

## SEROPREVALENCE AND RISK FACTORS OF HEPATITIS C VIRUS IN PATIENTS AND BLOOD DONORS IN KANO, NIGERIA

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### ABSTRACT

Hepatitis C virus (HCV) is a major cause of chronic liver disease resulting in cirrhosis and hepatocarcinoma. It is believed to be widespread in Africa but its epidemiology is incomplete and is yet to be determined in many areas of the sub-saharan Africa including Nigeria. Using third generation enzyme immuno-assay (EIA-3) and recombinant immunoblot assay (RIBA) technique as confirmatory test, we examined the prevalence of HCV antibodies in 226 blood donors and 226 patients attending Aminu Kano Teaching Hospital (AKTH) in Kano, Nigeria and evaluated the risk factors of HCV transmission in this environment. HCV antibodies were detected in 0.4% and 2.2% blood donors and patients respectively. The overall HCV seroprevalence was 1.3%. There was increased infection acquisition with increasing age; one (16.7%) HCV infection occurred in 25-34 years age group and 5 or 83.3% in subjects  $\geq$  45 years in age which was significant ( $P < 0.05$ ). The ratio of infection in male to female was 1:5. Evidence of previous exposure via transfusion was common in HCV seropositive subjects and could be a major risk factor of acquisition in this environment. Adequate screening of blood products in sub-Saharan Africa (Nigeria inclusive) may minimize the risk of HCV transmission and associated health complications.

**Key words:** Hepatitis C virus, seroprevalence, patients, blood donors, risk factors.

### INTRODUCTION

Hepatitis C Virus (HCV) is an enveloped, single-stranded, positive sense RNA virus. It is a member of flaviviridae family placed in genus, hepacivirus (1, 2). It is an important

cause of liver disease in the tropics; provoking chronic persistent infection progressively causing chronic hepatitis leading to liver cirrhosis and hepatocarcinoma (HCC) (3,5).

As at 1997, the World Health Organization (WHO)<sup>(6)</sup> estimated that about 170 million people were chronic carriers of HCV infection worldwide. Furthermore, an average of 14% of infected persons was at risk of developing liver

cirrhosis, HCC or both annually. There are about 3.2-4 million cases of chronic HCV in the United States (US) alone which results in at least 10,000 deaths each year (7,8). In Canada, the number of HCV cases was estimated to be as high as 270,000 (9).

Routes of HCV transmission include parenteral (including illicit drug abuse by injection), sexual, vertical (from mother to child) and through blood transfusion while tattooing and all forms of circumcision (ritual or traditional) have been suggested as modes of acquisition of the disease (10-

13).

Data from various epidemiological studies globally indicated that HCV seroprevalence among the general population varies from  $< 1\%$  to  $2\%$  in industrialized countries of the west (14) and  $>20\%$  in certain regions of Africa (15) and south-east Asia (16). However, among the blood donors, the HCV seroprevalence was  $1.4\%$  in the US,  $0.5-1\%$  in the United Kingdom (UK) and  $0.68\%$  in France (17). In sub-saharan Africa (Nigeria inclusive), there is paucity of data on HCV infection while a few studies carried out in Nigeria were mainly from the southern part of the country, and none from our hospital location in Kano; a commercial centre in the north-west geopolitical zone of Nigeria. The study was therefore aimed 'to determine the seroprevalence of HCV among blood donors and patients attending Aminu Kano Teaching Hospital (AKTH), a tertiary health centre in Kano, Nigeria and evaluate the risk factors of HCV acquisition in this environment.

### SUBJECTS, MATERIALS AND METHODS

The subjects screened for HCV antibodies comprised of 226 (215 males and 15 females) asymptomatic blood donors consecutively recruited for testing. Others were 226 (95 males and 127 females) patients from the general outpatient Department (GOPD) of

the hospital who were randomly selected for the study. In total, there were 310 or 68.6% males and 142 (31.4%) females. Their ages ranged from 15 to 59 years (median 37.5 years). Using a structured questionnaire and with informed consent, all the participants were interviewed to record history of surgery, blood transfusion, tattooing, use of illicit drugs like cocaine or heroin by injection, known previous infectious diseases, anaemia etc. All individuals who reported for blood re-donation for the blood bank during the investigation and the immunocompromised were excluded from the study. The study was conducted between February and August, 2007 and was approved by ethnical committee of the hospital.

**TABLE 1: HCV ANTIBODY TEST RESULTS OF SUBJECTS AT AKTH**

Subjects	No screened	No positive (%)
Patients	226	5 (2.2)
Blood donors	226	1 (0.4)
Total	452	6(1.3)

#### Serological assay

Serum samples were obtained by standard methods and tested for HCV antibodies. Briefly, 5 millilitres of blood was collected from each subject by venous puncture and centrifuged at 3000rpm for 5 minutes. Serum was separated from each blood sample and stored at - 20°C until analyzed. The sera were tested for anti-HCV antibodies by employing third generation enzyme immuno-assay technique (Caltech. Diagn. Incorp. Cal. USA). For assurance, all positively reactive samples from the initial test were retested with recombinant immunoblot assay (RIBA) or, western blot, (Diasorin, Italy) for confirmation. Testing Procedures and interpretation of results were as prescribed by the manufactures of test kits. These were methodically followed and strictly adhered to. All positive patients were informed of the test results for further medical evaluation and management. Data were analysed using simple proportion student's t-test or Wilcoxon signed rank was used to compare continuous variables and the chi-square test was used to compared proportions. A p value of  $\leq 0.05$  was considered significant.

