

Prevalence of Anti-HIV, HBs-Ag and Anti-HCV Reactivity in Different Categories of Egyptian Blood Donors: Experience of the National Cancer Institute in the Last 5 Years

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ABSTRACT

Background: Transfusion related hepatitis is a major concern to the transfusion medicine community in Egypt. A recent government mandate requires that all blood used for transfusion has to be collected from non-paid volunteer donors. This study attempted to characterize the safety profile of different groups among the Egyptian blood donors in order to maximize the use of limited recruitment resources.

Material and Methods: This is a retrospective study in which we reviewed the testing records of 46747 donors who presented at random at our donor room as well as at the blood drives conducted at different organizations between March 1995 and August 2000. Donor groups were divided into 7 categories based on the type of organization and place of the blood drives. HBs-Ag, anti-HCV and anti-HIV testing results were examined and tabulated by category.

Results: Only two positive HIV donors were identified. The overall prevalence of HBs-Ag was 2.1% and HCV was 7.1%. Prevalence of co-infections with HBV and HCV was 0.086%.

Conclusions: Hepatitis C continues to represent a serious challenge in Egypt despite the decreasing prevalence among blood donors. Groups with educated members who belong to moderate or high socioeconomic background such as college and high school students as well as members of the social and sports clubs are safer donors and should be targeted with intensive educational and recruitment efforts.

Key Words: *Anti-HIV: Anti-Human Immunodeficiency virus - HBs-Ag: Hepatitis B surface antigen - HCV-Ab: Hepatitis C virus-antibody - Donor categories*

INTRODUCTION

Hepatitis B virus is a member of the hepadnavirus family (interrupted, circular ds DNA).

The main modes of transmission are via blood transfusion, I.V. drug abuse, during intercourse and perinatally from mother to newborn [17].

The causative agent of AIDS was identified in 1983 as a previously unknown retrovirus, which today is termed the Human Immunodeficiency Virus type 1 (HIV-1) (originally LAV, HTLV-III). In 1986, a further representative of the humanopathogenic immunodeficiency viruses was isolated (HIV-2). HIV is transmitted through sexual contact between persons infected with HIV contaminated. Blood products inadequately disinfected medical instruments (e.g. injection needles) and from mother to child at birth or during breast feeding are other ways in which the HIV virus can spread in the population.

As a consequence, test methods for the detection of HIV-specific antibodies were introduced in blood banks and the blood-processing industries in 1985. As a screening method, the ELISA test has become well established. For confirmation of positive ELISA test results, an HIV-specific western blot is performed. With the identification of new virus types (HIV-2) and HIV variants (HIV-O), commercially available ELISA screening tests have been continuously optimized and improved in terms of their sensitivity.

HCV is a member of the flavivirus family. It is an enveloped virion containing a genome of single stranded positive polarity RNA. It is transmitted via blood transfusions, sexually and

since the initiation of the HCV screening programs in 1985, abuse of intravenous drugs became a major route. ELISA systems using the core antigens C-22 and NS3, C-33 which detect most HCV strains were developed [13].

The range of available cloned or synthetic HCV antigens is now extensive and third generation anti-HCV assays with antigens from the core NS3, NS4 and NS5 genome regions are in routine use [3]. These improvements in screening of HCV-Ab have enabled better detection of HCV prevalence and have eliminated false positive cross reactivity. A high prevalence rate of HCV antibody positivity was reported in Egyptians [12] and a high frequency of reactivity was observed among Egyptian blood donors reaching 18.14% [5]. This high prevalence of anti-HCV in healthy Egyptian donors suggests an additional and even more important mode of transmission for HCV other than blood transfusion.

Still, blood transfusion strikingly raises the incidence of HCV-Ab reactivity [1]. Coinfection by hepatotropic viruses is not uncommon and can occur due to the fact that Hepatitis B virus and hepatitis C virus share similar routes of transmission. The relative role of the infecting viruses in determining the final clinical picture is not yet well defined. Several reports indicate that clinical and pathological severity of liver disease among coinfecting patients is increased and in patients with HCC, co-occurrence of both viruses is a common event [10].

HCV and HBV coinfection was found in 16% of 34 HCC patients with underlying liver cirrhosis [9], based on antibodies in sera and in 9% of the cases based on the presence of HCV RNA. HCV might influence HBV antigen expression in the liver and either partial or complete suppression might occur [6].

