

Original Research Article

Investigation of hepatitis A outbreak in a municipality in Northern Kerala

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Received: 10 June 2020

Revised: 25 July 2020

Accepted: 27 July 2020

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ABSTRACT

Background: Viral hepatitis A is a contagious viral disease affecting liver that can result in mild to severe illness. It can occur sporadically and in epidemics with a tendency of cyclical recurrence. India is considered to be hyper endemic region for HAV infection with very high infection rate in early years of life.

Methods: An outbreak investigation was conducted in a municipality in Northern Kerala where a sudden rise in hepatitis A cases was reported by health authority to describe the outbreak in terms of person, place and time. Different sources were also inspected to identify probable cause for an outbreak in the area.

Results: A total of 267 households were surveyed which included 84 households with at least one hepatitis A case and 183 household without cases. Individuals with hepatitis A counted up to 157. Mean age of the cases were 14.09±7.34 years. 89.1% took allopathic treatment and 7% took Ayurveda treatment. The total attack rate of the population was 0.29% and attack rate of ward 31 was 4.96%.

Conclusions: Results of the outbreak investigation indicates that there is a need for establishment of an efficient water quality surveillance system and bringing about intervention for behavioural change in the population.

Keywords: Hepatitis A, Northern Kerala, Water quality

INTRODUCTION

Hepatitis A is a contagious viral liver disease caused by hepatitis A virus (HAV) that can result in mild to severe illness. The incubation period of hepatitis A is usually 14-28 days. Symptoms of hepatitis A range from fever, malaise, loss of appetite, diarrhoea, nausea, abdominal discomfort, dark-coloured urine and jaundice. The peak infectivity occurs during the two weeks before the onset of jaundice or elevation of liver enzyme levels when the concentration of virus in the stool is highest.¹

The virus is primarily spread when a non-immune person ingests food or water that is contaminated with the feces of an infected person.² The disease is closely associated

with unsafe water or food, inadequate sanitation and poor personal hygiene.³ Hepatitis A occurs sporadically and in epidemics worldwide, with a tendency for cyclic recurrences.⁴ Viral hepatitis continues to be a major public health problem in India.³⁻⁵ Several large outbreaks of hepatitis A in various parts of the country have been recorded in the past decade.^{3,5,6} India was considered as hyperendemic region for HAV infection with very high infection rates in the early years of life.²

Person-to-person transmission is the most common way of spread of hepatitis A during an outbreak.³ It has been reported that 70% of children <6 years of age are asymptotically infected or develop a mild self-limiting illness.⁴ Adults are more likely to have symptomatic

hepatitis A infection than children. Antibodies to HAV (anti-HAV) can be detected during acute illness. This early antibody response is predominantly of the IgM class, is used to establish a diagnosis of acute infection and persists for 5 to 6 months.⁵ In most developing countries in Asia and Africa hepatitis A is highly endemic and large population acquires immunity through subclinical infection at early life.

A study from north India showed that most of the population acquired antibodies to HAV by the age of 10 year.² Several injectable inactivated hepatitis A vaccines are available internationally. All are similar in terms of how well they protect people from the virus and their side-effects. No vaccine is licensed for children younger than 1 year of age. In China, a live oral vaccine is also available.⁶

Hepatitis A outbreak can cause significant economic and social consequences in communities. It may take weeks or months for people recovering from the illness to return to work, school, or daily life. The World Health Assembly in May 2016 adopted the first ‘Global Health Sector Strategy on Viral Hepatitis, 2016-2021’. It aims at eliminating viral hepatitis as a public health problem, reducing new viral hepatitis infections by 90% and reducing deaths due to viral hepatitis by 65% by 2030.⁶

A study was thus conducted to know the extent of Hepatitis A outbreak in a Municipality in northern Kerala and to find out the probable causative factor leading to the outbreak.

METHODS

A case control study was conducted during 27th November 2018 to 12th December 2018 in a municipality area in Northern Kerala. The study got permission from District Health Authority for identifying root cause of the outbreak. The total population of the Municipality area was 53463, with 1036 children below 1 year and 4882 children below 5 years. Around 10,232 houses are situated in wide geographic area which is divided into 32 wards under 7 subcentre area.

Survey was carried out with the help of an epidemiological case sheet which was designed to collect information from households regarding sources of water supply, treatment of water before consumption, personal hygiene, distance of water source from septic tank, history of any mass gathering and information regarding course of the disease in cases.

A probable case was defined as any person with fever or loss of appetite with or without abdominal pain or vomiting followed by yellowish discolouration of sclera or urine with elevated liver enzymes or bilirubin level.

A line list was initially collected from district health authority which was used to plan for the survey (n=64).

House to house visit was conducted to identify cases and controls.

