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Original Article

Seroprevalence of Hepatitis E Virus Infection among Patients with Acute Hepatitis Symptoms in Ahvaz, Iran

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ABSTRACT

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Key words
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Background and Aims: Hepatitis E virus (HEV) is considered as one of the common causes of acute viral hepatitis in the world, particularly in the developing countries. It also causes fulminant hepatitis in pregnant women. Although HEV infection in Iran is endemic, there are numerous reports of epidemics caused by this infection in this part of the world. This study aimed to determine seroprevalence of HEV among patients with acute hepatitis symptoms in Ahvaz, Iran.

Materials and Methods: In this cross-sectional study patients were selected based on laboratory findings related to acute hepatitis including elevated serum bilirubin levels, markedly elevated levels of liver enzymes such as alanine aminotransferase, aspartate aminotransferase and mild increases in alkaline phosphatase activity.The plasma samples were tested for IgM/IgG Hepatitis E antibody (anti-HEV) using enzyme-linked immunosorbent assay.

Results: Out of 241 study patients, 125 (51.9%) were male and 116 (48.1%) female. The mean age±SD was 31.53±17.17 years. The results indicated 27.4% prevalence of anti-HEV antibodies among patients with acute hepatitis in Ahvaz.

Conclusions: In regard with the findings, HEV can play an important role in incidence of hepatitis. The study needs to be conducted in high-risk groups and in general populatios.

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Introduction

Hepatitis E virus (HEV) is an icosahedral non-enveloped, single-stranded positive-sense RNA virus in the genus of Hepevirus from the family Hepeviridae [1]. HEV is considered as one of the most common causes of acute viral hepatitis over the world particularly in the developing countries. This is a major cause of fulminant hepatitis in pregnant women [2, 3]. The viral particle is relatively stable under environmental conditions like sewage water [4]. Therefore, the oral-fecal route, like contaminated food or water, is a predominant route of HEV transmission to others. In rare cases, HEV can be transmitted zoonotically and by blood transfusion [5]. However, there is evidence of vertical transmission of hepatitis E virus infection from mother to fetus seemingly representing the ability of the virus to cause congenital infections [6]. HEV infection is regarded as a significant public health problem especially in the developing countries where large outbreaks and epidemics of HEV infections happen as a result of poor personnel hygiene, inadequate sanitation, and an unsafe drinking water supply [7]. Several studies have also reported the high seroprevalence of HEV infection in the developed countries [8]. The clinical symptoms and laboratory findings of HEV infection are similar to other hepatotropic viruses which cause acute hepatitis [9]. Pregnant women with HEV infection in the third trimester are at an increased risk of fulminant hepatic failure and maternal death [10].

One-third of the world population is infected with HEV virus [11]. Each year, 20 million new infections and 3.3 million acute infections as well as 56,600 deaths occur in the world [12, 13]. In general populations, the mortality rate is 1-2% [11] However, in pregnant women and in individuals with pre-existing liver disorders it may amount to 10-25% and over 75%, respectively [14]. Iran is considered as an endemic area of HEV infection [15]. The prevalence of HEV infection in Iran is very different due to the variations in public health and hygiene levels, risk factors and transmission routes in different areas and groups [16]. According to the studies conducted in different regions of Iran, the HEV prevalence is reported to be 1.1-14.2% in public population [17], 4.5-14.3% in blood donors [18], 6.3-8.3% in patients of hemodialysis [19], 27.5% in chronic liver disease [20], and 10-16.4% in HIV-infected patients [3]. However, Iran is the endemic area of HEV infection and studies carried out in this regard are not adequate [15]. Therefore, this study was performed to evaluate the seroprevalence of HEV in patients with acute hepatitis symptoms.

Materials and Methods

Study population

In this cross-sectional study, 241 patients including 125 (51.9%) male and 116 (48.1%) female (mean age±SD: 31.53±17.17 years) with acute hepatitis symptoms such as elevated liver enzymes levels such as increased serum alanine aminotransferase, aspartate aminotransferase and bilirubin as well as clinical symptoms such as fever, fatigue,

malaise, anorexia, jaundice and pruritus were enrolled during December 2013 to August 2016 in the city of Ahvaz. This project was approved by the Ethic Committee of Ahvaz Jundishapur university of medical sciences. In addition, the consent form was obtained from all the patients.

