

Seroprevalence of Hepatitis E Virus among Blood Donors in Omdurman Locality, Sudan

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Abstract

Background: Hepatitis E virus (HEV) is significant international public health problem and is estimated that 2.3 billion people are infected globally. Blood-borne transmission of HEV had been investigated as indirect evidence implicating HEV as a potential transfusion risk by many investigators worldwide.

Objective: This study was carried out to determine the seroprevalence of HEV among blood donors who attended blood bank of Omdurman Teaching Hospital.

Methods: A cross-sectional study was carried out among 90 blood donors attended blood bank of Omdurman Teaching Hospital during the period from April to July (2014). Serum samples from blood donors were tested for IgG anti-HEV antibody using a specific enzyme linked immunoassay (ELISA) kit. Structured questionnaire was used to gather socio-demographic data.

Results: The prevalence of HEV infection was found to be 26.7% (24/90) and increased significantly with age.

Conclusion: These findings demonstrate the high prevalence rate of anti-HEV among blood donors, this will raise the potential risk of HEV infection by blood transfusion so that screening of HEV among blood donors before transfusion is very important. Further studies are warranted to determine the true seroprevalence of the virus in the society at large.

Keywords: Anti-HEV IgG, ELISA, Hepatitis E virus, Blood donors, Sudan

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Introduction

Hepatitis E virus is probably the most common cause of acute hepatitis and jaundice in the world ^[1]. HEV is a spherical, non-enveloped, single-stranded RNA virus that belongs to the new genus, *Hepevirus* ^[2]. In developing countries, hepatitis E occurs both sporadically and as epidemic disease, affects a large proportion of the population, and is largely due to genotype 1 (with genotype 2 accounting for cases in Mexico and parts of Africa) ^[1,3]. HEV can be transmitted by blood transfusion and has recently been found in donated blood in a number of countries and the increased HEV incidence raises concern about the safety of blood and blood products ^[4]. Several case reports from Europe and Japan have documented clinical hepatitis in patients after being transfused with blood products from an HEV infected donors ^[5,6]. Patients who are immunosuppressed (such as solid organ transplant recipients, patients treated for malignancies or those infected with HIV) which commonly receive blood transfusions, these patients are at risk of fulminant hepatitis or chronic rapidly progressive liver disease from an HEV infection ^[7].

This work was carried out to determine the seroprevalence of HEV among blood donors who attended blood bank of Omdurman Teaching Hospital.

Methods

The current descriptive, cross-sectional study carried out between April to July 2014. Ninety blood donors attended blood bank of Omdurman Teaching Hospital, Sudan were recruited in this study. This study was approved by Sudan University of Science and Technology ethical committee board and verbal consent was obtained from each blood donor. The blood specimens were collected by venipuncture in sterile plain containers for serological analyses. Samples were centrifuged and sera were separated immediately. Sera were stored at -20° C till processed and then tested for the presence of anti-HEV IgG antibody by enzyme-linked immunosorbent assay (ELISA) (Biokit, Barcelona, Spain). The presence of anti-HEV IgG antibody was considered as the evidence for prior exposure to HEV.

Statistics

Data were entered in the computer using SPSS and doubled checked before analysis. Significance of difference was determined using chi-square test. Statistical significance was set at P values < 0.05 .

Results

Frequency of HEV IgG among blood donors

Out of the 90 blood donors tested, 24 subjects (26.7%) were HEV IgG positive, while 66 subjects (73.3%) were negative for HEV IgG (Figure 1).

Influence of age on HEV IgG seropositivity among blood donors

The age range of the donors was from 22 to 50 years, with a mean age of 31 years, subjects were divided into two age groups (≤ 31 years and > 31 years) in order to evaluate the effect of age on HEV seropositivity, there was significant difference ($P < 0.05$) between the two age groups on HEV IgG seropositivity (Table 1).

Influence of residence on HEV IgG seropositivity among blood donors

The results presented in table 2 demonstrate that there was no significant difference ($P > 0.05$) between the residence and HEV IgG seropositivity.

