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RESEARCH ARTICLE

Risk Factors Related to Seroprevalence of Virus Hepatitis E During Pregnancy

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ABSTRACT

Background: The hepatitis E virus the main as result of the severe course of viral hepatitis in worldwide acute hepatitis. Pregnant women are more vulnerable to infection because their mortality rate might exceed 25%. It is unknown how common the hepatitis E virus is among expectant mothers in MOSUL.

Aims: In this study, a group of pregnant women in MOSUL City were examined to determine the seroprevalence of infection with the Hepatitis E Virus.

Methods: 350 expecting mothers from MOSUL were enrolled in the study overall. Sera was tested to determine the presence of IgG antibodies against the hepatitis E virus using the ELISA technique. The women's sociodemographic information was acquired, along with information on their virus hepatitis E risk factors (interaction with animals, blood transfusions, and drinking water sources).

Results: Hepatitis E virus positivity was found in just one lady, yielding a prevalence of 0.28%. She reported not having been had good living conditions and were not being exposed to any hepatitis E virus infection risk factors, a high socioeconomic status, and a high level of education. The majority of the ladies (67.9%) were from middle-class or upper-class families; 36.6% had a college degree; and 50.4% drank bottled water. Only a small percentage were exposed to risk factors for hepatitis E virus infection: 2.9% had received blood transfusions, and 11.4% had direct contact with animals.

Conclusion: Hepatitis E virus infection was incredibly rare in the sample (0.28%). More epidemiological studies in various population groups are required to determine the MOSUL's overall hepatitis E virus prevalence.

INTRODUCTION

Infection caused by the virus hepatitis E was uncommon in the sample (0.28%). To ascertain the nationwide predominance of the hepatitis E virus MOSUL, more epidemiological research in other population groups are needed.¹ The hepatitis E virus was initially identified in 1978 during an outbreak in

the northern Indian region of Kashmir valley when 52,000 instances of the disease led to 17,000 fatalities.²

A single-stranded RNA virus called hepatitis E has four genotypes, of which only genotypes 1 and 2 infect people can cause endemic HEV or epidemics in nations with subpar sanitization practices. Humans, pigs, and other animals can

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contract the disease from genotypes 3 and 4, which can cause sporadic infection in both developed and developing nations.³ Globally, there are different HEV genotype distributions, with genotype 1 being more prevalent. Genotype 2 is more common in sub-Saharan Africa and Mexico, while genotype 1 is more common in Southeast Asia, Africa, and Latin America. Both populations with and without medical vulnerabilities can contract genotypes 3 and 4, which are primarily found in sporadic cases in wealthy nations.^{4,5}

The family Hepeviridae includes the genus *Hepevirus*, which includes the hepatitis E virus. There is just one serotype of the hepatitis E virus. Furthermore, there are four primary genotypes (HEV1, HEV2, HEV3, and HEV4).^{6,7} These four genotypes can infect people but exhibit various epidemiological patterns depending on where they are found.⁸ Numerous sporadic cases and outbreaks of HEV1, HEV2. They are connected to waterborne spread and fecal-oral transmission and happen in impoverished countries. HEV3 and HEV4 are viruses common in numerous animal reservoirs, are transmitted to humans through foodborne zoonotic pathways, and occasionally cause cases of escalating importance.⁸⁻¹⁰

Hepatitis E infection risk factors include contaminated water sources, poor hygiene, crowded living circumstances, being a teenager and having a lot of interaction with animals, especially pigs. Acute liver failure or chronic liver disease, despite the fact that it normally causes a severe, self-limiting sickness.^{11,12} Pregnant women with hepatitis E infection run the risk of developing a serious illness characterized by recurring fulminant hepatitis episodes.^{13,14} a high death rate that is 10 times higher than that of men or women who aren't pregnant.¹⁵ Only one study on blood donors in MOSUL looked into anti-hepatitis E virus IgG antibody prevalence, and the findings revealed 4% positivity.¹⁶

However, no research has ever been done on the prevalence among pregnant Iraqi women. Our study aimed to determine the prevalence of infection with the hepatitis E virus in pregnant women living in the MOSUL governorate's capital city.

