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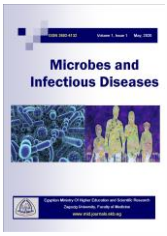

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**Original article**

# Seroprevalence and risk factors of hepatitis C virus infection among blood donors attending selected hospitals in Kaduna State

***Aisha Usman [1,2*], Faruk Adamu Kuta [2], Talatu Bosso Saidu [2], Oluwatosin Kudirat Shittu [3]***

*1- Department of Microbiology, Faculty of Sciences, Kaduna State University, Kaduna Nigeria*
*2- Department of Microbiology, Faculty of Life Sciences, Federal University of Technology, Minna, Nigeria*
*3- Department of Biochemistry, Faculty of Life Sciences, Federal University of Technology, Minna, Nigeria*

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**ABSTRACT**

**Background:** Screening of blood for hepatitis C virus (HCV) infection is vital in preventing the transmission of HCV infection from blood donors to recipients. The aim of this study was to determine the seroprevalence and risk factors of HCV infection among donors in Kaduna State, Nigeria. **Materials and methods**: A structured questionnaire was administered to the consenting blood donors to assess their level HCV infection awareness as well as obtain information on demographic and risk factors associated with HCV infection. Blood samples were aseptically collected from 600 blood donors through the venous puncture. HCV Antibody ELISA kit was used to screen the samples for HCV antibody. **Results**: The overall seroprevalence of HCV infection among blood donors in Kaduna State was observed to be 4.67%. Highest seroprevalence of HCV infection was observed among blood donors with in the age group of 50 – 57 years while blood donors aged 58 - 65 years had the least seroprevalence of HCV infection. Male blood donors had higher seroprevalence of HCV infection (5.18%) compared to female blood donors (2.04%). Seroprevalence of HCV infection was significantly associated with marital status, family type of the blood donors and awareness of hepatitis C status. Previous history of sexually transmitted diseases (STD). Sexually Transmitted Infection (STI) was identified as risk factor statistically associated with HCV infection among the blood donors screened. **Conclusion**: In this study, 4.67% of blood donors have been infected with hepatitis C virus. Seroprevalence of HCV infection was higher among male donors.

## Introduction

Hepatitis C virus (HCV) is an enveloped RNA virus with a single-strand positive-sense genome. It is a member of *Hepacivirus* genus and *Flaviviridae* family. It is the aetiological agent of hepatitis C, a chronic disease of the liver. The disease is spread through use of injection drug, transfusion of blood, hemodialysis, transplantation of organ and rarely through sexual intercourse [1]. Hepatitis C virus transmission occurs predominantly through transmission with infected blood [2]. Owing to cirrhosis and hepatocellular carcinoma progression, hepatitis C has been identified as a global health issue [1].

Millions of lives are saved by blood transfusion however; transfusion with unsafe blood equally put millions of people at risk of transfusion transmissible infections (TTIs) [3]. Screening of

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* *Corresponding author:* Aisha Usman
E-mail address: usmanaisha1104@gmail.com

blood for TTIs such as hepatitis C virus infection is critical in preventing and reducing the risk of infection transmission to donation recipients [4]. Transfusion transmissible infections pose serious global health problem and threaten the safety of blood donation [5]. Owing to the importance of blood safety, World Health Organization listed enhancing optimal blood safety as one of their primary objectives [6].

Hepatitis C virus infection results in either acute or chronic hepatitis. The former is normally asymptomatic and is less likely to result in liver failure. Symptomatic acute HCV infection has a mild clinical course with less than one fourth (<25%) of patients presenting with jaundice. About 60–80% patients with acute infection develop chronic infection. The rate of spontaneous viral clearance in patients with chronic HCV is very low. Approximately, one fifth (20–30%) of patients with chronic HCV infection develop cirrhosis over a period of 10–30 years. 1–4% of cirrhotic patients develop hepatocellular carcinoma per year [1].

The global burden of disease has been greatly increased by HCV infection [7]. The estimates of world disease burden in 2015 revealed that a 2.5% seroprevalence rate of HCV which is equivalent to more than 177.5 million infections [8]. The virus is associated with failure of the liver, liver cirrhosis and hepatocellular cancer. These are responsible for deaths relating to HCV and account for 350,000 deaths annually and globally [9,10]

Over 80 million individuals are infected with HCV globally and about One-third individuals with chronic hepatitis have been predicted to result in liver cirrhosis or hepatocellular carcinoma [11]. HCV infection has been identified as a major cause of liver failure and liver transplantation [12].