Detection of antibodies against HEV

The peripheral venous blood was collected from each patient. Plasma samples were separated from whole blood. Samples were tested for IgM/IgG Hepatitis E antibody (anti-HEV) using enzyme-linked immunosorbent assay (ELISA) according to the manufacturer's instruction (DIA.PRO HEV Ab ELISA kit).

Statistical analyses

Statistical analyses were performed using Chi-squre and SPSS 21 Package program (SPSS Inc., Chicago, IL, USA). The p-values of lower than 0.05 were regarded as statistically significant. The proportions of patients which are categorized by sex, age and seasons was compared by ANOVA test and Fisher's exact statistics. Descriptive statistics were used for data analysis. The results were presented as frequencies or percentage.

Results

In terms of age, the patients were divided into six groups comprising less than 15 yrs, 16-25 yrs, 26-35 yrs, 36-45 yrs, 46-55 yrs and more than 56 yr. Those with 42/241 (17.4%), 59/241 (24.5%), 56/241 (23.2%), 36/241 (14.9%), 18/241 (7.5%) and 30/241 (12.4%) constructed groups 1 to 6 respectively (Fig. 1). In terms of season, 72/241 (29.9%) patients were in the spring 54/241 (22.4%) in the summer, 45/241 (18.7%) were in the fall, and 70/241 (29%) patients in the winter (Fig. 2). Table 1 presents a summary of characteristics of the study of all the patients. Of the 241 patients, 66/241 (27.4%) were shown to be positive for anti-HEV total antibodies while 175/241 (72.6%) were negative. The overall anti-HEV total antibodies prevalence rate was 27.4% among patients with acute hepatitis. Based on the gender and season, 30/125 in the male group and 36/116 in the female group were positive for anti-HEV total antibodies.

Totally, 21/72 in the spring, 15/54 in the summer, 15/45 in the fall, and 15/70 in the winter were shown to be positive for anti-HEV total antibodies. Although, the seroprevalence was higher in the spring season and female groups; but HEV seropositivity was not statistically significant in terms of gender ($p=0.223$) and season ($p=0.542$). Nevertheless, there was a statistically significant difference in anti-HEV total antibodies seroprevalence rate between the patients grouped based on age ($p<0.01$). Seroprevalence of (HEV) antibody increased with age from 7.1% (3/42) in group 1 to 76.7% (23/30) in group 6, so that the highest rate of anti-HEV seroprevalence was identified in group 6 (Table 1).

