

PREVALENCE OF HEPATITIS C VIRUS SEROPOSITIVITY AMONG BLOOD DONORS AT A TEACHING HOSPITAL IN NORTHEASTERN MALAYSIA

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Abstract. Hepatitis C virus (HCV) can be transmitted by blood donation. In this study we aimed to determine the prevalence of HCV seropositivity among blood donors at our institution in order to inform efforts to reduce the transmission of HCV from blood donors to patients. Study subjects were potential blood donors who presented to the Transfusion Medicine Unit at the study institution in Malaysia to donate blood during 2011-2019. We retrospectively reviewed the records of all these subjects for the following: HCV enzyme immunoassay results (EIA) (positive results confirmed by a recombinant immunoblot assay (RIA)), gender, age, ethnicity, marital status and donation frequency. A total of 87,418 subjects were included in the study consisting of 113,475 donated blood samples. More than half, 57.87% of subjects were males; 85.34% were aged ≤ 41 years; 59.13% were first time donors. As much as 80.12% of subjects were Malay, 12.68% were Chinese, 1.70% were Indian and 5.50% were of other ethnicities; 62.35% were married. A total of 85 subjects (0.1%) had both a positive EIA and positive RIA HCV test. Of these 85 subjects, 76% were male. The mean (\pm SD) age of study subjects with HCV seropositivity was 36 (± 12) (range: 18-65) years. Among subjects with HCV seropositivity, 87% were first time donors, 93% were Malay, 5% were Chinese, 1% were Indian and 1% were of other ethnicities and 62% were married. The prevalence of HCV seropositivity during 2011 and 2019 were 0.13% and 0.06% (range: 0.03-0.2%), respectively. In summary, the prevalence of HCV seropositivity among study subjects was low and the majority were male, first-time donors, Malay and married. The prevalence of HCV seropositivity among study subjects fluctuated by year. We conclude that although the prevalence of HCV seropositivity was low, it might be reduced further by carefully monitoring male, Malay, married first time donors to detect

other possible risk factors that should be screened for. Further studies are needed to determine what additional questions should be asked to increase the sensitivity of the screening questionnaire for detecting higher risk donors.

Keywords: viral infection; hepatitis C virus; transfusion-transmissible infection

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INTRODUCTION

Hepatitis C virus (HCV) infection is a worldwide public health problem that can present as acute or chronic hepatitis, resulting in mild to severe symptoms and may last a few weeks or a lifetime (WHO, 2017). An estimated 71 million people worldwide have chronic HCV infection (WHO, 2017).

HCV infection occurs in both developed and developing countries. The goal of public health authorities is to reduced global mortality and morbidity caused by chronic HCV infection (Lavanchy, 2009). Effective screening methods are crucial to prevent transfusion transmitted HCV infections.

A cohort study conducted among adults who received blood transfusions showed after an average of 15 years, about 75% of patients were positive for HCV RNA and 15-20% developed liver cirrhosis (Prati, 2002). One study estimated about 1 in 100,000

blood transfusions results in HCV transmission because the donation occurs in the window period between contracting and spreading the virus and when testing yields a positive result (van der Poel, 1999).

In this study we aimed to determine the prevalence of HCV seropositivity among blood donors at our center in order inform efforts to reduce the transmission of HCV from blood donors to patients.

MATERIALS AND METHODS

We retrospectively reviewed the data of potential blood donors who presented to the study institution during 2011-2019. The first year of data used in our study was 2011 because that is when we began using our laboratory information system where the date for this study was obtained from. The following data were obtained from each subject record: subject gender, age, number of

donations, ethnicity and marital status. Each subject was tested for HCV using a Realtime HCV enzyme immunoassay (EIA) (ARCHITECT Immunoassay Analyzer, Abbott, Chicago, IL) and positive results were conformed using a recombinant immunoblot assay (Fujirebio Diagnostics Inc, Tokyo, Japan). The prevalence of HCV seropositivity among our subjects was calculated by dividing the number of seropositive cases by the total number of donated blood samples

This study was approved by the Human Research Ethics Committee, Universiti Sains Malaysia (USM/JEPEM/18070311).

