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RESEARCH ARTICLE

# PROFILE OF HEPATITIS A AND E IN FLOOD VICTIMS OF RURAL CHENNAI

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**ABSTRACT**

**Introduction:** Floods are the most common natural disaster in both developed and developing countries and their impacts on health relate to population vulnerability and type of flood event. Access to safe water and sanitation can be jeopardized and disease outbreaks can occur by contaminated drinking water, due to flooding and related displacement especially Hepatitis A and E infections which are transmitted by the fecal-oral route. Aims And Objectives: The objective of this study was to know the incidence of viral hepatitis infection ( A and E) in flood victims from villages adjoining Tiruporur and Guduvanchery in Chennai in patients who were clinically suspected to have hepatitis, association of faeco-oral route of hepatitis virus infection with clinical features and emphasis on prevention by the provision of Hepatitis A vaccine.

**Materials And Methods:** After getting approval from Institutional Ethics Committee (IEC 236), this study was done in Shri Sathya Medical College & Research Institute , Kanchipuram District, Tamil Nadu with sample size of 100 patients. Patients coming to our hospital after Dec first week, 2015 (post floods) with symptoms such as fever, jaundice , loss of appetite, vomiting, abdominal symptoms, occupation , history of febrile episodes and duration, loss of appetite, high-coloured urine, loose stools, H/o travel, h/o outside food intake , H/o stay in flood-relief camps, were included in the study. Those patients who came to our hospital before Dec first week, 2015 were excluded from the study. Patients were subjected to appropriate lab investigations such as serum bilirubin , liver enzymes and ultrasound abdomen for hepatomegaly along with clinical correlation to confirm the diagnosis of hepatitis. ELISA for viral hepatitis serological markers (IgM antibodies to Hepatitis A and Hep E ) was done using validated commercial kits.

**Results:** 5 patients tested positive for Hep A (1 child aged 4 years and rest were adults). There were no Hep E positive samples.

**Conclusion:** Our study emphasizes that immunisation must be the prerogative and awareness about faeco- oral contamination of food and water during floods must be spread among the people in order to avoid further health hazards especially due to Hepatitis A.



## INTRODUCTION

Natural disasters are events which cause immense catastrophe attributed to atmospheric, hydrologic and geologic origins which can cause significant social and economic consequences. Floods are the most common natural disaster in both developed and developing countries, and they have devastating impact, as evident by the floods in China in 1959, Bangladesh in 1974 and the 2004 tsunami. Their impacts on health relate to population vulnerability and type of flood event [2]. Flood-related injuries may occur when people attempt to flee, or try to salvage their valued possessions from getting damaged, which may cause injuries from unstable buildings and electrical power cables.

Access to safe water can be jeopardized by a natural disaster. Diarrheal disease outbreaks can occur bycontaminated drinking water, due to flooding and related displacement[4]. Hepatitis A and E infections are transmitted by the fecal-oral route, when lack of access to safe water and sanitation is present. World Health Organisation (WHO) organizes World Hepatitis Day on July 28 every year to increase awareness and understanding of viral hepatitis[2]. Assessingthe health effects of floods, particularly in relation to morbidity is influenced by the difficulty of carrying out strict controlled epidemiologic studies of floods, especially in developing countries.

Heavy rainfall due to the annual north-east monsoon in November–December 2015 led to floods in South India,

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affecting the Coromandel coastal region of the states of Tamil Nadu, Andhra Pradesh and the union territory of Puducherry. More than 500 people were killedand over 18 lakh people were displaced. The flooding has been attributed to the El Nino effect[14]. The city of Chennai alone experienced five major floods between 1943 and 2005 floods causing particularly severe damage, due to ill-structured urban development, which had encroached on many wetlands. On 1 December, heavy rains led to inundation in many areas of Chennai, Kancheepuram and Tiruvallur districts. By afternoon, power supplies were suspended in 60% of the city while several city hospitals stopped functioning .With a letup in rainfall, flood waters gradually began to recede on 4 December, though 40 percent of the city's districts remained submerged and there was shortage of safe food and drinking water. Especially rural areas adjoining Chennai, Kancheepuram and Tiruvallur districts were tremendously affected.

In Kancheepuram district, Chengalpattu, Nandivaram-Guduvanchery, Perungalathur, Tambaram, Mudichur and Anakaputhur were inundated in floodwaters up to 7 meters deep by 5 December, which washed away roads and severed rail links; 98 people from the district were reported to have died[14]. Supplies of basic necessities, including milk, water and vegetables, were affected due to logistical difficulties. Many city neighbourhoods, however, remained flooded with some lacking basic necessities.

