



# Epidemiology of hepatitis E virus in children in the province of Van, Turkey

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## Abstract

**Aim:** Hepatitis E virus is an etiological agent of hepatitis which is transmitted enterically and may lead to water-born outbreaks. Although it is mainly transmitted by the fecal-oral route, it is estimated that many cases are associated with zoonotic transmission in developing countries. In this study, we aimed to investigate the seroprevalence of hepatitis E in the childhood age group in the province of Van and to demonstrate the relationship between seroprevalence and demographic properties, residential house/region, water supply used at home, dealing with livestock and history of surgery.

**Material and Methods:** In this study, hepatitis E virus IgG antibody was studied by ELISA method in children aged between 2 months and 18 years between June 2014 and September 2014 in the province of Van.

**Results:** A total of 408 children and adolescents were enrolled in the study. Hepatitis E IgG was found to be positive in 4.2% of the subjects. 179 (43.8%) of the subjects were female and 229 (56.2%) were male. The mean age was 123 months±56.6 months (minimum 2 months, maximum 214 months). When the seropositivity rates were compared by age groups and gender, no difference was found. No correlation was found between hepatitis E seropositivity and the variables of residence, dealing with livestock and water resources. No correlation was found between anti-hepatitis E virus seropositivity and parental education level, number of cohabitants and history of surgery.

**Conclusion:** In our study, hepatitis E virus seropositivity was found to be lower compared to the mean seropositivity in Turkey. Hepatitis E infection does not constitute a serious problem in children in the province of Van in accordance with the results reported from different parts of our country. Livestock dealing and usage of well water are not considered risk factors for Hepatitis E infection. (Turk Pediatri Ars 2016; 51: 148-51)

**Keywords:** Adolescent, child, hepatitis E, Turkey, Van

## Introduction

Hepatitis E caused by hepatitis E virus (HEV) which is a member of the Hepeviridae family (its previous name was enteric-epidemic Non A Non B hepatitis) is frequently characterized by an acute, self-limiting hepatitis picture. Hepatitis E is endemic in Southeast and Middle Asia and is the most common cause of acute hepatitis in the Indian subcontinent, Egypt and China. Outbreaks have been reported in the Middle East, western and northern regions of Africa and North America (Mexico) (1, 2). In our country, outbreaks related with HEV are not observed, though sporadic cases have been reported. Although it is mainly transmitted by the oral-fecal route, it is presumed that many cases are associated with zoonotic transmission in developing countries (1, 2). There is no

study related with HEV seropositivity in the childhood age group reported previously from the province of Van. In this study it was aimed to investigate the seroprevalence of hepatitis E in the childhood age group in the province of Van where livestock is a significant source of income.

## Material and Methods

In this study, hepatitis E Ig G serology was studied in children aged between 0 and 18 years between June 2014 and September 2014. The subjects were selected randomly among the patients who presented to the outpatient clinics of Yüzüncü Yıl University School of Medicine. The sample size of the study was calculated by the n=formula which is used in cases where the population size is not known. Assuming the hepatitis

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E seropositivity rate to be 8% and the variance related with this rate to be about 2% according to the literature information, the effect size (d) was considered 0.2 according to 95% confidence coefficient (5% error). Accordingly, the sample size was calculated to be n=384. Ethics committee approval was obtained for the study (Yüzüncü Yıl University School of Medicine, Clinical Researches Ethics Committee Headship, Decision number: 15, Date: 14.05.2014). Written informed consent was obtained from the families of the participants. The sociodemographic properties of the children in the study group including age, gender, parental education level (primary school, high-school/university), area of residence (town center/county or village), type of house (detached house/apartment), water resource used in the house (city water/bore water/well water), household size, presence of livestock handling (small cattle or cattle farming) and history of surgery were interrogated. The subjects were divided into three different age groups as the preschool age group (0-5 years), primary school age group (6-13 years) and 14-18-year age group. HEV IgG antibody was studied using commercial ELISA kit (Dia Pro®) in sera obtained from the subjects. The results were analyzed using Statistical Package for the Social Sciences program (ver. 15.0; SPSS Inc.; Chicago, IL, USA). The mean and standard deviation (SD) values of the quantitative variables and number and group percentiles of the categorical variables were indicated. Chi-square test and Fisher test were used to compare the categorical variables.

