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Original Research Article

Investigation of acute diarrhoea outbreak at Narasapura, Kolar

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ABSTRACT

Background: Greatest risk of acute diarrhea outbreaks occurs in over-populated communities & refugee settings characterized by poor sanitation, unsafe drinking-water and increased person to person transmission. Because the incubation period is very short, number of cases can rise extremely quickly and it calls for a prompt and thorough investigation. There were reports of cases of acute diarrhoea and based on the preliminary field work, the existence of an outbreak was confirmed. Hence it was decided to investigate the outbreak with objectives to determine the causes and source of acute diarrhoea outbreak at Narasapura village in Kolar and to suggest control measures.
Methods: The cross sectional study was conducted in Narasapura village of Kolar which is a fast growing industrial area. All the households and migratory settlements of the affected area were included. Attack rates of the disease were computed, epidemic curve drawn and the results were analyzed to draw conclusions. Control measures were applied simultaneously.
Results: The diarrhoea attack rate at AD colony was 10%. Males (65%) were more affected compared to females (35%). 15.4% stool samples were positive for *Vibrio cholera* and 18% of the water samples was found to be non-portable. *Vibrio cholerae* O1 biotype El Tor serotype Ogawa strain was implicated as the cause for present outbreak.
Conclusions: Cholera continues to be a public health problem in migratory settings, causing disease outbreaks. Environmental risk factors and lack of awareness are the contributory factors which need to be addressed.

Keywords: Outbreak, Cholera, Outbreak investigation, Narasapura

INTRODUCTION

An outbreak is a situation when a health event occurs at a greater frequency than normally expected within a specified period and place or when there occurs a cluster of disease that can be linked to the same exposure.[1] The occurrence of an epidemic signals that some significant shift has taken place in the existing balance between the agent, host and environment. It calls for a prompt and thorough investigation of the epidemic to control the current outbreak, to uncover the factors responsible so as to guide in advocating control measures to prevent further spread and future outbreaks and for better planning and organization of health services.[2]

According to National health profile of India, 116,73,018 cases of acute diarrhea were reported in 2015. Cholera remains an ever present risk in many countries and new outbreaks can occur sporadically in any part of the world. The greatest risk occurs in over-populated communities and refugee settings characterized by poor sanitation, unsafe drinking-water, and increased person to-person transmission.[3,4] Because the incubation period is very short, the number of cases can rise extremely quickly.[5]

Narasapura is a fast growing industrial area in Kolar, Karnataka with as many as 8-9 manufacturing companies located close to it. There were reports of 13 cases of acute diarrhoea from Narasapura being admitted in a tertiary

care hospital in Kolar, among which, based on the stool examination reports, two cases were diagnosed to be having Cholera.

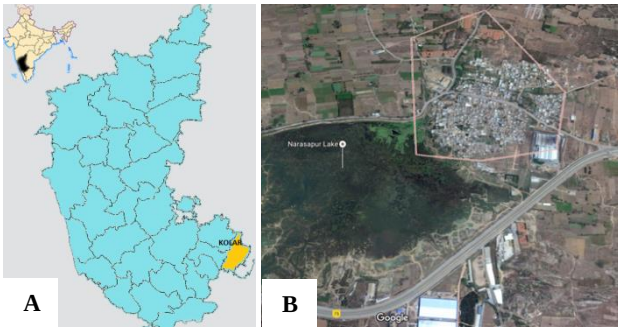

Figure 1: (A) Map showing Kolar, Karnataka; (B) map showing Narasapura.
(Source: Kolar district facts available from Veethi and Google maps13)

The affected community was visited and the reported cases of acute diarrhea were contacted who further informed that there were similar other cases in the community. The health workers and the medical officer of Narasapura were contacted to note that there were many cases of acute diarrhea from the community during the same period.

Based on the preliminary field work, the existence of an outbreak of acute diarrhea was confirmed. Hence it was decided to investigate the outbreak of acute diarrhea at Narasapura with the objectives of determining the source of the acute diarrhoea outbreak and to suggest measures to control the present outbreak and prevent such outbreaks in the future.

METHODS

This cross-sectional survey was conducted during September and October 2016. All the households of the affected community at Narasapura village of Kolar were included in the study. The study is approved by Institutional ethical committee.

