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*Full Length Research Paper*

# Hepatitis C Virus Antibody Among Blood Donors: The Experience in a Nigerian Blood Transfusion Service Centre

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**Hepatitis C virus (HCV) is one of the blood borne viral agents of significant worldwide medical concern because of post transfusion hepatitis. This study is to determine baseline data on HCV in our blood service to guide future planning towards the quality of blood transfusion. All consenting blood donors between January and March 2013 were screened with ELISA for hepatitis C virus antibody and their ABO blood groups determined. The subjects were 2382 (87.5%) voluntary and 339 (12.5%) family replacement blood donors. The overall prevalence of HCV antibody among our subjects was 6.1%. There were 156 (6.6%) sero positive HCV reactions among the voluntary blood donors which is significantly higher than 10 (3.0%) observed among family replacement donors;  $p=0.01$ . The sex prevalence of HCV among the male and female donors were 6.2% and 5.9% respectively;  $p=0.7$ . The highest prevalence of 12.6% was recorded among donors aged 46-55 years. The rate of HCV antibody positivity was 8.4% among new voluntary non remunerated blood donors, 2.5%, 3.0%, and 8.6% among regular voluntary non remunerated blood donors, family replacement blood donors and lapsed donors respectively. The differences in the HCV prevalence among the ABO blood groups were not significant;  $p>0.05$ . We conclude that HCV infection is common among all types of blood donors.**

**Keywords:** Hepatitis C virus, Blood donors, Blood Service

## INTRODUCTION

Hepatitis C virus is one of the blood borne viral disease agents of medical concern worldwide because of post transfusion hepatitis. Hepatitis C virus (HCV) was identified as being responsible for 90-95% of post transfusion non A, non B hepatitis with the propensity to progress to chronic liver disease terminating in liver

cirrhosis or hepatocellular carcinoma in 30-40% of cases.

Many healthy looking blood donors might be asymptomatic carriers with the risk of infecting the recipients of their cellular and plasma blood components. Several studies have been carried out on the prevalence of HCV antibody among blood donors who were mainly replacement and paid.

In Nnamdi Azikwe University Teaching Hospital, Nnewi, South East Nigeria, Odenigbo et al (2011) reported a 2.0% prevalence of HCV antibodies among their blood

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donors with the highest rate (3.2%) of positive reaction occurring in the 31-40 years age bracket and a low 1.4% within the ages of 21-30 years. Jeremiah and others (2008), while analyzing HCV antibody positivity in their blood donors who were 88% males and 63% commercial, found 5.0% sero-positivity with highest infection rate among paid donors. The age 21-30 years had the highest rate of infections. 80% of seropositive reactions in their study were among the commercial blood givers. The sex difference in the sero-positivity to HCV in their blood donors was significantly higher among the female donors. Erhabor and colleagues (2006) found an overall rate of 0.5% HCV among their entirely male paid and family replacement blood donors in Port Harcourt, Southern Nigeria. The highest rate of anti HCV antibody positive reaction was within the ages of 18-27 years. While paid donors had a prevalence of 0.8%, family replacement blood donor had a lower 0.2% HCV sero-positivity in the same study. In a 2009 study, Buseri et al reported gross 28.8% transfusion transmissible infections (TTIs) rate, and 2.6% dual infections among a cross section of prospective blood donors in Osogbo, Western Nigeria. They also reported a 6.0% anti HCV antibody in their male dominated blood donors with infection rate being highest in the age range 18-47 years. Udeze et al (2009) found a prevalence of 8.0% anti HCV among their 99.92% male blood donors aged 18-60 years. The highest prevalence of 11.5% occurred in the 30-39 year group. Among blood donors in Makurdi, North central Nigeria, Alao et al (2010) reported a prevalence of 5.4% HCV antibody. They found the highest rate of antibody positivity in donors aged above 50 years.

Nkrumah and co-workers (2011) in Ghana, West African, reported a 9.4% antibody marker of HCV in their blood donors drawn from the rural areas where centers for collection of blood are located close to the village communities. The sex prevalence of anti HCV in their study was higher (11.6%) among their male blood donors.

