

Hepatitis E in the State of Sikkim (North East India)-A report on an outbreak

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ABSTRACT

Background

Hepatitis E virus is a significant public health menace in developing countries and is being reported from newer geographical regions. It is enterically transmitted and causes acute hepatitis.

Objective

The objective of this study is to correlate the patient details from outbreak of Hepatitis E in 2012 with the water culture done during that period.

Method

Records of the patients with Hepatitis E virus (HEV) infection in 2012 were analysed. Their serum samples were tested for Immunoglobulin M (IgM) Hepatitis E virus by rapid immunochromatography (ICT) and further confirmed by Immunoglobulin M Enzyme linked immunosorbent assay (IgM ELISA) in National Centre for Disease Control, New Delhi. Water was tested by the Multiple Tube test method using double strength Mc Conkey broth with neutral red and H₂S test method.

Result

Patients with febrile jaundice (n-62) were screened for Hepatitis E virus and 32 were positive by rapid Immunochromatography test and Enzyme linked immunosorbent assay. The overall attack rate was 0.03%. Drinking water from ten different localities in Gangtok were tested and 83% of the water were found to be unsatisfactory for drinking during that period.

Conclusion

Regular testing of water quality and public education and awareness is important to curb such outbreaks in future.

KEY WORDS

Acute hepatitis, Hepatitis E virus, Outbreak, Sikkim

INTRODUCTION

HEV is a non enveloped Ribonucleic acid virus that causes enterically transmitted acute self-limiting hepatitis.¹ It is endemic in southeast and central Asia with several reports of epidemics and outbreaks worldwide after the first recorded epidemic during 1995 in New Delhi, India.² In the Indian subcontinent it is known to be endemic in the neighbouring country of Pakistan, and outbreaks reported from the Indian states of Delhi, Uttar Pradesh, Punjab, Rajasthan, Maharashtra, Andhra Pradesh, and Tamil Nadu.²⁻⁹

In the monsoon of 2012 there were several cases of icteric hepatitis in Sir Thotub Namgyal Memorial hospital, Gangtok. Serum samples were routinely screened for IgM Hepatitis A virus (HAV), Hepatitis C virus (HCV), HEV and Hepatitis B surface Antigen (HBsAg) by the rapid ICT method. Apart from sporadic cases of HBsAg and HAV, HEV cases were not reported as of yet. Serum samples from 2012 were found to be positive for IgM HEV. Samples were sent for confirmation by ELISA to National Centre for Disease Control (NCDC), New Delhi.

METHODS

Gangtok is the state capital and the largest town with a population of 98,658 according to 2011 census and has an area of 35 km². Provision of treated water system was developed in Gangtok in 1960s and is based on gravity. The water supply distribution system is unplanned and has unequal coverage thus many households have diverted neighbourhood spring water for their domestic use.

The study was undertaken after clearance from the department of health care, human services and family welfare department and the institutional ethics committee.

Serum Samples from 84 patients with icteric hepatitis were screened for IgM HAV, HBsAg, HCV and HEV by the ICT method (Tulip diagnostics Pvt Ltd, Verna, Goa, India). All the positive samples were sent to NCDC, New Delhi and were confirmed by IgM ELISA.

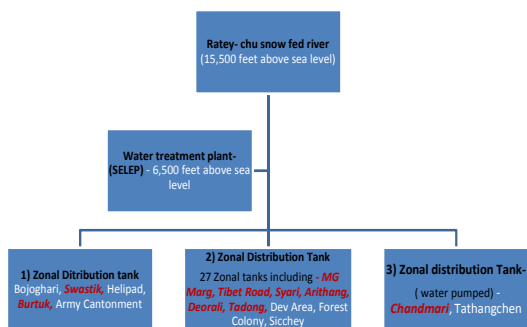


Figure 1. Schematic diagram of water supply and distribution for Gangtok town and surrounding areas (Outbreak affected areas are marked in Red)

Representative water samples from various localities in and around Gangtok town were tested for faecal contamination by the multiple tube test method using double strength Mc Conkey broth with neutral red (Himedia Laboratories Pvt Ltd, Mumbai, India) and H₂S test method (Himedia Laboratories Pvt Ltd, Mumbai, India) during the 2012 outbreak. A schematic diagram showing the water supply and distribution of Gangtok is shown in figure. 1

RESULTS

The overall attack rate was 0.03%. The attack rate was calculated using the following formula.

