Assessing Occult HBV Infection Risk: Serological Markers and HBV-DNA PCR in HBsAg-Negative Blood Donors in Ilorin, Nigeria

ABSTRACT

Introduction:Blood transfusionis essential in medicine but carries risks of blood transmission infections like the Hepatitis B virus (HBV).Research has revealed the existence of occult HBV infection where Individuals with no detectable HBsAg habor HBV DNA in their liver or blood.Diagnosis of HBV in developing countries typically relies on detecting HBsAg; however, this method alone does not eliminate the risk of transmission and may overlook occult infections. Implementing enhanced screening protocols such as HBV DNAdetection, is vital for improving blood safety against HBV transmission. This study aims to identify strategies to reduce therisks associated with transfusion-related HBV infection using blood donors recruited in Ilorin, Nigeria.

Method: One hundred and ninety-five (195) healthy blood donors were recruited from hospitals in Ilorin, Nigeria. Detailed pre-donation questionnaires were administered to the donors in an interviewer based manner. Venous blood was collected from all the donors into a plain bottle for serological screening with the help of expert laboratory scientists, and the test results were kept confidential. Enzyme Linked Immunosorbent Assay (ELISA) kit was used to detect HBV antibodies(Anti-HBs, Anti-HBe, and Anti-HBc) as instructed by the manufacturer. The viral markers (HBsAg and HBeAg,) were detected using One Step Cassette Style HBV Test or Rapid diagnostic test (RDT), and Real- time polymerase chain reaction (R-TPCR) was done to detect HBV DNA.Data obtained was analyzed through Statistical Package for the Social Sciences (SPSS) Version 25.0.Chi-square were used to test for the associations with statistical significance set at $P<0.05$.

Results: Among the recruited 195 blood donors, 15 (7.69%) tested positive for HBsAg, and were excluded from the study. The remaining 180 HBsAg-negative donors were evaluated for HBV serologic markers. Family replacement donors, male donors, and those within age 26-35 exhibited the highest prevalence of demographic characteristics compared to commercial and voluntary donors, female donors, and other age groups ($p=0.0000$, 0.0000, 0.0001) respectively. First-time donors and individuals with one sexual partner were also notably associated with blood donation ($p=0.0025$ and $p=0.012$, respectively). No HBV DNA was detected in all HBsAg-negative donors. Also, 82 HBsAg-negative donors tested positive for HBV antibodies; 18 (10%) for Anti-HBs, 37 (20.5%) for Anti-HBc, 25 (13.8%) for Anti-HBs and Anti-HBc, and 2 (1.1%) for Anti-HBs, Anti-HBe, and Anti-HBc.

Conclusion:This study reveals that FRD, male donors, those aged 26-35, first-time donors, and donors with one sexual partner are more likely to donate. Although, noHBsAg-negative sample testedpositive for HBV DNA,but the results of serological markers indicated past exposure, raising concerns about occult infections. These findings emphasize the importance of intensifyingHBV screening beyond the standard HBsAg test

to the detection of HBV for a fuller picture of a donor's HBV status and to ensure safer blood transfusions.

Keywords: Blood transfusion, Occult HBV Infection, Hepatitis B virus, Family replacement donor, Voluntary donor, Commercial donor.

INTRODUCTION

Blood transfusion is a life-saving procedure in which donated blood or blood components are given to patients. Blood transfusion is vital in modern medicine for saving lives, yet it poses risks of transmission infection such as hepatitis B virus (HBV) (Folukee*t al.,* 2022). Hepatitis B virus (HBV) is a major global health concern, with over 240 million people affected worldwide (Cornberg, 2019). Diagnosing HBV infection typically relies on identifying specific serological markers. In developing countries, transfusion-associated hepatitis B virus infection (TAHBV) remains a significant risk, despite mandatory screening for Hepatitis B surface antigen (HBsAg) using the Enzyme Linked Immunosorbent Assay (ELISA) technique (Shastry and Bhat, 2011). While safety measures over the decades have reduced the risk of HBV transmission through blood transfusion, challenges persist due to factors such as HBV prevalence, donor demographics, and screening strategies (Weusten et al., 2017).The primary serological marker for diagnosing HBV is HBsAg, a protein found on the surface of the virus. However, there exists a "window period" of up to 200 days, where HBV may not be detectable in the serum despite infection (Mitchell *etal*., 2022). This can lead to missed diagnoses, particularly in donations that test negative for HBsAg but were collected during the early or late stages of infection. The effectiveness of screening protocols largely hinges on the sensitivity and specificity of both serological and molecular assays employed (Candotti&Laperche, 2018).