Among blood donors at the Railway Hospital Rawalpindi Pakistan, Mumtaz et al (2002) found a 6.21% HCV and 5.86% HBV prevalence in donated blood. Another study in the Armed Forces Institute of Transfusion in Rawalpindi, Bhatti et al (1996) reported a 4.78% anti HCV among their blood donors.

Fischer (1995) from a study conducted in Anderson Cancer Center, reported the prevalence of 0.5-1.5% sero-positivity to hepatitis C virus in the general population of the United States and 0.65% anti HCV in their blood donors. Jain et al (2003) found an overall prevalence of 1.57% HCV in their blood donors in New Delhi, India with higher rate of infection among their male voluntary blood givers. They noticed the highest rate of 1.62% HCV infection among their repeat donor and 1.55% in first time voluntary blood donors while the age specific rate was highest in the range of 20-29 year blood donors.

Chinparlee et al (2011) studying the impact of 98% coverage on expanded vaccination program in Thailand described decreasing trends of TTIs infections among new donors. He noticed a faster reduction in Hepatitis B virus for which vaccine is available and a slower reduction in HCV that has no Vaccine. He recommended the use of nucleic acid testing of blood donors for HCV to prevent transfusion of antibody negative TTIs contaminated blood.

## AIMS

There are insufficient data on the sero-positivity of hepatitis C virus among voluntary blood donors in our setting. The introduction of centralized blood service to source blood from altruistic blood donors calls for generation of baseline data on HCV in this growing type of blood givers to guide future planning for improved quality service delivery.

## METHODS

A total of 2721 accepted blood donors who consented to donate blood at the Jos centre of the National Blood Transfusion Service (NBTS) between January and March 2013 were recruited into this prospective study. The donors were classified into family replacement blood donors (FRBD), new voluntary non-remunerated blood donors (NVNRBD), regular voluntary non-remunerated blood donors (RVNRBD) and lapsed voluntary non-remunerated blood donors (LVNRBD). Their biodata were taken before blood donation. At the end of blood donation, 5.0ml of whole blood was collected into plain blood sample container before phlebotomy needle was removed. The blood samples were allowed to clot and retract before sera were separated using Pasteur pipettes. Enzyme linked immunosorbent assay HCV screening was done using Diapro anti HCV kit according to the manufacturer's guide. The epi info software was used for statistical analysis; Chi-square was used to determine significant difference in the prevalence of HCV between groups of donors. P value less than 0.05 was considered significant. Results are presented in tables.

## RESULTS

A total of 2721 blood units from donors were screened for antibody to HCV in this study. The overall prevalence of HCV antibody among our subjects was 6.1%. The subjects were 2382 (87.5%) voluntary and 339 (12.5%) family replacement blood donors. There were 156 (6.6%) sero positive HCV reactions among the voluntary blood donors which is significantly higher than 10 (3.0%) observed among family replacement donors;  $p=0.01$ . The

**Table 1.** Distribution of blood donors according to HCV positive reactions among age groups.

Age range (Years)	No HCV Neg	No HCV Pos	Total
18 -25	908 (94.1%)	57 (5.9%)	965 (35.5%)
26 -35	974 (96.2%)	38 (3.8%)	1012 (37.2%)
36 -45	387 (91.9%)	34 (8.1%)	421 (15.1%)
46 -55	201 (87.4%)	29 (12.6%)	230 (8.5%)
56 -65	83 (89.2%)	10 (10.8%)	93 (3.4%)
Total	2555 (93.9)	166 (6.1%)	2721 (100.0%)

**Table 2:** The comparative prevalence of HCV among age groups

Age range (years)	% HCV	Age range (years)	% HCV	P value
18 -25	5.9%	26 -35	3.8%	0.03
18 -25	5.9%	36 -45	5.1%	0.13
18 -25	5.9%	46 -55	12.6%	0.0004
18 -25	5.9%	56 -65	10.8%	0.06
26 -35	3.8%	36 -45	8.1%	0.0005
26 -35	3.8%	46 -55	12.6%	0.000001
26 -35	3.8%	56 -65	10.8%	0.002
36 -45	5.1%	46 -55	12.6%	0.50
36 -45	5.1%	56 -65	10.8%	0.40
46 -55	12.6%	56 -65	10.8	0.60

