

*Full Length Research Paper*

# Prevalence of hepatitis C virus infection among blood donors in some selected hospitals in Kano, Nigeria

<sup>1</sup>J.A. Bala, <sup>2\*</sup>A.H. Kawo, <sup>2</sup>M.D. Mukhtar, <sup>3</sup>A. Sarki, <sup>3</sup>N. Magaji, <sup>3</sup>I.A. Aliyu and <sup>4</sup>M.N. Sani

<sup>1</sup>Department of Medical Laboratory Science, Faculty of Medicine

<sup>2</sup>Department of Microbiology, Bayero University, PMB 3011, Kano, Nigeria

<sup>3</sup>Department of Pathology, Aminu Kano Teaching Hospital, PMB 3452, Kano, Nigeria

<sup>4</sup>Department of Microbiology, Ahmadu Bello University, PMB 1045, Zaria, Nigeria

## ABSTRACT

Hepatitis C virus (HCV) is the major etiologic agent of post-transfusional hepatitis. Sera from 320 participants (80 enrolled from each of four blood banks from Wudil, Gaya, Sumaila and Takai local government areas) were tested for antibodies to HCV. A total of 319 subjects were males and 1 female between the ages of 14–64 years. One-step rapid test was employed in the analysis. Eleven (11) out of 320 sera (3.4%) were sero-positive (reactive). This showed a relatively low prevalence of HCV infection among blood donors in this part (north) of the country when compared with those established for the southern parts of Nigeria. However, the prevalence (3.4%) was found to be higher when compared with similar reports from western countries. Prevalence rate based on the 80 subjects in each LGA indicated that Gaya had the highest prevalence of 4(5.0%), followed by Wudil with 3(3.8%); Sumaila and Takai were observed to have the least prevalence rate of 2(2.5%) each. However, no significant statistical difference was observed ( $P>0.05$ ) between the LGAs. There was no statistical association between the demographic data and HCV infection. However, the relationship between possible risk factors and HCV infection revealed significant statistical association in the transmission through family (vertical transmission), receipt of injection as well as consumption of alcohol. There is need for public intervention through mandatory screening of blood and blood products, destruction of disposable needles, adequate sterilization of re-usable materials and promotion of health education on HCV infection and its prevalence.

**Keywords:** Prevalence, Hepatitis C virus, Blood donors, Kano, Nigeria.

## INTRODUCTION

Historically, patients with hepatitis without serological evidence of hepatitis A or B infection, initially described in recipient of blood or blood products were classified as non-A, non-B hepatitis. This was only possible following the development of diagnostic serological tests for hepatitis A and B in 1965 and 1973 respectively (Papaerangelou, 1987). In 1989, an agent of non-A, non-B viral hepatitis was identified as RNA virus with immunological specificity for transfusion associated non-A, non-B hepatitis and named hepatitis C by Choo *et al*

(1989). HCV has long incubation period of 2 to 26 weeks (Chukwurah *et al.*, 2005). The virus is plasma-borne and has the same routes of transmission in comparison with hepatitis B virus-sexual contact, exposure to contaminated blood and blood products, or vertical transmission, that is, from mother to her fetus during the prenatal period. HCV infection is usually silent and acute phase is asymptomatic, progressing to chronic cirrhosis and hepatocellular carcinoma. HCV has emerged in recent years as the most common basis for liver disease in the United States, having infected an estimated 3.9 million people in the country (Alter *et al.*, 1999). HCV is a major public health problem worldwide and it is estimated that 200 million people, representing 3% of the world population, are chronically infected with the virus (NIH,

---

\*Corresponding Author E-mail: [ahkawo@yahoo.com](mailto:ahkawo@yahoo.com);  
Tel: +234-802-3153895

2002). In developed countries particularly USA and UK, there is a mandatory screening test for Hbs-Ag and antibodies to HCV, HIV 1 and 2 and *Treponema pallidum* (syphilis) (Garson *et al.*, 1992; Aubuchon *et al.*, 1997). Most developing countries and indeed some centers in Nigeria do not screen donors for hepatitis C virus (Chukwurah *et al.*, 2005), hence there is dearth of information on the prevalence of this clinically important virus. Therefore this study was carried out to investigate the seroprevalence of HCV antibodies among blood donors in some selected blood banks in some LGAs in the southern part of Kano State, northern Nigeria.