HBV belongs to the Hepadnavirus family and is characterized by its circular, partially double-stranded DNA (NHS, 2021). In clinical settings, three key antigens are assessed: surface, core, and envelope antigens. Acute or chronic HBV infections are diagnosed by detecting markers such as HBsAg, anti-HBc IgM, and HBV DNA (Terrault et al., 2016). The presence of HBsAg indicates active infection, while anti-HBs antibodies signify recovery and immunity from HBV. Persistent HBsAg for over six months typically indicates chronic infection (NICE, 2017).Hepatitis B core antigen (HBcAg) is not routinely measured but is relevant due to the immune response it generates, particularly the production of anti-HBc antibodies (NHS, 2021). Detection of anti-HBc IgM suggests recent infection, while IgG antibodies indicate resolved or chronic infection (de Almeida Pondé, 2022). These serologic markers provide vital insights into an individual's infection status, immunity, and disease progression.

Hepatitis B envelope antigen (HBeAg) is another important marker, indicating active viral replication. Its presence in the blood signifies a higher risk of transmission. Transitioning from active disease to an inactive carrier state is marked by HBeAg seroconversion, where antibodies against HBeAg (anti-HBe) develop (Koffas*etal*., 2021). A high HBV-DNA load correlates with an increased risk of cirrhosis and hepatocellular carcinoma (Wang et al., 2020).Clinically, HBV infections present a spectrum of manifestations. Many individuals with acute HBV may experience mild or no symptoms, while others may exhibit constitutional symptoms such as weight loss, fever, and fatigue,

alongside more severe signs like jaundice(Virlogeux&Trépo, 2018). Chronic HBV infection carries long-term risks, including chronic liver disease and HCC, which may remain asymptomatic for years until complications arise(Seto*etal*., 2018).

Occult hepatitis B infection, defined by the presence of anti-HBc antibodies without detectable HBsAg, poses a significant challenge in blood donor screening(Ye *etal*., 2021). Relying solely on HBsAg testing may overlook these cases, particularly in regions with high rates of anti-HBc IgM among donors(Vermeulen, 2021). Comprehensive screening protocols must include serological markers that effectively detect potential occult infections to safeguard against transmission through transfusions(Bloch, 2022).The critical window phase, during which HBsAg may not be detectable, increases the risk of transmitting HBV through blood products(van Drimmelen&Lelie, 2022). Testing for anti-HBc antibodies becomes essential during this period, because it can indicate past or current infections, including cases where HBV DNA is present before HBsAg appears(Gish *et al*., 2020). Despite advancements, addressing occult HBV infection remains a challenge. Anti-HBc testing, differentiating between IgG and IgM antibodies, helps identify individuals with occult infections(Cavigliа*etal*., 2020). The presence of occult HBV among various donor categories underscores the need for vigilant screening strategies to mitigate transmission risks(Leontari*etal*., 2024).Addressing the challenges posed by HBV transmission through blood transfusions requires a multifaceted approach. While HBsAg remains the primary marker for HBV screening in blood donors, integrating anti-HBc testing is crucial for comprehensive detection of infections, including occult cases to safeguard public health, particularly in regions with high prevalence rates.

2. MATERIALS AND METHOD

2.1 SAMPLE SELECTION, POPULATION AND AREA

One hundred and ninety-five (195) blood donors including voluntary, family replacement and commercial or paid donors were recruited for this study from tenhospitals having blood donation center in Ilorin, Kwara state. A detailed pre-donation questionnaire was designed and administered in an interviewer based manner to gather relevant demographic characteristics. Table 1 shows the recruitment criteria used for sample selection. The age range of these donors was between 19 and 55 years. Before the collection process began, informed consent was obtained from all participants using a consent form.

Table 1: The inclusive and exclusive used for sample selection.