This study is therefore aimed at determining the seroprevalence and risk factors of HCV infection among donors in Kaduna State.

## Materials and methods

### Study area

The research was conducted at Kaduna State, Nigeria. Kaduna State has a population of over 6 million and an area of 45,567 km$^2$. It is located in North Western Nigeria and comprises 23 Local Government Areas (LGAs) and 3 senatorial districts. Geographically, it has two seasons: dry season and wet season. Samples were collected from two hospitals each in Kaduna North (Hajiya Gambo Sawaba General Hospital, Zaria and General Hospital Hukuyi, Kudan), Kaduna Central (Yusuf Dantsoho Memorial Hospital and General Hospital Kawo) and Kaduna South (Sir Patrick Yakowa Memorial Hospital, Kafanchan and General Hospital Kachia).

### Study population

The study population was 18 – 65 years old male and female blood donors attending the selected hospitals.

### Study design

The research was a hospital-based and cross-sectional study covering the three zones of Kaduna State (Kaduna North, South and Central).

### Ethical approval and consent

Ethical approval was sought from the ethical review committee of Kaduna State Ministry of Health and ethical committee of the hospitals before the commencement of sample collection. Consent forms was designed and administered to study population to obtain their consent to be included in the study.

### Inclusion and exclusion criteria

Blood donors who are attendees of the selected hospitals and those who consented were included in the study. Blood donors on Directly Acting Antivirals (DAAs) therapy, not attendees of the selected hospitals and those who did not consent were excluded from the study.

### Questionnaire administration

A structured questionnaire was designed and administered to the study population so as to assess their level awareness and obtain demographic information and predisposing risk factors associated with the rate of infection **(Appendix I).**

### Sample size calculation

The sample size was determined using the equation described by **Naing *et al.*** [13]

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where:

*n* = required sample size,

Z = level of confidence at 95% (standard value of 1.96)

P = Known prevalence of the disease, prevalence rate of 15.1% (which is equal to 0.151) in Abuja reported by **Duru *et al.*** [4].

d = precision or margin of error at 5% (standard value of 0.05)

Therefore:

$$n = \frac{1.96^2 \times 0.151(1-0.151)}{0.05^2}$$

$$n = \frac{3.8416 \times 0.151\ (0.849)}{0.0025}$$

$$n = \frac{0.4924893}{0.0025}$$

n = 196.99574

n = 197

Therefore, 197 was the minimum sample size for the research. However, for equal distribution 200 samples were collected from each zone of Kaduna State to give a total of 600 (200 x 3) blood samples.

**Collection of samples**

Blood samples (5 ml) were collected from 600 blood donors aseptically through the venous puncture with a sterile syringe and transferred in to sterile plain bottles. After clotting, the samples were centrifuged for 2 mins at 2000 rpm and the sera were transferred into cryovials and stored at refrigerating temperature (-4 ℃) for further analysis [14].

**HCV antibody detection by enzyme linked immunosorbent assay (ELISA)**

The serum samples were screened for HCV antibody using HCV Ab ELISA test kit (RecombiLISA, CTK Biotech Inc, USA). It is a solid - phase ELISA kit based on the principle of the indirect enzyme immuno-assay technique for the detection of antibodies (IgG and IgM) to HCV in human serum/plasma. The assay was carried out according to the manufacturer's instruction as follows. Samples, controls and reagents were first brought to room temperature, then 100 µl of the controls (positive and negative) were added to the designated control wells. No reagent was added to the blank well. To the test wells, 100 µl of sample diluent was added to each well followed by 10 µl of the serum samples. The plate was then rocked gently for 20 seconds and covered afterward with a sealer. The plate was incubated at 37 ℃ for 30 minutes and the contents of the wells were disposed afterward. The wells were then filled with 350 µl of diluted wash buffer and rocked gently for 30 seconds. The wash solution was completely discarded and then the washing step was repeated four more times. Horse Raddish Perioxidase (HRP) – protein A conjugate (100 µl) was added into each well except the blank well. The plate was covered with a sealer and then incubated at 37 ℃ for 20 minutes. After incubation, the plate was washed five times as described above. Fifty microliter (50 µl) of TMB substrate A and 50 µl of TMB substrate B were added to each well including the blank well and then the plate was incubated at 37 ℃ for 10 minutes. After incubation, the reaction was stopped by the addition of 50 µl of stop solution to each well and mixing gently for 30 seconds. The absorbance was read at 450 nm using micro titer plate reader.

