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Investigation of community based hepatitis a outbreak in a district in Northern Kerala

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Abstract---Background: Hepatitis A is the most common form of acute viral hepatitis worldwide. The disease is closely associated with unsafe water or food, inadequate sanitation and poor personal hygiene. Objectives: An epidemiological investigation was carried out to investigate the outbreak, describe epidemiological features and recommend measures for control. An epidemiological case sheet was prepared, case definition formulated. Result: 82 cases of hepatitis A was confirmed. According to investigation, twenty students and one religious teacher staying at nearby mosque were infected and majority

was belonging to the age group 15 -25 years. There was clustering of cases in two wards of this panchayath mostly which was around the mosque. Attack rate was found to be more in the age group 15-25 years(13.31%). Males (3.37%) had an attack rate almost 3.5 times higher than that of females (0.96%). One death was reported. The case fatality rate was 1.21. Conclusion: The provision for safe drinking water and proper sanitation needs to be considered high priority by Panchayath. There should be attempts for health awareness of handwashing, proper chlorination and adequate distance between septic tank and water source at households.

Keywords---outbreak, investigation, hepatitis A, water, sanitation.

Introduction

The most prevalent type of acute viral hepatitis in the world is hepatitis A. Hippocrates is generally credited with providing the first description of hepatitis (epidemic jaundice), and outbreaks of hepatitis A have been known for millennia, affecting both military and civilian populations (1). Small, non-enveloped, acid-resistant, and thermostable, the hepatitis A virus (HAV) is a single-stranded RNA virus that causes the disease. Unspecific prodromal symptoms with different combinations of fever, malaise, weakness, anorexia, nausea, vomiting, arthralgia, and myalgia are typical signs of a typical clinical presentation. With the onset of jaundice, prodromal symptoms typically subside. The two weeks prior to the development of jaundice or an increase in liver enzyme levels are when the virus concentration in the faeces is at its maximum, and this is also when infection peaks. After one week, the majority of patients are no longer contagious when jaundice first develops due to a drop in viral content in the stool (2,3). When an uninfected person consumes food or water that has been tainted with an infected person's faeces, the virus is largely disseminated.

The disease is intimately linked to the ingestion of contaminated water or food, poor sanitation, and poor personal hygiene (4). With age, the age of the infected person has a significant impact on how the clinical symptoms manifest. Most of the remaining children with hepatitis A under the age of six are asymptomatic, and about 50% of those who are symptomatic have minor signs (3). In 0.2% of clinical cases, acute liver failure and mortality from HAV infection are possible but rare; the risk rises with age and the existence of chronic liver disease (5). Hepatitis A is sporadic and prevalent over the world, with a propensity for cyclical recurrences(4). HAV infection is relatively prevalent in India, however it mostly strikes infancy. Most typically asymptomatic at this age, infection results in lifelong protection against reinfection (6).The majority of outbreaks were reported from rural areas, according to India's first study on national viral hepatitis monitoring and outbreak statistics for the years 2011 to 2013.

The cause of more than half (56%) of these outbreaks was recognised, with hepatitis E accounting for 78 (48%) of them, hepatitis A for 54 (33%) of them, hepatitis A and E for 19 (12%), and either hepatitis B or C for 12 (7%) of them. Most epidemics were caused by contaminated drinking water(7).Weekly recaps of

outbreaks have been recorded from Kerala 84 times in the last five years, according to weekly reports of outbreaks gathered from the Integrated Disease Surveillance Project's official website(8). A Panchayat in Kerala's Northern district saw a significant outbreak of severe jaundice in April 2017. An investigation into the outbreak was started with the goals to describe the epidemiological characteristics of the hepatitis epidemic in that Panchayat and offer suggestions for how to further stop the disease's spread.

Materials and Methods

Systematic steps were followed in investigating the outbreak. Current incidence of hepatitis in the area was compared with the background rates reported to Integrated Disease Surveillance Project from the area. A house to house visit was undertaken in two wards of the panchayath, in northern district of Kerala where jaundice was reported over a period of 3 days by a team from the field staff from health department and staff from MES Medical College. The team visited 12 cases initially and sent their blood samples for confirmation. The defined area had a total population of 59,530, divided into 23 wards. We along with primary healthcare team did house to house visit for searching hepatitis A cases. A probable case of hepatitis A was defined as an acute illness with fever or loss of appetite followed by yellowish discoloration of sclera or urine after April 20, 2017 in the same panchayath. All the cases were interviewed at their residence using a structured questionnaire, which included information regarding the demographic characteristics, source of water, personal hygiene, treatment of water before consumption, habit of consuming food from outside and past history of hepatitis. A line list of cases was developed with information regarding the date of onset, age, sex, and place of residence. Data was also collected from the school and religious school from the panchayath. Surveillance was strengthened in nearby areas. An epidemiological case sheet was prepared. Information regarding source of water supply, treatment of water before consumption, personal hygiene, toilet facilities, and distance of water source from toilet, mass gatherings and exposure to mass food consumption was collected. An environmental assessment was also carried out to assess the environmental factors that could have contributed to the outbreak. Attack rates of acute hepatitis by age and sex were calculated. An epidemic curve was drawn and a spot map was generated. Data was entered into Microsoft Excel and was transferred and analyzed using SPSS version 24. Frequency were expressed in proportions and depicted with suitable tables and figure.