**Table 3.** HCV prevalence among various blood donor types

Donor type	HCV Neg (%)	HCV Pos (%)	Donor type	HCV Neg (%)	HCV Pos (%)	P value
FRBD	329 (97.0)	10 (3.0)	NVNRBD	1391 (91.6)	127 (8.4)	0.0006
FRBD	329 (97.0)	10 (3.0)	LVNRBD	117 (91.4)	11 (8.6)	0.008
FRBD	329 (97.0)	10 (3.0)	RVNRBD	718 (97.5)	18 (2.5)	0.6
NVNRBD	1391 (91.6)	127 (8.4)	LVNRBD	117 (91.4)	11 (8.6)	0.9
NVNRBD	1391 (91.6)	127 (8.4)	RVNRBD	718 (97.5)	18 (2.5)	0.000001
LVNRBD	117 (91.4)	11 (8.6)	RVNRBD	718 (97.5)	18 (2.5)	0.0004

Key:

FRBD: Family Replacement Blood Donors

VNRBD: Voluntary Non Remunerated Blood Donors

R: Regular, N: New, L: Lapsed

donors were aged 18 to 65 (mean 32.6) years consisting of 1771 (65.1%) males and 950 (34.1%) females. The sex prevalence of HCV among the male and female donors was 6.2% and 5.9% respectively;  $p=0.7$ . The age range of 18 and 35 years constituted 72.7% of our blood donors, while 27.3% were aged 36 to 65 years. The age range of 26 to 35 years aged contributed 37.2% of blood donors, while 35.5% were aged 18 to 25 years. 15.5%, 8.5% and 3.4% of donors were aged 36 - 45, 46 -55 and 56 -65 years respectively. The age specific prevalence of HCV sero-positivity was 5.9% among donors 18 to 25 and 3.8% in the range 26-35 years. The highest

prevalence of 12.6% was recorded among donors aged 46-55 years (table 1).

The prevalence of HCV (3.8%) among donors 26 -35 years is significantly lower than 5.9% recorded in the age range of 18 -25 years. It is also significantly lower than prevalence found in age groups above 45 years;  $p<0.05$  (table 2).

The rate of HCV antibody positivity was 8.4% among new VNRBD, while 2.5%, 3.0%, and 8.6% were recorded among regular VNRBD, FRBD and lapsed donors respectively (Table 3). The rate of HCV sero-positivity was significantly lower (3.0%) among family replacement

**Table 4.** HCV distribution among ABO blood groups

Blood group	HCV Neg (%)	HCV Pos (%)	Blood group	HCV Neg (%)	HCV Pos (%)	p value
A	558 (93.5)	39 (6.5)	B	708 (94.3)	43 (5.7)	0.4
A	558 (93.5)	39 (6.5)	AB	97 (93.8)	8 (6.2)	0.7
A	558 (93.5)	39 (6.5)	O	1181 (93.9)	77 (6.1)	0.7
B	708 (94.3)	43 (5.7)	AB	97 (93.8)	8 (6.2)	0.4
B	708 (94.3)	43 (5.7)	O	1181 (93.9)	77 (6.1)	0.7
AB	97 (93.8)	8 (6.2)	O	1181 (93.9)	77 (6.1)	0.5

blood donors than (8.4%) among the newly recruited voluntary donors;  $p=0.006$ . The prevalence of 3.0% HCV among the FRBD was also significantly lower than 8.6% among lapsed voluntary donors;  $p=0.008$ . The prevalence of HCV among family replacement donors and 2.5% among regular VNRBD was not significantly higher;  $p=0.6$ . The difference in the prevalence of HCV among new VNRBD and lapsed donors was also not significant;  $p=0.9$ . The lower rate of HCV infection among regular VNRBD (2.5%) and new VNRBD (8.4%) was significant;  $p=0.000001$ , and also significantly lower than 8.6% among lapsed donors;  $p=0.0004$  (Table 3).

