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THE RISK OF TRANSFUSION- ACQUIRED HEPATITIS - C VIRUS INFECTION AMONG BLOOD DONORS IN PORT HARCOURT: THE QUESTION OF BLOOD SAFETY IN NIGERIA

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ABSTRACT

Objective: This study was undertaken to establish the sero-epidemology of Hepatitis C Virus (HCV) antibodies among blood donors in Port Harcourt. Nigeria.

Methods: One Thousand Five Hundred consecutive blood donors presenting to the blood transfusion unit of the University of Port Harcourt Teaching Hospital between January and April, 2003 comprising of 1481 males and 19 females were screened for hepatitis C antibodies using the commercially available Clinotech anti-HCV test strips. All initially positive samples were subsequently tested using a second-generation Trinity Biotec enzyme linked immunosorbent assay.

Results: HCV antibodies were detected in 7(0.5%) of donors. Although statistically not significant, the overall sero prevalence of HCV antibodies was higher in males 7 (0.5%) compared to zero prevalence among females. (χ^2 = 1.94, p = 1.000). Commercial remunerated donors had a higher prevalence of anti-HCV anti-bodies 5 (0.8%) compared to family replacement donors (0.2%) (χ^2 = 1.25, p = 0.26). The highest infection rate occurred in the 18 - 27 years age group 7 (0.7%).

Conclusion: This study shows a 0.5% prevalence of HCV antibodies among blood donors and describes their demographic characteristics. This calls for urgent implementation of a universal donor screening for HCV antibodies and setting up of a national blood transfusion service run on the basis of voluntary, non-remunerated low risk donors.

Key words: HCV antibodies, blood donors, Port Harcourt, Nigeria

INTRODUCTION

Hepatitis C virus infection principally transmitted via intravenous drug use, transfusion of contaminated blood or blood products, multiple heterosexual partners and homosexual activity, and from mother to child has emerged a global public health problem and a significant cause of morbidity and mortality in Nigeria and many parts of the world. [1,2,3.]

In the United States it is estimated that approximately 36,000 new infections occur every year with an estimated 3.9 million (1.8%) of the population infected [4,5]. In developed countries, Hepatitis C antibodies has been found in approximately 0.5 - 2% of the general population and less than 1% of blood donors [6]. Bukh *et al* (1993) reported a 0.5 to 7% prevalence of hepatitis C antibodies among blood donors world wide [7]. Researchers in a town in Japan, Schizonoka Perfecta, have reported a 48.6% prevalence of HCV antibodies, making it a micro epidemic town with the highest prevalence in the world [8].
In France the prevalence of Anti-HCV repeatedly reactive donations was found to be 0.6%.

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In developing countries the epidemiology of HCV is less understood. The risk of transmission of HCV among volunteer blood donors in Peru has been found to be 1.1%, while it is 15.6% among the general population [10]. Anti HCV prevalence among Egyptian blood donors ranged from 6% to 38%, averaging approximately 15%[11]. In Zimbabwe, a prevalence of 0.9% of anti-HCV antibodies was reported among blood donors [12]. Individual efficacy of result of measuring anti-HCV and serum alanine aminotransferases (ALT) levels to screen for HCV appears a promising option. Of anti-HCV sero-positive blood donors, 20% showed elevation of ALT greater than two standard deviations (2SD). When blood from these donors was transfused to patients, about 86% developed post - transfusion hepatitis compared with none for recipients of normal ALT blood [13]. Previous study in Benin, Nigeria among blood donors indicated 14% prevalence among commercial remunerated donors [14]. Olubuyide *et al* in Ibadan, Nigeria obtained a prevalence of 18.7% among patients with hepatocellular carcinoma [15].At this time it seems that combined anti-HCV and ALT level assessment may be the most appropriate way to detect HCV - infected blood [16]. The risk of post-transfusion non-A, non-B hepatitis (NANB) may vary geographically (1 to 11.5%) in the United States [17]. Concern over transfusion associated hepatitis has

therefore led to many blood transfusion services worldwide implementing routine screening of blood donors for HCV antibodies.