Thus, the aim of our study was to detect the incidence of HBs-Ag, HCV-Ab and HIV (I & II)-Ab reactivity among different categories of blood donors to choose the best category suitable for donation and to study the incidence of Hepatitis B & C coinfections for further studying of its sequela.

PATIENTS AND METHODS

We collected serum samples from the blood donors in the period between March 1995 and

August-2000. We divided the blood donors into eight groups according to the place of donation either inside the NCI-blood bank or in blood drives in different places outside the NCI-blood bank. All donors were ≥ 18 years old.

Those who donated in faculties, institutes and schools were 9036 donors; exhibitions, unions and clubs 3322; banks, hotels and companies 4730. We considered the two groups of clubs, exhibitions, and unions and that of companies, banks and hotels as a single group due to their similarity. In addition, there were 3490 donors from churches and mosques. We collected serum samples from 3046 soldiers who donated blood. Factories workers who donated blood were 3235. Those who donated for their relatives, or patients inside the hospital (they were mostly from rural areas) were 13804 donors. From a group of professional (paid) donors recruited at the stadium we gathered 6084 serum samples. Now, we stopped completely taking blood from paid donors.

All the samples were examined using 2nd then 3rd generation enzyme linked immunosorbent assays for anti-HCV-Ab detection, ELISA technique also for HBs-Ag detection and HIV(I & II)-Ab detection. Kits were purchased from: Innogenetics (innotest for HCV-Ab): Belgium, Omega diagnostics limited (pathozyme-HBsAg): U.K. and Biotest ELISA (Biotest Anti-HIV tetra ELISA): Germany, respectively.

RESULTS

Table 1 summarizes the results of anti-HCV-Ab and HBs-Ag reactivity in the 7 different groups of blood donors as well as the incidence of HBV & HCV Co-reactivity in those groups.

As seen from the tables the best three categories of blood donors were:

1- Faculties, institutes and schools (n= 9036, 88 HBs-Ag reactive: 0.97%, 190 HCV-Ab reactive: 2.1%).

2- Clubs, exhibitions, unions, banks, hotels and companies (n= 8052, 138 HBs-Ag reactive: 1.71%, 384 HCV-Ab reactive: 4.77%)

3- Soldiers (n= 3046, 72 HBs-Ag reactive: 2.4%, 205 HCV-Ab reactive: 6.7%).

Followed by the following two categories respectively:

4- Mosques and churches (n= 3490, 77 HBs-Ag reactive: 2.2%, 316 HCV-Ab reactive: 9%).

5- Donors inside the blood bank (donating for their relatives): (n= 13804, 333 HBs-Ag reactive: 2.4%, 1280 HCV-Ab reactive 9.3%).

• The incidence of Hepatitis B & C coinfections was:

1- In those who donated inside the hospital (mostly from rural areas) (in 4778, 13 were reactive): 0.27%.

2- In the external blood drives (in 18443, 7 were reactive): 0.04%.

• Only two positive cases for serum HIV-Ab were identified among all donor categories (n= 46747): 0.004%.

Table (1): Results of anti-HCV-Ab, and HBs-Ag reactivity and incidence of HBV & HCV Co-reactivity in the 7 different groups of blood donors.

Blood drive place	No.	HBs-Ag		HCV		No. of B & C
		No	%	No	%	
Soldiers	3046	72	2.36	205	6.73	
Soccer sport events (paid donors)	6084	190	3.12	519	8.53	
Banks-companies-hotels-exhibitions-clubs-unions	8052	138	1.71	384	4.77	
Faculties-Institutes-Schools	9036	88	0.97	190	2.1	2
Factories (6th October, 10th Ramadan cities)	3235	96	2.97	324	10	4
Mosques & Churches	3490	77	2.21	316	9.05	1
Donors inside the hospital	13804	333	2.41	1280	9.27	13

DISCUSSION

Anti-HCV assays have continued to develop rapidly in the past few years. The incorporation of structural and non-structural HCV genomic antigens has enabled earlier anti-HCV detection and reduced the non-specific test results of the first generation C-100-3 assay. The second generation ELISA technique for the detection of HCV-Ab correlated with HCV-RNA in 97.6% of chronically infected patients and in healthy blood donors [11].