Inclusive criteria	Exclusive criteria
➢ Age between 19 and 55 ➢ Haemoglobin>13.5g/dl in males and >12.5g/dl in females ➢ HBsAg negative. ➢ Blood pressure ≥100-140mmHg systolic/≤90 mmHg diastolic ➢ Pulse 60-100 bpm ➢ Weight ≥ 45kg ➢ No blood donation in the last 3 months for males and 4 months for females. ➢ No chronic illness such as diabetes mellitus, asthma, or history of allergy.	➢ Nonconsenting participants ➢ HBsAg positive patients (by rapid screening) ➢ Blood donors who did not meet the criteria mentioned above. ➢ Intravenous drug users ➢ Pregnant women ➢ Postpartum or breastfeeding women ➢ Donor who tested positive for at least one thesemarkers: HBsAg, HCV and HIV

2.2 Ethical Approval and Donor Consent

Ethical approval was obtained from Ministry of health, Kwara State with approval number; **ERC/MOH/2024/08/332**. The potential donors were provided with adequate information about the study and interpreters were used where necessary with a view to obtain their consent by signing or thumb printing.

2.3 Sample Size Calculations

The formula bellow was used for calculating the adequate sample size in prevalence study (Pourhoseinghol *etal*., 2013).

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

n = the minimum sample size

Z =Standard normal deviate set at 1.96 corresponding to 95% confidence limit.

P = Sero prevalence rate for studies in Nigeria is 13% (Japhet *etal*., 2011).

Thus P=0.13(13%)

(1 – P) = 1.0 – 0.13 = 0.87

d = Levelof precision = 0.05 (5%).

Calculation

$n = Z^2P(1-P)/d^2$

Therefore the minimum sample size (n) = $(1.96)^2$x 0.13 x (0.87) / $(0.05)^2$ = 174

For this study, **195** blood donors were recruited.

2.4 SAMPLE COLLECTION

After completing the questionnaire, 5mls of venous blood was collected into a plain bottle from the 195 donors recruited. The blood was allowed to clot and retract at room temperature. Sera were separated by centrifugation at 3000rpm for 5 minutes. The supernatant sera was separated into two other plain bottles A and B (A for antigen and antibody testing and B for serum DNA testing) and preserved at -20C until analyses were done. Out of 195 donors recruited, the results of HBsAg screening showed that 15 donors were positive for HBsAg and were excluded in this study**.**

2.5LABORATORY INVESTIGATION

Enzyme Linked Immunosorbent Assay (ELISA) kit [eBIOSCIENCE, Bender MedSystems GmbH, Wien, Austria] was used to detectHBV antibodies(Anti-HBs, Anti-HBe, and Anti-HBc) as instructed by the manufacturer. The viral markers (HBsAg and HBeAg,) were detected using One Step Cassette Style HBV Test or Rapid diagnostic test (RDT)[Atlas Link, Manassas, NOVA, USA].Real- time polymerase chain reaction (R-TPCR) was also doneto detect HBV DNA according to the method of AlJanabi*etal*. (2022).

2.6STATISTICAL ANALYSIS

Statistical Package for the Social Sciences (SPSS) version 25.0 was used for all data analysis in this study. Frequencies and percentages in tables or charts were used to present the demographic characteristics, risk factors for HBV infection among donors, and hepatitis B screening results for participants. Odds ratios (ORs) and 95% confidence intervals (CIs) and Chi-square were used to test the association between demographic characteristics/serological markers and blood donors. The statistical significance was set at $p < 0.05$.

3. RESULTS

The prevalence ofHBsAg positive among 195 recruited donors is shown in **figure1**.Out of 195 donors recruited for this study results showed that 15 donors were positive for HBsAg (7.69%) and were excluded in this study. The remaining 180HBsAg negative blood donors (92.31%) were then assessed for HBV serologic markers.

Table 2 shows the demographic characteristics of three categories of blood donors (commercial donors, family replacement, and voluntary donors) used for this study. Among the subjects used for this study, family replacement131(73%)has the highest prevalence of the demographic characteristics used for this studycompared to commercial 34 (18.9%)and voluntary donors15 (8.1%). It was observed that family replacement donors were more associated with blood donation than commercial donors and voluntary donors

(p=0.0000). Male blood donors were more associated with blood donation than the females (p=0.0000). The age bracket of 26-35 years were found more associated with blood donation than the other age groups (p=0.0001). Also, it was found out that blood donors that are first donors, and having one sexual/marital partner were significantly associated with blood donation (p=0.0025, 0.012 respectively).However, there were no significant associations of blood group, level of education and body piercing with blood donation.

The R-T PCRresult in **Table2** shows that all the 180 blood samples obtained from the three categories of HBsAg negative blood donors tested with RDT and ELISA were negative for HBV DNA with the R-T PCR. Figure 2 shows increased absorbance of the extracted HBV DNA from standard positive control (a) and samples control (b), but zero absorbance (c) from the 180 HBsAg negative donors' blood samples.