There is paucity of data on the prevalence of anti HCV among blood donors in Port Harcourt, Nigeria. Most blood transfusion centers in Nigeria do not presently routinely screen blood intended for transfusion for HCV antibody: The magnitude of transfusion- transmitted hepatitis C in Port Harcourt is unknown and the relative frequency and importance of risk behaviors such as intravenous drug use, high risk sexual activity, injecting with unsterilized needle, communal sharing of blades and sharp instruments, all common high risk behaviors practiced in Port Harcourt, is unknown. Port Harcourt is the capital of Rivers State the heart of the oil and gas industry in the Niger Delta Area of Nigeria. It is cosmopolitan oil rich state hosting the presence of various multinational oil companies with a high influx of migrant workers and job seekers. The economic activity of the indigenous people is mainly agriculture, fishing and hunting.

In this present study, we sought to investigate the sero-prevalence of HCV antibodies among blood donors living in Port Harcourt, to assess the magnitude of the infection, describe the demographic characteristics and to advocate, based on the sero-prevalence, for a screening policy that encourages the exclusion of donors with surrogate markers for hepatitis C virus.

SUBJECTS MATERIALS AND METHODS

Subjects:

Blood samples were collected from a total of 1500 consecutively recruited blood donors (651 commercial and 849 family replacement donors) presenting at the Blood Transfusion unit of the Department of Hematology and Blood Transfusion of the University of Port Harcourt Teaching Hospital Port Harcourt, Nigeria between January and April 2003. The hospital is a 500- bed tertiary health facility in the cosmopolitan oil –rich Rivers state in the heart of the oil and gas industry in the Niger Delta geopolitical zone of Nigeria. Socio-demographic data and written informed consent were obtained from all study subjects. The donors were made up of 1481 males and 19 females aged 18 to 57 years.

Laboratory Methods

Five milliliters of whole venous blood were collected from each study subject and centrifuged. Serum samples were separated, aliquoted, labeled and stored at - 20°C prior to testing. All samples were tested using the commercially available Clinotech anti-HCV test strips (Clinotech diagnostics, Canada). This is a one step test strip for the qualitative detection of antibodies to HCV. All initially positive samples were subsequently tested using a second-generation Trinity Biotec enzyme linked immunosorbent assay kit (Trinity Biotec Plc Ireland), an immunochromatographic method, which is a qualitative in vitro diagnostic test. The testing was done strictly following the manufacturers standard operating procedure.

Data Analysis

Data analysis was performed with a statistical package for personal computer (version 9; SPSS, Inc. Chicago, IL) using comparisons of mean (student t-test) and proportion (chi square test) was appropriate to assess the significance of trends for sero-positivity across ordinal variables. A p- value of ≤ 0.05 was considered significant in all statistical comparisons.

RESULTS

A total of 1500 donor serum samples were tested for anti-HCV. The overall anti- HCV prevalence was 7 (0.5%) with a higher male prevalence $^{7}/_{1481}$ (0.5%) compared to none for females ($\chi^2 = 1.94$, $p = 1.000$). The highest sero-prevalence occurred in the 18-27 years age group $^{7}/_{1026}$ (0.7%). Table 1 shows the age distribution of anti-HCV positivity among blood donors.

Table 2 shows that the anti-HCV prevalence was higher among males $^{7}/_{1481}$ (0.5%) compared to none for females. This difference however was not statistically significant ($p > 0.05$).

The anti-HCV positivity based on donor status is shown in table 3. The prevalence was relatively higher among commercial donors $^{5}/_{651}$ (0.8%) compared to family replacement donors $^{2}/_{849}$ (0.2%) although this difference was not statistically significant ($\chi^2 = 1.25$, $p = 0.2$)

Table 1: Age Distribution of Anti-HCV Positive Blood Donors

Age Range (years)	Number Screened	Number Anti HCV positive	% Anti-HCV positive
18 – 27	1026	7	0.7
28 – 37	362	-	-
38 – 47	103	-	-
48 – 57	9	-	-

$\chi^2 = 3.25$, $p = 0.36$

Table 2: **Sex Distribution of Anti-HCV Positive among Blood Donors**

Sex	Number Screened	Number Anti HCV Positive	% Anti-HCV Positive
Male	1481	7	0.5
Female	19	-	-