Data was collected using a structured questionnaire after obtaining the informed consent. Basic demographic details of household members and identification of cases was done using a questionnaire for rapid household survey. Part II of the questionnaire involves the epidemiological case sheet of cases which includes information on date of onset of symptoms, any treatment received and a sanitary survey. The data was compiled in Microsoft excel. Age and sex specific attack rates of the disease was computed. Epidemic curve was drawn and the results were analyzed to draw conclusions.

Action taken: A team consisting of Staff and Post graduates from department of Community medicine and Department of Public health of the Medical College and officials from District Surveillance Unit, visited the place on 4th August 2016 to undertake a preliminary survey of the area. The local panchayat workers were instructed to stop the water supplied through the pipelines and make temporary alternative arrangements for drinking water. They were also instructed to clean the clogged storm water drains and send the water samples for bacteriological testing. People were educated on the importance of consumption of safe drinking water and proper sanitation. Tab.Tetracycline and oral rehydration salts were supplied by the health workers to households with history of acute diarrhoea.

RESULTS

Water supply

The water supply to this area comes from 2 borewells in the lake close by. The water is stored in an overhead water tank before it is supplied to individual houses through pipelines which run under the storm water drains in some places. Water supplied once in 2 days is collected in pots from the pipes just above the storm water drains stagnated with sullage and other clogged wastes and is stored in closed containers. Majority of the households consumed the water directly and didn't follow any method of household purification of water.

Sanitary survey

Majority of houses in the area are semi-pucca or Kachha with the houses located very close to each other without a proper road in between. The houses and the settlements of migrant industrial workers are overcrowded with no proper cross-ventilation.The houses lacked a separate toilet facility and open air defecation was evident. Utensils and clothes were washed just outside individual houses letting the waste water into the storm water drains. The storm water drains were clogged with waste and sullage and there was stagnation of water giving scope for vector breeding. Some of the households had cattle sheds very close to the households while some didn't have separate cattle sheds. The animal waste and other solid wastes from households were indiscriminately disposed off close to the living area. Stray dogs were present. There is a place close to the community where automobile/other wastes are brought in through trucks to be stored, segregated and recycled. In the same place, burning of plastics and other industrial wastes was being carried out.

There are 73 households with a total population of 401 in the AD colony of Narasapura wherefrom majority of cases of acute diarrhea were reported.

There were 40 cases of acute diarrhea, majority of them had date of onset on 1st and 2nd of August 2016. They had symptoms of 4-5 episodes of diarrhoea per day which was watery in consistency and in some cases there was a history of 2-3 episodes of vomiting per day. While

majority of cases recovered without complications, there were reported instances of acute renal failure. There were no deaths reported due to acute diarrhoea during the study period.

Table 1: Sociodemographic profile.

Variable		Frequency (n=401)	%
Age categories (in years)	Less than 5	42	10.5
	5 to 18	77	19.2
	18 to 50	240	59.9
	More than 50	42	10.5
Sex	Male	224	55.9
	Female	177	44.1
Occupation	Daily wages	146	36.4
	Student	99	24.7
	Factory Worker	47	11.7
	House wife	37	9.2
	Unemployed	12	3.0
	Driver	11	2.7
	Tailor	5	1.2
	Other	15	4.03

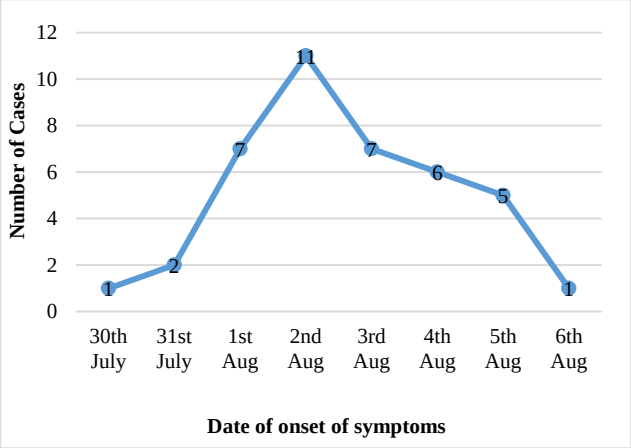

Figure 2: Epidemic curve of the acute diarrhoea outbreak.

