Seroepidemiology of hepatitis- E in children of Kashan, Iran in 2012

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Abstract: History and Objectives: Hepatitis-E is one of the viral diseases that are transmitted through the consumption of polluted foods and water. It commonly produces a viral hepatitis that may have no apparent demonstration or may lead to acute and deadly disease. The prevalence of the disease in non-endemic countries varies between 1 to 20 percent whereas this figure increases to 50 percent in endemic areas. The purpose of this research was to determine the prevalence of the serologic hepatitis-E in children in addition to examining the association of the disease with variables of age, gender and the number of family members in the city of Kashan. Materials and methods: This was a descriptive epidemiologic research that included 558 children between the ages of 1 to 15 years. The sample was drawn from a cluster sapling procedure. Factors such as Anti-HEV IgG were examined through ELISA method. Statistical analysis was performed by Using SPSS: PC version 14.0. Results: The result of analysis indicated that the prevalence rate of the disease among children was 3.7 percent. The presence of disease was associated with the age and the number of family members ($P<0.05$) but not with the gender of the child ($P>0.05$). Discussion and Conclusion: Based on the findings of this research, it was concluded that HEV is endemic in the region; therefore, appropriate public health programs may be effective in controlling the disease.
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Introduction

Hepatitis- E is a single – stranded RNA-virus that belongs to the hepatoviridae family (1, 2). It commonly produces a viral hepatitis that may have no apparent demonstration or may lead to acute and deadly disease (3, 4). The disease is transmitted through the consumption of infected foods or water (5-8). However, infected water is the main source of transmission (5, 6). Fecal-oral route is the common mean of transmission, but there may be other ways such as injection, blood transfusion, intercourse and pregnant mother transmission to her fetus (9-16). There are reports that indicated this disease is transmitted from animal or consuming their products In Europe, United States and Japan (17-19).

The prevalence of the disease in non-endemic countries varies between 1 to 20 percent whereas this figure increases to 50 percent in endemic areas (20). The prevalence of hepatitis E in developing countries where the health standards are relatively low is 7.2 to 35 percent. In India, the serologic prevalence reaches as high as 40 percent while this rate in developed countries is 1 to 3 percent (3, 21, and 22). This virus causes mild condition in low ages, but results in sever infectious disease in adults that is associated with reduction of working capacity and absenteeism from work (23). Affliction to this virus is usually self-limiting and its morbidity and mortality rate is relatively low ranging from 1 to 4 percent, but in pregnant women this rate increases to 20 percent (24). This disease like the hepatitis A demonstrates itself in acute form and does not change to chronic condition (25). Several researches have been conducted in Iran to examine the prevalence of hepatitis-E in different regions. The majorities of these projects have employed ELISA method based on instruction provided by the manufacturing kit company (DIA-PRO) (26, 27).

Considering the prevalence rate of 3 to 9 percent of hepatitis –E virus in various part of Iran (28) and the importance of this disease and its transmission method that usually occurs through the use of polluted water, it is necessary to determine the HEV condition in the region and provide more precise and accurate information such as the prevalence rate and associated factors with the its prevalence. Such results are important from the epidemiological perspective and also for the health authorities and health plan. The majorities of the researches conducted worldwide have examined the prevalence of serologic HEV in adults and less attention has been devoted to studying the young population, particularly the children; and the fact that the immunity in this part of the population is lower and they are more susceptible, this research was conducted to determine the prevalence of Serologic HEV in children and very young children in the city of Kashan, Iran in addition to examining the association of positive cases with the variables of age, sex and the number of family members.

Research methodology

This was a cross sectional population-based research including the population of children between the ages 1 to 15. The children were selected from the Shahid Beheshti hospital and five other health and treatment centers within the region. The consent for participation of the children in the research protocol was obtained from their parents. A researcher-designed questioner was used to record the demographic information such as age, sex and the number of family members. Three 3 ^{cc} of blood sample was collected from every participant to keep in the laboratory. The serum component was separated and kept at -20 degree centigrade till the testing time. Following the completion of the data, ELISA method was used with Dia-Pro Italy Kit to examine HEV (Anti-HEV, IgG). The cut-off level was set according to the instruction provided by the kit manufacturer.

The data were analyzed by using SPSS:PC version 17.0 Kolmogorov -Smirinov test showed that the data were normally distributed, therefore, parametric test were employed to test the mean differences. Independent t-test as well as Chi-squared test was used.

Results

A total of 558 children between the age 1 to 15 years were examined in this research. Overall, 212 children were between the ages of 1 to 5 years, 192 were between the ages 6 to 10 and 154 were between the ages 11 to 15 years, respectively. In addition, 235 of the children were boys (42%) and 323(58%) were girls. The family size was categorized as 4 or less (441 cases) and above 4 members (117 cases). The total number of cases whose test results was positive anti body HEV was 21. Table 1 presents the frequency of positive serologic according to the age category.

Table 1: frequency distribution of positive serologic HEV cases according to the age category

p-value	percent	Positive antibody	frequency	Age
0.02	1.4	3	212	1-5
	3.6	7	192	6-10
	7.1	11	154	11-15
	3.7	21	558	total

Table 1 show that the highest frequency of the positive HEV antibody is present in age group between 11 to 15 years. The result of chi squared test indicated that there was a significant difference among the proportion of the cases afflicted to positive HEV antibody (p=0.2).

