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RESEARCH ARTICLE

Seroprevalence of Hepatitis E Virus Infection Among Pregnant Women in Ilam, West of Iran

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Abstract: ***Introduction*:** Hepatitis E infection is commonly known as acute and self-limiting hepatitis, and therefore, less attention is paid to it, whereas hepatitis E virus is a major cause of fulminant hepatitis in pregnant women and its infection during pregnancy is associated with maternal and fetal mortality. The prevalence of anti-HEV antibodies in pregnant women in Ilam city is unknown. The aim of the present study was to investigate the prevalence of anti-HEV total and anti-HEV IgM antibodies among pregnant women in this area.

***Material and methods*:** A total of 420 serum samples were collected between March 2018 and September 2019 from pregnant women, with a mean age of 29.61 years, ranging from 19 to 47 years, referred to Ilam health centers, west of Iran. Demographic data, including age and place of residence, were collected from patient records. The titers of anti-HEV total and anti-HEV IgM antibodies were measured by the ELISA method. The association between the prevalence of hepatitis E antibody and age and place of residence variables was evaluated by the chi-square test. Statistical analysis was performed using SPSS version 20.

***Results*:** In total, 18 of the 420 participants (4.3%) were positive for anti-HEV total, while 2 (0/47%) tested positive for anti-HEV immunoglobulins M (IgM). Anti-HEV status had no statistically significant association with age and place of residence.

***Conclusion*:** The seroprevalence rate of HEV infection among pregnant women in Ilam city is relatively low. Considering that seronegative pregnant women are at risk of acquiring HEV, it is recommended that pregnant women be educated to avoid sources of HEV infection.

ARTICLE HISTORY

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1. INTRODUCTION

Hepatitis E virus is one of the global health problems. It has been reported to infect 20.1 million people annually, resulting in 3.4 million symptomatic cases, 70000 deaths due to acute liver failure, and 3000 stillbirths [1, 2]. The mortality rate of this virus has been reported in less than 2% of the general population, and in about 10% to 30% of pregnant women, particularly during the third trimester [3]. Hepatitis E virus is a single-stranded RNA virus, a member of the genus Orthohepevirus in the family of Hepeviridae. The virions are non-enveloped, spherical particles with a diameter of approximately 27–34 nm [4]. HEV has 7 genotypes, Genotypes 1 and 2 are only observed in humans. These genotypes are now circulating in Asia, Latin America and Africa, and are responsible for epidemics originating from contaminated waters. Genotypes 3 and 4 infect both humans and animals and cause the most sporadic infections in developed countries [2, 3, 5]. HEV is known as the cause of acute and self-limiting hepatitis, however, it can become chronic in immunocompromised individuals and is associated with fulminant hepatitis in pregnant women as well as has a lethal consequence for the fetus. In addition to the aforementioned, extrahepatic manifestations, such as neurological disorders and renal damage, have also been reported. Among different groups, immunocompromised individuals and pregnant women are at risk for acquiring this infection [5, 6]. Our attitude over the past decade has changed on the epidemiology of hepatitis E infection. It was previously thought that the virus is limited to developing countries, but it has now been recognized that it has a high prevalence in high-income countries as zoonotic infection [5]. HEV is determined as one of the food/waterborne viruses and it is mainly transmitted by the fecal-oral route. In addition to zoonotic transmission, it is infrequently transmitted between humans through blood, blood products, and tissue transplantation. Vertical transmission from mother to child has also been proven [7, 8]. Given its previous outbreaks and epidemics, its control is very im-

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portant in developing countries and especially in poor hygiene areas. In order to control the infection, it is first necessary to determine the prevalence of the virus in different regions, then appropriate strategies for control and prevention are adopted. Iran is endemic to hepatitis E infection, but limited studies have been performed on the epidemiology of this infection, especially in pregnant women. Ilam is the capital of Ilam province and is located on Iran's western border with Iraq. In recent years, a large population has been traveling between the two regions, as Iraq is also endemic to hepatitis E infection [9]. Therefore, it is important to determine the hepatitis E infection status in this city, especially in high-risk groups.

2. METHODS

2.1. Study Population and Sample Collection

This study was conducted in Ilam city in western Iran. A total of 420 pregnant women referred to healthcare centers in Ilam were enrolled in this study. A random sampling technique was used. These women were in the age range of 19-46 years old (mean age: 29.61). Serum samples were collected between March 2018 and September 2019 and stored in a freezer at -20°C until the experimental process. For each sample, demographic data such as age and place of residence were recorded.