Results

82 cases of hepatitis A were confirmed, as all the samples sent were positive for IgM HAV. According to investigation, twenty students and one religious teacher staying at nearby mosque were infected and majority was belonging to the age group 15 -25 years. Most probably the water of mosque would have been contaminated and people who used water from there would be infected first and then spread to the community. Index case was student who was resident of Mosque complained of tiredness followed by vomiting, fever and jaundice. One death was reported among a male 23year old who visited the mosque. A spot map was drawn showing the distribution of cases in the panchayath. There was

clustering of cases in two wards of this panchayath mostly which was around the mosque.

Of the 62 cases interviewed, 39 (62.9%) of the cases gave a history of having attended the mosque prior to the occurrence of symptoms. Cases were high among the Muslim 52 (63.4%) community, 16 (19.5%) among Christians and 9 (10.9%) among Hindus. (Figure 2). An environmental assessment was carried out to assess the environmental factors that could have contributed to the outbreak. All the wells in the area were insanitary wells, without a proper platform and pump. The wells were also not properly covered. It was also observed that majority of the wells had not been chlorinated in the area. The reasons for not performing chlorination were, that it altered the taste of water and they chlorine was harmful to fishes that were bred in some of the wells. The well situated in the mosque was found to be insanitary. The well was not covered and it had not been chlorinated before the outbreak. The parapet wall was broken at places and was not in good condition. The water analysis from the wells and ablution pond in the mosque showed presence of coliform bacteria indicating fecal contamination. More than three fourth cases (76%) did not have the habit of consuming boiled water before the outbreak. One fifth (24%) of the cases did not have the habit of washing hands with soap after defecation. Some of the children below 5 years of age had the habit of open defecation.

Discussion

The probable source of infection was the ablution pond within the compound of the mosque. Twenty students and one religious teacher staying at the mosque were infected first, following which the infection was spread to the community. This water was used without boiling in the mosque leading to onset of symptoms of hepatitis A. Coli forms were also identified from the ablution pond and well water indicating fecal contamination. Attack rate was found to be more in the age group 15–25 years (13.31%), students in this age group stay at the mosque for religious studies. Males (3.37%) had an attack rate almost 3.5 times higher than that of females (0.96%) because male goes to mosque frequently. One death was reported and the case fatality rate was 1.21.

In relation to water and sanitation, the Sustainable Development Goals aim to achieve universal and equitable access to safe and affordable drinking water for all by the year 2030. According to UNDP, at least 1.8 billion people globally use a source of drinking water that is fecally contaminated. The specific SDG goals of Kerala aim to provide 100% safe drinking water to all areas (9). About 15 years ago, the cord blood anti-HAV level in Indian newborns was almost 100%, which in turn reflected the maternal antibody prevalence. In recent studies, this level has come down to 50%-60%. These observations may be the first indication of the epidemiological shift of the age of acquisition of the HAV infection in the community, and increased susceptibility to HAV in young adults (10, 11). Attack rate was found to be more in the age group 15–25 years (13.31%), followed by 5–15 years (4.23%) and then 25–35 years (2.36%) similar to study done by Shilu et.al. where attack rate was highest among the 15-25 years age group (6.14%) followed by the 5-15 years age group (4.47%) (12).

Adequate supplies of safe drinking water and proper disposal of sewage within communities, combined with personal hygiene practices, such as regular hand washing, reduce the spread of HAV (13). In our study males (3.37%) had an attack rate almost 3.5 times higher than that of females (0.96%) similar to Rakesh et.al. study where males had an attack rate almost eight times higher than that of females (14). Though hepatitis A is a self-limiting viral disease, it causes significant morbidity. Most people with hepatitis A feel sick for about 2 months and many need hospital care. People affected with HAV may take a few months to return to work, school, or daily life, and so, HAV infections can lead to economic losses and social consequences in the community. A study report showed that average out of pocket expenditure, including direct and indirect expenses, to a family due to one of its member affected with hepatitis A in Kerala as Rs. 24,025 (SD Rs. 8,315). When the disease is shifting to higher age group, as seen in Kerala, it leads to severe manifestations and fatality similar to our study where case fatality is 1.2 (15).

