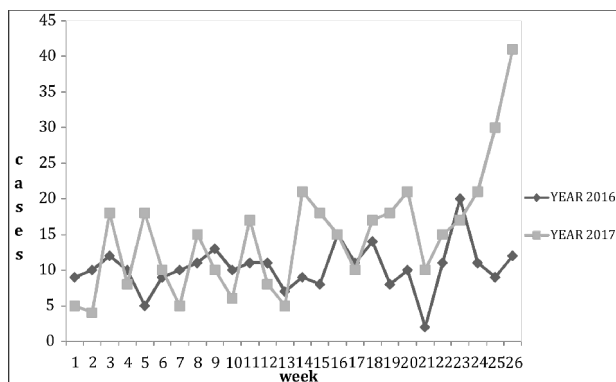


Table 2: Preventive measures taken by the authority in affected area of Sojitra village

Date	Residual Chlorine test		Chlorine tablet distribution	ORS distribution
	Positive	Negative		
30/06/2017	56	42	1500	52
1/07/2017	68	11	800	20
2/07/2017	97	11	600	35
3/07/2017	129	50	800	43
4/07/2017	110	35	800	46
5/07/2017	51	9	350	19
6/07/2017	117	33	180	19
7/07/2017	106	13	350	31
Total	734	204	5380	265

Cases ranged widely from 6 months to 85 years of age (As per Fig 2) with mean age group of 33 (SD ± 19.22).

Figure 3: Week wise distribution of cases in year 2016 and 2017



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 234 samples (21.75%) as dated on 07/07/2017. ORS was also distributed in the affected population efficiently. (Table 2)

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 Sojitra which has 1 CHC and 2 PHCs (Dabhau and Deva Talpad). Anand district is more prone towards water borne disease. Our study was done at Sojitra village as a part of an epidemic investigation done on a rapid basis with short duration exposure to that area. Total 57 cases of acute diarrhoeal disease were confirmed by the authority till the day of visit. There was no death reported. The cases ranged from age of 6 months to 85 years with the mean age of 33 (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 diarrhoeal cases were more common in children greater than 5 years of age.^[6] There were 27 (47.5%) males and 30 (52.63%) females. Nearly similar distribution of male and female was found in a study done by Arti et al in Madhya Pradesh.^[7]

Total affected population was 3786 with the attack rate of 1.51%. Attack rate among Muslims and

Hindus were 1.74 and 1.03 respectively. Clustering of cases was seen in Khatkiwad comprising a total population of 668 with the attack rate of 4.93%. In a study done at Dharmashala (Himachal Pradesh) overall attack rate was found to be 14% among the residing hostellers.^[8]

Attributable risk among the Muslims having non-vegetarian food post Ramadan was found to be 40%. Similar were the findings in a study by Surendra et al which showed that eating beef outside was the most important risk factor for Acute Gastroenteritis with an attributable risk of 71% in the population.^[8]

Week wise distribution of acute diarrhoeal disease cases clearly indicates that Sojitra Village is an endemic area for Acute Diarrheal Disease but there was a sudden rise in the number of cases from 24 to 26 weeks of 2017 as compared to 2016 data. This may be due to non-chlorinated, contaminated water supply or eating of contaminated non vegetarian food post Ramadan. Chlorine persists in water after dosing and this helps in minimizing the effect of recontamination. When there is a risk of acute diarrhoeal disease outbreak, residual chlorine should be maintained at all points above 0.5mg/L.^[9] In Sojitra village only 20% used chlorinated water supplied to them by the municipality. Nearly 5380 chlorine tablets were distributed in affected households yet 21.74% 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 diarrhoeal illness. The significant risk factor was water transportation and poor handling of water at household levels.^[10]

Although diarrheal disease with known aetiologies are under regular surveillance by Intensified Diarrhoea Control Fortnight, India, Only limited food borne/ water borne outbreaks were subjected to epidemiological study. Nearly 1.7 billion cases of diarrhoeal disease are reported every year

which are significantly clustered in summer and monsoon months. ^[11] In India the proportionate mortality rate of diarrhoea was 9.1% and estimated projection of year of life lost (YLL) due to diarrhoeal diseases will increase to 1,95,046 in 2016. ^[12]

The results of our study suggest that non chlorinated drinking water might be the source of infection in this village, but they were drinking the same water since long time. If water was the only source of outbreak then cases would have been distributed uniformly in the entire area and all the age groups would be equally affected. On the contrary, the cases were clustered in a particular small area called Khatkiwad where majority of the population were Muslims. Secondly, children were less affected here. Third, the outbreak happened just after Ramadan Eid. This signifies that cases might have occurred due to consumption of contaminated food.

Conclusion:

The most probable cause of acute diarrhoeal disease could be consumption of contaminated food post Ramadan Eid celebration. This outbreak affects substantially Muslims, clustered in Khatkiwad area of Sojitra Village but could not be confirmed due to lack of laboratory evidence during epidemic.

Recommendations:

Effective chlorination of all the water sources is 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 area is pivotal.

Declaration:

Funding : Nil

Conflict of Interest : Nil

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