Study included all probable cases with in the time period starting from 1st March 2018 to 30th November 2018. Universal sampling technique was applied. The participants who were willing to participate in the study with reports of treatment available were included in the study. Those without investigation reports and treatment records were excluded from the study.

A house with the cases in the line list was identified with the help of field workers in health department and data was collected by interviewing and inspecting the reports and surroundings of the house. The responders were asked for their information about other cases in the locality and those houses were added to the line list and were included in the study. For every case 2 houses without cases near to that patient’s house were chosen and were taken as controls.

An environment assessment was carried out to assess the environmental factors that could have contributed to the outbreak. Schools in which the students were studying was noted and these schools were traced back for cases and sanitary measures. Hospitals, hotels, textiles, shopping complex and other major building were surveyed.

Data was entered in Microsoft Excel 2010 and data analysis was done by IBM SPSS Vr.25. Proportion of cases in area was calculated, also in different age group. Attack rate was calculated in whole population, in separate area, and among different age group.

RESULTS

A total of 1252 people in 267 households were surveyed, from which 157 individuals were found with symptoms suggestive of Hepatitis A with elevated SGPT, SGOT or bilirubin level. Out of this only 10 cases were confirmed by ELISA test. Others were treated symptomatically. Only 69 cases of them were in the initial line list.

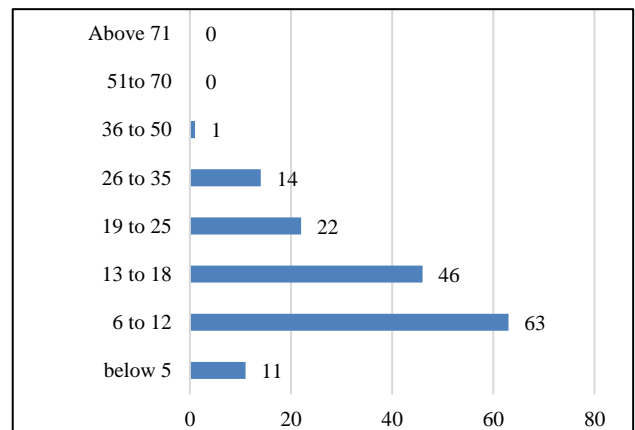


Figure 1: Age distribution of cases (n=157).

Both the gender were almost equally affected i.e. 76 females and 81 males, most of the cases belonged to the age group of 6 to 12 (n=63) and 12 to 18 (n=46). Above the age of 50 years no cases were reported. Students (n=118) were the most affected group followed by housewives (n=16) and teachers (n=3). Out of the cases who needed admission (n=24) only a few had severe disease (n=6) that needed admission for about 2 weeks to 1 month.

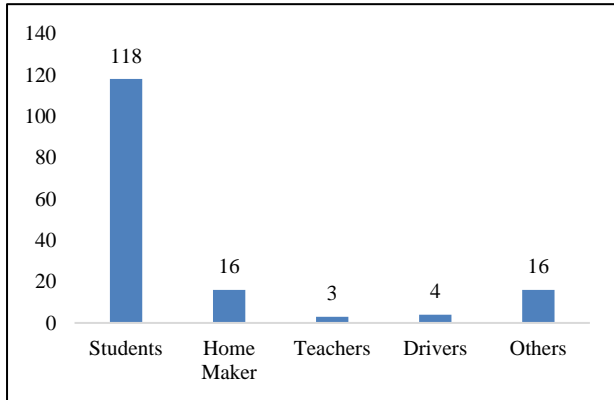


Figure 2: Occupation of the cases (n=157).

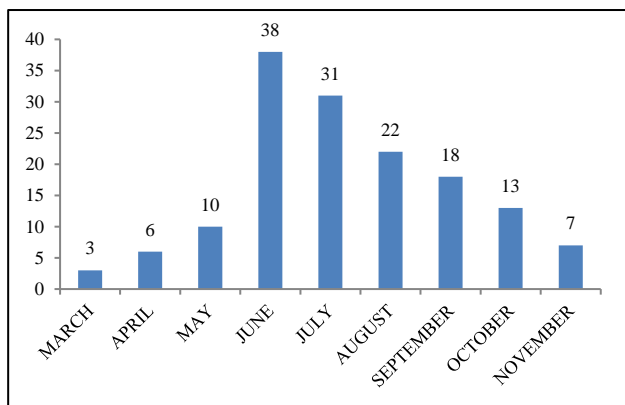


Figure 3: Timeline of cases.

Table 1: Choice of treatment facility.

Treatment facility	N (%)
Allopathic treatment	Government hospitals 74 (47.1)
	Private hospitals 66 (42.0)
Ayurveda treatment	11 (7.0)
Traditional medicine	6 (3.8)

The time scales shows peaking of cases during the month of June, July and September. Table 1 shows the choice of treatment facility. 89.1% took allopathic treatment (47.1%- Government hospitals, 42%- Private hospitals). About 7% took Ayurveda treatment and 3.8% took traditional medicine. Table 2 shows the total attack rate of the population 0.29% and ward number 31 (4.9%) has the highest attack rate compared to other wards. Males (0.32%) had higher attack rate compared to females.