In future, profuse climatic changes may increase the frequency and intensity of floods in many regions of the world. Despite great advances in medicine over the past few decades, medical complications occurring due to natural disasters are still extremely common[5].

In this study, we review the epidemiologic evidence of flood-related health impacts, especially hepatitis caused by hepatitis A and E viruses.The objective of this study was to know the incidence of viral hepatitis infection in flood victims from villages adjoining Tiruporur and Guduvanchery in Chennai. Patients who were clinically suspected to have hepatitis and those patients with symptoms such as jaundice, fever, loss of appetite, vomiting, abdominal discomfort and fatigue were investigated. Since there has been no data published on viral hepatitis infections after the floods in TamilNadu , our study aims to showcase the prevalence of individual hepatitis virus infection in a small community affected by the floods , association of faeco-oral route of hepatitis virus infection with clinical features and emphasis on prevention by the provision of vaccine (HepA and B) for the contacts and family members of known positive patients.

REVIEW OF LITERATURE

Natural disasters include earthquakes, volcanic eruptions, landslides, tsunamis, floods, and drought. During the past couple of decades, millions of people have lost their lives due to natural disasters, causing marked economic damages [6], due to lack of resources, infrastructure, and disaster-preparedness mechanisms. The most common causes of deaths during floods are drowning or trauma[5]. Literature search reveals minimal information is available on the frequency of nonfatal flood injuries, as they are mostly not routinely reported or identified as flood related.

Published studies (case-control studies, cross-sectional surveys, outbreak investigations, analyses of routine data) have reported increased incidence of diseases like cholera, hepatitis, cryptosporidiosis, non-specific diarrhea, poliomyelitis, rotavirus, and enteric fever[5,6].

In Muzaffarabad, Pakistan, an outbreak of acute watery diarrhea occurred after the 2005 earthquake among camp occupants. The outbreak involved roughly more than 750 cases, predominantly adults, which was controlled after adequate water and sanitation facilities were provided [4]. Hepatitis A and E are also transmitted by the fecal-oral route, in association with lack of access to safe water and sanitation. Hepatitis A is endemic in most developing countries, and most children are exposed and develop immunity at an early age[2]. In hepatitis E–endemic areas, outbreaks are known to occur after heavy rains and floods; the illness is generally mild and self-limited, but in pregnant women case-fatality rates can reach 25% [15]. After the 2005 earthquake in Pakistan, sporadic hepatitis E cases and around 1,200 cases of acute jaundice, many confirmed as hepatitis E, occurred among the displaced population. Clusters of both hepatitis A and hepatitis E were noted in Aceh after the December 2004 tsunami [3,6].

***Hepatitis A***

Hepatitis A virus is transmitted through ingestion of contaminated food and water ,poor sanitation , poor personal hygieneor through direct contact with an infectious person[2]. It is a self-limiting infection but small proportion of patients develop fulminant hepatitis. Unlike hepatitis B and C, hepatitis A infection does not cause chronic liver disease and is uncommonly fatal, but it is known to cause debilitating symptoms and fulminant hepatitis (acute liver failure), which is associated with high mortality.

Hepatitis A occurs both sporadically and in epidemics [1], causing significant economic and social consequences in communities. The virus can withstand food-production processes routinely used to inactivate and control bacterial pathogens. It can take weeks or months for people recovering from the illness to return to work, school or daily life. Improved sanitation and the hepatitis A vaccine are the most effective ways to combat the disease[2].

***Symptoms***

The incubation period of hepatitis A is usually 14–28 days. Symptoms of hepatitis A range from mild to severe, which include fever, malaise, loss of appetite, diarrhoea, nausea, abdominal discomfort, dark-coloured urine and jaundice. Severity of disease and mortality increases in older age groups whereas infected children under 6 years of age do not usually experience noticeable symptoms, and only 10% develop jaundice.

***Diagnosis***

Specific diagnosis is made by the detection of HAV-specific IgM and IgG antibodies in serum and molecular techniques such as PCR to detect viral RNA.

***Treatment***

Therapy includes replacement of fluids which are lost due to dehydration, and bed rest.

***Prevention***

Improved sanitation, food safety and immunization are the most effective ways to combat hepatitis A[2]. The spread of hepatitis A can be reduced by adequate supplies of safe drinking water, proper disposal of sewage and personal hygiene practices such as regular hand-washing.