Data Gathering

Known risk factors for hepatitis E virus infection (drinking water source, blood transfusion, sociodemographic, and contact with animals), as well as pregnancy stage and sociodemographic data (age, education level, and income level), were collected from the women using a questionnaire.

Serological tests

The venous was used to collect three milliliters (3 mL) of venous blood into a tube that triggers clotting. Sera were right away separated and maintained at -20°C until testing. Following the manufacturer's instructions, anti-hepatitis E virus IgG antibodies were examined using an ELISA kit (Euroimmun, Lübeck, Germany). The company claims that this assay's sensitivity and specificity are 100%.

Data analysis

The data was analyzed using, application called GraphPad Prism 6. For quantifiable information, the standard deviation

(SD) and mean are shown; for data classification, the frequencies are shown.

RESULTS

For the study total 350 expectant mothers participants were there. The age range of the participants was 15 to 43 years, with a mean age of 28.33 (SD 5.82) years. None of the subjects displayed any clinical symptoms of infection with the hepatitis E virus at the time samples were taken. Only one person (0.28%) had IgG antibodies against the hepatitis E virus. She claimed not to have been exposed to any of the dangers of contracting the hepatitis E virus, and she had respectable living conditions, a good social standing, and a good education.

Two-thirds (50.4%) of the women in the research drank bottled water, and the majority had incomes of medium (36%) or high (31.8%); approximately half (36.6%) had a university degree. Only a tiny minority had direct animal contact (11.4%) or had received blood transfusions (2.9%), two risk factors for hepatitis E virus infection.

DISCUSSION

We believe that this is the first study to evaluate anti-hepatitis E virus IgG antibody seroprevalence in Mosul pregnant women. Hepatitis E virus prevalence was extremely low, according to our findings (0.22%). The prevalence at issue in (Tables 1 and 2) was the lowest. These findings might point to the virus's restricted ability to circulate among pregnant Iraqi women.

The hepatitis E virus has been detected in a number of Eastern Mediterranean countries, including Egypt, Saudi Arabia, Tunisia, and the United Arab Emirates.¹⁷ Numerous studies have been conducted in these nations on a variety of populations, including hemodialysis patients, hepatitis patients, pregnant women, blood donors, and pregnant women. On the other hand, epidemiological information on the spread of the hepatitis E virus and the illness it produces in MOSUL is limited to a single seroprevalence study that was carried out based on 100 blood donors in 2019 and showed a low frequency (4% positive).¹⁶

Other studies have shown similar results, showing that infection with the hepatitis E virus in pregnant women is infrequent (0.4% in El Paso, Texas).⁽¹⁸⁾ Rio de Janeiro, Brazil, 1%¹⁹, 1.6% in Mexico's Ciudad Juarez¹⁸ and 1.6% in Venezuela's capital, Caracas.²⁰ Importantly, even in endemic regions with probable outbreaks of hepatitis E virus infection, a very low-frequency viral hepatitis E (3.6%) was found in ladies who are pregnant.²¹ In MOSUL, there have been. There have been no outbreaks of the hepatitis E virus, and the disease is not believed to be endemic there. Our results are in contrast to past studies that examined pregnant women and discovered a significant prevalence of the hepatitis E virus: Egypt's Dakahlya Governorate, 58.6%²¹ in Rajasthan, India, it is 28.8%.²² Given the enormous epidemiological variation that exists even within one nation, such differences in the incidence of Pregnant woman with hepatitis E between countries aren't surprising. For instance, a study of pregnant women in France

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Table 1: The characteristics of the sample of expectant mothers in Tripoli, Mosul, and the dangers of hepatitis E infection

Variable	No. (n=350)	%
Age range (in years)		
≤ 25	122.9	35.1
26–34	164.9	47.1
≥ 35	62.2	17.8
Pregnancy trimester		
First	86.3	24.7
Second	112.8	32.2
Third	150.9	43.1
Level of Educational		
Illiterate	7	2
Elementary school	31.9	9.1
Center school	83.2	23.8
Secondary education	63	18
University	164.9	47.1
Income level		
Low	44.3	12.7
Medium	162.6	46.4
High	143.1	40.9
Contact with animals		
Yes	51.3	14.7
No	298.7	85.3
Blood transfusion		
Yes	13.2	3.8
No	336.8	96.2
Drinking water source		
Bottled water	227.1	64.9
Tap water	86.3	24.7
Spring and well water	36.6	10.4

discovered that the prevalence of seroprevalence of the virus Hepatitis E was higher in the southern part of the nation (29.3%) than in the northern part of the country (3.6%).²³ Sociodemographic and sanitary disparities might contribute

to changes in the prevalence of the hepatitis E virus in various regions and nations.

