

Investigation of Diarrhoea Outbreak in a Remote Village of Southern Karnataka

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ABSTRACT

Diarrhoea occurs world-wide and causes 4% of all deaths and 5% of health loss to disability. A total of 1714 outbreaks have been reported in 2017 in India of which acute diarrhoeal diseases is major cause. One of the most important causes for diarrhea is due to water contamination with human and animal feces. The main purpose of an outbreak investigation is to control the outbreak, limit its spread to other areas and assess the preventive strategies that could be adopted to reduce or eliminate the risk of such outbreak in future. Methodology: 18 members in the village of a V. Guttahalli were admitted to the community health centre at Mulbagal in Kolar, in November 2010 with vomiting, diarrhoea and severe dehydration. A rapid household survey in the affected village was carried out for case finding and management. Environmental survey was carried out. Drinking water samples were collected and analyzed. Results: Thirty people in the rapidly surveyed households had developed acute diarrhoea in the past 7 days. The affected households were consuming water from common sources. The water supply distribution pipes were tampered near the collection points. Generally sanitation of the community was very poor with open defecation all around and animal dung was present near the water collection points. Cholera bacilli was not identified from stool samples and water collected from water tanks. The outbreak declined after ensuring that people collected water from a single point and temporarily stopping the distribution of water through the multiple water taps in the community. One out of the four water samples from different collection points was positive for E-coli. Conclusions: Water contamination through the damaged distribution pipes was identified as the cause of acute diarrhoea outbreak at V. Guttahalli. It is important for the local governance to supervise and maintain water supply system. The community should be educated about the importance of hygiene and sanitation of water distribution system and the water collection points.

Key-words: Outbreak, Diarrhoea, Risk, Community, Water.

INTRODUCTION

Diarrhoea occurs world-wide and causes 4% of all deaths and 5% of health loss to disability. It is most commonly caused by gastrointestinal infections which kill around 2.2 million people globally each year. ¹A total of 1714 outbreaks have been reported in 2017 in India of which acute diarrhoeal diseases is major cause. ²One of the most important causes for diarrhea is due to water contamination with human and animal feces. The aetiology of diarrhoea is very varied, important aetiological enteropathogens are V. Cholera, E. coli, salmonella, shigella. Rotavirus has emerge as the leading cause of severe, dehydrating diarrhoea in children age less than 5 years. ³ Most of the pathogenic organisms that cause diarrhoea are transmitted primarily or exclusively by the faecal-oral route. Faecal-oral transmission may be water-borne; food-borne, or direct transmission which implies an array of other faecal-oral routes such as via fingers, or fomites, or dirt which may be ingested by young children. ⁴ An epidemic or outbreak is said to exist when the number of cases is in excess of the expected

frequency for that population, based on the past experience. ⁵ The main purpose of an outbreak investigation is to control the outbreak, limit its spread to other areas and assess the preventive strategies that could be adopted to reduce or eliminate the risk of such outbreak in future.

The objective of the investigation was to describe the outbreak of Diarrhoea at V. Guttahalli village in Kolar, to identify the factors contributing to the outbreak and to suggest control measures.

MATERIAL AND METHODS

Soon after getting the reports of increased number of cases of diarrhoea in V. Guttahalli on November 2010, a team comprising of Medical Officer, A.N.M., Asha worker, Lab technician and few M.B.B.S. interns visited the area. The diagnosis of outbreak was confirmed clinically and as the number of cases were clearly in excess of expected frequency for that area and time of the year, it was considered to be an outbreak. The people at

risk were defined. Spot map prepared to find out clustering of cases.

A house to house survey was conducted to find out the cases among all the households of V. Guttahalli Village, Mulbagal Taluk. Along with finding of cases a questionnaire was prepared which would help us in finding out about symptoms of cases if any, treatment seeking behaviour, treatment obtained, storage of water, source of water and method of purification. Testing of ecological factors were done i.e. water sources were examined for cleanliness, the water samples were taken from those sources for laboratory testing and the sewage system were looked into.

The cases which were admitted in the hospital were followed up and stool samples were obtained from them for the laboratory testing. The follow up was done in the village until no new cases were obtained.

Statistical Analysis-

The obtained data was entered in the MS excel sheet. The proportions of the various quantitative and qualitative variables were found. The information from questionnaire survey was entered in Microsoft Excel and later analyzed with SPSS software.