There was no history suggestive of food poisoning, e.g. large gathering or any other recent function. 3 (7.5%) individuals with acute diarrhea gave history of recent travel and 12 (30%) gave history of consumption of food outside.

The diarrhoea attack rate at AD colony of Narasapura was 10%. Males (65%) were more affected compared to females (35%) and 62.5% of cases were within the age group of 18 to 50.

A total of 13 stool samples and 11 water samples were processed for isolation of enteric pathogen using standard laboratory techniques. 15.4% of stool samples revealed dartling motility on hanging drop examination and *Vibrio cholerae* O1, biotype El tor, serotype Ogawa was implicated as the cause of current outbreak at Narasapura.

Table 2: Characteristics of cases of diarrhoea.

Variable		Frequency (n=40)	%
Age categories (in years)	Less than 5	3	7.5
	5 to 18	8	20.0
	18 to 50	25	62.5
	more than 50	4	10.0
Sex	Male	26	65.0
	Female	14	35.0
Symptom	Watery diarrhoea	30	75.0
	Vomiting and watery diarrhoea	10	25.0
Whether treatment received	Yes	38	95.0
	No	2	5.0
History of recent travel	Yes	3	7.5
	No	37	92.5
History of consumption of food outside	Yes	12	30.0
	Other	28	70.0

Table 3: Sex specific attack rate.

Sex	Total	Cases	Attack rate
Male	224	26	11.6
Female	177	14	7.9

Table 4: Age specific attack rate.

Age group (in years)	Total	Cases	Attack rate
Less than 5	42	3	7.1
5 to 18	77	8	10.3
18 to 50	240	25	10.4
more than 50	42	4	9.5

DISCUSSION

Cholera remains a major public health problem in India and outbreaks of Cholera continue to occur in different parts of the country. In the present study, more number of individuals in the age group of 18-50 were affected as compared to other age groups. The attack rate in each age group was almost the same (10.3, 10.4 and 9.8 among the age groups 5-18, 18-50 and >50 years respectively) except for the age group of less than 5 years which had comparatively lesser attack rate (7.1%). This is similar to the studies conducted by Verma et al and Bhandari et al in which the age groups of >15 years were affected more commonly.[6,7] In the present study, the attack rate in males (11.6%) was more as compared to females (7.9%) which

is similar to the finding of a study by Deshmukh et al which had more number of male sufferers.[8]

In the present outbreak, bacteriological examination of stool and water sample revealed V. cholerae O1, biotype El Tor, serotype Ogawa as the causative organism. Other studies in India also revealed the same strain as the causative organism of gastroenteritis outbreaks in the recent past in India.[9-12]

In the present outbreak, cluster of cases was seen in short span of time which is also evident from the epidemiological curve, (Figure 2), which shows one peak only, suggesting a single point-source exposure as likely transmission route for this outbreak. After the stoppage of water supplied through pipelines, the number of cases declined rapidly and situation was under control. 18% of the water samples tested from the taps in AD colony were found to be non-portable whereas the other samples tested from elsewhere had no coliform bacteria and were portable. Hence the contaminated water from the taps in the AD colony could possibly be the source of infection in the present outbreak of cholera. Open air defecation, disposal of sullage in an open space and insanitary method of collection of water from the taps could have contributed to the occurrence of outbreak.

CONCLUSION

In the current outbreak of acute diarrhoea at Narasapura, majority of cases (80%) are from AD colony, few cases from AK colony (20%) and no cases are reported from Thigalara beedi.

The water from the overhead water tank supplies not only AD colony but also other areas as B block and a part of C block (AD colony, AK colony and Thigalara beedi). The 2 water samples which showed high MPN count are collected from the taps in AD colony. Other water samples collected from the borewells and from taps in AK colony tested negative for E-coli and were portable. The water supplied through the pipelines was stopped on 4th August 2016 and an alternative arrangement for drinking water was made. Following this, there was a substantiate reduction in the number of cases of acute diarrhoea.

Vibrio cholerae O1 biotype El Tor serotype Ogawa strain continues to cause disease outbreaks, particularly in migratory and over crowded settings, the spread of which is favoured by the adverse environmental conditions. This calls for prompt surveillance for water quality on regular basis and vaccination against cholera in such settings.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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