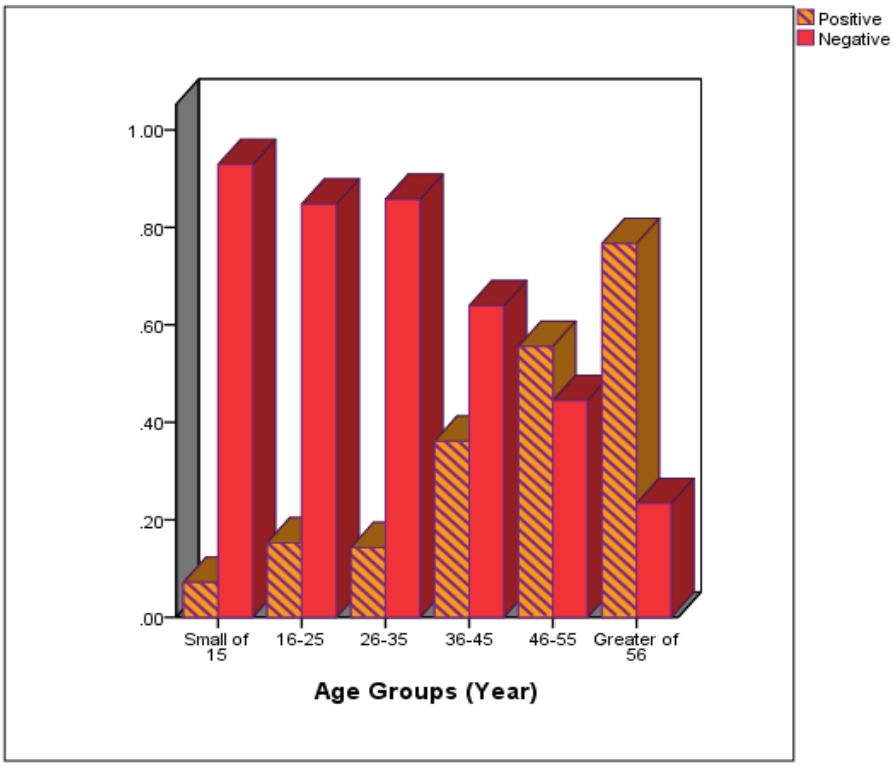

Fig .1. Prevalence of anti-HEV IgM/IgG antibody in categorized by age

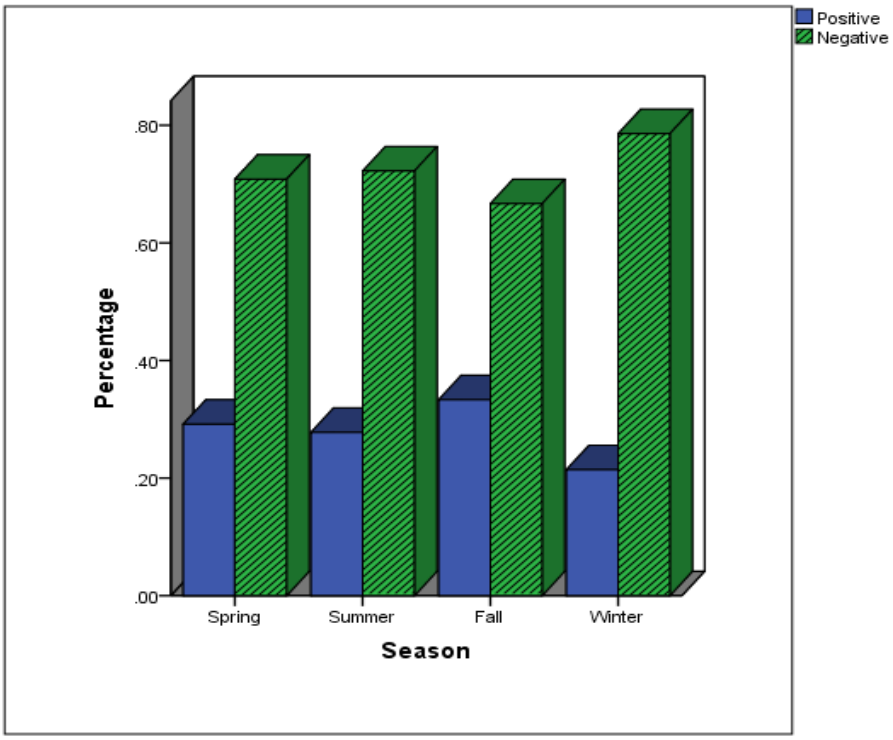

Fig. 2. Prevalence of anti-HEV IgM/IgG antibody according to four seasons

Table 1. Anti-HEV total antibodies seroprevalence rate in studied samples

	Participants (n=241)	Anti-HEV positive (n=66)	Anti-HEV Negative (n=175)	P-value
Gender				0.223
Male	125 (51.9%)	30 (45.5%)	95 (54.3%)	
Female	116 (48.1%)	36 (54.5%)	80 (45.7%)	
Season				0.542
Spring	72 (29.9%)	21 (29.2%)	51 (70.8%)	
Summer	54 (22.4%)	15 (27.8%)	39 (72.2%)	
Fall	45 (18.7%)	15 (33.3%)	30(66.7%)	
Winter	70 (29.0%)	15 (21.4%)	55 (78.6%)	
Age groups (yr)				<0.01
≤15	42 (17.4%)	3 (7.1%)	39 (92.9%)	
16-25	59 (24.5%)	9 (15.3%)	50 (84.7%)	
26-35	56 (23.2%)	8 (14.3%)	48 (85.7%)	
36-45	36 (14.9%)	13 (36.1%)	23 (63.9%)	
46-55	18 (7.5%)	10 (55.6%)	8 (44.4%)	
≥56	30 (12.4%)	23 (76.7%)	7 (23.3%)	