2.2. Detection of Antibody against HEV

All serum samples were tested for the presence of anti-HEV total and anti-HEV IgM antibodies with ELISA kits (HEV Ab Ultra, HEV IgM, Dia. Pro Diagnostic BioProbes Srl, and Italy). In these kits, an antibody produced against the four strains of HEV was measured according to the instructions protocol using HEV-specific recombinant antigens, which includes conservative regions of the four virus strains. All tests were performed according to the kit instructions. Samples with a value less than and more than the cut-off value were considered as negative and positive samples, respectively.

2.3. Statistical Analysis

The association between seroprevalence rate of the anti-HEV total antibody with age and place of residence was investigated by chi-square test. P-value less than .05 was considered statistically significant. All tests were analyzed using SPSS version 20.

3. RESULTS

Out of 420 pregnant women (368 urban and 52 rural), anti-HEV total antibodies were positive in 18 (4.3%), while anti-HEV IgM antibodies were detected only in 2 subjects (0/47%). The mean age of pregnant women was 29.61 years with a range of 19-46 years.

The participants were classified into four age groups: <25, 25–30, 31–36, and over 36 years. There was no statistically significant association between the seroprevalence of the HEV and the age and place of residence of the participants. In addition, no significant difference was observed among age groups.

4. DISCUSSION

Although most cases of hepatitis E infection are limited to asymptomatic cases or acute hepatitis, the virus can have severe consequences during pregnancy. In some pregnant women, it results in fulminant hepatitis, which is associated with high mortality. In some studies, fetal outcomes such as low birth weight, miscarriage, premature birth, and jaundice have also been reported [7]. In recent years, numerous extrahepatic manifestations, such as Guillain-Barre syndrome, meningitis, myocarditis, glomerulonephritis, and cryoglobulinemia, have been reported as consequences of hepatitis E infection [10, 11].

Since hepatitis E viremia duration is very short and there is little chance of detecting virus RNA in the blood, seroepidemiological studies of this infection are of particular importance [12].

Although pregnant women are at high risk for hepatitis E infection, few studies have been conducted in Iran, and seroprevalence in many parts of Iran is still unclear. In recent years, a review article has reported HEV seroprevalence in Iranian pregnant women between 3.6% and 7.4% [13]. In another meta-analysis study, the prevalence of hepatitis E among all populations in Iran was reported to be 10% on average. The overall prevalence of hepatitis in Iran in different populations has been decreasing in recent years, however, this pattern is not the same in all parts of the country [9], which seems to be related to improved health conditions and adequate water supply.

The results of our study showed that the seroprevalence HEV infection among pregnant women was 4.3%, which is higher than the results of studies in the northwest of Iran, Urmia, (3.6%) [14], Tabriz (3.1%) [15] but lower than the results of similar studies in Gorgan, (7.4%) [16] and Hamedan (7.4%) [17].

The seroprevalence rate of HEV infection obtained in our study in western Iran was higher than the results of similar studies in Spain (3.6%) [18] but lower than Egypt (84.3%) [19], India (33.67), and Ethiopia (31.6%) [20]. These variations are related to factors such as the level of hygiene, the water source, the sewage disposal system, the amount of contact with animals, consumption of uncooked or undercooked meat, number of immigrants from endemic areas, and different sensitivity of the ELISA kits used.

The anti□HEV IgM antibody with a prevalence of 0/47% was found in this study, indicating a very low prevalence of the HEV and is similar to the previous studies in Iran (0.83%) [21], Ethiopia (/5%) [20], and Spain (0.67%) [18].

Most studies show that the prevalence of hepatitis E increases with age due to increased cumulative exposure [16, 20]. Our findings indicate that there is no significant association between the prevalence of HEV and age, which is consistent with some studies [14, 22].

Our data showed no significant relationship between the seroprevalence of HEV infection and the place of residence, as mentioned in other reports [16, 22]. One possible reason for these results is that villages under study are located near the city of Ilam and are similar to the Ilam city in terms of drinking water supply, sewage disposal system, and sanitation level.

CONCLUSION

The seroprevalence of HEV infection among pregnant women in Ilam city is relatively low. As a result, the number of at-risk seronegative women is high, and if they become infected during pregnancy, it may lead to maternal and fetal morbidity/mortality. It is recommended that pregnant women be educated to avoid sources of infection.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by Ilam University of medical sciences (approval no. ir.medilam.rec.1398.007)

HUMAN AND ANIMAL RIGHTS

The reported experiments on human subjects were performed in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2013 (http://ethics.iit.edu/ecodes/node/3931).

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

Not applicable.

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CONFLICT OF INTEREST

The authors have no conflicts of interest, financial or otherwise.

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