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ORIGINAL CONTRIBUTION

Prevalence of hepatitis C virus antibodies among blood donors in Omdurman region in Sudan

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Abstract. Infection with HCV is a major cause of transfusion-associated hepatitis, cirrhosis, and hepatocellular carcinoma. This study was conducted to estimate the prevalence rate of anti–HCV antibodies among voluntary blood donors attending the transfusion department at Omdurman hospitals. A cross-sectional study was conducted from 2 January to 27 March 2007. The rapid test method was used and confirmed with the ELISA (third generation). The population included 1672 Sudanese people. The age of the donors (all males) was between 18–45 years, with a mean of 36 years. Anti-HCV antibody was detected in 1.016% of the study population. The prevalence of anti –HCV among voluntary blood donors was 1.02%. Routine screening for HCV should be conducted for all blood donors before they are accepted for donation.

INTRODUCTION

Hepatitis C is a blood borne, infectious, viral disease that is caused by a hepatotrophic virus called hepatitis C virus (HCV). The infection can cause liver inflammation that is asymptomatic but may lead to chronic hepatitis which causes cirrhosis and liver cancer [1].

HCV is a member of a large family of the viruses that includes the causative agents of yellow and dengue fevers. The disease is known to have two stages; the acute phase [2] and the chronic phase [3] with different clinical signs [4]. In USA and Western Europe, the complications of hepatitis and cirrhosis were the most common reasons for liver transplantation.

The prevalence of HCV infection varies in different parts of the world: in Scandinavia, it was less than (0.59%) [5] and, in Egypt, it was over (20%) [6]. In a study on strains of viral hepatitis antibodies in the Sudan, HCV markers were positive in (3%) of the patients studied compared to (82%) positive for Hepatitis B virus (HBV) markers [7].

In a study in Juba (the capital of the Southern region in the Sudan until the year 2011 and now the capital of the newly formed Southern Sudan State), (3%) of the population were carrying HCV antibodies, suggesting that the incidence of HCV infection was not high in the study group [8]. However, in another study, the prevalence of HCV in heamodialysis patients in the Sudan was reported to be (34.9%) [9].

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Diagnosis of the disease is rarely made during the acute phase of the disease because infected people experience no symptoms and/or until sever symptoms develop. The diagnosis of the chronic phase is also challenging due to the absence or lack of specificity of symptoms until advanced liver disease occurs which could take decades. Occasionally, HCV is diagnosed as a result of targeted screening such as blood donation or contact tracing [10]. Thus, the contradicting reports, the lack of the studies in this field and the absence of information were leading factors to conduct the present study to determine the prevalence of HCV antibodies among voluntary blood donors attending the transfusion departments at Omdurman hospitals in the Sudan.

MATERIALS AND METHOD

This study was conducted during January-March 2007. The study was carried out in four hospitals in Omdurman area: Omdurman Teaching Hospital, Omdurman Pediatric Hospital, Ombadah Hospital and the Military Hospital. The donors were males over 18 years old. They were randomly selected in the four hospitals. Consent forms were prepared and approval of all subjects included in the study were obtained before blood was taken. In addition to the blood samples, all donors were interviewed and a questionnaire was filled to obtain information on age, place of living, family relationship with patients, occupation and history of blood donation.

The methods in use for routine screening of voluntary blood donors in the Sudan in the blood banks of the hospitals are: the rapid screen test, third generation of ELISA and Polymerase Chain Reaction (PCR).

In this study the one step cassette style Anti-HCV serum/whole blood Test was used. The sealed pouch was opened; the cassette test kit was removed from the pouch and used as soon as possible. 3.0 µl of serum/whole blood sample was added by an accurate pipette. Three drops (120 µl) of diluents was added into the reagent well of the cassette test kit. The result was read after 10 minutes incubation in room temperature. The positive result was confirmed by using HCV Ab third generation Enzyme Immunoassay for determination of anti HCV antibody in human serum and plasma. This was prepared and produced by DIA-PRO Diagnostic Bioprobes Srl Via columella n 31 20128 Milano–Italy.

The assay procedure was done by placing the required number of micro wells in a holder. The 1st well was left empty for the operation of blanking. 200 µl of negative control were dispensed in triplicate. 200 µl Calibrator in duplicate and 200 µl positive control in single proper wells. 200 µl of sample diluents were added to all wells, then 10.0 µl of sample were dispensed in each properly identified well, the plate was shaken gently. 50.0 µl assay diluents were dispensed in to all the controls and samples wells. The color of samples was checked whether it turned to dark blue. The micro plate was washed with an automatic washer by delivering and aspirating 350 µl well of diluted washing solution. 100 µl Enzyme conjugate were pipetted into each well. The 1st blanking well was covered with a sealer. It was checked that the red colored component has been dispensed in all wells. The micro plate was incubated for 45 minutes at 37°C and washed. 100 µl chromogen/substrate mixtures were pipetted into each well. The blank well was included. Then the micro plate was incubated at room temperature for 15 minutes. 100 µl sulphuric acid were pipetted into all the wells using the same pipetting sequence to stop the enzymatic reaction. Addition of the acid turned the positive control and positive samples from blue to yellow. The data were entered in a master sheet and analyzed by the Statistical Packages for Social Sciences (SPSS). By using Quai square. And expressed in numbers and percentages.

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RESULTS

The total of the donors was 1672 Sudanese males. Their ages ranged from 18-45 years old (Table 1). None of the subjects was a health care worker. The questionnaire revealed the following: no one had a history of blood transfusion, self injection with intravenous drugs, heamodialysis, received intravenous immunoglobulin's, having endoscopic procedures and the only medical surgical procedure done to the majority of them (1598, 95.6%) was circumcision (Table 2).