Virus hepatitis E prevalence in our research of expectant mothers was significantly lower (0.22%) than that among MOSUL blood donors (4%).¹⁶ The provision and widespread use of filtered and bottled water as well as the organization of successful food safety campaigns, may effectively reduce fecal-oral transmission and waterborne transfer of the hepatitis E virus, which are the primary means of transmission in underdeveloped countries. The public health measures targeted at lowering Infections with the hepatitis E virus and the resulting mortality and morbidity depend on these developments.

Maintaining and developing basic hygiene and sanitation practices is necessary to maintain the low prevalence rate of hepatitis E. But because of the violence in their homeland, millions of Syrians have emigrated to nearby countries, notably MOSUL, which is currently housing 1.5 million Syrian refugees. Large-scale epidemics of the hepatitis E virus have been reported in such groups, including in Darfur, Sudan, because of their unfavorable living conditions, which puts displaced populations and refugees at an increased risk of contracting the virus.²⁴ These recent events necessitate more vigilance and thorough epidemiological monitoring of the vulnerable refugee community if MOSUL is to preserve its low hepatitis E virus prevalence.

It is crucial to note that there is significant diversity in the results of the several. There are serological assays available for detecting the hepatitis E virus.²⁵⁻²⁹ In fact, employing several serological assays, the same individuals from the same geographic areas were shown to have significantly different IgG seroprevalence levels (3.6 and 16.2% among UK blood donors, respectively, and 10.9 and 31.3% in French kidney and liver transplant patients).^{27,29} We only used one commercially available assay to test serum. Our results may not adequately reflect the prevalence of IgG antibodies against the Hepatitis E virus among the pregnant ladies in our community sample as a result. Alanine aminotransferase and aspartate aminotransferase levels in the serum, which are important signs of a recent acute hepatitis E virus infection, were also

Table 2: Seroprevalence of hepatitis E virus defense in Mediterranean countries' pregnant women

Country	Sample size	Positive	Kit manufacturer	Year (reference)
Turkey	245	o (IgM); 12.6 (IgG)	Germany's Virotech GmbH	2004 (15)
	386	7(IgG)	Italy's Globe Diagnostics	2006 (16)
Spain	424	0.94 (IgG)	United States of America, Abbott Diagnostics	2004 (17)
	1517	o(IgM); 5.45 (IgG)	Spain, Biokit	2010 (18)
	1040	0.67 (IgM) 3.6 (IgG)	Italy DiaPro Diagnostic Bioprobes	2010 (19)
Egypt	2428	84.3	Internal enzyme immunoassay	2006 (20)
	116	58.6 (IgG)	Singapore-based Genelabs Diagnostics	2011 (21)
France	315	o (IgM); 7.74 (IgG)	China, Wantai	2014 (22)
	263	(IgG and IgM) 5.6	United States of America, Abbott Laboratories	1993 (23)
Tunisia	404	o (IgM); 12.1 (IgG)	Globe Diagnostics SRL is based in Italy.	2011 (24)

not checked.^{14,30} As a result, it's probable that we overlooked instances of persistent infection with the acute hepatitis E virus that are subclinical and silent.

Because our study only included pregnant women from four medical institutions in MOSUL, its findings might not correctly show the prevalence of the virus hepatitis E throughout the governorate of the North, often known as the entire nation. Additionally, not all expecting mothers in MOSUL are insured by the healthcare system; as a result, we might have ignored impoverished women who are normally more susceptible to contracting the hepatitis E virus but who rarely or never seek antenatal treatment. A larger population sample in future studies might be more useful.

Our results suggest that the hepatitis E virus does not necessarily need to be present in routine prenatal screening programs. To determine the frequency and epidemiology of hepatitis E virus infection in MOSUL city among pregnant women and other people in various regions of the country, more research is necessary.

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