The pattern of seropositivity showed in **table 3** revealed that out of the 180HBsAg negative blood donors, 98 are negative for all the HBVserologic markersand the remaining 82 are tested positive for one or more HBV serologic markers. Out of 82 samples that tested positive,**18 (10%)**,**37 (20.5%)**,**25 (13.8%)**, and **2 (1.1%)** tested positive for **Anti-HBs only**; **Anti-HBc only**; **Anti-HBs and Anti-HBc**; and **Anti-HBs, Anti-HBe and anti-HBc** respectively. None was positive for more than two HBV serologic markers.

Table 4 shows the frequency of HBV (positive) markers among three categories of blood donors negative for HBsAg.There is no significance in the frequency of **Anti-HBs** (0.979), **Anti-HB_e**(0.487), and **Anti-HB_c**(0.292) **among** FRD, CD and VD.

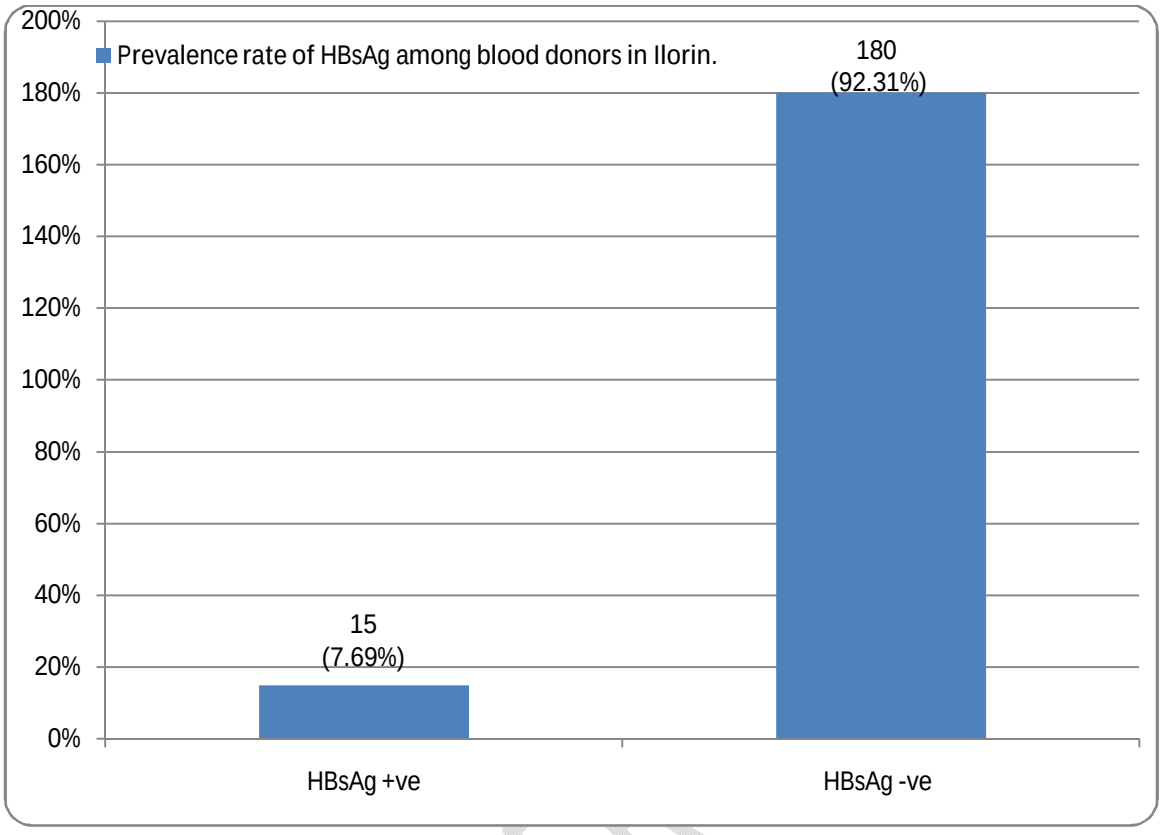


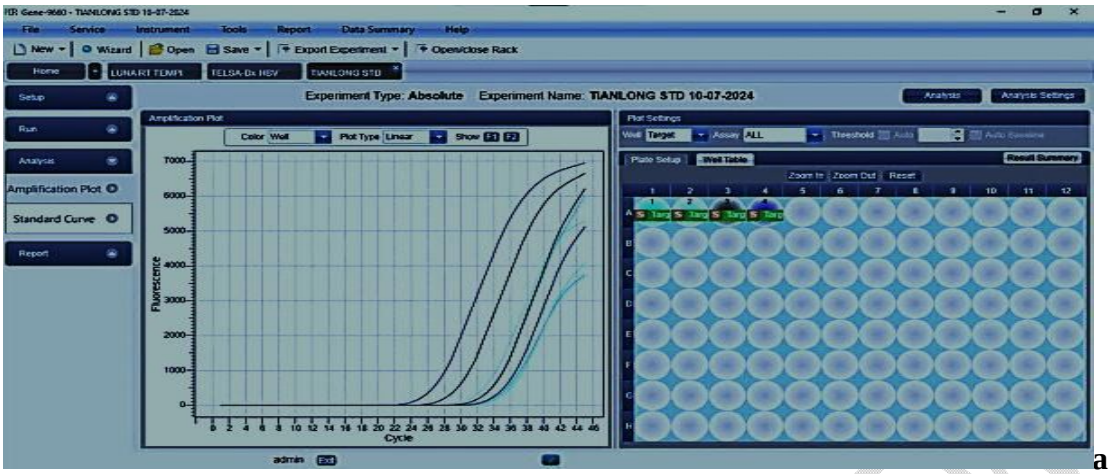
Figure 1: The prevalence rate of HBsAg among blood donors in Ilorin.
HBsAg +ve: Blood donorspositive for HBsAg.
HBsAg -ve: Blood donors negative for HBsAg.

Table 2: Demographic characteristics of three categories of blood donors (commercial donors, family replacement, and voluntary donors)