**Statistical analysis**

The data obtained was analyzed using the Statistical Package for Social Science (SPSS) version 29. Chi-square test was used to analyze the differences in HCV infection based on sociodemographic factors. Odd ratio and 95% confidence interval were used to determine the risk factors association HCV infection. *P* values of $p \leq 0.05$ were considered significant.

**Results**

**Figure 1** illustrates the overall seroprevalence of hepatitis C virus infection among blood donors attending selected hospitals in Kaduna State. Out of the 600 serum samples screened for HCV antibody, 28 samples were seropositive giving an overall seroprevalence rate of 4.67%.

Majority (49.17%) of the blood donors were within the age group of 26 – 33 years while age group with the least percentage of blood donors was 58 – 65 years (0.83%). So also, most of the blood donors (83.67%) were males **(Table 1).**

The socio-demographic factors associated with HCV infection among the blood donors are shown on **table (1).** Blood donors with in the age group of 50 – 57 years had the highest seroprevalence rate of 5.88%. The least seroprevalence rate of HCV infection (0.00%) was observed among blood donors within the age group of 58 - 65 years. The difference observed in the seroprevalence of HCV infection based on age group was statistically not significant ($p = 0.8868$).

Based on gender, the seroprevalence of hepatitis C virus infection was higher among male blood donors (5.18%) compared to female blood donors (2.04%). The difference observed in the seroprevalence of HCV infection based on gender was not statistically significant ($p = 0.17787$). The seroprevalence of HCV was highest among blood donors in Kaduna South (5.50%). The least seroprevalence was observed among blood donors

in Kaduna Central (4.00%). The difference observed in the seroprevalence of HCV infection based on location was not statistically significant ($p$= 0.5245).

Hepatitis C virus (HCV) infection was significantly associated with marital status ($p$ = 0.0011) and family type ($p$ = 0.0209) of the blood donors; however, HCV infection was not significantly associated with occupation of the blood donors ($p$ = 0.6977). Seroprevalence of HCV infection was significantly highest among blood donors who were single (12.20%) and lowest among blood donors who were married (2.85%). HCV seroprevalence was significantly higher among blood donors who had a polygamous family (6.95%) compared to blood donors who had a monogamy family (2.93%). Although not statistically significant, blood donors who are health care personnel had the highest HCV seroprevalence (5.76%).

More than half of the blood donors (54.83%) have knowledge of hepatitis C and approximately half of them (50.33%) knew their hepatitis C status. Based on their level of awareness of the routes of HCV transmission, 49.50% were aware that HCV can be transmitted through sharing of sharp objects; 52.00% were aware that HCV can be transmitted through sexual intercourse with an infected individual; 47.33% were aware that HCV can be transmitted through transfusion with infected blood while 50.50% were aware that HCV can be transmitted from infected mother to her child. However, 65.00% of the blood donors were not aware of treatment for hepatitis C **(Table 2).**

Seroprevalence of HCV infection among the blood donors was significantly associated with awareness of hepatitis C status ($p$ = 0.0486). However, the seroprevalence of HCV infection was not associated with awareness of HCV transmission through: sharing of sharp objects ($p$ = 0.7392), sexual intercourse ($p$ = 0.5769), transfusion of infected blood ($p$ = 0.6271) and from infected mother to child ($p$ = 0.6590). So also, knowledge of hepatitis C ($p$ = 0.0904) and awareness of treatment for hepatitis C were not associated with HCV infection (p = 0.6263) **(Table 2).**