Vaccination

Several hepatitis A vaccines are available internationally. It is recommended to take two vaccine doses for a longer-term protection of about 5 to 8 years after vaccination.

People at increased risk of hepatitis A include travellers to countries where the virus is endemic, homosexual men andpeople with chronic liver disease.

Vaccination to control community-wide outbreaks is most successful in small communities, when the campaign is started early and when high coverage of multiple age groups is achieved by formulating evidence-based policy and data for action , preventing transmission andexecuting screening, care and treatment[2].

***Hepatitis E***

Enterically transmitted hepatitis E virus (HEV) infection is the most frequent cause of acuteviral hepatitis (AVH) in developing countries[2,20]. The disease was first recognized in the Indian subcontinent in the 1950s. HEV is classically transmitted feco-orally, although nosocomial spread vertical transmission from mother to infant, and person-to-person transmission has also been reported[2]. It is infrequently transmittedby transfusion of blood or blood products.

Hepatitis E can occur either in large epidemics, or in the form of sporadic cases. It is endemic in Southeast and Central Asian countries, few areas of Middle East, Africa and Mexico. Hepatitis E has both high incidence and severe course in pregnant women in some geographic regions of HEVendemic countries, such as Northern India[15], while in other HEV endemic countries, such as Egypt, it has a benign course with little or no morbidity[2].

In arecent large prospective study from Northern India on the maternal and fetal outcomes of Hepatitis E infection, around 60% of viral hepatitis in pregnant women was attributed to hepatitis E infection[15]. Fulminant hepatic failure was more common among HEV-infectedwomen (55%) who were 2.7 times at higher risk than non-HEV infected women (20%)[14,15]. Maternal mortality was observed to be higher due to fulminant hepatic failure in the HEVinfected group (41%) vs. 7% in the non-HEV group[17].

Sporadic hepatitis E infection is also associated with increased incidence and severity inpregnant women as reported by a study from India[16]. The prevalence and the severity of HEVinfection in pregnant women did not differ significantly in various stages of gestation. The severe liver injury due toHEV infection during pregnancy may be related to several possible factors, such as differences in immune and hormonal factors occurring during pregnancy, genetic and environmental factors with its occurrence in certain developing countries[14].

## MATERIALS AND METHODS

After getting approval from Institutional Ethics Committee (IEC 236), this study was done for a period of 3 months from April 2016 to June 2016 in Shri Sathya Medical College & Research Institute, Kanchipuram District, Tamil Nadu. The study population included willing outpatients and in-patients of Paediatrics, General Medicine, Surgery, Obstetrics & Gynaecologydeptin our hospital, whose informed consent was obtained prior to sample collection.

The sample size for our study was 100 patients. Patients coming to our hospital after Dec first week, 2015 (post floods) with symptoms such as fever, jaundice, loss of appetite, vomiting, abdominal symptoms, occupation, history of febrile episodes and duration, loss of appetite, duration of jaundice, duration of passing high-coloured urine, duration and frequency of loose stools, H/o travel, h/o outside food intake, H/o stay in flood-relief camps, were included in the study. Those patients who came to our hospital before Dec first week, 2015 were excluded from the study.

## METHODOLOGY

Patients who came to our hospital with symptoms suggestive of hepatitis after the floods during the first week of December were identified. They were subjected to appropriate lab investigations such as serum bilirubin, liver enzymes and ultrasound abdomen for hepatomegaly along with clinical correlation to confirm the diagnosis of hepatitis.

After collecting serum samples by sterile aseptic precautions, ELISA for viral hepatitis serological markers (IgM antibodies to Hepatitis A and HepE ) was done using validated commercial kits.

Kit name with Exp.Date& Lot no for:
Hep A kit – DSI s.r.l/ Dec 2017/ 00781014
Hep E – Dia.Pro/Oct 2016 / 0715 /L

Quality control was followed as per kit manufacturer's guidelines. The readings were noted using ELISA reader and OD (optical density absorbance) values were interpreted by cut-off values for positive and negative tests.

Demographic details of those patients who had positive results for any one viral hepatitis serological marker were collected and those positive patients who were identified to be residing in flooded areas and villages adjoining Tiruporur and Guduvanchery,were further scrutinized forhistory of needle-stick injuries, blood transfusion , tattooing, alcohol intake, H/o pregnancy, family h/o jaundice, H/o medications by needle, H/o vaccination, history of hepatitis positivity in family contacts and H/o loss of weight to rule out the occurrence of hepatitis due to "non-flood causes" in those patients.The data was analysed and results were interpreted .