Table 2: Attack rate.

Group	Attack rate
Total population	0.29%
Male	0.32%
female	0.27%
Age group <5	0.22%
Ward 31	4.96%

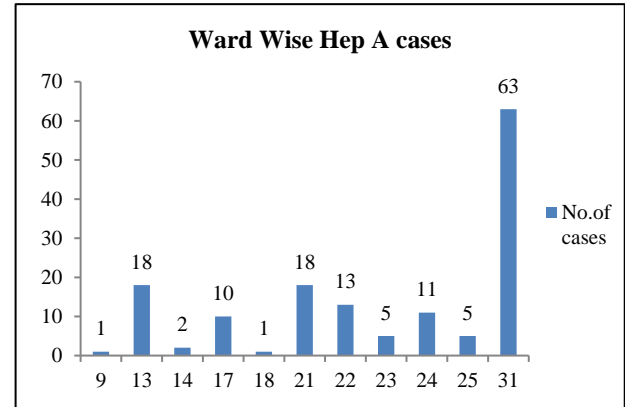


Figure 4: Distribution of cases ward wise.

Most of the cases were detected in the subcenter 1 (n=71) that too concentrated to ward 31 (n=62).

Few cases were started insubcentre-1 area during March and April. 3 cases were reported in month of March, 6 cases were reported in the month of April and from the middle of May, cases began to rise and it peaked during the month of June and July then there was a slow reduction in number of cases from August.

All the 20 cases identified from ward 24 and 25 were students for whom the common source of outside food was traced to zip-up which was manufactured using unhygienic water source.

Whole 21 cases from ward 21 obtained the infection probably from a marriage function which took place in mid-June, attended by the same family line members who were major residents in that area. 4 people got affected from there and then propagated among their school.

But for the 22 cases reported from ward 13 and 14, the sources were scattered. 6 School students had affected probably from a common public wells. Others had different sources from distant areas, some have sources outside Municipality.

Environmental assessment

In these houses first cases were reported in May. The cases were seen along the sides of the canal where the distance between the well and canal is less than 1 metre. Most of the household wells are open and are easily prone for contamination with the surface running water. Most of

the houses are having leech pit. There were no cases reported from those houses where wells are situated more than 10 metre away from the canal even though they had susceptible group of population. In some areas where the canal was blocked the contaminated water from canal overflowed and got mixed with source of drinking. Few household sullage is directly entering the canal. Many houses have leech pit and that are nearer to the canal. Canal is not being maintained properly and all type of waste are seen including insulin syringe, tablets, plastics and diapers overflowing of septic tank from backyard of hospital, a major textiles and also a flat were the other source of contamination of the drainage canal. The overflowing of the contaminated canal during the monsoon season caused rapid spread of disease.

Out of 21 schools in the Municipality 13 major schools were selected for the survey to know whether there was any outbreak among school children. There was no clustering of cases in any school or classes. Only students coming from the outbreak area were having the disease. Kitchen was well maintained in all schools also the hygiene and sanitation was found to be good. These might be the factors which prevented rapid spread of hepatitis A among school children.

Among restaurants, 13 restaurants were surveyed and it was found that in many of them dish washing area was unhygienic, they had pit with water collection. Food handlers were not affected with hepatitis A which prevented an extensive outbreak throughout the municipality and beyond.

DISCUSSION

Kerala with improved water and sanitation coverage the prevalence of water borne diseases like hepatitis A is still a mystery, there have been a number of outbreaks of hepatitis A in the recent past in spite of a higher literacy rate the people in Kerala are reluctant to adopt preventive measures.⁷⁻⁹ Even though Hepatitis A is a self-limiting disease it causes high morbidity, in severe cases as per the management protocol the patient have to take rest for about few weeks and this can result in loss of pay and economic issues being more common among younger children it can affect academic activities. As it is transmitted through fecal-oral route it is important to provide interventions at lower classes with regard to hand washing and personal hygiene. Most of the adults are already exposed to hepatitis A infection in their childhood so they have the immunity and hence any second time infection will not produce severe symptoms rather the condition will be subclinical.

The increased number of hepatitis cases over the years necessitates the need for Hepatitis A vaccination for all individuals but the national technical advisory group on immunization (NTAGI), who advocates vaccine policy to Ministry of Health and family Welfare, Government of India, has recommended the use of hepatitis A

vaccination only in the context of epidemic control and for individual use.¹⁰

Monsoon season in Kerala has two phases first phase starts in June and second phase during October. Time scale of hepatitis outbreak in our study shows multiple peaks during the month of June, July and September of 2018. Initial line list or the primary data provided by the health team of the area was only 69 on day one but as the survey progressed we could reach out to more and more cases.