#### RESULTS

The HCV diagnosis of the participants comprising blood donors and patients attending AKTH in Kano, Nigeria is shown in table 1. The overall HCV seroprevalence was 1.3% consisting of 2.2% and 0.4% seropositive patients and blood donors respectively. Of 452 subjects screened for HCV infection, 310 (68.6%) were males and 142 or 31.4% were females. The ages of patients ranged from 15-59 years (mean  $\pm$  SD, 39.5  $\pm$  3.5) while ages of the blood donors ranged from 18-49 (mean  $\pm$  SD, 35.2  $\pm$  4.1) (Table 2).

**TABLE 2: SEX AND AGE RANGE OF PATIENTS AND BLOOD DONORS SCREENED FOR HCV ANTIBODY AT AKTH**

Subjects	No screened (Male/female)	Age range (yr.) Mean $\pm$ SD
Patients	226 (95/127)	15 - 59 (39.5 $\pm$ 3.5)
Total (%)	452(310)	(68.6)/142 (31.4)

The distribution of HCV seropositivity according to age range, sex and history of transfusion is shown in table 3. Out of 6 HCV seropositive subjects, 5 or 83.3% were females with all of them having history of blood transfusion and was found to be statistically significant ( $P < 0.05$ ) while the remaining one was a male who did not have any record of transfusion. However, the possible source or route of acquisition in this male subject could not be ascertained.

**TABLE 3: HCV SEROPOSITIVITY OF SUBJECTS ACCORDING TO SEX AND HISTORY OF TRANSFUSION**

Age range of Subjects (yr.)	No (% +ve)	sex M F	No (% with history of transfusion)
15 - 24	-	- -	-
25 - 34	1(6.7)	1 -	1
35 - 44	-	- -	-
$\geq 45$	5(83.3)	1 4	4
Total (%)	6	1(16.7) 5(83.3)	5(83.3)

There was increased infection acquisition with increasing age; five seropositive subjects were  $\geq 45$  years in age which was significant ( $P < 0.05$ ) while the remaining female subject was 27 years old.

#### DISCUSSION

In this study, the overall prevalence of HCV infection was found to be 1.3% comprising blood donors and patients attending our hospital (AKTH) in Kano, Nigeria. This prevalence is low compared with the rates reported elsewhere in the country viz: among some selected risk groups including 37.9% in patients attending STD clinics (18), 18.7% among patients with HCC (19) and 14% among blood donors and patients attending sickle-cell anaemia clinics (20) in Nigeria. The variations may be due to difference in study populations, and rate of exposure to risk factors of HCV transmission in those areas. However, this figure of 1.3% falls within the published data of 0.4 - 1.5% seroprevalence from Western Europe and North America (17) and corroborates the level of infection rate of HCV in those areas.

The prevalence of HCV infection in our study was 0.4% among blood donors and 2.2% among hospital patients. These results were consistent with the estimates of 0.3 - 1 among blood donors in Europe and Australia, (11) and 1-2.4% reported from parts of

Asia including Pakistan, India, China and Bangladesh (21). These prevalence rates were however, lower than 4% - 12.5% of HCV infection published from various regions of Africa (22), and as high as 47% reported in parts of Nigeria (23,24). The wide disparity in HCV prevalence may be due to profound diversity in demographic characters of populations and subpopulations in this continent. Moreso, the issue of quality and reliability of HCV infection diagnosis especially in poor-resourced developing economics due to inadequate facility and high cost of test kits may play a role in the present scenario (22).

The incidence of HCV infection was correlated with increasing age (one case in 25-34 years age range; 5 cases in  $\geq 45$  years age) and was significantly ( $P < 0.05$ ) higher in females than males by ratio 5:1. The scenario corroborates the report of Halim and Ajayi<sup>(23)</sup> who suggested that age could be a contributing risk factor in the acquisition of HCV infection especially in endemic areas. Similarly, the reason for increased rate of infection in females than their male counterparts may be explained by tendency of exposure to multiple risk factors in depressed economy with inadequate health care system in a country like Nigeria. These include variety of poorly conducted surgery-assisted treatments for gynaecological problems which may require blood transfusion. For instance, evidence of previous exposure to HCV through caesarian operation (CS) and transfusion (conducted outside of our hospital) during child delivery was given by 5 (83.3%) female subjects all of whom were HCV positive; a finding that is statistically significant ( $P < 0.05$ ). This outlook corroborates the hypothesis that transfusion is a major risk factor in the transmission of HCV especially in poor-resourced areas of the developing world. In view of this outcome, it is imperative that adequate screening of blood and blood products for HCV be carried out in all blood transfusions to minimize the risk of HCV transmission in sub-Saharan Africa including Nigeria. There is need to provide necessary facility in this regard that will aid HCV control measures and prevent associated health complications.

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