



# Seroprevalence of Hepatitis E IgG Antibodies Among Voluntary Blood Donors in a Tertiary Hospital

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## ABSTRACT

**Background:** Transfusion safety is a major concern in medical practice. Hepatitis E is a potential threat among transfusion-transmitted infections. In resource poor settings and in endemic countries, parenteral transmission can occur at an increased rate and leads to subclinical infection. Currently Hepatitis E virus screening is not mandatory in many countries. This can possibly endanger the population.

**Materials and Methods:** We aimed at estimating the seroprevalence of HEV antibodies (IgG) among healthy blood donors in Chennai, South India. A prospective study was conducted among 142 blood donors from January 2016 to November 2016 in a tertiary care teaching hospital. Serum anti HEV IgG antibody was detected by Enzyme Linked Immuno Sorbent Assay (ELISA).

**Results:** Out of 142 samples, 19/142 (13.38%) showed positivity for IgG antibodies for HEV.

**Conclusion:** This study showed the importance of screening for HEV, as there is increased rate of positivity among the blood donors in our study population.

**Keywords:** Hepatitis E, Parenteral Transmission, Blood Transfusion, Maternal Mortality, HEV IgG

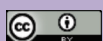
## Introduction

Hepatitis E is an enterically transmitted infectious virus, which causes acute self-limiting hepatitis.<sup>[1]</sup> Initially it was considered as only water borne outbreak infection, now it has been proven that there are other modes of transmissions like zoonotic transmission, person-to-person transmission and through blood transfusion.<sup>[1]</sup> Transfusion transmitted infections (TTI) are one among the major risks during blood transfusion.<sup>[2]</sup> Among them, most commonly screened infections during blood and blood products transfusion in health care centers are as follows: Human immunodeficiency virus (HIV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), syphilis and malaria. Other least common infections screened are Toxoplasmosis, Leishmaniasis and Hepatitis E virus (HEV).<sup>[3]</sup> Developed countries have a constant vigilance in the estimation of prevalence of transfusion related HEV infections. It was estimated that 80,000 to 1,00,000 HEV infections had occurred due to transfusion in England in 2013, with seroprevalence rate of 6.8% and annual incidence rate of 0.35%.<sup>[4]</sup> Studies in developing countries like India are very limited and only little evidence is available till now. In a study conducted among blood donors in Pune, 1.5% of HEV RNA was estimated during the year 2000 and 3.7% during the year 2004.<sup>[5,6]</sup> Blood transfusions are carried out in critically ill cases that include solid organ transplantation, pregnancy,

hematological disorders and neoplasm. Hepatitis E, even though most commonly causes self limiting diseases, in the above said critically ill and immunocompromised cases, it leads to more severe presentations that may end up in chronic hepatitis and cirrhosis. Though acute morbidity due to transmission of HEV infection through blood transfusion is rare and supporting evidences are still lacking, studies need to be explored in all developing countries to know the real burden of transfusion transmitted HEV infections.<sup>[7]</sup> Hence we aimed at estimating the seroprevalence of HEV IgG antibodies among healthy blood donors in our tertiary hospital, Chennai, South India.

## Materials and Methods

A prospective study was conducted in the Department of transfusion medicine in a tertiary care teaching hospital in Chennai, South India. Institutional ethical committee approval was obtained and the serum samples were anonymized. By simple random sampling, 142 samples of the healthy donors were chosen as study population during the study period of January to November 2016. Serum anti HEV IgG antibody was detected by Enzyme Linked ImmunoSorbent Assay (ELISA). Third generation enzyme immune assay for the detection of IgG antibodies to Hepatitis E virus kit (Diagnostic Bioprobes Srl Via G. Carducci n°27 20099 Sesto San Giovanni - Italy) was used and procedure was done as per manufacturer instructions.



The sensitivity and specificity of the kit is 100%. The positive cases were retested in duplicate. The results were tabulated in MS office Excel 2016 and analyzed using SPSS software.

## Results

The study population that included 142 samples showed predominant gender distribution of 141 males and 1 female donor. The range of age is from 18 years to 51 years with

a mean age of 25 years. Age distribution was analyzed by stratification of age group into 18-20 years (33.09%), 21-30 years (49.29%), 31-40 years (13.38%), 41-50 years (3.52%) and 51-60 years (0.7%).