## MATERIALS AND METHODS

### Study area/population

A total of three hundred and twenty (320) blood samples were collected from consented blood donors aged 14 – >54 years in four local government areas (LGAs) of Kano State (Wudil, Gaya, Sumaila and Takai) and screened for anti-HCV between May, 2010 and January, 2011.

### Sample collection, processing and analysis

Three milliliters (3 ml) of whole blood was withdrawn aseptically from the cephalic vein of the ante-cubital fossa of each donor using a sterile syringe. The blood was transferred to plain container and allowed to clot for separation (Cheesbrough, 2005). The clotted blood was spun at 3000 *g* for 10 minutes, the serum separated into a sterile plain container(s) and stored at -20°C until ready for the assay. The analysis was carried out using ACON one-step HCV test strip (manufactured by ACON laboratories, Inc., CA92121, USA).

### Test procedure

The pouches were allowed to assume room temperature before the test was carried out, and the strips were removed and used immediately. The strips were immersed vertically into the sample bottles containing the sera with the arrow pointing toward the sera and were allowed to stay for 5 minutes and then placed on a non-absorbent flat surface and the results were read at 15 minutes, and recorded accordingly.

### Interpretation of results

*Positive* – Two distinct red lines appeared; one line in the control region (C) and another line in the test region (T). The intensity of red color varied depending on the concentration of the anti HCV present in the specimen.

*Negative* – One red line appeared in the control region (C), no apparent red or pink line appeared in the test region (T).

*Invalid* – One red line in the test region only, i.e., control line fails to appear.

## Statistical analysis

The data generated in this study was analysed for statistical significance in the association of HCV infection and demographical parameters as well as possible risk factors using Pearson Chi-Square with the aid of Statistical Package for Social Sciences (SPSS) version 15.0.

## RESULTS

Out of 320 blood donors involved in the study, 11(3.4%) were sero-positive to hepatitis C virus (HCV) while 309(96.6%) were sero-negative (Table 1). Table 2 depicts the results compared to the four LGAs studied. Out of the 80 subjects in each LGA, Gaya had the highest prevalence rate of 4(5.0%), followed by Wudil with 3(3.8%) while Sumaila and Takai had the least prevalence rate of 2(2.5%) each. However, there was no significant difference ( $P > 0.05$ ) between the LGAs. Table 3 shows the prevalence of HCV in blood donors in relation to demographical parameters. The males had the highest frequency of donation with 319(99.7%) while only 1(0.3%) of the subjects was a female. Hence, the prevalence rate was found to be high in the males. The age group of 24–33 years had the highest prevalence of 4(1.3%) while those that attended Arabic schools had the highest frequency of donation with 113(35.3%). There was no significant difference ( $P > 0.05$ ) between the donors. The relationship among possible risk factors and HCV infection in Table 4 revealed a significant ( $P < 0.05$ ) association in vertical transmission, receiving injection at time of sickness, history of sexually-transmitted infections (STIs) and alcohol consumption while it indicated a non-significant ( $P > 0.05$ ) association in transmission through blood transfusion, history of surgery, history of hepatitis and cigarette smoking. All the donors were found to use new syringes as well as not sharing needles with other people when receiving injection each time; as such no disease was recorded in each case.

## DISCUSSION

The prevalence of HCV in a population can only be ascertained by serological studies, as many of those with persistent viraemia do not have symptoms. In this study, one-step rapid procedure was carried out to establish the prevalence of HCV infection. The HCV prevalence in this

**Table 1.** Overall results of the HCV prevalence in the study area

Total number of samples	No. of Reactive (%)	No. of non-reactive (%)
320	11(3.4)	309(96.6)
<b>P-value</b>	<b>0.000 **</b>	

Key: \*\* indicates highly significant.

