

ORIGINAL  
ARTICLESeroprevalence of Hepatitis E Virus Infection  
in Children in the Southwest of Iran

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**Background and Aims:** Hepatitis E virus (HEV) infection causes an acute, self-limiting hepatitis that is associated with high mortality, especially in pregnant women. Our previous clinical experiences indicated that there was a high prevalence of hepatitis A virus (HAV) among school-age children in the city of Ahvaz (in the southwest of Iran). Due to the fact that HEV is transmitted generally by the same route as HAV, the present study was performed to determine the seroprevalence of HEV among school-age children in Ahvaz.

**Methods:** In a cross-sectional study, the seroprevalence of anti-HEV antibodies was determined in sera from 566 children aged 6–15 years by enzyme-linked immunosorbent assay (ELISA). The study population included 257 (45.4%) males and 309 (54.6%) females.

**Results:** Anti-HEV antibodies were detected in 48 children (8.5%; 95% CI, 6.3-11.1). The seroprevalence of HEV was not statistically different between males and females or between different age groups.

**Conclusions:** HEV is relatively prevalent in children that live in the southwest of Iran, and further studies are needed to investigate the seroprevalence of HEV in other age groups.

**Keywords:** Seroprevalence, Hepatitis E, Iran

## Introduction

Viral hepatitis is a global public health problem, especially in developing countries. Hepatitis A virus (HAV) and hepatitis E virus (HEV), two of the major agents that cause viral hepatitis, are transmitted via the fecal-oral route and result in sporadic and epidemic forms of acute hepatitis (1, 2). Multiple studies have examined the prevalence of HAV in different countries, but little information is available about the epidemiology of HEV. Most studies describe the prevalence of HEV only in adults or in select groups of subjects (3, 4). HEV can cause epidemic hepatitis in young adults, and the first epidemic of this virus was reported in New Delhi in 1955 (5).

Hepatitis E is a significant health problem in many regions, such as the Indian subcontinent, Southeast Asia, the Middle East, and North Africa (6). In the countries that neighbor Iran, the prevalence of this

virus in children was reported to range from 0.89% in Turkey to 19.4% in Pakistan (7, 8). Our previous clinical experiences in Ahvaz (in the southwest of Iran) showed a high prevalence of hepatitis A among school-age children. In Iran, the majority of studies have examined the prevalence of anti-HEV antibodies in select groups of the population, which does not reflect the prevalence of infection

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in the overall community and in healthy children (9, 10). Due to the fact that little is known about the seroepidemiology of HEV in Iranian children, or the epidemiologic similarities of HAV and HEV, we decided to determine the prevalence of anti-HEV antibodies among school-age children in Ahvaz.

### Materials and Methods

A sample of school-age children who ranged in age from 6 to 15 years was obtained from 16 randomly selected schools in Ahvaz in the southwest of Iran between October 2006 and June 2007. Informed consent to take blood samples was obtained from parents. Sera were stored at -20°C, coded, and further tested in the Virology laboratory of Ahvaz Medical School.

Immunoglobulin G (IgG) antibodies against HEV were detected using a commercial immunoenzymatic method (Bioelisa HEV IgG; Biokit, Spain) according to the manufacturer's instructions. The cut-off value was defined using positive and negative control sera that were included in each assay. Samples were considered positive if the optical-density (OD) value was above the cut-off value, and all positive samples were retested in duplicate by the same enzyme immunoassay to confirm the initial results.

The statistical analysis was performed using SPSS (version 13) software. The prevalence of anti-HEV

antibodies and 95% confidence intervals (95% CIs) were calculated for different age groups and different sexes. Chi-square tests and t-tests were performed, and statistical significance was established at P values of < 0.05. The study was approved by the appropriate ethics committee.

### Results

Five hundred and sixty-six children between the ages of 6 and 15 were enrolled in the study. There were 257 (45.4%) males and 309 (54.9%) females. The mean age ± standard deviation (SD) was 10 ± 2.7 years. IgG antibodies against HEV were detected in 48 of the 566 analyzed samples. (8.5%; 95% CI, 6.3 to 11.1). There was no significant difference in the prevalence of anti-HEV antibodies between males and females (Table 1). Table 2 shows the prevalence of anti-HEV antibodies in the different age groups. The prevalence did not differ in a statistically significant manner between the different age groups.

### Discussion

This is the first study to analyze the prevalence of IgG antibodies against HEV in children in the southwest of Iran. The overall prevalence of anti-HEV antibodies was found to be 8.5%. Some

**Table 1.** Prevalence of anti-HEV antibodies in males and females.

Results \ Sex	Male	Female	Total
Positive	23 (4.1%)	25 (4.4%)	48 (8.5%)
Negative	234 (41.3%)	284 (50.2%)	518 (91.5%)
Total	257 (45.4%)	309 (54.6%)	566 (100%)

**Table 2.** Prevalence of anti-HEV antibodies in different age groups.

Results \ Age (y)	6-8	9-11	12-15	Total
Positive	15 (2.7%)	17 (3%)	16 (2.8%)	48 (8.5%)
Negative	178 (31.4%)	185 (37.7%)	155 (27.4%)	518 (91.5%)
Total	193 (34.1%)	202 (35.7%)	171 (30.4%)	566 (100%)

earlier studies had examined the seroprevalence of HEV infection in children in developed countries. In one study from Japan, 2.6% of the 309 study children were seropositive for HEV<sup>(11)</sup>. In a study of healthy children in Spain, anti-HEV antibodies were detected in 4.6% of the 124 samples that were analyzed<sup>(12)</sup>. Most studies that have examined the prevalence of HEV infection in developing countries have produced widely varying results. In one study from Ghana, 4.4% of samples from a group of children who were 6-18 years old were anti-HEV positive<sup>(13)</sup>. On the Indian subcontinent, the prevalence of HEV was reported to be higher than in other parts of the world. In India, the prevalence of HEV was reported to range from 1% in southern areas to 33.8% in northern areas<sup>(14, 15)</sup>. A Pakistani study of 100 children in Karachi found a prevalence of 19.4%<sup>(8)</sup>. Several studies have been undertaken to determine the prevalence of HEV infection in children in other countries that are close to Iran. In one study from Riyadh, Saudi Arabia, 1.2% of children under the age of 12 were seropositive for HEV<sup>(16)</sup>. In Turkey, the seroprevalence of anti-HEV antibodies was reported to range from 2.1% in urban areas to 8.6% in rural areas<sup>(17, 18)</sup>. Some studies have found a higher prevalence of anti-HEV antibodies among females and older individuals than among males and younger individuals<sup>(12, 19, 20)</sup>. However, in the present study, the prevalence of anti-HEV antibodies was not found to differ in a statistically significant manner between different age groups or between males and females. This might be related to an equal risk of exposure to HEV in children of all ages and in both sexes.

In conclusion, this study found a seroprevalence of 8.5% for anti-HEV antibodies in children that live in Ahvaz in the southwest of Iran, and although the prevalence of HEV infection is not as high as it is in some areas, such as the Indian subcontinent and Far East Asia, it is higher than the prevalence rates in most of the countries that neighbor Iran. This relatively high prevalence of anti-HEV antibodies suggests that children in Ahvaz are exposed to HEV and that further studies of other age groups would be useful.

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