Original Research Article

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A study of serum electrolytes level in viral hepatitis E patients in a tertiary care hospital of south Gujarat

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ABSTRACT

Background: the aim of the study was to find and understand the relation between electrolytes and viral hepatitis E. To study electrolyte abnormality in patients with hepatitis E virus (HEV).

Methods: This study is a single centre cross sectional study on the patients with HEV infection. Consecutive cases affected with HEV-at department of medicine, SMIMER (Surat Municipal institute of medical education and research) hospital, Surat during the period of 1 year (July-2019 to June-2020) are taken up for the study.

Results: Abnormal electrolytes are associated with higher mortality in patients infected with HEV.

Conclusions: A higher mean serum creatinine, total bilirubin, SGOT, SGPT; lower total protein, albumin, and abnormal electrolytes in body fluid (Na+, K+, Cl-, Ca++) values are associated with higher mortality in patients infected with HEV.

Keywords: Viral hepatitis E, Serum electrolytes, Serum creatinine

INTRODUCTION

Hepatitis E virus (HEV) is a positive-sense, singlestranded RNA icosahedral virus with a 7.5 kilo base genome. HEV has a fecal-oral transmission route, especially in developing countries. Initially classified in the Caliciviridae family, the virus has since been classified in the genus hepevirus. 1 The commonly recognized cases occur after contamination of water supplies seen after monsoon flooding, although sporadic or isolated cases can occur. Globally, 57 000 deaths and 3.4 million cases of acute hepatitis E are attributable to infection with HEV genotypes 1 and 2. Over 60% of all hepatitis E infections and 65% of all hepatitis E deaths occur in East and South Asia, where seroprevalence rates of 25% are common in some age groups. An epidemiologic feature that distinguishes HEV from other enteric agents is the rarity of secondary person-to-person spread from infected persons to their close contacts. Infections arise in populations that are immune to HAV and usually are seen

in young adults.2 In endemic areas, the prevalence of antibodies to HEV is 40%. In nonendemic areas of the world, such as the United States, clinically apparent acute hepatitis E is extremely rare. However, the prevalence of antibodies to HEV can be as high as 20% among high-risk groups such as homosexual men (15.9%), intravenous drug abusers (23%), and blood donors (21.3%).^{2,3} The seroprevalence of HEV in the civilian noninstitutionalized US population from 1988-1994 was 21.0% (95% confidence interval, (19.0%-22.9%).4 Also, persistent infection of hepatitis E has been documented in liver transplant recipients. Epidemics of hepatitis occur frequently in the Indian subcontinent and are mostly due to HEV.^{5,7} Previously reported epidemics of viral hepatitis occurred in Delhi and Kanpur. 8,9 Hepatitis E outbreak in India and Asia has a case fatality rate of 1-2% in normal population and 10-20% in pregnant women.² In a view of increased reporting of cases of hepatitis E in our hospital, and because there were no reports like this earlier, a study of clinical and epidemiological profile of hepatitis E and

its outcome was undertaken. The aim of this study was to explore the clinical and epidemiological profile of all the hepatitis E patients being admitted to tertiary care hospital in Surat, India and to further assess various factors that influence the prognosis of these patients.

METHODS

This study is a single centre cross sectional study on the patients of viral hepatitis E infection carried out on 60 patients admitted to SMIMER hospital, Surat during the period of 1 year (July-2019 to June-2020). Patients included are those admitted in medicine department of our tertiary care hospital, those with recent onset of jaundice, conjugated hyperbilirubinemia hyperbilirubinemia, positive report of HEV and those with age more than 17 years. Patients excluded are those with age less than 17 years, patients with underlying chronic liver disease, USG suggestive of cirrhosis of liver, patient with drug induced hepatitis, cholestatic hepatitis of pregnancy, haemolytic jaundice, hepatitis due to metabolic disease and hepatitis due to multi-organ failure, patient with positive report of hepatitis A, B, C or D. All patients with HEV meeting the inclusion criteria coming to wards of our tertiary care hospital during the study period are included. Baseline data including age and sex, detailed medical history including conventional risks factors, clinical examinations, physical examination and relevant investigations were included as part of the methodology. For all the subjects standing height and weight were measured. Urine was tested for the presence of bile pigments and bile salts. The liver function tests included estimation of serum bilirubin, serum alkaline phosphatase, and serum alanine aminotransferase (ALT). Blood samples were collected from all the patients on the day of admission to the hospital. Serum was separated and preserved at-20 °C until it was tested. Sera were screened within 4 days of collection for the hepatotropic viral markers. Anti-HAV IgM (Immuno vision) was assessed using HAV-specific immunodominant recombinant antigens by capture enzyme immunoassay; anti-HEV IgM (Immuno vision), using ORF2 as well as ORF3 recombinant antigens by capture enzyme immunoassay; HBsAg was screened by using third-generation enzyme immunoassay (PATHOZYME); and anti-HCV antibody was detected by third-generation enzyme immunoassay (General biologicals corp.) using synthetic HCV peptides, core and NS4 antigens, and recombinant antigens NS3 and NS5 by sandwich assay. All tests were carried out using procedures as per the manufacturer's instructions. Study was ethically approved by the institutional ethics committee. Data entry and statistical analysis is performed with the help of IBP SPSS version 22. The statistical analysis is done by appropriate statistical method. The statistical methods used for quantitative data are descriptive statistics presented by n, mean, standard deviation and range. For qualitative data, frequency count, N and percentage are put in tabular columns. To analyse the data, appropriate statistical tests are applied. To

compare the difference between variances in the subjects, unpaired student's t test and chi square test are used.

RESULTS

In the present study, the mean and standard deviation for age in the study subjects is 39.1±12.17 years respectively. The age distribution is as shown in Table 1 below.