Characteristics	FRD	VD	CD	Total donors	Chi-square (P-value)
Number (Prevalence)	131(73)	15 (8.1)	34 (18.9)	180 (100)	**37.153 (0.000)***
Gender: Male	118 (65.6)	7 (3.9)	34 (18.9)	159 (83.3)	**30.146 (0.000)***
Female	13 (7.2)	8 (4.4)	0 (0)	21 (11.7)	
Age (years): 19–25	39 (21.7)	11 (6.1)	8 (4.4)	58 (32.2)	
26–35	49 (27.2)	1 (3)	20 (11.1)	70(38.9)	**19.063 (0.001)***
36–55	43 (23.9)	3 (1.7)	6 (3.3)	52(28.9)	
First donor	51 (28.3)	8 (4.4)	6 (3.3)	65(36.1)	**7.404 (0.025)***

Blood group:	**A**	13 (7.2)	0 (0)	5 (2.8)	18(10)	
	B	38 (21.1)	1 (0.6)	7 (3.9)	46(25.6)	
	AB	5 (2.8)	2 (1.1)	0 (0)	7(3.9)	
	O	75 (41.7)	12 (6.7)	22 (12.2)	109(60.6)	**11.321 (0.079)**
Level of education						
Primary		9 (5.0)	1(0.6)	7 (3.9)	17(9.4)	
Secondary		68 (37.8)	8 (4.4)	19 (10.6)	95(52.8)	**7.852 (0.097)**
Tertiary		54 (30.0)	6 (3.3)	8 (4.4)	68(37.8)	
Number of donors with body piercing		52 (28.9)	2 (1.1)	11(6.1)	65(36.1)	**4.311 (0.116)**
Sexual/Marital partner:	**0**	41 (22.8)	8 (4.4)	12 (6.7)	61(33.9)	
	1	68 (37.8)	7 (3.9)	10 (5.6)	85(47.2)	**12.829 (0.012)***
>1		22 (12.2)	0 (0)	12 (6.7)	34(18.9)	

VD = voluntary donors, FRD = family relative donors, CD = Commercial donors,
***Statistical significant p<0.05.**



