

Brief Communications

Prevalence of Hepatitis C Virus Antibodies Among Blood Donors in Northern Jordan

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Abstract

Background and Objectives: Hepatitis C Virus (HCV) remains the most common cause of transfusion-related hepatitis in the world. Despite the accurate screening methods introduced after the discovery of the virus about two decades ago, blood and blood products transfusion remains an important source of HCV infection in Jordan. The worldwide prevalence of HCV among blood donors is variable, ranging between 0.17 and 20%. The main objective of this study was to determine the prevalence of positive serology for HCV among blood donors in the population of Northern Jordan. The prevalence of different HCV genotypes among positive serology individuals was a secondary objective of the study.

Study Population and Methods: From January 2004 till June 2006, a total of 14,236 individuals (13666 males and 570 females) donated blood at King Abdullah University Hospital. A third-generation Enzyme- Linked Immuno-Sorbent Assay (ELISA) test system using the commercial Diasorin kit, ETI-AB-HCVK- 4(N0146, N0147) which was used to screen all donors for antibodies to HCV. The test was performed strictly as per the manufacturer's instructions. Data were collected from the blood bank database. Samples of HCV positive serology and detectable HCV RNA were submitted to genotyping using Real Time PCR. (MX 4000) method.

Results: A total of 29 blood donors (27 males, 2 females) were tested positive for anti-HCV antibodies, with an overall prevalence of 0.20%. The seroprevalence in females was approximately the double of that of males (0.35% vs 0.19%). The most prevalent HCV genotype was type 4.

Conclusion: This study indicates that the prevalence of HCV among blood donors in the North of Jordan is lower than that in other regions of the country. Overall, our national prevalence of HCV among healthy blood donors (0.2%-0.79%) is concordant with the results of epidemiological studies from the Western World (0.17-0.15%). The most prevalent HCV genotype in this cohort of individuals was genotype 4.

Keywords: Hepatitis C virus; Blood donors; HCV antibody; HCV Genotype.

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Introduction

Since its discovery in 1989, HCV was identified as the major cause of non-A non-B hepatitis, with blood transfusion and intravenous drug use as the main modes of transmission.^{1, 2} Blood borne pathogens like Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and human immunodeficiency virus are considered serious but preventable public health problems in the developing world.^{3,4} Hepatitis C infection is a growing worldwide health concern. The World Health Organization estimates that 3% (170 million) of the world's population is chronically infected with the virus.^{5,6} It is a leading cause of liver cirrhosis and hepatocellular carcinoma in Western countries, and only the second to HBV in the developing countries.⁷⁻¹¹

Considerable geographic and temporal variations in the incidence and prevalence of HCV infection have been reported in studies of blood donors, ranging from 0.17-1.5% in Western Europe, 6% in Central African regions and 1.6% in Southern and East Africa. However, it may reach up to 20% in Egypt and Central Asia, reflecting the remarkable variation in population prevalence of the disease between Western countries and the developing world.^{12, 13}

Since the introduction of routine screening for HCV antibodies of blood donors in 1992, the incidence of transfusion-associated hepatitis C has decreased significantly worldwide.

After the introduction of newer, more sensitive third generation ELISA in the late 1990's, the rate of transfusion-associated HCV infection has decreased further.¹⁴⁻¹⁶

Earlier data from Jordan suggested that the prevalence of anti-HCV antibodies in the serum of blood donors is about 0.79%.¹⁷⁻¹⁹ The aim of the present study was to determine the prevalence of positive HCV serology among asymptomatic first-time blood donors in the North of Jordan. A secondary objective was to estimate the prevalence of different HCV genotypes in blood donors with positive serology.

Materials and Methods

This cross-sectional study was carried out at King Abdullah University Hospital, which serves about 2 million people in the North of Jordan. During the period between January, 2004 and June, 2006, all adult blood donors screened for HCV were enrolled in this study. All participants were first-time blood donors. A focused medical evaluation to all potential donors was performed routinely by blood bank staff. Individuals with serious chronic medical problems and candidates with high pre-test probability for HCV infection were not allowed to donate blood. Most of the donors were Jordanians and relatives of inpatients, and they donated blood on an exchange basis.

During the study period, a total of 14,236 potential donors, 13666 males (96%) and 570 females (4%), donated blood at King Abdullah University Hospital. A third-generation Enzyme-linked Immuno-Sorbent Assay (ELISA) test system using the commercial Diasorin kit, ETI-AB-HCVK- 4(N0146, N0147), was used to screen all the samples for antibodies to HCV. The tests were performed as per the manufacturer's instructions. Data collection and patient's information were strictly confidential according to the Helsinki Declaration.

Results

Only 29 individuals out of 14,236 potential donor tested were found positive for anti-HCV antibodies (Table 1). Therefore, the prevalence of positive HCV serology in this patient population was 0.20%. Among males, the seroprevalence was 0.19%, while the seroprevalence was almost the double (0.35%) among females.

HCV genotyping was performed in 26 out of 29 patients (Table 2). The remaining three patients had undetectable HCV RNA by PCR, and thus no genotyping was performed.