The risk factors that were assessed for possible associated with HCV infection among the blood donors are presented on **table (3).** Odd ratio analysis revealed that previous history of sexually transmitted diseases (STD)/Sexually Transmitted Infection (STI) was the only risk factor associated statistically with HCV infection among the blood donors screened ($p$ = 0.0365). Blood donors with previous history of STD/STI were almost three times more likely to be infected with HCV (OR = 2.97; 95% CI = 1.07-8.24). However, HCV infection was not statistically associated with sharing of sharp objects ($p$ = 0.1866), multiple sexual partners ($p$ = 0.1507), previous history of blood or blood product transfusion ($p$ = 0.6651), family history of HCV infection ($p$ = 0.2139), use of intravenous illegal drugs ($p$ = 0.4308), working with blood or needles ($p$ = 0.3536), homosexuality ($p$ = 0.1520), previous history of surgical procedure ($p$ = 0.2340), body piercings ($p$ = 0.6639) and tattoos / tribal mark on body ($p$ = 0.3368).

**Table 1.** Socio-demographic factors associated with HCV infection among the blood donors.

| **Socio-Demographic Factors** | **No. examined (%)** | **No. positive** | **Seroprevalence (%)** | ***p*-value** |
|---|---|---|---|---|
| **Age group (Years)** | | | | |
| 18 – 25 | 43 (7.17) | 2 | 4.65 | 0.8868 |
| 26 – 33 | 295 (49.17) | 16 | 5.42 | |
| 34 – 41 | 164 (27.33) | 7 | 4.27 | |
| 42 – 49 | 76 (12.67) | 2 | 2.63 | |
| 50 – 57 | 17 (2.83) | 1 | 5.88 | |
| 58 – 65 | 5 (0.83) | 0 | 0.00 | |
| Total | 600 (100.00) | 28 | 4.67 | |
| **Gender** | | | | |
| Male | 502 (83.67) | 26 | 5.18 | 0.17787 |
| Female | 98 (16.33) | 2 | 2.04 | |
| Total | 600 (100.00) | 28 | 4.67 | |
| **Location** | | | | |
| Kaduna North | 200 (33.33) | 9 | 4.50 | 0.5245 |

| | | | | |
|---|---|---|---|---|
| Kaduna Central | 200 (33.33) | 8 | 4.00 | |
| Kaduna South | 200 (33.33) | 11 | 5.50 | |
| Total | 600 (100.00) | 28 | 4.67 | |
| **Marital status** | | | | |
| Married | 456 (76.00) | 13 | 2.85 | 0.0011* |
| Single | 82 (13.67) | 10 | 12.20 | |
| Divorced | 29 (4.83) | 3 | 10.34 | |
| Widowed | 33 (5.50) | 2 | 6.06 | |
| Total | 600 (100.00) | 28 | 4.67 | |
| **Occupation** | | | | |
| Civil servant | 249 (41.50) | 13 | 5.22 | 0.6977 |
| Health care personnel | 139 (23.17) | 8 | 5.76 | |
| Student | 154 (25.67) | 5 | 3.25 | |
| Farmer | 50 (8.33) | 2 | 4.00 | |
| Others | 8 (1.33) | 0 | 0.00 | |
| Total | 600 (100.00) | 28 | 4.67 | |
| **Family type** | | | | |
| Monogamy | 341 (56.83) | 10 | 2.93 | 0.0209* |
| Polygamy | 259 (43.17) | 18 | 6.95 | |
| Total | 600 (100.00) | 28 | 4.67 | |

**Table 2.** Seroprevalence of HCV infection based on level of awareness of the blood donors.

| **Awareness** | **No. examined (%)** | **No. positive** | **Seroprevalence (%)** | ***p*-value** |
|---|---|---|---|---|
| **Knowledge of hepatitis C** | | | | |
| Yes | 329 (54.83) | 11 | 3.34 | 0.0904 |
| No | 271 (45.17) | 17 | 6.27 | |
| Total | 600 (100.00) | 28 | 4.67 | |
| **Awareness of hepatitis C status** | | | | |
| Aware | 302 (50.33) | 9 | 2.98 | 0.0486* |
| Not aware | 298 (49.67) | 19 | 6.38 | |
| Total | 600 (100.00) | 28 | 4.67 | |
| **Awareness of HCV transmission through sharing of sharp objects** | | | | |
| Aware | 297 (49.50) | 13 | 4.38 | 0.7392 |
| Not aware | 303 (50.50) | 15 | 4.95 | |
| Total | 600 (100.00) | 28 | 4.67 | |
| **Awareness of HCV transmission through sexual intercourse** | | | | |
| Aware | 312 (52.00) | 16 | 5.13 | 0.5769 |
| Not aware | 288 (48.00) | 12 | 4.17 | |
| Total | 600 (100.00) | 28 | 4.67 | |
| **Awareness of HCV transmission through transfusion of infected blood** | | | | |
| Aware | 284 (47.33) | 12 | 4.23 | 0.6271 |
| Not aware | 316 (52.67) | 16 | 5.06 | |
| Total | 600 (100.00) | 28 | 4.67 | |