Safe and effective inactivated hepatitis A vaccines have been available since 1992 worldwide and are generally used in developed countries to protect risk groups and stop outbreaks. Based on current scientific evidence, protection is considered to be life long after a complete hepatitis A vaccination schedule (two doses) (16). Countries or regions that have implemented universal immunization, e.g. Israel, Italy (Puglia), Spain (Catalonia) and the United States, have demonstrated a successful impact on the incidence of hepatitis A (17). Hepatitis A vaccine can be recommended to susceptible populations with intermediate endemicity. HAV vaccination may be considered on the basis of epidemiological and cost-effectiveness studies. The best cost-effective recommendation is safe drinking water and proper disposal of sewage combined with personal hygiene practices, such as regular hand washing and washing after using toilet. Health education session was done for the people of the village about safe water and sanitation practices. The soil samples were not collected around the infected well and the isolation of Hepatitis virus along with genotype were not studied. This can be considered as limitation of the present study.

Conclusion

Hepatitis A virus is still a major cause of infection and disease in the world and heterogeneous pockets of susceptible and exposed individuals may co-exist in rapidly developing societies. Thereafter, small localized or large outbreaks of HAV infection will remain a threat in such areas. The hepatitis A outbreak in a Panchayath in North Kerala was associated with poor sanitation practices among the people. The outbreak started in the inhabitant of a mosque which gradually spread to the community. Proper sanitation measures and vaccination can help to prevent future outbreaks.

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Table 1
Attack rate of hepatitis A

Age group in years	No of cases	Total population	Attack rate (%)
5 – 15 years	25	591	4.23
15 – 25 years	45	338	13.31
25 – 35 years	12	508	2.36
Sex	No of cases	Total population	Attack rate (%)
Male	63	1871	3.37
Female	19	1996	0.96
Case fatality rate	1	82	1.21

Attack rate [Table 1] was found to be more in the age group 15–25 years(13.31%) , followed by 5–15 years (4.23%) and then 25 –35 years (2.36). Males (3.37%) had an attack rate almost 3.5 times higher than that of females (0.96%). One death was reported. Patient was admitted with fever vomiting, yellowish discoloration of sclera and drowsiness.The case fatality rate was 1.21.

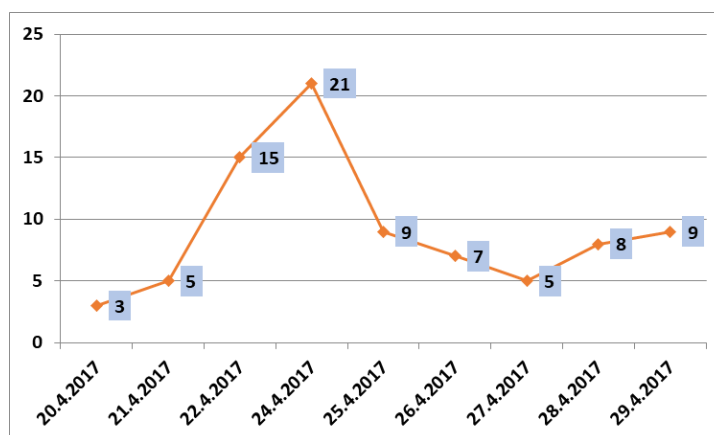


Figure 1. Epidemic curve

The epidemic curve showed a rapid rise in number of cases followed by a fall with majority of cases within one incubation period pointing to the possibility of a point source epidemic (i.e., all the cases were exposed at a particular time). The epidemic started during third week of April (20th to 29th) and had its peak during the fourth week of April (22nd to 26th). (Figure 1)

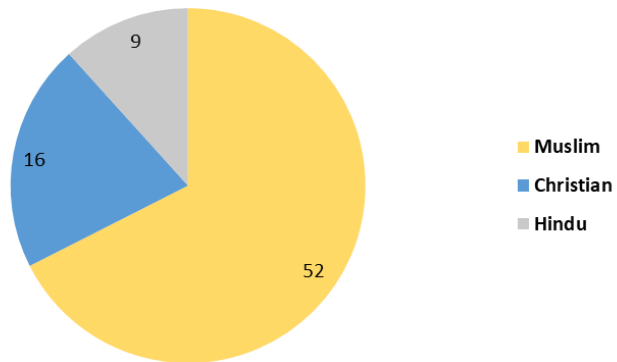


Figure 2. Frequency distribution of hepatitis A according to religion