The distribution of HCV sero-positive donors showed the lowest rate of 5.7% among blood group B followed by 6.1% among group O subjects. Blood groups AB and A donors had HCV infection rates of 6.2% and 6.5% respectively. There was no significant difference between the HCV prevalence among various blood groups (Table 4).

## DISCUSSION

The marker of HCV infection was found in 6.1% of all blood donors in our studied subjects. This prevalence is similar to that reported by Alao et al (2010) who found a 5.4% rate of HCV antibody among blood donors in Makurdi, Benue State, North Central Nigeria. Our finding is also similar to the 5.1% HCV infection among Port Harcourt's blood donors documented by Jeremiah and colleagues (2008). The 6.1% HCV in this study concurred with an earlier finding of 6.0% reported by Buseri et al (2009) among their male dominated blood donors in Oshogbo, South Western Nigeria. Research reports from Pakistan showed a 6.21% among blood donors in a civilian hospital in Rawalpindi (Mumtaz et al, 2002) and 4.78% among those who donated at the Armed Forces Institute of Transfusion in Rawalpindi (Bhatti et al, 1996).

The prevalence of HCV antibody among our blood donors is however higher than 2.0% recorded by Odenigbo et al (2011) in South East Nigeria and 0.5% reported by Erhabor and colleagues (2006) among blood donors in Port Harcourt Nigeria. It is also higher than 3.4% documented by Bala et al (2012) among blood

donors of some selected hospitals in Kano Nigeria. Our blood donors have a higher rate of HCV infection compared to their Ugandan counter parts, where Hladek et al (2006) reported a prevalence of 4.1% using enzyme immune assay. This 6.1 percent HCV infection among our donors is higher than 3.0% documented from a meta analysis study including confirmatory tests of chronic viral hepatitis infection in the sub Saharan Africa, (Madhava et al, 2002). 6.1% prevalence of HCV in our study is also higher than 0.5-1.5% documented by Fischer (1995) among the general population of the United States and 0.65% among their blood donors.

The prevalence of 6.2% HCV among our male blood donors was not significantly higher than 5.9% observed among the female group. This differs from the significant higher HCV antibody sero-positivity reported among female blood donors in Port Harcourt (Jeremiah et al, 2008). We observed significant inter age group differences in the prevalence of HCV among our blood donors with the lowest rate of 3.8% in the age bracket of 26-35 years. High rates of HCV infection of 8.1-12.6% was found within the age range of 36-65 years with the highest rate of 12.6% occurring in the range of 46-55 years (Table 1). This is similar to report of work done by Alao and others (2010) who documented the highest age prevalence of HCV among blood donor above 50 years in Makurdi, Nigeria. It is however at variance with 3.2% highest HCV rate among donors aged 21-30 years in South Eastern Nigeria (Odenigbo et al, 2011). It further failed to agree with another report of work done by Erhabor et al (2006) in Port Harcourt, Nigeria where they documented the highest HCV infection rate among their blood donors aged 18-27 years. It is also different from the highest infection rate of HCV detected among donors aged 30-39 years in Lagos Nigeria (Ayolabi et al, 2006). The similarity between our study in Jos and that of Alao et al (2010) in Makurdi may be due some yet undefined environmental and or social factors found in the North Central geopolitical region of Nigeria where both study sites are located. The non-uniform variability in the age related prevalence of HCV sero-positivity among blood donors from various regions calls for further study to determine the epidemiological factors responsible for the spread of HCV to allow for institution of control measures.

The lowest rate observed among donors aged 26-35 years suggests that the Club 25 made up of young donors aspiring to donate at least twenty five times by the age of 25 years might not be the safest donor group. There is need to educate these young persons, on the routes of contracting transfusion transmissible infections. Emphasis should be placed on the recruitment of donors below 36 years where the prevalence of HCV is lower than among those above 35 years. There is need to urgently develop vaccines for the prevention of HCV infection among young prospective blood donors.