## RESULTS

Total number of patients identified with symptoms of hepatitis based on history and clinical findings were 100 and the total number of serum samples tested for viral hepatitis markers were 100.

Positive samples for hepatitis IgM antibodies by ELISA were 5 for HepA . All samples tested were negative for Hepatitis E. (Table :1)

**Table 1**

| Viral hepatitis markers in serum | Number of positive patients |
|---|---|
| Hepatitis A | 5 |
| Hepatitis E | nil |

Hep A positive patients – 1 child aged 4 years and rest were adults

## DISCUSSION

Floods vary greatly in their character and in the size and vulnerability of the populations they affect. Health implications of floods may range from drowning, injuries, respiratory diseases, shock, hypothermia, cardiac arrest, skin diseases, wound infections, ocular infections, gastrointestinal illnesses, serious water borne and vector-borne diseases, psychosocial disturbances and cardiovascular diseases[13].

Food shortage, disruption of emergency response and health services, electrocutions and injuries contribute to significant morbidity in people affected and displaced by floods. Floodwater can be heavily contaminated with varieties of pollution starting from mud, sewage, decay of animal bodies, and pesticides to highly hazardous chemicals.

Malfunctioning water treatment plants and sewer discharge directly entering the watercourse without purification are potential causes of epidemic outbreaks of water-borne diseases after floods.Both Hepatitis A and Hepatitis E infections are transmitted through the fecal–oral route, due to ingestion of contaminated water, sewage-contaminated and inadequately-treated water[12,15].

In our study, we had 5 serum samples positive for Hepatitis A which corroborates with post flood impact on water resources. It is in concordance with a similar data on outbreak of Hepatitis A after flash floods in North India in June 2013 regarding the suspected outbreak of acute viral hepatitis among children who were staying in a rescue camp in the district of Rudraprayag, Uttarakhand[12]. A linkage was hypothesised between the infected individuals and faeco-oral contamination of waterconsumed . Of 25 samples found positive on screening , around 92% were found to have antibodies for Hepatitis A detected by anti-HAV IgM-ELISA. All the cases were children and belonged to age group 2 to 9 years[12].

Mixing of contaminated soil into wells and rivers during rains or floods has also been associated with HEV outbreaks in India[15]. The Integrated Disease Surveillance Programme of the NCDC received notification of 290,000 cases of acute viral hepatitis in 2013[7]. East and South Asia regions account for 60% of hepatitis E global incidence and 65% of global deaths. Among the Indian population, prevalence is less until age 15, reaching 40% in young adults. HEV is the most important cause of epidemic hepatitis, although HAV is more common among children.

Under the Integrated Disease Surveillance Programme (IDSP), 315 outbreaks of viral hepatitis were reported from 2010 to 2013. The majority of these outbreaks were due to hepatitis E and hepatitis A viruses.

Analysis of data reported shows that hepatitis cases are reported every year and most cases are reported during the monsoon season with rapid decline in the post-monsoon period (starting October). Most cases have been reported from Gujarat (17.1%), Tamil Nadu (12.7%), Uttar Pradesh (11.8%), West Bengal (7.3%) and Madhya Pradesh (7.3%)[7].

In our study , samples were negative for Hepatitis E , which was surprising because acute viral hepatitis due to Hepatitis E has been documented to be the commonest cause in India[20].

As per a recent global policy report (2013), India still needs to work in areas of generating data for evidence based policies, implementing preventive measures, raising awareness and partnerships, and screening and management of viral hepatitis. The outcome of this surveillance will be generation of baseline data for viral hepatitis, identification and management of acute cases, identification of major risk factors and contacts of infected persons requiring counseling and post-exposure prophylaxis.

## CONCLUSION

To the best of our knowledge, there has been no article published on viral hepatitis infections in Tamil Nadu after the December 2015 floods . In concurrence with global and national data on the impact of floods on the health of communities, the outcome of our study is in concordance with increase in viral Hepatitis A infection in flood affected villages within our community. Immunisation must be the prerogative and awareness about faeco- oral contamination of food and water during floods must be spread among the people in order to avoid further health hazards. Continous surveillance for hepatitis E in antenatal patients is essential in order to prevent morbidity and ensure a favourable outcome.

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