**Table 2.** Prevalence of HCV according to local government area

LGA	Total number of samples	No. of Reactive (%)	No. of non-reactive (%)
Wudil	80	3(3.8)	77(96.3)
Gaya	80	4(5.0)	76(95.0)
Sumaila	80	2(2.5)	78(97.5)
Takai	80	2(2.5)	78(97.5)
<b>P-value</b>			<b>0.793<sup>NS</sup></b>

Key: **NS** indicates not significant

study was found to be 3.4% (Table 1). This is lower than 12.3% as well as 6.3% HCV prevalence rates reported by Halim and Ajayi (2000) as well as Sheyin *et al* (2011) respectively. In addition, the prevalence of 3.4% obtained in this study is also lower than the 8.4% HCV prevalence reported from Abuja by Agwale *et al* (2004). Chukwurah *et al* (2005) also reported a prevalence of 7.6% among blood donors in south-eastern State of Nigeria. Ayolabi *et al* (2006) reported a sero-prevalence rate of HCV among blood donors in Lagos, Nigeria to be 8.4%, which is also higher than the one observed in the present study (3.4%). On the other hand, Beatriz *et al* (2000) reported a lower 1.2% sero-prevalence rate of HCV in the general population of northwestern Tanzania. The finding in this study is higher than values ranging between 0–1.4% reported from USA and Europe (Alter *et al.*, 1999). These variations could be due the fact that prevalence of HCV greatly differs according to the geographical location of a population. The donors that attended Arabic schools, which constitute mainly the ‘Almajirai’, farmers that reside in rural areas and other categories of people that did not attend western education had the highest frequency of blood donation (Table 3). One would have expected that those attended tertiary institutions would donate blood more than any group of people; however, the reverse was the case in this study. This could be due to the fear of its implications. In addition, the higher number of male donors could be as result of inability of females to donate because of some physiological factors such as menstruation and pregnancy, which limit the chances of female donation. However, most females even those fit to donate did not volunteer to donate. The most common risk factor of HCV in developing countries like Nigeria is transfusion of unscreened blood or plasma-derived products (Conry-Contelena *et al.*, 1996). In the present study, the prevalence rate was related to the history of

transfusion among the donors (Table 4) where it was observed that all the cases occurred among the donors that did not receive blood transfusion, however, this is at variance with previous findings of Sheyin *et al* (2007; 2011) who reported that in comparison with other risk factors, blood or blood products transfusion was found to be the highest risk factor with 5(15.2%) prevalence. Alcohol consumption is a risk factor for HCV infection accounting for a prevalence of 1(0.3%) and 10(3.1%) among alcoholics and non-alcoholics respectively (Table 4). Alcohol intake accelerates the emergence of HCV cirrhosis of the liver (John and Anne, 2007).

## CONCLUSIONS AND RECOMMENDATIONS

From the results obtained in the present study, it can be clearly stated that hepatitis C virus infection exists among the study population. The results further indicated a significant prevalence rate among the blood donors. It could therefore be suggested that in order to reduce the incidence of HCV associated transfusion hepatitis in Nigeria based on the results obtained in this study, there is need for larger prospective studies on the prevalence and chronicity of hepatitis C virus in potential blood donors within the country and also to encourage more educated people to donate blood. Even though serological test remains a valuable tool for the identification of etiology of HCV infection, however, in spite of advances made in the knowledge of the spread, epidemiology, diagnosis and treatment of chronic hepatitis C, there is need to develop and implement a comprehensive strategy to prevent and control this infection. On the overall, there should be public enlightenment about the presence of HCV infection and possible risk factors.