Ethical Clearance: The study received approval by the research review board and the ethical review board of Sri Devaraj Urs Medical College, Kolar. Verbal informed consent was obtained from the participants or their guardians before proceeding with the survey activities. Anonymity of the respondents at all stages of data analysis was maintained.

RESULTS

Table 1 Shows a total of 160 households were investigated for diarrhea outbreak. The total no. of study subjects were 678 among them 51 % are males and 49% are females. Sex wise distribution of cases shows that females (77%) were more affected than males (23%), With respect to the age distribution Predominantly adults(16-65 age group) are affected by gastroenteritis 65% compared to other age group.

Table1: Demographic characteristics of the study population

Study population	Frequency(N)	Percentage(N)
Total no of males	275	51
Total no of Females	265	49
Total	678	100
Gender distribution of cases		
Males	7	23
Females	24	77
Total	31	100
Age distribution of cases		
Age group		
0-5	4	13
15-Jun	5	16
16-65	20	65
>65	2	6
Total	31	100

Figure 1: Epidemic curve of Diarrhoea cases

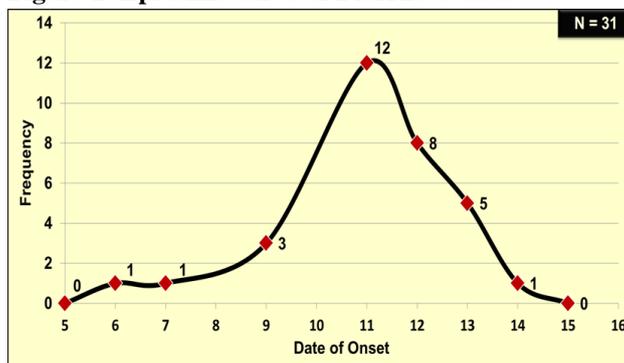


Table 2: Attack rate of the study population

	No. affected	Total no.	Disease specific attack rate (%)
Gender specific attack rate among the study population			
Male	7	371	1.9
Female	24	307	7.8
Total	31	678	4.6
Age specific attack rate among the study population			
0-5	4	72	5.6
15-Jun	5	140	3.6
16-65	20	449	4.4
>65	2	17	11.7
Total	31	678	4.6

Table 3: Clinical features and practices among the study subjects

	Frequency(N)	Percentage(N)
Presentation of symptoms		
Loose stools	29	93.5
Vomiting	4	12.9
Treatment seeking behaviour		
No treatment	2	6
Village level	8	26
Urban level	21	68
Total	31	100
Storage of water		
Buckets with Closed container	153	95.62
Open	7	4.37
Total	160	100
Method of purification		
No method	53	33.12
Boiling	107	66.85
Total	160	100

Fig. 1 shows the epidemic curve of the diarrhoea outbreak at V.Guttahalli Village. Ashwini, a 21-year-old female, was the primary case, reported on November 6th 2010. She complained of severe watery stools and vomiting, for which she was admitted to the Government Hospital, Mulbagal. She did not provide a history of

travel outside the village or eating outside the house in the past month. This report was followed by four cases on November 11th. On 12th, there were 25 reported cases of diarrhea, and a rapid response team was immediately set up in the village. The cases were treated with antibiotics, an oral rehydration solution and intravenous fluids according to the severity of the case in the village itself. Critical cases requiring further care were referred to the Taluk hospital for more intensive treatment.

Table 2 shows the attack rate among the study population is high among females 7.8% compared to males 1.9 % and the attack rate is high among the age more than 65 (11.7 %) compared to the other age group.

Table 3 shows that loose stools and vomiting are the predominant clinical symptoms among the study population. About 68 % of the cases have visited urban area for treatment seeking in a health center, about 26 % of the cases have taken treatment at the village level by seeking the advice of ASHA worker and 6 % of the cases have not taken any treatment. Among the 160 households surveyed about 96 % of the households were storing the water by closing the container. In 67 % of the households boiling was the method employed for purification of water and in 33 % of the households no method was used in purification of water.