Table 1: Age wise distribution.

Age (years)	No. of patients (n=60) (%)		
21-30	18 (30)		
31-40	17 (28.33)		
41-50	13 (21.67)		
51-60	12 (20)		
Mean age	39.1±12.17		

In gender wise distribution, it is found that male patients 34 (56.67%) are predominantly higher than female 26 (43.33%). The ratio of male: female is 1.30:1.

In present study, yellowish urine is the most common symptom followed by different symptoms. The distribution of symptoms is as shown in Figure 1 below.

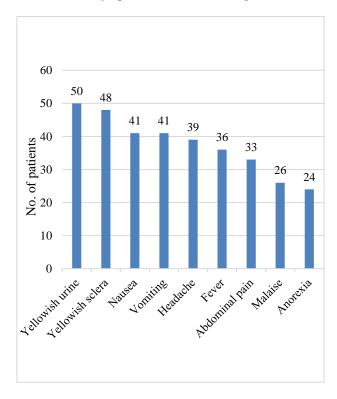


Figure 1: Symptoms wise distribution.

On general examination, icterus 45 (75%) is the most common finding followed by pallor 12 (20%) and the least common is oedema 2 (3.33%).

The Following Table 2 shows various biochemical parameters in this study:

Table 2: Distribution based on biochemical parameters.

Biochemical parameters	Mean ± SD
RBS (mg/dL)	114.56±3.48
Hb (gm/dL)	11.24±1.92
Total count (cmm ³)	9535±2975.76
Platelet count (cmm ³)	221366.66±70305.37
Serum creatinine (mg/dL)	0.97±0.15
Serum bilirubin (mg/dL)	11.72±8.20
SGPT (U/L)	1130.33±886.57
SGOT (U/L)	991.25±794.05
Total protein (g/dL)	6.86±1.00
Serum albumin (g/dL)	3.70±0.97
Serum globulin (g/dL)	3.16±0.36
PT (sec)	13.95±1.81
INR	1.02±0.04
Na ⁺ (mmol/L)	137.9±6.31
K ⁺ (mmol/L)	4.49±0.92
Cl ⁻ (mmol/L)	100.41±5.89
Ca ⁺² (mmol/L)	8.96±1.00
P (mmol/L)	3.89±0.41

In the present study, outcome wise distribution is as shown below:

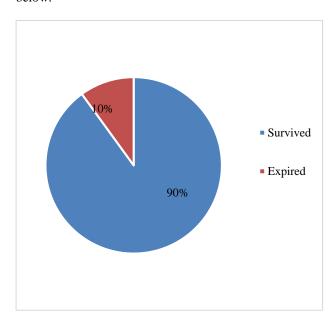


Figure 2: Outcome wise distribution.

DISCUSSION

HEV is the major etiological agent of acute viral hepatitis in young adults. It is not possible to differentiate viral hepatitis based on clinical features, biochemical parameters, and severity of illness. Serological markers are essential for correct etiological diagnosis. In addition, higher mean serum creatinine, total bilirubin, SGOT, SGPT, total protein, albumin, and abnormal electrolytes in body fluid (Na+, K+, Cl-, Ca++) values are associated with higher mortality in HEV patients.

The mean age of the present study correlates with other studies mentioned in Table 3 below:

Table 3: Comparison between other studies and present study for age.

Authors name	Mean age (years)
Murthy et al ¹⁰	45.59±14.4
Desai et al ¹¹	27.25±9.5
Shah et al ¹²	30±12.4
Present study	39.1±12.17

The male: female ratio of the present study was correlated with other studies mentioned in Table 4 below:

Table 4: Comparison between other studies and present study for gender.

Author's name	Male:female ratio
Murthy et al ¹⁰	4.8:1
Desai et al ¹¹	1.12:1
Present study	1.30:1

In the present study, serum albumin is compared amongst those who survived $(3.79\pm0.90~\text{gm/dL})$ with those who expired $(2.86\pm1.31~\text{gm/dL})$ which shows higher mortality in those with low level of serum albumin. In a similar study done by Murthy et al, serum albumin amongst those who expired $(2.6\pm0.11~\text{gm/dL})$ was very low as compared to those who survived $(3.41\pm0.40~\text{gm/dL})$.

In addition, when we compared serum creatinine amongst those who survived (0.95±0.15 mg/dL) with those who expired (1.11±0.14 mg/dL), significant difference was observed. Study done by Murthy et al also shows similar data, in which serum creatinine was (1.12±0.64 mg/dL) and (2.9±1.38 mg/dL) for patients who survived and expired, respectively. ¹⁰

The comparison between electrolytes of this study and other study is shown in Table 5 below:

Table 5: Comparison between other studies and present study for electrolytes.

Author's name	Survived (mmol/L)		Expired (mmol/L)	
name	Na+	K+	Na+	K +
Murthy	$136.04 \pm$	$4.29 \pm$	123±	5.95±
et al ¹⁰	2.97	0.51	3.56	1.21
Present	139.61±	4.33±	$122.5 \pm$	5.93±
study	3.52	0.82	4.67	0.23

Limitations

Most of the study subjects are enrolled from a same institute (Local study). Also, major limitation of the study is the cross-sectional nature of the data which may preclude the findings regarding the temporal nature of the

relationship of biochemical parameters with the mortality in HEV patients.

CONCLUSION

HEV is the major etiological agents of acute viral hepatitis in young adults. It is not possible to differentiate viral hepatitis based on clinical features, biochemical parameters, and severity of illness. Serological markers are essential for correct etiological diagnosis. In addition, higher mean serum creatinine, total bilirubin, SGOT, SGPT, total protein, albumin, and abnormal electrolytes in body fluid (Na+, K+, Cl-, Ca++) values are associated with higher mortality in HEV patients.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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