During the survey we could understand that few individuals even had the opinion that boiling of water is not necessary at all and some are against chlorination stating that chlorination alters the natural taste of water and it even kills the fishes inside their well.

In the severely affected area the houses were situated behind and down the valley of a major health facility building got affected first and spot map suggested that the distribution of cases were adjacent to the canal to which the sediments of effluent treatment plant of the major health facility was leaked. Another major textile building with leakage of septic tank also contributed to the outbreak in the area. In another area it was from unhygienic zipup which was consumed by students. In another area the cases started emerging after attending a marriage function in family.

Secondary cases continued to occur by person-to-person transmission indicating poor sanitation practices among the residents of the areas and cases were reported till December. Improving personal and environmental sanitation would help to decrease the transmission of the virus. Behaviour change communication campaigns targeting personal hygiene measures like washing hands before eating food and after defecation, boiling water before drinking were conducted. Importance of periodic chlorination of wells was also emphasized. Control measures were implemented soon after the outbreak was reported. Super chlorination of wells was done on alternate days for the first week, followed by twice weekly for a month and then weekly thereafter till twice the incubation period of the disease was carried out.

The major group of population affected were students in the age group of 6-18 years, followed by house wives and teachers which was similar to a study done by Rakesh et al.¹¹

Though the number of cases were high only few had severe infection requiring weeks of hospitalisation.

Kerala is characterized by a high density of public and private health infrastructure. A study done by Levesque et al showed that there is a high level of utilization (83.6%) of allopathic medical services in Kerala which is comparable with 89.1% in our study. Only 7% of the study subjects took Ayurvedic treatment mainly.¹²

A study done by Chandrakumar et al in Malappuram showed that initially 92% of the patients chose modern system of medicines, however after one week of onset of symptoms most patients (78.45%) shifted on to alternate medical systems. Of this 22.34% depended on homoeopathic therapy and 73.26% shifted to Ayurvedic therapy. The remaining 4.4% depended on other forms of therapy like Siddha and Unani systems.¹³ In our study only 7% of the subjects took Ayurvedic treatment and only 3.8% chose traditional medicine and none were using more than one system of medicine simultaneously. Among those who took Ayurvedic treatment had the opinion that it has lesser side effect compared to Allopathy and there are not enough drugs or specific treatment regimen in allopathic treatment. Only fluid therapy and antipyretics is being provided at the health care facility which also contributed in choosing Ayurveda. This actually shows a lack of communication between the physician and the patient.

In our study the total attack rate of the population was found to be 0.29%. Ward 31 had the highest attack rate of (4.9%) and Compared to females (0.027%), males (0.32%) had higher attack rate which is similar to a study by Rakesh et al and Kurup et al.^{8,9} The attack rate for children <5 years was the highest when compared to another study done at Vellore and Kothamangalam where the attack rate was the highest among the young adults.^{7,8}

Most of the children will be infected with the hepatitis A virus before the age of 10 years from childhood itself, so majority will not experience any predominant symptoms or rather the manifestation will be subclinical but they will develop life-long immunity. As older children and adults are generally immune to the infection an outbreak will tell you about the sanitary condition of the area.

We conducted the study with the help of field workers from health department. So near complete cases were included in the study. The epidemic was not over by the time completed the study, new cases were reported after completion of the study from the municipality area. We were able to point out the source of the study and to recommend corrective measure to reduce further outbreak.

Limitation was that there was no proper funding for carrying out soil and water analysis to confirm the source. In one ward almost all houses were affected so controls were taken from other ward areas.

CONCLUSION

Hepatitis A outbreak survey showed that more number of cases were reported from ward 31 (n=63) and the major source being the major health facility. Outbreak was probably due to contamination of canal by septic and sewage waste in the area. In other areas sources were more scattered. Children and adolescents were more affected. In most of the houses drinking water is only

heated, so instructions for practising roll boiling should be advocated. Filters with reverse osmosis and UV radiation may be installed in houses. Health promotion and education for high risk and susceptible groups (safe drinking and food habits, hand hygiene etc.) safe probable water should be supplied for public functions like marriages parties gatherings. Health workers should be informed about any such functions and the source of drinking water used in those functions should be checked for contamination. All the leach pits should be converted to septic tanks. Hospital waste disposal should be continuously checked for. Effluent treatment should be under strict monitoring. Water from wells of the surrounding area should be checked for chemical and biological contamination.

Funding: No funding sources

Conflict of interest: None declared

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

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Cite this article as: Nizar A, Haveri SP, Binub K, Ishaque S, Sasi ST, Venugopal AK. Investigation of hepatitis A outbreak in a municipality in Northern Kerala. *Int J Community Med Public Health* 2020;7:3414-9.