RESULTS

A total of 87,418 subjects were included in the study, consisting of 113,475 donated blood samples; 57.87% males. Up to 85.34% of subjects were aged <41 years, 62.35% were married and 59.13% were first time donors. As much as 80.12% of subjects were Malay, 12.68% were Chinese, 1.70% were Indian and 5.50% were other ethnicities.

A total of 85 subjects (0.10%) had both a positive EIA and positive RIA HCV test. Of these 85 subjects; 76% male. The mean (+SD) age of study subjects with HCV seropositivity was 36 (+12) (range: 18-65) years. Among the 85 subjects with seropositivity, 21.18% were aged 17-24 years, 17.65% were aged 25-29 years, 12.94% were aged 40-44 years, 12.94% were aged

45-49 years, 10.59% were aged 35-39 years, 10.59% were aged 50-54 years, 8.23% were aged 30-34 years and 5.88% were aged 55-65 years. Among subjects with HCV seropositivity, 87% were first time donors, 93% were Malay, 5% were Chinese, 1% were Indian and 1% were of other ethnicities and 62% were married (Table 1).

The numbers and prevalences of HCV seropositivity during 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018 and 2019 were 13 (0.13%), 9 (0.09%), 12 (0.12%), 20 (0.2%), 9 (0.09%), 3 (0.03%), 8 (0.08%), 5 (0.06%) and 6 (0.06%), respectively. The mean overall prevalence was 85/87,418 (0.1%) (Fig 1).

DISCUSSION

In our study the overall HCV seroprevalence was 0.1%; during the final year of the study (2019) the seroprevalence was 0.05%. The prevalence fluctuated by year so no clear significant trend could be detected. Other similar studies from other countries have reported varying prevalence levels of HCV among blood donors. A study from Singapore reported a HCV seroprevalence of 0.059% (Soh *et al*, 2019), a study from the United States reported a HCV seroprevalence of 0.072% (Murphy *et al*, 2010), a study from Europe reported a HCV seroprevalence of 0.02% (Mutimer *et al*, 1995), a study from Indonesia reported a HCV seroprevalence of 3.1% (Amirudin *et al*, 1991), a study from Thailand

Table 1

Demographic characteristics of study subjects with HCV seropositivity (N = 85)

Demographic variables	<i>n</i> (%)
Gender	
Male	65 (76)
Female	20 (24)
Age groups in years	
17-24	18 (21)
25-29	15 (18)
30-34	7 (8)
35-39	9 (11)
40-44	11(13)
45-49	11 (13)
50-54	9 (11)
55-65	5 (6)
Number of blood donations	
First time	74 (87)
Occasional donor	8 (9)
Regular donor	3(4)
Ethnicity	
Malay	79 (93)
Chinese	4 (5)
Indian	1 (1)
Other	1(1)
Marital status	
Single	32 (38)
Married	53 (62)