The results of analysis indicated that 3.4 percent of boys and 4 percent of the girls had positive HEV antibody. The result of analysis showed that there was no significant association between the gender and affliction to hepatitis E (p=0.71). These results are presented in table 2.

Table 2: frequency distribution of positive serologic HEV cases according to gender

p-value	percent	Positive antibody	frequency	Sex
0.71	3.4	8	235	Boy
	4	13	323	Girl
	3.7	21	558	total

Finally, the results of analysis indicated that there was a significant association between the family size and affliction to hepatitis E (p=0.01). Larger family sizes were more afflicted to hepatitis E. These results are presented in table 3.

Table 2: frequency distribution of positive serologic HEV cases according to family size

p-value	percent	Positive antibody	frequency	Family size
0.01	2.7	12	441	=<4
	7.6	9	117	>4
	3.7	21	558	total

Discussion

According to the result of the present study, the prevalence of HEV infection in the study population was 3.7 percent. There was a positive association between the affliction to disease and family size, and age; as the family size and age increased so did the number of cases of diseases. However, there was no relationship between the sex and affliction to the disease. Comparing the results of this research with the results of other researchers conducted in Iran is limited in the sense that the majorities of the studies reported in this regard involve different populations. For instance, there are reports about the rate of infection among the blood donors (29-32), soldiers (33), pregnant women (34), HIV patients (35), chronic liver diseases (36), or hemodialysis patients (37, 38).

In these studies the prevalence rate of serologic HEV in Tehran was 7.3 to 7.8 percent (29, 32), in Tabriz 7.8 percent (30), in Khoramabad 7.8 percent (28), in Kermanshah 7.7 percent (39), in Ghom 15.5 percent (40). These researches included adult subjects; however, they reported that there was a significant association between the disease and age, where as they found no significant association between the disease and sex. These findings in regard to the gender and age are similar to what was found in the present research.

In some researches different results have been reported. For instance, in a study conducted in Khozestan province, 400 blood donors were examined and 46 cases of positive HEV cases were identified. The prevalence of disease in women was 5.7 percent whereas the prevalence of the disease in men was 14.6 percent. This difference was statistically significant, but the percent of cases above the age 35 (12.7%) compared to the age under 35 (10.9%) was not statistically significant (31). In another study conducted in the Khomeini Shahr and Mobarekeh, in the province of Isfahan, the prevalence of 13.3 and 10 percent were reported while no significant association between the gender and age with affliction to the disease was found (41). Shamsizadeh and associates (2007) studied the prevalence of the disease in the province of Khozestan by including the children between the ages of 6 to 15 years old and reported that 5.8 percent of the children were identified as positive while no significant association between the age, sex and the affliction rate was found (42). The findings of this study are not in agreement with the results of the present study in regard to the age variables, while the findings in regard to sex variable were similar. Saffar and associate studied the prevalence of affliction to HEV in Sari by including the population between the age 2 to 25 years. They reported a 2.3 percent prevalence of the disease in the entire population while the prevalence in the age group under 10 was 1.17 and between 10 to 25 years it was 7.27percent. The findings of this study was in agreement with the findings of the present study and showed that there was a significant association between the age and family size but not with the gender (43).

Other researchers have also conducted research about the prevalence of HEV in various countries. For instance, a research conducted in Mexico included 3549 individuals between the ages 1 to 29 years and reported that 374 cases (10.5 %) were HEV positive. The prevalence rate was 1,1 in less than 5 years old children, while the rate in individuals between the age 26 to 29 years was 14.2 percent. There was a positive significant association between the age and affliction rate; however, no significant relationship between the sex and disease was found (44). Similar study was conducted in England by including 2731 subjects between the ages 1 to 80 years and found that 355 cases were positive HEV (13%). The prevalence in the age group 50 years and over was 25 percent and the association between the age and affliction was significant (45). In another research reported in Magnolia, 717 individuals between the age from birth to 20 years were examined for Anti HEV, IgG and only 5 cases (0.7%) were identified as positive (46). In another study in the same country including 520 children 2 to 7 years old, a prevalence rate of 0.6 percent was reported (47). More studies including adult subjects have been reported in industrialized countries such as Italy (2.6%), Spain (2.5%), Germany (2 %) and Holand (0.4%) (28). Studies performed on blood donors in developed countries have reported the prevalence rate of 1.1 to 2.2 percent (28, 48, and 49). However, the prevalence rate from the countries such as Egypt (17.2%), Korea (11.2%) Turkey (3.8 %), Pakistan (17.5%) has been different (1, 28, 50, and 51). Different studies in Turkey have reported different rates of 2.1 to 12.8 percent in different areas of the country (52). The prevalence rate of 14.8% was reported in Kurd refugees from Iraq (53) in India and Turkey's research (54- 56) all have shown positive association between the positive cases and increase in age. Overall, the prevalence rate of the disease in the present study was similar to the results reported by other researches, that is, there was a lower rate of affliction in the younger children than the older age groups. Further studies particularly about determining the role of HEV in clinical hepatitis and the prevalence rate of HEV in high risk case in the region, as has been previously studied the frequency of HBV and HCV in high risk cases in the region(57) are needed.

Conclusion

The finding of this study and other studies indicate that HEV disease is endemic in Iran and appropriate health measures and health education are necessary to control the disease.

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