Out of 142 samples, 19/142 (13.38%) showed positivity for anti-IgG antibodies for HEV. The distribution of HEV positive cases based on age stratification is depicted in Figure 1.

**Table 1: Comparative evidence of seroprevalence of Hepatitis E among blood donors in different countries.**

Study Place	Study Year	Methodology	Detection	Sero-prevalence	Ref
Spain	1998	ELISA	HEV IgG	2.8	(13)
Pune, India	2000	PCR	HEV RNA	1.5	(5)
United States	2002	ELISA	HEV IgG	18.3	(14)
Saudi Arabia	2004	ELISA	HEV IgM	8.96	(6)25 of whom were transfused with 107 blood units, while the other 25 did not receive any transfusions. RESULTS: In our retrospective study, markers of acute HEV infection (IgM anti-HEV and HEV RNA
Pune, India	2007	PCR	HEV RNA	0	(18)
South west France	2007	ELISA	HEV IgG	16.6	(17)19.1% of rural donors and 14.2% of urban donors had anti-HEV antibodies (P = 0.13
Japan	2007	ELISA	HEV IgG	7.1	(19)serum samples were collected from 6700 voluntary blood donors with an elevated alanine aminotransferase (ALT
Gujarat, India	2012	ELISA	HEV IgM	4.78	(12)
Southeast England	2012	PCR	HEV RNA	0.04	(7)but is probably widespread, and the virus has been detected in pooled plasma products. HEV-infected donors have been retrospectively identified through investigation of reported cases of possible transfusion-transmitted hepatitis E. The frequency of HEV transmission by transfusion and its outcome remains unknown. We report the prevalence of HEV RNA in blood donations, the transmission of the virus through a range of blood components, and describe the resulting morbidity in the recipients. METHODS: From Oct 8, 2012, to Sept 30, 2013, 225,000 blood donations that were collected in southeast England were screened retrospectively for HEV RNA. Donations containing HEV were characterised by use of serology and genomic phylogeny. Recipients, who received any blood components from these donations, were identified and the outcome of exposure was ascertained. FINDINGS: 79 donors were viraemic with genotype 3 HEV, giving an RNA prevalence of one in 2848. Most viraemic donors were seronegative at the time of donation. The 79 donations had been used to prepare 129 blood components, 62 of which had been transfused before identification of the infected donation. Follow-up of 43 recipients showed 18 (42%

Study Place	Study Year	Methodology	Detection	Sero-prevalence	Ref
Germany	2013	ELISA	HEV IgG	6.8	(4)incidence, and viremia in blood donors for the assessment of risk of transfusion-transmitted (TT
Central Italy	2014	ELISA	HEV IgG	49	(20)
			HEV IgM	0.63	
			HEV RNA	0.63	
Punjab, India	Not given	ELISA	HEV IgG	10.7	(21)
Chennai, India	2016	ELISA	HEV IgG	13.38	Current study