HCV: hepatitis C virus

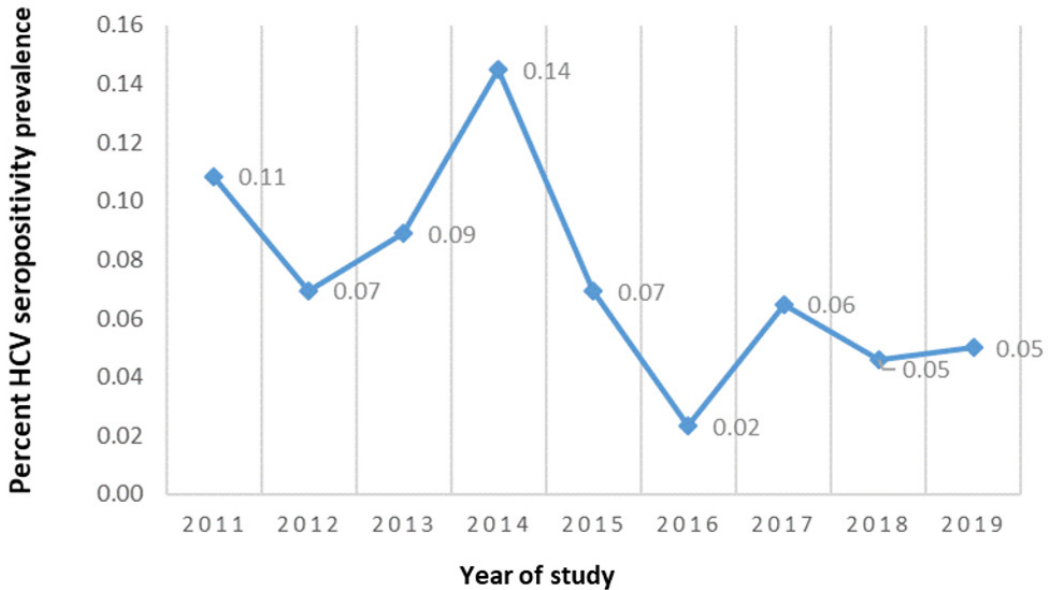


Fig 1 - Seroprevalence of HCV seropositivity among study subjects
HCV: hepatitis C virus

reported a HCV seroprevalence of 2.9% (Luksamijarulkul *et al*, 2004), a study from Sierra Leone reported a HCV seroprevalence of 2.9% (Tognon *et al*, 2020), a study from Ethiopia reported a HCV seroprevalence of 1.2% (Degefa *et al*, 2018), a study from Malawi reported a HCV seroprevalence of 1.0% (M'Baya *et al*, 2019), a study from Ghana reported a HCV seroprevalence of 9.4% (Nkrumah *et al*, 2011), a study from Egypt reported a HCV seroprevalence of 20% (El-Ahmady, 1994) and a study from equatorial Africa reported a HCV seroprevalence of 6.5% (Delaporte, 1993). In our study, the prevalence of HCV seropositivity

was low, possibly due to the donor population. Our blood bank does not pay blood donors and we recruit blood donors from lower HCV infection risk groups, such as university/college students, members of the armed forces and government staff. Selecting healthy donors and using nucleic acid amplification technology (NAT) to screen donated blood have been shown to decrease the number of HCV infections (Chimparlee *et al*, 2011).

In our study, we saw no consistent trend in infections over time, unlike a study from Iran where a decreasing prevalence was seen over time (Farshadpour *et al*, 2016) and another

study from Pakistan that reported an increasing prevalence over time (Mujeeb *et al*, 2008).

In our study, the age group with the largest proportion of subjects with HCV seropositivity was those aged 17-24 years, similar to a study from Pakistan that reported the most common age group among those with HCV seropositivity was 25 years old (Khan *et al*, 2013). This is most likely because those aged <25 years have greater risk behavior for contracting HCV infection (Damesyn *et al*, 2003).

In our study, among those with HCV seropositivity, the greater proportion of them were married. This finding is in contrast to a study from Malaysia that reported married subjects had a lower risk of having anti-HCV seropositivity than those who were single (Muhamad *et al*, 2020). This could be because blood donors in our study were more likely to be married, indicating the study populations are not comparable.

In our study, the majority of those with HCV seropositivity were male, similar to a previous study from Egypt (Farshadpour *et al*, 2016). However, a study from China reported no significant difference in HCV seropositivity by gender among blood donors (Gao *et al*, 2011).

In our study, the majority of those with HCV seropositivity were first time blood donors, similar to studies from Egypt (Farshadpour *et al*, 2016), Romania (HaTu *et al*, 2014) and Iran (Ranjbar

Kermani *et al*, 2019). This makes sense since HCV seropositive donors would be informed about their status and would not try to donate again.

In summary, the prevalence of HCV seropositivity among study subjects was low and the majority were male, first-time donors, Malay and married. The prevalence of HCV seropositivity among study subjects fluctuated by year. We conclude that although the prevalence of HCV seropositivity was low, it might be reduced further by carefully monitoring male, Malay, married first time donors to detect other possible risk factors that should be screened for. Further studies are needed to determine what additional questions should be asked to increase the sensitivity of the screening questionnaire for detecting higher risk donors.

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CONFLICTS OF INTEREST DISCLOSURE

The authors declare no conflicts of interest.

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