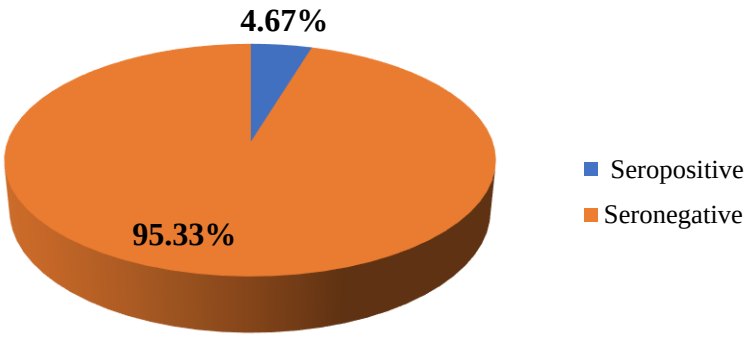
| | | | | |
|---|---|---|---|---|
| **Awareness of HCV transmission from infected mother to child** | | | | |
| Aware | 303 (50.50) | 13 | 4.29 | 0.6590 |
| Not aware | 297 (49.50) | 15 | 5.05 | |
| Total | 600 (100.00) | 28 | 4.67 | |
| **Awareness of treatment for Hepatitis C** | | | | |
| Aware | 210 (35.00) | 11 | 5.24 | 0.6263 |
| Not aware | 390 (65.00) | 17 | 4.36 | |
| Total | 600 (100.00) | 28 | 4.67 | |

**Table 3.** Risk factors associated with HCV infection among blood donors.

| **Risk Factors** | **No. examined** | **No. positive** | **Seroprevalence (%)** | **OR (95% CI)** | ***p*-value** |
|---|---|---|---|---|---|
| **Sharing of sharp objects** | | | | | |
| Yes | 31 | 3 | 9.68 | 2.33(0.66-8.19) | 0.1866 |
| No | 569 | 25 | 4.39 | | |
| Total | 600 | 28 | 4.67 | | |
| **Multiple sexual partners** | | | | | |
| Yes | 127 | 9 | 7.09 | 1.82(0.80-4.13) | 0.1507 |
| No | 473 | 19 | 4.02 | | |
| Total | 600 | 28 | 4.67 | | |
| **Previous history of Blood or blood product transfusion** | | | | | |
| Yes | 90 | 5 | 5.56 | 1.25(0.46-3.37) | 0.6651 |
| No | 510 | 23 | 4.51 | | |
| Total | 600 | 28 | 4.67 | | |
| Family history of HCV infection | | | | | |
| Yes | 64 | 5 | 7.81 | 1.89(0.69-5.16) | 0.2139 |
| No | 536 | 23 | 4.29 | | |
| Total | 600 | 28 | 4.67 | | |
| **Use of intravenous illegal drugs** | | | | | |
| Yes | 30 | 4 | 13.33 | 1.58(0.51-4.90) | 0.4308 |
| No | 570 | 24 | 4.21 | | |
| Total | 600 | 28 | 4.67 | | |
| **Working with blood or needles** | | | | | |
| Yes | 110 | 7 | 6.36 | 1.52(0.63-3.67) | 0.3536 |
| No | 490 | 21 | 4.29 | | |
| Total | 600 | 28 | 4.67 | | |
| **Homosexuality** | | | | | |
| Yes | 16 | 2 | 12.50 | 3.07(0.66-14.20) | 0.1520 |
| No | 584 | 26 | 4.45 | | |
| Total | 600 | 28 | 4.67 | | |
| **Previous history of STD/STI** | | | | | |
| Yes | 44 | 5 | 11.36 | 2.97(1.07-8.24) | 0.0365* |