The most prevalent genotypes was 4(69%) followed by genotype 1(31%). Other genotypes were not identified in this cohort of patients. Viral kinetics including HCV RNA levels during and after treatment period is being evaluated in a prospective study at our institution.

Table (1): Anti-HCV antibodies results among blood donors according to gender distribution.

Gender	Screened	Tested anti HCV positive	Prevalence %
Male	13666	27	0.19%
Female	570	2	0.35%
Total	14,236	29	0.2%

Table (2): HCV genotype distribution among positive anti-HCV blood donors.

Sex	Genotype I	Genotype IV	Total
Male	8	16	25
Female	0	2	2
Total	8	18	26

Discussion

First-time blood donors had twice the risk for presenting a positive HCV test. This association is plausible, since first-time donors have never been screened before.^{20, 21}

The prevalence of anti-HCV in blood donors varies considerably around the world with a prevalence of 1.2 per cent in Japan,²² 0.42 per cent in Germany,²³ 0.68 per cent in France,²⁴ 0.87 per cent in Italy,²⁵ and 0.01 to 0.55 per cent in United States and United Kingdom.^{26, 27} With regard to the burden of HCV seroprevalence in the developing countries blood donors, it has been reported to be 2.4% in the Eastern Province of Saudi Arabia,²⁸ 12.3% in Nigeria,²⁹ 0.9% in Ghana,³⁰ and more than 20% in Egypt.³¹

A number of Jordanian studies reported an overall prevalence of about 0.79%.¹⁷⁻¹⁹ Our study is the first to report data from the North of Jordan.

Interestingly, the current study is in agreement with prior local reports that stated that the overall HCV seroprevalence of blood donors is lower than that in neighboring countries such as Saudi Arabia or Egypt,^{28, 31} and very close to the figures of the developed countries.²²⁻²⁷ This may reflect, in fact, the low prevalence of HCV in Jordanian population or a selection bias by blood banks for young healthy adult donors.

This assumption warrants further evaluation, with a larger-scale epidemiological study of samples representative of different regions of the country and variable age groups of the population.

It has been established that the incidence of post-transfusion hepatitis C infection decreases considerably after screening the blood for anti-HCV by third generation ELISA tests.¹⁴ However, the risk of transmission of HCV cannot be totally eliminated with the current screening techniques. In fact, the sensitivity is limited for the "window period" when the antibodies cannot be detected either because the production of antibodies has not yet started or the antibody levels are too low to be detected by the assay.¹⁶

Conclusions

The prevalence of HCV-positive blood donors is relatively low in Northern Jordan in comparison to other areas of the country. Overall, our national prevalence of HCV among healthy blood donors (0.2%-0.79%) is concordant with the studies from the developed world. This may represent the result of highly selective criteria for blood donation adopted by blood banks in Jordan. In our study population, the most prevalent HCV genotype is genotype 4, followed by genotype 1.

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مدى إنتشار مضاد إلتهاب الكبد الفيروسي (ج) بين المتطوعين للتبرع بالدم في شمال الأردن

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الملخص

الأهداف: هذه الدراسة تمت في مستشفى الملك المؤسس عبد الله الجامعي في أقسام الباطنية وعلم الأمراض وبنك الدم من أجل معرفة مدى إنتشار مضاد فيروس التهاب الكبد (ج) الذي يعتبر سببا رئيسا لإلتهاب الكبد المزمن والذي يؤدي إلى تشمع الكبد وسرطان الكبد بين المتطوعين للتبرع بالدم وبالبالغين الأصحاء لدى بنك الدم .

الوسائل: خلال الأعوام 2004-2006 تم فحص الدم لـ 14.236 متبرعا منهم 13666 (96% ذكور) و 570 (4% إناث). وتم إجراء فحص (ELISA) الجيل الثالث للتأكد من خلو العينات من أمراض سارية منها: مرض التهاب الكبد الفيروسي (ج). وقد تم إجراء فحص التنميط الجيني للعينات التي تحوي هذا الفيروس.

النتائج والخلاصة: 29 متبرعا من أصل 14.236 متبرعا بينهم (27 ذكور) و (2 إناث) تبين أن لديهم فيروس التهاب الكبد (ج) مما يشكل ما نسبته (0.2%). 26 من العينات الايجابية امكن إجراء فحص التنميط الجيني لها و تبين ان النمط الجيني الرابع هو الاكثر انتشارا بنسبة 69% يليه النمط الجيني الأول بنسبة 31%. وهذه النتيجة هي أقل قليلا من النتائج المحلية المنشورة سابقا وهي (0.79%) ومطابقة للنتائج العالمية في دول العالم الأول والتي تتراوح بين (0.17%-1.5%). بينما تتراوح هذه النسبة في الدول المجاورة مثل مصر والسعودية ما بين (6% - 20%).

وهذا قد يدل على مدى كفاءة بنوك الدم في الأردن في حسن اختيار متبرعي الدم وبالتالي تقديم الخدمة والعناية الطبية الأفضل للمرضى المحتاجين لنقل الدم أو أحد مشتقاته.

الكلمات الدالة: التهاب الكبد الفيروسي (ج)، المتطوعين للتبرع بالدم، مضادات التهاب الكبد الفيروسي (ج)، النمط الجيني الرابع لالتهاب الكبد الفيروسي.