In our study we found out that the incidence of HIV (I & II)-AB among the healthy donors is very minute (only two cases were reactive among 46747 donors). This is because most of the modes of transmission are not found in our oriental country with its traditions and this indicates that our blood supplied for patients, or for those who may need surgery, or have accidents is safe as regards the possibility of HIV transmission.

As regards Hepatitis B virus, the incidence of HBsAg reactivity using ELISA technique varied according to the category of the blood donors being lowest in students followed by the educated employees in banks, hotels, companies, clubs, unions and exhibitions followed by the soldiers, those who donated in campaigns held in mosques or churches, & those who donated inside the blood bank in this order. The

workers in the factories and the professional paid donors in the Stadium were the highest two groups as regards their HBs-Ag reactivity. Generally speaking, the incidence of HBs-Ag reactivity has been reduced greatly after the introduction of the corresponding vaccine especially in the educated people and those of the high socio-economic status. This incidence is almost similar to that found in other studies from western countries [2].

The incidence of HCV-Ab reactivity varied according to the category of blood donors being lowest in the students followed by the employees (banks, hotels, unions, companies, clubs and exhibitions) then soldiers; the incidence of HCV-Ab reactivity in those who donated in Mosques or Churches or inside the blood bank was comparable and the highest incidence of reactivity was found among workers in factories indicating that it may be related to the socio-economic status. This is in agreement with other studies [4,5,7,12]. The relatively higher incidence in low socioeconomic classes may be related to ignorance, pollution or lack of sterilization in the small hospitals or clinics. A great percentage of HCV-Ab reactive workers in the factories came from Zagazig, so this area has to be studied carefully to find out the cause of HCV endemicity there. We can consider the soldiers category as a cross section of the country as a whole that is including all classes high,

medium and low socio-economic status so it gives us the median incidence of a sample from the whole country.

HCV-Ab and HbsAg combined reactivity was found in 0.27% in those who donated inside the blood bank; the incidence was measured in a subgroup of the donors (n= 4778), and also in a subgroup of all other categories of blood donors where the incidence of HCV-Ab+HbsAg reactivity was 0.04% (n=18443). This incidence is much lower than another Egyptian study [9] that reported a 16% incidence using ELISA technique (for anti-HCV-Ab) and a French study that reported HCV-RNA positive rate of 25% in HBsAg seropositive donors versus 86% in HBsAg seronegative patients [14]. The discrepancy could be explained by that the 2 previously mentioned studies were done on patients while our work was done on healthy non-paid donors. Also our results were lower than those found in a Russian study who examined 3358 blood donors and 1781 somatic patients and they verified chronic viral hepatitis in 14% of seropositive donors [2].

Hepatitis C is preventable and clinicians and blood bank doctors should use every possible opportunity in their practice to assess those at risk e.g. co-infection with hepatitis B and actively engage them in risk factor reductions. In a Japanese study [15], the activity of DNA polymerase in co-infected patients was reported to be lower in those with detectable HCV-RNA. HBsAg titres tended to be lower in co-infected patients than in patients with HBV alone. In co-infection, HBV may suppress the replication of HCV and HCV appears to reduce the expression of HBsAg and probably suppresses HBV replication. The extent of this reciprocal interference of virus replication is influenced by the infecting HCV genotype, genotype 1 of HCV having more efficient inhibitory activity on HBV than genotype 2 [10]. No studies are available yet for the influence of genotype 4, the most prevalent in the Egyptian population. Uchida et al. [16], suggested that HCV is coinfected frequently with the silent HBV mutant and the latter probably promotes the replication of the former in the liver.

It has been suggested that HCV core protein may impair the polymerase activity of HBV in vitro potentially lowering HBV titre in coinfected

patients. Therefore, routine enzyme immunoassay may not detect HBV, in spite of the presence of HBV viraemia in low titres. So Lee et al. [8] suggested that PCR for HBV would reveal coexistent HBV viraemia in HCV viraemic patients or donors despite HBsAg negativity by EIA. In HBV endemic areas the possibility of coinfection of HBV in HbsAg negative donors or patients with HCV viraemia should be considered and molecular analysis for HBV-DNA performed.

So, we need to re-evaluate HCV-Ab reactive donors after examining HBV infection by molecular technique as the incidence in our donors may be different, and we need to trace the cause of high HCV-Ab reactivity in Zagazig and in low socio-economic status through further studies.

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