$\chi^2 = 1.94$, $p = 1.000$

Table 3: **Anti-HCV Positivity Based on Donor Status**

Donor Status	Number Screened	Number V positive	% Positive
Commercial Donors	651	5	.08
Family Replacement Donors	849	2	0.2

$\chi^2 = 1.25$, $p = 0.26$

DISCUSSION

Chronic infection with HCV constitutes a serious threat to the world's public health in this century as 3.9 million people in the United States [5] and 200 million people worldwide are estimated to have been infected [18].Our study represents the first large-scale effort in the Niger Delta Area of Nigeria to examine the prevalence of anti-HCV among blood donors. Our findings of a 0.5% HCV sero-prevalence rate parallels data from most developed countries [6] and developing countries [12,16] but however at variance with prevalence observed in a previous study in Nigeria among commercial remunerated donors [14] and that observed among patients with hepatocellular carcinoma [15]. It is also at variance with prevalence observed among Egyptian blood donors [11] and in Schizonoka Perfecta Japan [8]. It is possible that the findings of higher anti-HCV prevalence in Egypt and Japan may be a reflection of a number of yet unidentified risk factors. The prevalence of anti-HCV of 0.5% found among blood donors in this study constitutes further evidence of the need for efficient donor screening practices in Nigeria, considering the fact that most transfusion centers in Nigeria do not presently routinely screen donors for anti-HCV. Although the prevalence of anti-HCV found among Nigerian blood donors in this study seems low, it should be noted that the guiding principle of blood transfusion is that it is beneficial and will not cause harm [19]. Thus there is need for the advent of a screening policy for the exclusion of donors with surrogate markers for hepatitis C and implementation of a universal donor screening policy [20].Our findings of a significantly higher anti-HCV prevalence among commercial, remunerated blood donors $^5/_{651}$ (0.8%) compared to family replacement donors $^2/_{849}$ (0.2%) is consistent with the observation from the World Health Organization (WHO) that commercial, remunerated blood donors are more likely to transmit transfusion - transmissible infections (TTI's) than voluntary donors [21]. The higher prevalence of anti-HCV found among commercial donors compared to family replacement donors in this study may have been accounted for by the fact that commercial, remunerated donors often come from the poorest sectors of society and may be poor in health, more likely to give blood more often, undernourished, and at risk of having a transfusion- transmissible infection from high risk behavior; like intravenous drug use, maintenance of multiple sex partners and unprotected sexual intercourse. It is evident that the safest blood is that from the voluntary unpaid donors. Such donors give blood out of altruism and are not under pressure to donate blood [22].

This study indicates that the highest prevalence of anti-HCV occurred among youths of 18 - 27 years. This finding is however at variance with the previous study by Thomas *et al* [23] who found HCV sero-prevalence rate significantly higher in older individuals in the United States. Our study also indicates that the majority of commercial donors in the Niger Delta Region of Nigeria was in the 18- 27 years age group. This observation may be due to the high unemployment rate among youths of the Niger Delta area, making them prone to remunerative blood donation, and other high-risk behaviors.

Blood transfusion currently faces interesting challenges both in the developed and developing countries. The advent of HCV and other transfusion-transmissible infections has provoked a greatly heightened emphasis on transfusion safety with inexplicable implications of complexity and cost. We strongly recommend the immediate take off of the National Blood Transfusion Service in Nigeria to address the issue of chronic shortage of blood and blood products that puts most blood transfusion centers (including ours) in Nigeria under pressure to collecting blood from commercial remunerated donors. We also advocate that routine anti-HCV testing be included in the donor screening menu and that a universal donor screening policy be instituted to exclude donors with surrogate markers for hepatitis C. We recommend that commercial, remunerated donation be discouraged. It is clear from this study, with an anti-HCV prevalence of 0.5%, that a number of our citizens may have contracted transfusion-transmitted HCV infection, since most transfusion centers do not presently routinely screen donors for anti-HCV. We advocate that blood transfusion safety should be the guiding principle

rather than cost. Above all, the average cost of managing a patient who gets a transfusion-transmitted HCV infection is far higher than the average cost of anit-HCV screening in Nigeria, which on the average is five hundred naira (US $ 5.00). The Federal and State governments may do well to muster political will to fund this project through a National Blood Transfusion Service. This will further ensure blood transfusion safety in Nigeria.

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