The prevalence of 3.0% HCV infection among FRBD was significantly lower than 6.6% among all voluntary blood donors;  $p=0.01$ . Our observation of 3.0% HCV among family replacement blood donors is lower than 7.5%, Mujeeb et al (2008) earlier reported among FRBD from interior Sindh, Pakistan. Three per cent HCV seropositivity among our FRBD is higher than 0.2% documented by Erhabor et al (2006) among family replacement blood donors in Port Harcourt. This prevalence is however similar to 3.6% documented by Abdul mujeeb et al (2006), among first time blood donors in Karachi. 2.5% HCV rate among our voluntary blood donors is higher than 0.74% found among voluntary blood donors who donated at a tertiary health centre in rural area of India, (Gari et al, 2012). Lapsed and new voluntary non-remunerated voluntary blood donors have significantly higher HCV infection rates than FRBD;  $P=0.008$  and  $0.006$  respectively. The lower sample size of FRBD in this study may explain this finding. There is however great need to strengthen donor selection process through donor education towards self deferral and meticulous application of donor suitability criteria to the elimination of those at risk of transmitting transfusion transmissible infections in the blood service. The 2.5% prevalence of HCV among regular non-remunerated voluntary blood donors is not significantly lower than 3.0% among FRBD;  $p=0.6$ . The prevalence of HCV among regular VNRBD was significantly lower than among lapsed VNRBD;  $p=0.004$  and new VNRBD;  $p=0.000001$  (Table 3). This prevalence of 2.5% HCV among our regular blood donors is however higher than 1.6% determined by enzyme immuno assay among voluntary blood givers in the Senegal (Etard et al, 2003). The pattern of HCV infection among our voluntary blood donors differs from among Indian voluntary donors were 1.62% and 1.55% were documented among their regular and new voluntary donors respectively, (Jain, 2003). The HCV infection in this study suggests the need to intensify voluntary blood donor recruitment with focus on retention of all safe persons for regular donations. We join Kew et al (2004) in recommending the development of strategy for a comprehensive prevention and control of hepatitis C virus infection in the community

The distribution of HCV reactive blood donors, according to their ABO blood groups, showed no significant differences between the ABO blood antigens;

$p>0.05$ . The highest rate of 6.5% was observed among blood group A, followed by AB (6.2%), group O (6.1%) and 5.7% among blood group B, (Table 4). The prevalence of HCV among our blood groups A and O donors are higher than 1.3% and 2.4% documented by Odenigbo et al (2011) among donors of same blood groups in Newi, South East Nigeria. This further calls for more study into the mode of the spread and prevention of this viral agent in order to save blood donor pool.

## CONCLUSION

We conclude from this study that, while HCV infection is common among all types of blood donors donating at the blood service, regular non-remunerated voluntary blood donors are the least affected. We further conclude that HCV infection is not related significantly to ABO blood group system.

## RECOMMENDATION

We recommend the screening of all blood donors for HCV regardless of donor types and previous HCV status. There is need to develop vaccine to immunize all children who are the future blood donors and all safe blood donating adults.

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## REFERENCES

- Abdul Mujeeb S, Nanan D, Sabir S, Altaf A, Kadir M (2006). Hepatitis B and C infections in first time blood donors in Karachi: a possible subgroup for sentinel surveillance. *East Mediterr Health J.* 12: 735-741
- Alao OO, Okwori EE, Araoye MO (2010). The sero-prevalence of hepatitis C virus infection among prospective blood donors in makurdi, Nigeria. *The internet J. infect. Dis.* 8: DOI: 10.5580/1d2e.
- Ayolabi CI, Taiwo MA, Omilabu SA, Adebisi AO, Fatoba OM (2006). Ser-prevalence of hepatitis C virus among blood donors in Lagos, Nigeria. *Afr. J. Biotechnol.* 5: 1994-1996
- Bala JA, Kawo AH, Muktar MD, Sark A, Magaji W, Aliyu LA, Sani MA (2012). Prevalence of hepatitis C infection among blood donors in some selected hospitals in Kano, Nigeria. *Intern. Res. J. Microbiol.* 3: 217-22
- Bhatti FA, Shaheen N, Tariq WUZ, Amin M, Salim M, (1996). Epidemiology of hepatitis C virus in blood donors in Northern Pakistan. *PAFMJ*; 46: 91-92.