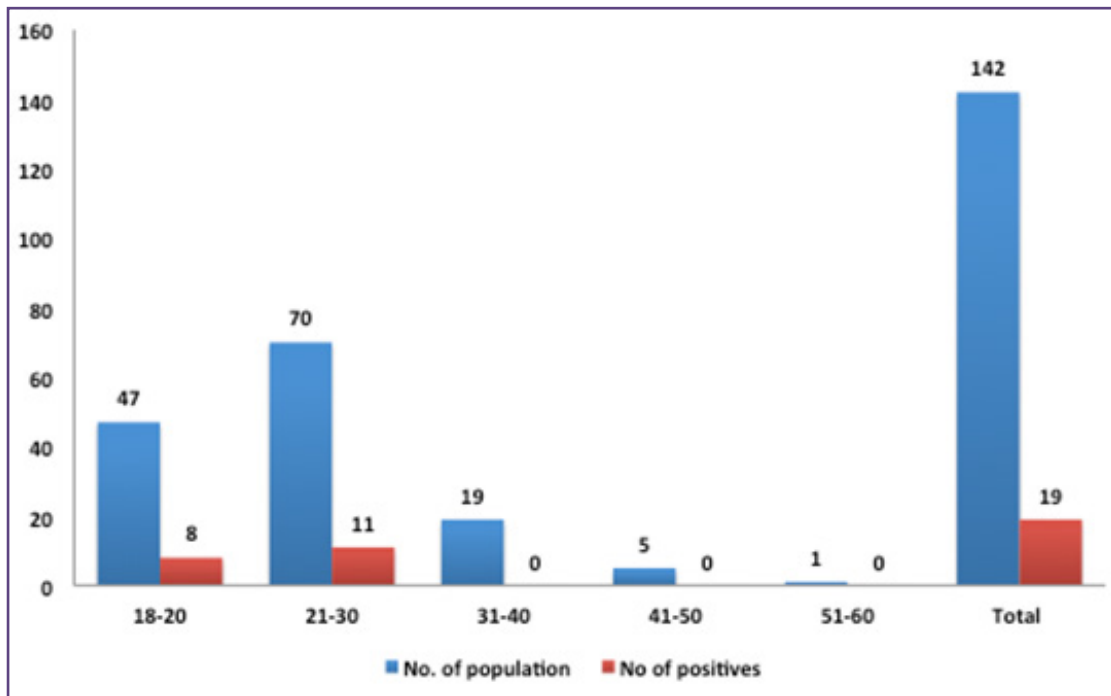


Fig. 1: Age wise distribution of study population and HEV seropositivity.

### Discussion

In our study, among a total of 142 voluntary blood donors screened for HEV antibodies, 13.38% showed seropositivity. Gender preponderance for HEV infection cannot be concluded from our study, as there is male dominance in study population. However certain studies conducted at Japan and Iran have shown a male preponderance. In contrary, studies from France and Brazil have shown no difference among gender distribution in HEV seroprevalence.<sup>[8,9,10]</sup> Age stratification has shown that majority of the positives are amongst younger age group 8/47 (17.02%) among 18-20 years followed by 11/70 (15.71%) among 21-30 years. None of the population above the age group of 31 years showed positivity. This may be contrary to the study conducted in western India,

which showed increased positivity among older age groups supported by studies in USA and Denmark.<sup>[11,12,13,14]</sup> This may be due to decreased number of study population in age group more than 31 years.

Seroprevalence rate in our study is comparable with the higher prevalence as seen in southwest France and England.<sup>[15,16,17]</sup> Few Indian studies have shown lesser seroprevalence rates of 1.5% and 3.7%, but the methodology used was polymerase chain reaction, which detected HEV RNA.<sup>[5,6]</sup> Comparison of prevalence rates among different studies are represented in Table 1.

The reasons behind these variations may be due to different sample size, different age groups and due to different methodology used that included serological methods and molecular methods.

Seroprevalence rates are detected based on the presence of anti-HEV IgG in blood. Though the duration of persistence of anti-HEV IgG in blood after exposure is not certain, it mainly depend upon immune status of individual and other factors. Antibody levels are in peak during acute phase of illness and it may persist up to a maximum of 12 years or even more.<sup>[22]</sup> Clinical risk of transmission of infection can be evidenced only by detection of viremia either in asymptomatic form or in subclinical presentation. Studies estimating seroprevalence helps in estimating the burden of HEV. However only HEV RNA detection aids in identifying viremic cases and transmission related risk could be estimated with increased specificity.<sup>[23]</sup> Since molecular methods are limitedly used only for epidemiological studies due to cost factor; serological methods using more sensitive and specific kits (anti HEV IgM and anti HEV IgG) is mandatory in all health care centers.

Limitations of our study are small sample size, increased distribution of younger age groups in study population and molecular method couldn't be used due to increased cost. Future plan has been proposed to conduct studies overcoming the above limitations.

## Conclusion

The above study throws light about screening for HEV in blood donors in general. Though little knowledge is available about HEV transmission risk during blood transfusion, in endemic countries it is advisory to screen the blood and blood products for HEV for effective prevention. More longitudinal studies need to be conducted in all health care centers to estimate the burden of HEV among Indian population, so that a national policy can be implemented to screen and prevent transmission of HEV during blood transfusion.

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