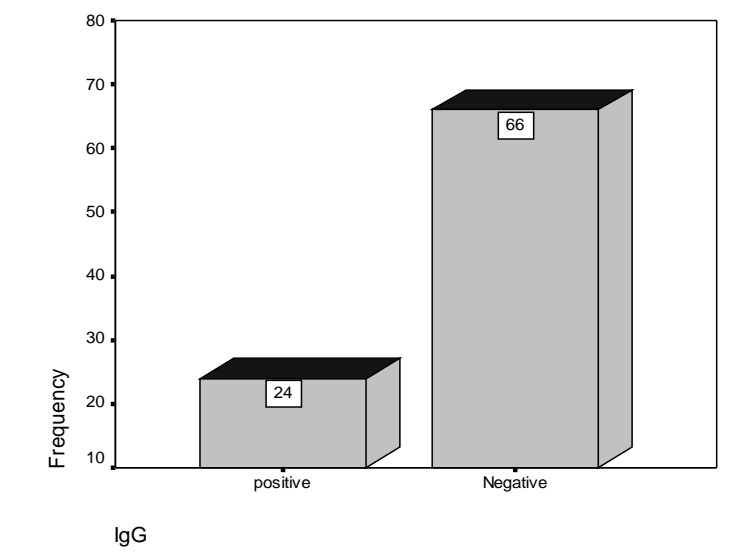


Fig. 1. Frequency of HEV IgG among blood donors.

Table 1: Influence of age on HEV IgG seropositivity among the blood donors

Serological marker (Anti-HEV antibody)		Age groups (Years)			
		≤ 31 years		> 31 years	
		NO	%	NO	%
Anti HEV IgG	Positive	9	10.0	15	16.7
	Negative	40	44.4	26	28.9

Table 2: Influence of residence on HEV IgG seropositivity among the blood donors

Serological marker (Anti-HEV antibody)		Residence			
		Urban		Rural	
		NO	%	NO	%
Anti HEV IgG	Positive	16	17.8	8	8.9
	Negative	53	58.9	13	14.4

Discussion

The overall prevalence of anti-HEV IgG antibody among our blood donors was 26.7%, which is more than those reported by Johargy *et al* (2013) in Makkah, Saudi Arabia (18.7%)^[8], Mansuy *et al* (2011) in South West France (16.6%)^[9], Assarehzadegan *et al* (2008) in Khuzestan Province, Southwest Iran (11.5%)^[10], Taremi *et al* (2007) in Tabriz, Islamic Republic of Iran (7.8%)^[11]. Also our anti-HEV IgG rate was higher to that reported in Northern France (3.2%)^[12], in Brazil (2.3%)^[13]. Also higher than recent studies which have revealed seroprevalence rates of 13.5%, 16.6% and 20.6% among blood donors in England, France and Denmark, respectively^[14].

Seroprevalence in Sudan was lower than countries of the Eastern Mediterranean Region where reports of up to 52% seroprevalence for anti-HEV have been reported^[15].

The low or high rates observed by different investigators can be explained by varying epidemiologic condition in different geographical area and difference in diagnostic techniques between studies. This study was not able to assess the sex association of anti-HEV due to low flow of female donors, therefore all subjects were male.

In the current study, seroprevalence of anti-HEV IgG increased with age, from 10% in subjects less than or equal 31 years to 16.7% in those more than 31 years, that was similar with Johargy *et al* (2013)^[8], Kaufmann *et al* (2011)^[14], Taremi *et al* (2007)^[11] which stated that older donors tended to have higher HEV seroprevalence rates. Other studies have found older age to be a risk factor for anti-HEV positivity^[16,17], it is probable that this represents cumulative exposure over time.

In terms of area of residence, 17.8% of the donors who lived in the urban area were positive for IgG antibody to HEV, while 8.9% were positive who lived in rural area ($P = 0.17$). This similar to Bortoliero *et al* (2006)^[13] but disagree with Mansuy *et al* (2011) in South West France^[9] which stated that the prevalence rate was more in rural as compared to that in the urban subjects. These results indicate that the populations with higher density may be at greater risk of hepatitis E.

Conclusion

This study demonstrates the high prevalence rate of HEV seropositivity among male blood donors at Omdurman Teaching Hospital, this will raise the potential risk of HEV infection by

blood transfusion and may be source of outbreak. This underlines the importance of evaluating HEV screening for blood donors to avoid the transmission of HEV to the patients. An extended study on these populations with a detailed questionnaire may contribute to the identification of risk factors associated with HEV infection. Further studies are warranted to determine the true seroprevalence of the virus in the society at large.

Ethics

This study was approved by Sudan Medical specialization Ethics Review Board, Sudan.

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