**Table 3.** Prevalence of HCV according to demographical characteristics of the subjects

<b>Demographic characteristic</b>	<b>Total examined (%)</b>	<b>Number of reactive (%)</b>	<b>Number of non-reactive (%)</b>
<b>Sex</b>			
Males	319(99.7)	11(3.4)	308(96.3)
Females	1(0.3)	0(0.0)	1(0.3)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.850<sup>NS</sup></b>	
<b>Age group (years)</b>			
14-23	56(17.5)	1(0.3)	55(17.2)
24-33	127(39.7)	4(1.3)	123(38.4)
34-43	91(28.5)	3(0.9)	88(27.5)
44-53	35(10.9)	3(0.9)	32(10.0)
≥54	11(3.4)	0(0.0)	11(3.4)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.563<sup>NS</sup></b>	
<b>Marital status</b>			
Married	265(82.8)	9(2.8)	256(80.0)
Single	55(17.2)	2(0.6)	53(16.6)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.929<sup>NS</sup></b>	
<b>Educ. Qual.</b>			
None	11(3.4)	2(0.6)	9(2.8)
Arabic	113(35.3)	3(1.0)	110(34.4)
Primary	82(25.6)	2(0.6)	80(25.0)
Secondary	71(22.2)	2(0.6)	69(21.6)
Tertiary	43(13.4)	2(0.6)	41(12.8)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.094<sup>NS</sup></b>	
<b>Occupation</b>			
Public servant	39(12.2)	1(0.3)	38(11.9)
Unemployed	35(10.9)	2(0.6)	3(10.3)
Self-employed	246(76.9)	8(2.5)	238(74.4)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.718<sup>NS</sup></b>	
<b>Settlement</b>			
Urban	9(2.8)	0(0.0)	9(2.8)
Semi urban	89(27.8)	4(1.3)	85(26.6)
Rural	222(69.4)	7(2.7)	215(67.2)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.714<sup>NS</sup></b>	

Key: NS indicates no statistical significance (P&gt;0.05).

**Table 4.** Prevalence of HCV according to possible risk factors

Possible Risk Factor	Total examined (%)	Number of reactive (%)	Number of non-reactive (%)
<b>Blood transfusion</b>			
Yes	5(1.6)	0(0.0)	5(1.6)
No	315(98.4)	11(3.4)	304(95.0)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.671<sup>NS</sup></b>	
<b>History of liver disease</b>			
Yes	5(1.6)	0(0.0)	4(1.3)
No	316(98.7)	11(3.4)	305(95.3)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.704<sup>NS</sup></b>	
<b>Surgery before</b>			
Yes	5(1.6)	0(0.0)	4(1.3)
No	316(98.7)	11(3.4)	305(95.3)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.704<sup>NS</sup></b>	
<b>Family history of hepatitis</b>			
Yes	19(5.9)	7(5.9)	
No	301(94.1)	4(1.2)	12(3.8)
Total	320	11(3.4)	297(92.8)
<b>P-value</b>		<b>0.000**</b>	309(96.6)
<b>Medication use</b>			
Injection	218(68.0)	11(3.4)	207(64.7)
Tablet	102(31.9)	0(0.0)	102(31.9)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.021*</b>	
<b>New syringe or re-usable</b>			
New syringe	320(100.0)	11(3.4)	309(96.6)
Re-usable	0(0.0)	0(0.0)	0(0.0)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>.a</b>	
<b>Sharing needle</b>			
Yes	0(0.0)	0(0.0)	0(0.0)
No	320(100.0)	11(3.4)	309(96.6)
Total	320(100.0)	11(3.4)	309(96.6)
<b>P-value</b>		<b>.a</b>	
<b>Suffered from STIs before</b>			
Yes	1(0.3)	1(0.3)	0(0.0)
No	319(99.7)	10(3.1)	309(96.6)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.000**</b>	
<b>Alcohol consumption</b>			
Yes	4(1.3)	1(0.3)	0(0.0)
No	316(98.7)	10(3.1)	309(96.6)
Total	320	11(3.4)	309(96.6)
<b>P-Value</b>		<b>0.017*</b>	
<b>Cigarette smoking</b>			
Yes	9(2.8)	0(0.0)	9(2.8)
No	311(97.2)	11(3.4)	309(96.6)
Total	320	11(3.4)	309(96.6)
<b>P-value</b>		<b>0.566<sup>NS</sup></b>	

Key: \*\* indicates highly significant.\* indicates significant.