830 Reported a history of performing native procedures: 110 (6.57%) had cupping (bleeding); 320 (19.13%) had cutting marks on the face (a local tradition to differentiate the tribes, now disappearing), 200 (11.96%) had cupping and marks on the face and 200 (11.96%) had their teeth broken (Tables 2 and 4). Clinical signs: 97 (5.8%) had a history of jaundice, 107 (6.4%) with abdominal pain, 207 (12.13%) had joint pain and 1233 (73.7%) complained of fatigue.

103 Of the donors (6.16%) were HBV infected and 43 (2.57%) had HIV infection. Two of subjects in the HCV seropositive tested were positive for HBV but not for HIV. HCV antibodies were detected in 17 (1.016%) of the donors, Table 5. They were distributed in four age groups, between 25–45 years old (Prevalence 1.35%). None of them had a history of blood transfusion, drug abuse, heamodialysis, high risk sexual behavior, intravenous immunoglobulin receipt, native procedures, surgery or endoscopic procedures except circumcision.

TABLE 1 . Distribution of blood donors by age groups

A. Age Group	B. Frequency of the Population	C. Percentage of the Population
A. 18 – 24	B. 418	C. 25%
D. 25 – 31	E. 531	F. 31.77%
G. 32 – 38	H. 342	I. 20.45%
J. 39 – 45	K. 195	L. 11.66%
M. 46 – 52	N. 186	O. 11.12%

TABLE 2 Risk factors among blood donors

Risk Factors	Frequency of the Population	Percentage of the Population
Circumcision	1598	95.58%
Native Procedures	830	49.64%
High Risk Sexual Behavior	0	0%
Blood Transfusion	0	0%
Self Injection With I.V Drugs	0	0%
Intravenous Immunoglobulin's	0	0%
Dialysis	0	0%

TABLE 3 Frequency of native procedures among blood donors

Native procedures	Frequency of the Population	Percentage of the Population
Yes	830	49.64%
No	842	50.36%
Total	1672	100%

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TABLE 4 Types of native procedures among blood donors

Native Procedures	Frequency of the Population	Percentage of the Population
Marking of face	320	19.13%
Cupping	110	6.57%
Cupping + marking of face	200	11.96%
Broken teeth	200	11.96%
Total	830	49.62%

TABLE 5 Prevalence of hepatitis C virus among blood donors

Prevalence of HCV	Frequency	Percentage of Infection
Positive	17	1.02%
Negative	1655	98.98%
Total	1672	100%

DISCUSSION

The blood banks in the Sudan have very strict rules to follow. Firstly, no blood is to be taken from anyone below 18 years of age and females are not allowed to donate blood. Therefore, those who were examined do not actually represent the whole population. In fact they represent only males in the age group 18-45 years old. Secondly, anyone who donated blood within the previous three months will be rejected. Thirdly, the banks do not accept blood from anyone who will expose the patient or the donor to any health risk. One of these risks is the medical surgical procedures. However, the native procedures and circumcision do not affect the patient nor the donor in any way. Fourthly, the blood banks usually request the patient who needs blood to bring volunteers to donate blood. In this way they keep substituting the blood they lose. However, those donors will be examined clinically and the blood donated will be examined for hepatitis, HIV, malaria and/or any blood infectious transmitted disease. Any blood infected from a donor will be discarded.

The prevalence of HCV reported here is less than two percent from all donors, whether rejected or accepted. In a similar study conduct by a group working in Mekkah, Saudi Arabia Ahmed *et al.* [11], found the prevalence rate of HCV among Saudi blood donors to be (1.7%) and among non-Saudi donors to be (6.6%) [1]. On the other hand, the prevalence of HCV among Egyptians was reported in several studies [6]. It was suggested that a major risk factor that affect HCV transmission, in Egypt, and therefore the prevalence is the personal history of Parental Anti Schistosomal Therapy (PAT) [6]. A review of the Egyptian PAT mass–treatment campaigns, revealed a high prevalence of HCV among the families in which the parents were treated during these campaigns. [6] Although schistosomiasis is endemic in the Sudan, the prevalence of the disease in Khartoum State, where the study was carried out, is very low. Khartoum State is implementing a control programme among the school children and providing anti-schistosomal drug for those infected only. None of the subjects in this study reported infection with schistosomaiasis or having received anti schistosomal therapy. A report from Al-Damam, Saudi Arabia, Fathalla *et al.* [12], stated that the infection with the virus begins in the early age group of 10-15 years old. The age group of those infected with HCV, in this study, is the 25-45 years old. This is the reproductive age group in the Sudan and the income of those infected will be affected. Although this study was conducted during 3 months, and only 17 subjects were found infected, it is estimated that the number of those infected during the whole year will be a 100 individuals and all of them will be reservoir for the disease. The percentage of those infected with HBV and HIV were almost six times and three folds respectively of those infected with HCV.

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These are alarming figures and utmost care should be given to the examination of these diseases, especially the HIV, among blood donors. It will be ideal to use very specific and sensitive technology to screen the blood from the donors. It is recommended that routine examination of the population at the age group 20-45 to be carried out on a regular basis and free. In fact, the Sudan is now encouraging any one to examine HIV free on a voluntary basis. The blood was screened for HCV, HBV and HIV by the rapid direct binding screening test. It is a rapid test for the presence of the antibodies of the three viruses. The test is very sensitive, rapid and the results are read visually without any instrumentation. ELISA is a sensitive and accurate technology to test for antibodies. The results by the two methods are the same. It is, therefore, recommended to use the easier method in the hospital for routine work which is the rapid direct binding screening test.

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