Overall Attack rate=(Number of persons ill (new cases) within the time period)/(Population at risk within the time period) X 100

$$=29/100,286 \times 100$$

$$=0.028$$

$$=0.03\%$$

*Population of Gangtok according to census 2011.

Eighty four patients with icteric hepatitis were tested and 29 were positive for hepatitis E. The most common presenting complaint was fever with vomiting and the common physical finding was jaundice. Liver enzymes were raised in all the patients. Most cases were seen during the month of September (n-21) and August (n-11). Twenty nine patients were from East district, two from North and one from West district. The demographic profile of the patients is shown in Table. 1 and the results of the water culture are shown in Table 2.

Table 1. Demographic profile of the patients

Age group	Number of patients	Male	Female
15-20 years	7	6	1
21-30 years	17	13	4
31-40 years	5	4	1

DISCUSSION

Most reported epidemics have been related to consumption of faecally contaminated water.^{1,2} Difficult geographic terrains and fragile hills prove to be a menace for laying of water and sewer pipes, often water lines have to be carried over small streams usually contaminated with household waste and sewer water. The other contributing factors being the negative pressure created due to intermittent supply of water, local settlements, soil movements in the form of landslides and boulder slips. Spring water used in many areas is untreated and during monsoons is contaminated by human and household waste as shown by the multiple coliform count tests. Thus making water an efficient portal for spread of infectious diseases.

Table 2. Area wise result of water culture

Locality	No of water sample tested	Treated/Untreated	Result of water testing	No patients with HEV in the given locality
Arithang	2	Treated water – 1 Untreated water - 1	Unsatisfactory	5
Syari	4	Supply tank treated water – 1 Consumer point treated water - 3	Satisfactory Unsatisfactory	3
Tadong	4	Treated water (Supply tank) -1 Untreated/ Spring water - 3	Satisfactory Unsatisfactory	3
Dechenling	3	Treated water – 1 Untreated water - 2	Unsatisfactory Unsatisfactory	-
Pangthang	2	Treated water- 1 Untreated water - 1	Unsatisfactory Unsatisfactory	3
Swastik	1	Untreated/Spring water - 1	Unsatisfactory	2
Ranipool	3	Treated-1 Untreated/spring-2	Unsatisfactory Unsatisfactory	2
Deorali	2	Treated – 3/7/12 Treated – 28/8/12	Unsatisfactory Satisfactory	4
Chandmari	1	Untreated/Spring	Unsatisfactory	4
Chongyek	1	Untreated/ Spring	Unsatisfactory	-

Males are known to have a higher attack rate than females but in a recent HEV outbreak in Uganda, women were more likely to have symptomatic hepatitis E than men.¹⁰⁻¹² Likewise in the present study males were more commonly affected than females. The disease is most often seen among adults and unlike hepatitis A, is not common among children less than 5 years.^{2,10,11} In the present study, infection was common among adults in the age group 21-30 years. Asymptomatic infections are known to occur more often among children than adults, this may be the reason for only adult cases seen in this study.¹ Pregnant women especially in 2nd and 3rd trimester are known to be more frequently affected with HEV and have worse outcomes.¹⁰ There were no cases reported among pregnant women in this study.

Epidemics and outbreaks are known to follow natural disasters and calamities. Sikkim experienced an earthquake with a magnitude of 6.9 in the Richter scale on the 18th September 2011. Many lives were lost with widespread destruction of man-made structures. A major problem faced were the landslides that obstructed roads, damaged water supplies and underground sewer lines thus delaying rescue and repair works. The first monsoon post-earthquake was during June - August 2012 and maximum numbers of patients were documented in August (n-11) and September (n-21).

As all the patients were autochthonous primary cases with no significant travel history to disease endemic

areas the outbreak may have been imported into the state. Gangtok witnesses a huge inflow of tourist both national and international throughout the year. People from disease endemic areas which experienced recent massive outbreaks may have introduced the virus. As HEV RNA from humans or animal waste can survive and remain infectious for long periods in water thus a focus of infection in Gangtok.¹¹

House to house survey to identify people with jaundice and hepatitis like symptoms was not done and patients from other districts were not included in the study. This may have limited the present study from estimating the severity of the outbreak. Chlorine content of the treated water supply was not tested thus the quality of water as to whether adequate chlorination was attained or not at the time of outbreak could not be ascertained.

CONCLUSION

The difficult geographic terrain will always pose a challenge for supply of safe and clean drinking water in the hills. Community awareness and education programmes on water safety and health hazards, regular testing of water quality - bacteriological and chemical will help curb further outbreaks of water borne diseases.

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