| | | | | | |
|---|---|---|---|---|---|
| No | 556 | 23 | 4.14 | | |
| Total | 600 | 28 | 4.67 | | |
| **Previous history of surgical procedure** | | | | | |
| Yes | 49 | 4 | 8.16 | 1.95(0.65-5.87) | 0.2340 |
| No | 551 | 24 | 4.36 | | |
| Total | 600 | 28 | 4.67 | | |
| **Body piercings** | | | | | |
| Yes | 32 | 2 | 6.25 | 1.39(0.32-6.13) | 0.6639 |
| No | 568 | 26 | 4.58 | | |
| Total | 600 | 28 | 4.67 | | |
| **Tattoos / Tribal mark on body** | | | | | |
| Yes | 38 | 3 | 7.89 | 1.84(0.53-6.40) | 0.3368 |
| No | 562 | 25 | 4.45 | | |
| Total | 600 | 28 | 4.67 | | |

**Figure 1.** Overall seroprevalence of hepatitis C virus infection among blood donors attending selected hospitals in Kaduna State.




## Discussion

This study revealed that the blood donors were predominantly males (83.67%) and aged between 26 to 33 years (49.17%). The higher frequency of male blood donors might be linked to some physiological factors that hinder blood donation by females such as pregnancy, menstruation and breast feeding. This is in line with the World Health Organization (WHO) data on gender profile of blood donors which revealed that globally, female donors account for about 33%.[16] Similar to our finding of age group 26 to 33 years as the dominant age range of donors, WHO reports revealed that young adults are the predominant donors in low - and middle - income countries [15].

The finding of males been the predominant donors is similar to the finding of **Damola *et al.*** [2], **Negash *et al.*** [16] and **Tognon *et al.*** [17] who also observed that the blood donors were predominantly males. However, contrary to the finding of blood donors aged 26 to 33 years predominating, **Negash *et al.*** [16] reported blood donors aged 18 to 27 years as the predominant. Most of the blood donors in this study (54.83%) had knowledge of HCV, this finding is not in agreement with that **Damola *et al.*** [2], who reported that 67.0% of the blood donors do not have knowledge of HCV.

The overall seroprevalence of hepatitis C virus infection among blood donors attending selected hospitals in Kaduna State was observed to be 4.67%. This implies that the seropositive blood donors have been infected with HCV. However, HCV antibody seropositivity does not confirms chronic infection or need for treatment since HCV infection is spontaneously cleared by strong immune

response in approximately 30% of infected individuals, this can only be confirmed after nucleic acid detection [18]. The role of screening of blood donors for antibody against HCV cannot be overemphasized, since blood is reported as the main route of HCV transmission [19].

The seroprevalence rate observed in this study (4.67%) is similar to 4.2% reported by **Negash *et al.*** [16] among blood donors in Northwest Ethiopia and 4.8% reported by **Kabamba-Tshikongo *et al.*** [20] among blood donors in Lubumbashi, Democratic Republic of Congo. However, the seroprevalence is lower than 5.8% seroprevalence of HCV infection among blood donors in Kaduna State reported by **Sheyin *et al.*** [21], 7.0% HCV seroprevalence rate reported by **Akpu *et al.*** [22] among blood donors in a Tertiary Healthcare Facility in Nasarawa State, Nigeria and 8.38% HCV seroprevalence rate reported by **Ayolabi *et al*.** [23] among blood donors in Lagos, Nigeria. So also, **Duru *et al*.** [4] reported a higher seroprevalence rate of 15.1% among blood donors attending the University of Abuja Teaching Hospital, Abuja.

However, lower HCV seroprevalence rate among blood donors were reported by different researchers. HCV seroprevalence rate among blood donors of 3.1% was reported by **Damola *et al.*** [2] in Lagos, 3.23% was reported by **Ogbolu *et al.* [**24] in Ogbomoso, 1.8% was reported by **Nwankwo *et al*.** [25] in Kano, 1.6% was reported by **Fasakin *et al*.** [5] among blood donors in Ekiti State and 0.7% was reported by **Omosigho *et al.*** [26] in Ilorin, Kwara State. So also, lower seroprevalence rate of 0.64% was reported by **Abebe *et al.*** [27] among blood donors in Western Oromia, Ethiopia and 1.2% was reported by **Tognon *et al.*** [17] among blood donors in Sierra Leone. The variations observed in the seroprevalence rates might be due to differences in sample size, adequacy of blood and blood products screening practices, socio-cultural practices that expose individual to HCV infection (such as scarification, tattooing and circumcision) as well as the level of exposure to risk factors of HCV transmission. Additionally, the variation might also be linked to differences in sensitivity, specificity and accuracy of the diagnostic / test kits used in the studies.