- Buseri FI, Muhibi MA, Jeremiah ZA (2009). Sero epidemiology of transfusion transmissible infections among blood donors in Osogbo, Southwest Nigeria. *Blood Transfus.* 7: 293-297
- Chimparlee N, Oota S, Phikulsod S, Tangkivanich P, Poovoravan Y (2011). Hepatitis B and C virus in Thai blood donors. *Southeast Asian J. Trop. Med. Public Health.* 42:609-615.
- Erhabor O, Ejele OA, Nwauche CA (2006). The risk of acquired hepatitis C virus infection among blood donors in Port Harcourt: The question of blood safety in Nigeria. *Niger. J. Clin. Pract.* 18-26
- Etard JF, Colbachini P, Dromigny JA, Perrier-Gros-Claude (2003). Hepatitis C antibodies among blood donors, Senegal 2001. *Emerg. Infect. Dis.* 9: 43-45
- Fischer HE (1995). Blood donor screening and prevention of associated hepatitis C virus infection. *Curr. Issues Transfus Med.* 2:
- Gari AP, Deshpande JD, Phalke D, Kerle LB (2012). Sero-prevalence of transfusion transmissible infections among voluntary blood donors at a Tertiary care Teaching Hospital in rural area of India. *J. Fam. Med. Pri. Care.* 1: 48-51
- Hladek W, Kataaba P, Mermin J, Purdy M, Otekat G, Jackritz E, Alter MJ, Downing R (2006). Prevalence and cost of hepatitis C screening among Ugandan blood donors. *Trop. Med. Intern. Health.* 11: 195-204
- Jain A, Rana SS, Chakravarty P, Gupta RK, Marthy NS, Nath MC, Gururaja S, Chafunandi N, Vernia U, Kar P (2003). The prevalence of hepatitis C antibodies among voluntary blood donors of New Delhi India. *Eur. J. Epidemiol.* 18: 695-697
- Jeremiah ZA, Kaote B, Buseri F, Emelike F (2008). prevalence of antibodies to hepatitis C virus in apparently healthy Port Harcourt blood donors and association with blood groups and other risk indicators. *Blood Transfus.* 6:150-155
- Kew M, Francois G, Lavenchy D, Morgalis H, Van Damme P, Grob P, Halleuer J, Shouval D, Leroux Roels G, Meheus A, (2004). Prevention of hepatitis C virus infection. *J. viral. Hepat.* 11: 198-205
- Madhava V, Burges C, Druaker E (2002). Epidemiology of Chronic hepatitis infection in sub Saharan Africa. *Lancet. Infect. Dis.* 2: 293-302
- Mujeeb SA, Pearce MS (2008). *BMC Infect Dis.* 10; 8: 43-doi: 10-1186/1471-2334-8-43
- Mumtaz S, Rahman MU, Muzaffar M, Hassan M, Iqbal W (2002). Frequencies of seropositive blood donors for hepatitis B,C and HIV viruses in Railway Hospital Rawalpindi. *Pak. J. Med. Res.* 41: 19-22
- Nkrumah B, Owusu M, Fremnong HO, Averi P (2011). Hepatitis B and C viral infections among blood donors from rural Ghana. *Gha. Med. J.* 45:97-100.
- Odenigbo C, Oguejiofor C, Okonkwo U, Asamugha A, Ezech T, Okocha E, (2011). Prevalence of antibodies to hepatitis C virus in blood donors in Nnewi, South East Nigeria: in association with blood groups. *The Intern. J. Gastroenterol.* 10: 10.5580/1c70.
- Udeze AO, Donbraye E, Sule WF, Fadeyi A, Uche LN (2009). The sero-prevalence of hepatitis C infections among blood donors in Ibadan. *World Appl. Sci. J.* 7:1023-1028