Sanitary Survey: Drinking water source for the village is a tube well. Water is stored in a overhead tank which was cleaned once in 5 months. Water from the borewell is pumped into a water tank situated near the school. Everyday water in the morning water is supplied through pipes to the village houses. A leaking valve was identified near the water tank. The water distribution pipe ran through the drainage floor. Many houses in the village use this water for domestic use and drinking. Water is generally stored in pots, vessels and drums, although a few houses use sumps. Water samples collected from all sources were not potable, as the water contained coliform organisms. On the spot map, the whole village was affected, and no clustering of cases was observed. Water distribution pipes are damaged and leaking at four sites. People collect water from stand posts, which distributes water to around 22 houses. Drinking water is stored in closed vessels in most of the houses. 67% of the houses boiled water before drinking. Open field defecation was practiced by many individuals in the village. Out of the 4 samples taken at various water distribution system in the village one sample showed E-coli contamination. Overall Sanitary conditions of the village was very poor. Stool examination of the patients showed growth of E-Coli but no growth of Vibrio cholera was seen.

Interventions done

Village panchayat were informed about the outbreak. The leaking valve on the water distribution pipe running through the drainage floor was replaced, and the location of the pipe was shifted. Overhead water tank cleaned & chlorination was done The local authority was advised to chlorinate the water every morning. All disease cases were educated regarding the use of boiled water and hand washing practices during house visits and treatment.

House to house distribution of chlorine tablets and O.R.S. sachets was done. Overhead water tank cleaned & chlorination was done. Health education was given to the villagers on hygiene, sanitation, using boiled water during outbreak.

DISCUSSION

The diarrhoea outbreak included a total of 31 cases with the attack rate of 4.1, of which the attack rates among the females are high (7.1) compared to males (1.9). The attack rates were highest among the elderly (11.7) followed by children less than 5 years (5.6). Common source single epidemic curve was seen.

In this diarrhea outbreak the attack rates among the females is high (7.8) compared to males (1.9), where as in a study conducted Manoj kumar et al, males and females are almost equally affected.⁶ The females are affected more compared to males due to consumption contaminated water is high among them at the house as males are gone out for work. In a study conducted by S B Patil et al, males are affected more (57.9%) compared to females showing the causative organism exposure at work site for males.⁷

In a study conducted by A Joshi et al, the attack rate among the elderly was high (47.4) similarly in our study also observed high attack rates among the elderly (11.7) when compared to lesser age.⁸

In our study about 95.62 % of the households practiced water storage of in a closed container, similarly in a study conducted by Sonia puri et al, the water storage in a plastic containers and buckets seen to be of 87%.⁹ Our study also shows that piped water supply does not guarantee protection against faeco oral diseases. Proper layout of the pipes along with regular maintenance and repairs are needed to ensure supply of safe and potable water. In this study it was found that irregular and/or inadequate treatment of water, lack of drainage systems and domestic washings near the wells led to deterioration in the quality of water. The WHO water sanitation report shows 80% of the developing world population have access to some type of improved drinking water source and only 44% have access through a household connection from a piped system. In this study the all the household members accessed to improved drinking water but residual effect of chlorination was not met due to negligence in chlorination of the overhead tank in the village was observed. Although Individual household piped water system was not found in the village and only the stand posts were placed in many areas in the village or domestic and drinking purpose.

Conclusion:

Availability of safe and potable drinking water is always a major problem in rural India. Open air defecation and disposal of garbage is commonly practiced in this village. Bore well water was stored in water tank and then tank water was utilized for multiple purposes (washing clothes, cleaning, drinking and cooking etc.) by residents of the village. Outlet of tank is plastic pipe which passes through drainage at various places of the village. There is

high chance of sweeping of drainage water into the water pipe easily and chance of transmission of infection is pretty easier.

Relevance for the study:

As the outbreak happened in a very remote and very poor hygiene conditions of the Village V. Guttahalli which is now improved with respect to the interventions happened may be after the outbreak. At the same time the village now is having purified water system and same water is distributed to all the households. We might expect the same incidence to happen in the neighboring village Ramasagar where the sanitary conditions are very poor. The interventions done in the V. Guttahalli and water purification system by reverse osmosis can help in this village. In places like this still open air defecation and poor hygiene practices the outbreaks can be continued.

Recommendations:

Local concerned authorities should take care of the water sources, cleanliness of the surrounding areas should be maintained. Village people should be educated about the hygiene practices, methods of purification of water, uses of consuming pure water etc.

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