## Results

The sample size was calculated as 384. With this objective, a total of 420 children and adolescents were included in the study considering the problems which might arise during the study. Twelve patients were excluded from the study, because their sera were insufficient. HEV IgG was studied in a total of 408 patients. One hundred seventy nine (43.8%) of the patients were female and 229 (56.2%) were male. The mean age was found to be 123 months $\pm$ 56.6 months (minimum 2 months, maximum 214 months). HEV IgG was found to be positive in 17 (4.2%) of the subjects. The HEV IgG positivity rates by age groups are shown in Table 1. No difference was found when the seropositivity rates were compared by age groups and gender. Hundred and eighty subjects (45.3%) were living in town centers and 223 subjects (54.7%) were living in counties or villages. There was no statistically significant difference between the two groups (Table 1). One hundred seven (26.2%) of the subjects using well

**Table 1. Examination of the risk factors in the study group**

	Number of patients	Number of HEV IgG positive patients	p
Age			0.656
0-5	113	5 (4.4)	
6-13	207	7 (3.4)	
14-18	88	5 (5.7)	
Gender			0.787
Female	179	8 (4.5)	
Male	229	9 (3.9)	
Place of residence			0.520
Village-county	223	8 (3.6)	
Town center	185	9 (4.9)	
Household size			0.057
$\leq 6$	220	13 (5.9)	
$\geq 7$	188	4 (2.1)	
Livestock handling			0.134
Yes	113	2 (1.8)	
No	295	15 (5.1)	
Positive history of surgery			0.551
Yes	8	0 (0)	
No	400	17 (0.04)	
Water source used in the household			0.862
City water	301	14 (4.7)	
Well water	107	4 (3.1)	
Maternal education level			0.587
Primary school or below	288	13 (4.5)	
High school or university	120	4 (3.3)	
Paternal education level			0.274
Primary school or below	197	6 (3)	
High school or university	211	11 (5.2)	

water or bore water and 301 (73.8%) subjects were using city water. No statistically significant difference was found between the two groups in terms of HEV seropositivity (Table 1). The relationship of anti-HEV seropositivity with parental education level, household size and history of surgery is shown in Table 1.

## Discussion

Hepatitis E virus is a hepatitis agent which is transmitted by the enteric route and which may especially lead to waterborne outbreaks (1). The prevalence of

HEV infection has been reported to be 7.2%-24.5% in developing countries and 0%-3% in developed countries (3). In a meta-analysis which evaluated the studies related with HEV sero-epidemiology reported from our country, HEV positivity was found to be 8.03% in 4446 adults (4). In our country, the HEV seropositivity was found to be 3% in a study conducted in Istanbul which involved pediatric cases, 2.4% in adults in Edirne, 3.4% in a study which involved children and adults in Ankara, 4.5% in Trabzon, 6.4% in Aydın, 10.4% in Adana, 11.7% in Diyarbakır and 20% in Gaziantep (6-9). The HEV seropositivity was reported to be 4.3% in a study which involved 91 healthcare workers in the province of Van (10). In our study, the HEV seropositivity was found to be lower compared to the mean of Turkey.