<sup>NS</sup> indicates not significant.

.a indicates inability of computing statistics because of one variable is constant.

## ACKNOWLEDGEMENTS

The authors gratefully acknowledge the assistance of the entire medical laboratory scientists, technicians and assistants at Wudil, Gaya, Sumaila and Takai general hospitals, Kano State, Nigeria. Special appreciation goes to the Staff of Microbiology Unit, Department of Pathology, Aminu Kano Teaching Hospital, Kano, Nigeria for their technical assistance.

## REFERENCES

- Agwale MS, Lorine T, Chad W, Odama L, Kimy L, Dolores D, Negedu RM, Israel A, Shehu, BM, Uford I, Graham B, Reiner Z (2004). Prevalence of hepatitis C (HCV) co-infected in HIV-infected individuals in Nigeria and characterization of HCV genotypes. *J. Clin. Vir.* 1:5356.
- Alter MJ, Kruszon-Moran P, Nainan OV (1999). The prevalence of hepatitis C virus infection in the United States (1988–1994). *New Engl. J. Med.* 341:556-562.
- Aubuchon JP, Birkneyes JD, Bush MP (1997). Safety of blood supply in the United States: Opportunities and controversies. *Ann. Int. Med.* 127:904–909.
- Beatriz HT, Arthur L, Glen B, John S, James ED, Harvey JA, Thomas RO (2000). Sero-prevalence of hepatitis C virus in the general population of north-western Tanzania. *Amer. J. Trop. Med. Hyg.* 62(1):138–141.
- Cheesbrough M (2005). *Collection of blood for hepatitis C virus*. District laboratory practice in tropical countries. Part 2. Cambridge university press. Pp. 53-357.
- Choo Q, Kuo G, Weiner A, Overby L, Bradley D, Houghton M (1989). Isolation of a CDNA clone derived from a blood-borne non-A, non-B viral hepatitis genome. *Sci.* 244(4902):59-62.
- Chukwurah EF, Ogbodo SO, Obi GO (2005). Sero-prevalence of hepatitis C virus (HCV) infection among blood donors in south-eastern State of Nigeria. *Biomed. Res.* 16(2):133–135.
- Conry–Contelena C, Vanraden M, Gibble J (1996). Routes of infection, viraemia and liver disease in blood donors found to have hepatitis C virus infection. *New Engl. J. Med.* 336:919–922.
- Garson JA, Clewly JP, Simmonds P, Zhang LQ, Mori L, Ring C, Follet EAC, Martins S (1992). Hepatitis C viraemia in UK blood donors. *Vir. Sang.* 218–223.
- Halim NK, Ajayi OI (2000). Risk factors and sero-prevalence of hepatitis C antibody in blood donors in Nigeria. *East Afr. Med. J.* 77:410–412.
- John MD, Anne ED (2007). Alcohol and hepatitis C. *J. Aust. Med.* 187(1):47-48.
- National Institute of Health (2002): NIH consensus development conferences: Management of hepatitis C. *Gastr-oenterology* 123(6):2082-2099.
- Papaerangelou G J (1987). Epidemiology of hepatitis A and B. *Infect.* 15:221–227.
- Sheyin Z, Ahmad AA, Jatau ED (2007). Determination of HCV antibodies amongst blood donors in Kaduna metropolis, Nigeria. *Biol. Environ. Sci. J. Trop.* 4(1):54-57.
- Sheyin Z, Jatau ED, Mamman AI, Randawa AJ (2011). Risk factors associated with prevalence of hepatitis C virus in Kaduna State, Nigeria. *Biol. Environ. Sci. J. Trop.* 8(3):264-266.