Disscution

Hepatitis E infection is a global public health problem causing large outbreaks of acute hepatitis in the developing countries especially in the Southeast and Central Asia, the Middle East, northern and western parts of Africa as well as sporadic cases of the infection also in the developed countries [21]. There is wide variation of HEV prevalence in different areas of the world [22], however the HEV prevalence is greater in tropical and subtropical regions [23]. Since the overall prevalence rate of HEV in Iranian general population is more than 5%, Iran is considered as an endemic zone for HEV disease [15, 24]. Previous studies have reported variations in the epidemiology and prevalence of hepatitis E in different regions of Iran. These variations are due to differences in the life styles, status of public health, risk factors, and routes of transmission in different groups and geographical areas [25]. Taremi et al. reported HEV seroprevalence rate of 9.3% among general population in Nahavand Province in Iran [26]. Raoofi et al. indicated that HEV seroprevalence rate in general population of Khorramabad city is 7.8% [27]. In another study by Mohebbi et al. the prevalence of HEV was reported to be 9.3% in general population of Tehran [28]. Also Farshadpour et al. reported HEV seroprevalence rate leveling 46.1% among adults in South-West of Iran [29]. In Arabzadeh et al.'s study, HEV prevalence was 7.7% among blood donors in kerman [30]. Therefore, the available epidemiological studies in different regions of Iran report the highest rate of HEV prevalence

related to Ahvaz, the center of Khozestan province. Perhaps one of the main reasons for the high prevalence of this virus in Ahvaz is the pollution of Karun river water as the only source of drinking water in the region. This results from the fact that in many cases, household sewage, industrial wastewater, and wastewater from agriculture and hospitals enter the Karoon river. There are also reports of some epidemiologic studies performed on HEV prevalence among the general populations of other countries: 28% in Hong Kong [31], about 3.4% in Japan blood donors [32], 9% in Vietnam [33], 1.1% in Spain [34], and 3.6% in the general population of China [35]. The present probe investigated the HEV seroprevalence among the patients with acute hepatitis in Ahvaz city and found anti-HEV total antibodies to be 27.4%. In this study, the HEV seroprevalence rate significantly increased with age; from 7.1% in people aged below 26 years to 76.7% in individuals aged more than 56 years. The current study, in line with some other studies, indicated a statistically significant difference between age and the prevalence of the disease increasing with age [36, 37]. In accordance with the results of the previous studies [38-40], our findings showed that the presence of anti-HEV total antibodies is not associated with gender.

Outbreaks of hepatitis E in the tropical developing countries mainly occurs during the rainy season due to floods when sewage water gains access to open water reservoirs, as well as the overcrowding factor [41]. However our results showed a statistically insignificant difference in anti-HEV total antibodies seroprevalence rate between seasons, In other words, the presence of anti-HEV total antibodies is not associated with a particular season. Given that there is no effective vaccine to prevent infection and also due to the risk of progression to advanced liver disease including fulminant hepatitis or even chronic infection and cirrhosis with a high rate of mortality in high-risk groups like pregnant women, organ transplant recipient patients, and immunosuppressed patients, research on HEV infection epidemiology is very critical so as to employ preventive measures in the public health services of the country [13, 42-44].

Conclusions

Overall, the results of this study indicate that HEV can play an important role in the incidence of acute hepatitis. Therefore, it seems that further epidemiological investigations are needed to evaluate the association and role of the virus in the development of chronic hepatitis. Regarding the high prevalence of this disease, it seems that improving the quality of drinking water in Ahvaz should be considered as one of the most vital priorities. On the other hand, in the context of research, screening for this disease appears to be necessary in high-risk groups and at-risk populations.

Conflict of Interest

There is no conflict of interest in this article.

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