In the literature, there are different reports related with the relationship of hepatitis E virus seropositivity with age. It has been reported that HEV seropositivity increases as the age advances similar to hepatitis A virus (3, 11). In a study conducted in Spain in which 1249 samples obtained from children aged between 6 and 15 years were studied, it was reported that HEV seropositivity showed a slight reduction as the age advanced (12). In a study conducted in our country which involved school age children, the seropositivity rate was found to be 12.4%. In this study, the HEV seropositivity was found to be higher in children aged seven years compared to children aged 14 years (13). In a study conducted in the province of Antalya in our country, HEV antibody was not found in any child in preschool children, whereas the prevalence of anti-HEV IgG was found to be 1.6% in school age children (14). In another study conducted in our country, the HEV seropositivity was found to be 0% in children aged between 0 and 5 years and it was reported that the seropositivity rate increased as the age advanced (6). In our study group, no difference was found between the age groups. The HEV seropositivity was found to be 4.4% in the preschool age group; the ages of our youngest patients were two months and three months and HEV IgG antibody was negative in both patients. This suggested that their mothers were HEV seronegative. In a large, multi-center study reported from our country, the HEV seropositivity was found to be higher in adult ages compared to children and adolescents. The authors associated this with the fact that seropositive adults were infected with HEV in the past and with the reduction in the possibility of the adolescents to be exposed to HEV virus as a result of improved hygienic conditions in our country (7). Again, in an

other study conducted in our country, it was reported that the HEV seroprevalance increased in adult ages (9). Since our study involved the childhood age group, no prediction related with adult prevalence in the province of Van could be made.

Since hepatitis E is generally transmitted by the fecal-oral route like hepatitis A, water resource is a significant factor in HEV transmission. In a study in which farmers who used unrefined waste water as irrigation water in Diyarbakır and the control group were compared, the HEV seropositivity was found to be 34% in the farmers who used waste water for irrigation and 4.4% in the control group; the difference was markedly different (15). In a study conducted in our country which involved pediatric patients from the province of Konya, the prevalence of anti-HEV was reported to be 5.7% and the HEV seropositivity was found to be markedly increased in conditions where the water source was outside the house compared to the conditions where the water source was inside the house (16). In the province of Van, water obtained by drilling in gardens is used frequently. In our study group, this kind of water was being used in one fourth of the cases. However, no difference was found in HEV seropositivity by the water resource used in the house in our study. In the literature, it has been reported that the HEV seroprevalance is higher in individuals who live in the rural areas and who do not use city water (11). In a study conducted in Konya in our country, the HEV seroprevalance was found to be higher in individuals who lived in the rural areas compared to the ones who lived in the urban area (16). In two different studies conducted in Denizli and Aydın, no difference was found in seroprevalances in the study group between rural and urban areas (13, 17). In our study, no difference was found between the subjects who lived in villages/counties and the ones who lived in city centers.

It has been reported that Hepatitis E infection is a zoonotic disease at the same time. Consumption of raw and undercooked meat is a potential risk factor for zoonotic transmission of HEV. Hepatitis E RNA has been demonstrated in stool of domestic pigs and anti-HEV antibodies have been demonstrated in sera of pigs, sheep, cattle and rodents (2, 18). In a study conducted in China, it was reported that the HEV seroprevalance was markedly increased in children with a history of frequent contact with pigs (11). In a study conducted in the province of Edirne, the rate of handling with livestock (sheep, goats, cows, etc.) was reported to be markedly high in individuals

with HEV seropositivity (3). In our study, the rate of raising livestock was high, but the seropositivity was found to be low in the subjects who raised livestock.

In a study which investigated the HEV seropositivity in pregnant women, the HEV seropositivity was found to be markedly high in the subjects who had an education level of primary school and below (17). In another study, the frequency of hepatitis E was found to be markedly high in the subjects who had an education level of primary school and below and the authors thought that this was related with the fact that compatibility with hygienic rules decreases as the level of education decreases (7). However, the literature also contains some studies which have not found a correlation between the education level and HEV seroprevalance (9). Similarly, no correlation was found between the parental education level and HEV seropositivity in our study.

In conclusion, hepatitis E infection does not constitute a significant problem in children in the province of Van which is compatible with the results reported from different areas of our country. Raising livestock and using drilling water are not considered risk factors in terms of HEV infection.

**Ethics Committee Approval:** Ethics committee approval for this study was received from the Clinical Research Ethics Board of Yüzüncü Yıl University School of Medicine.

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

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