The highest seroprevalence rate of HCV infection (5.88%) observed in this study among blood donors aged 50 – 57 years might be as a result of previous exposure to the virus over the years. High seroprevalence of HCV infection among blood donors aged 26 – 33 years (5.42%) might be linked to high-risk behavior among individuals within this age bracket e.g., tattooing, multiple sex partners and intravenous drug abuse.

Higher seroprevalence of hepatitis C virus infection was observed among male blood donors (5.18%) compared to female blood donors (2.04%). This is likely due to the fact that males tend to be more exposed to risk factors of HCV infection as a result of some risky lifestyles they indulge in such as use of drug injections and tattooing. This is in agreement with the report of **Tigabu *et al.*** [28] and **Abdel-Gawad *et al.*** [29] who also observed higher HCV seroprevalence in males. In contrast to this finding, higher seroprevalence of HCV was found among female blood donors compared to male blood donors by **Damola *et al.*** [2] and **Ayolabi *et al.*** [23].

In this study, seroprevalence of HCV was found to vary with location, with blood donors in Kaduna South having the highest seroprevalence (5.50%). This could be linked to differences in socio-cultural practices and risk behaviours. Similar variation in HCV seroprevalence with in Kaduna State was also reported by **Sheyin *et al.*** [21], however he recorded highest seroprevalence of HCV among blood donors in Kaduna Central. This variation might be due to differences in study population since **Sheyin *et al.*** [21] screened blood donors and attendees of outpatient department.

Highest seroprevalence of HCV infection was observed among blood donors who were single (12.20%) while married blood donors had the lowest (2.85%). This finding is in agreement with the reports of **Damola *et al.*** [2], **Duru *et al.*** [4] and **Omosigho *et al.*** [26] who also observed higher seroprevalence of HCV infection among single blood donors. Higher HCV seroprevalence was seen among polygamous blood donors (6.95%).

Highest seroprevalence of HCV observed among blood donors who are health care personnels (5.76%) might be linked to the occupational hazards which they are frequently exposed to. This finding is however contrary to that of **Duru *et al.*** [4] who observed highest seroprevalence among civil servants.

A significant association was observed between awareness of hepatitis C status and HCV seroprevalence ($p = 0.0486$). Knowledge of hepatitis C was not associated with HCV infection in this

study ($p$ = 0.0904). However, contrary to this finding, **Duru *et al.*** [4] observed an association between lack of HCV knowledge and HCV infection among blood donors. Previous history of STD/STI was the only identified risk factors associated with HCV infection in this study. Blood donors with previous history of STD/STI were at higher risk of HCV infection (OR = 2.97; 95% CI = 1.07-8.24). This is not in agreement with the report of **Duru *et al.*** [4], who observed no association between history of STD and HCV infection.

In this study, sharing of sharp objects, multiple sexual partners, previous history of blood or blood product transfusion, family history of HCV infection, use of intravenous illegal drugs, working with blood or needles, homosexuality, previous history of surgical procedure, body piercings and tattoos / tribal mark on body were not identified as risk factors for HCV infection among blood donors. Similarly, **Duru *et al.*** [4] also observed that previous blood transfusion, previous surgery and multiple sexual partners were not risk factors associated with HCV infection.

In contrast to this finding, **Duru *et al.*** [4] identified domestic needle/sharp injuries and possession of tribal marks as risk factors associated with HCV infection among blood donors in Abuja. Sharing of sharps for tattoo/tribal markings was reported to be significant association with HCV infection among blood donors in Lagos by **Damola *et al.*** [2].

## Conclusion

The overall seroprevalence of HCV infection among blood donors in Kaduna State was 4.67%. Awareness of Hepatitis C status was associated with HCV infection. Previous history of STD/STI was identified as a risk factor associated with HCV infection among the blood donors screened.

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## Conflict of interest

Not declared.

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