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Seroprevalence of hepatitis E virus in blood donors in Khuzestan Province, Southwest Iran

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Summary
Objective: To determine the seroprevalence of hepatitis E virus (HEV) infection among volunteer blood donors in Khuzestan Province, Iran. Khuzestan is a war stricken area in the southwest of Iran, which shares a land, river, and sea border with Iraq. This region has suffered the heaviest public health system damage of all the Iranian provinces during a 25-year period of war and conflict.
Methods: A cross-sectional study was carried out among 400 urban volunteer blood donors of the regional blood banks, from May to December 2005. Serum samples from healthy blood donors were tested for IgG anti-HEV antibody using a specific enzyme linked immunoassay (ELISA) kit.
Results: The prevalence of HEV infection was found to be 11.5% (46/400). All patients were negative for anti-HIV, anti-HBV, and anti-HCV antibodies. The data indicate that 14.6% (38/260) of HEV positive subjects were male, compared to 5.7% (8/140) of females; this difference is statistically significant (risk ratio = 2.6, $p < 0.008$).
Conclusions: These findings demonstrate the high prevalence rate of anti-HEV among blood donors, particularly males.

Introduction

Hepatitis E virus (HEV) infection is the major cause of enterically transmitted non-A, non-B (NANB) hepatitis in many parts of the world.[1] This virus is well recognized as a cause of fulminant hepatic failure in areas where it is endemic, particularly in pregnant women infected in the third trimester.[2,3] The infection has been shown to occur in both epidemic and sporadic forms and to be primarily associated with the ingestion of fecally contaminated drinking water.[1] Although they make only minor contributions to the spread of the disease, other routes of transmission should not be overlooked. For example, vertical transmission of HEV in utero from infected mothers to their newborns has been documented.[4]

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Epidemiology studies have shown that HEV infection is quite common in some areas of the world such as India, Africa, and Southeast Asia, where it can represent the main cause of acute hepatitis.[5,6] Outbreaks of HEV infection have been reported from Central and Southeast Asia. Therefore, it is an important public health concern in many developing countries of Southeast and Central Asia, the Middle East, northern and western parts of Africa, and Mexico, where outbreaks have been reported.[5,7]

Evidence is accumulating that shows HEV infection to be an emerging disease in some developed countries as well.[8,9] From studies of blood donors in developed countries, it would appear that the prevalence of HEV in these countries is around 3–5%.[10–12]

Conflicts and war have a devastating impact on public health and the availability of safe and healthy food and water. Therefore the prevalence of HEV is higher in these areas; for example in Darfur, Sudan, the conflict has been responsible for the largest outbreak of HEV documented in the literature among internal displaced persons or refugees.[13,14] These studies have also shown that the most dramatic impact of this disease has been on pregnant women at the community level.[3,13,14]

Khuzestan Province, Iran, is located in the southwest of Iran and shares a land, river, and sea border with Iraq. Khuzestan has suffered the heaviest damage of all Iranian provinces during a 25-year period including: the Iran–Iraq War (1980–1988), the Gulf War (1990–1991), and the 10-year crisis in Iraq (1992–2003). Moreover, the main river in the region (the Karun) is the natural water source for piped and other water supply systems, for drinking and household needs.

To our knowledge, few studies have addressed the prevalence of HEV infection in Iran, which has experienced a few suspected outbreaks of HEV.[15] The current study was conducted to investigate the seroepidemiology of HEV among blood donors in Khuzestan Province.

Methods

Study population

This cross-sectional study was performed from May to December 2005 in Khuzestan Province on first-time, volunteer, healthy donors attending four regional blood banks in different cities, for blood donation. A total of 400 serum samples were collected from urban subjects. Blood samples were taken after obtaining an informed consent, and the serum samples obtained were then stored at −20 °C until anti-HEV immunoglobulin G (IgG) assays were carried out.

All of the subjects were also screened for syphilis (rapid plasma reagin (RPR) test), hepatitis B and C, and HIV type 1 and type 2 infections (ELISA test).

Laboratory assay

Sera from the study subjects, stored at −20 °C, were tested by anti-HEV IgG assay with a commercial ELISA microplate kit (HEV-EIA, Biokit, Spain) according to the manufacturer's instructions. The samples were considered positive when the absorbance/cut-off (A/C) ratio was equal or higher to 1.0 and negative when the A/C ratio was <0.9 (values given by the manufacturer).

Statistical analysis

Data comparisons were performed using the Chi-square test with Fisher's exact test. The differences were considered significant if $p < 0.05$.

Results

Four hundred healthy blood donors were tested. There were 260 (65%) males and 140 (35%) females; their mean age was 33.3 years (range 18–60 years). Out of 400 subjects, 46 showed anti-HEV IgG antibodies; therefore the prevalence of anti-HEV in our population was 11.5%. All patients were negative for anti-HIV, anti-HBV, and anti-HCV antibodies.

Table 1 shows the distribution of anti-HEV reactivity in healthy blood donors according to gender. These results indicate that in the male group 14.6% (38/260) were HEV positive compared to 5.7% (8/140) in the female group, a difference that is statistically significant (risk ratio (RR) = 2.6, $p < 0.008$).

Table 2 shows that 10.9% (28/258) of anti-HEV positive subjects were under 35 years of age and 12.7% (18/142) were over 35 years age. Therefore, a higher prevalence of anti-HEV positivity was seen in the over-35 years age group.

Discussion

Although HEV infection is endemic in Southeast and Central Asia, where several large outbreaks of hepatitis E have been observed, sporadic hepatitis E occurrences have also been observed in several countries where outbreaks have not been reported, including Egypt and Turkey.[16,17] There are few reports on outbreaks of HEV in Iran,[15] particularly for war stricken areas. Zali et al.,[18] in a population-based study, indicated that the prevalence rate of IgG anti-HEV among a healthy population in Iran was 9.6%. Taremi et al., in two independent studies,[19,20] reported the seroprevalence of HEV in Tabriz, Northwest Iran and in hemodialysis patients to be 7.8% and 7.4%, respectively.

In the present study the prevalence of anti-HEV IgG was 11.5% in urban healthy blood donors in Khuzestan Province, Southwest Iran, an area with an approximate urban popula-

Table 1 Prevalence of anti-HEV antibodies according to gender in healthy blood donors

Gender	Anti-HEV positive *n* (%)	Anti-HEV negative *n* (%)	Total *n* (%)
Male	38 (14.6)	222 (85.4)	260 (100)
Female	8 (5.7)	132 (94.3)	140 (100)
Total	46 (11.5)	354 (88.5)	400 (100)