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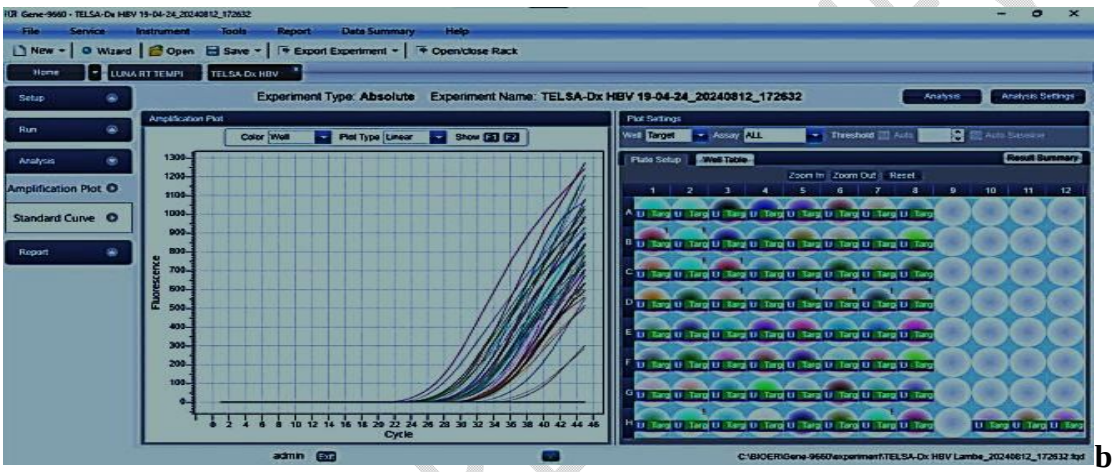

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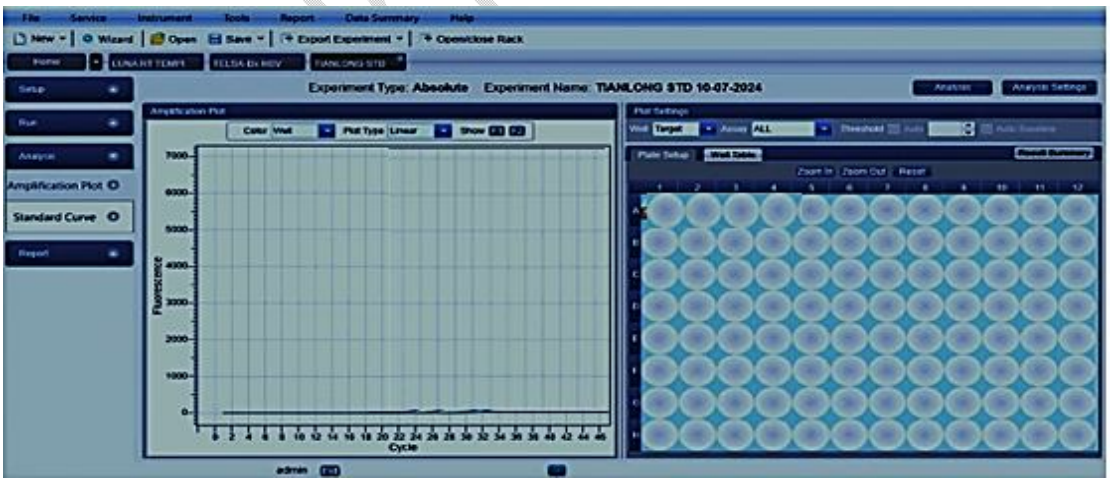

c

Figure 2: Amplification of extracted HBV DNA

The curves on the graphs signify HBV DNA positive from positive standard control **(a)** to samples control**(b),**and to blank graph of negative HBV samples **(c).**

Table 3: HBV serologic markers among HBsAg negative blood donors and donor status.

HBV serological markers	Frequency of occurrence N= 180 (100)	donor status
Anti-HBs-ve HBeAg-ve Anti-HBe-ve Anti-HBc-ve HBV DNA-ve	98 (54.4)	**Susceptible**
Anti-HBs+ve HBeAg-ve Anti-HBe-ve Anti-HBc-ve HBV DNA-ve	18 (10)	**Immunity/vaccination**
Anti-HBs-ve HBeAg-ve Anti-HBe-ve Anti-HBc+ve HBV DNA-ve	37 (20.5)	**Previous exposure/ absence of active virus**
Anti-HBs+ve HBeAg-ve Anti-HBe-ve Anti-HBc+ve HBV DNA-ve	25 (13.8)	**Immunity/previous exposure**
Anti-HBs+ve HBeAg-ve Anti-HBe+ve Anti-HBc+ve HBV DNA –ve	2 (1.1)	**Immunity/ Previous exposure/ absence of active virus**

All negative: Susceptible to HBV infection, Anti-HBs+ve/Anti-HBe+ve: Immunity against HBV, Anti-HBc+ve: Past exposure to HBV/ absence of active HBV.

Table 4 Frequency of HBV (positive) markers among HBsAg negative blood donors (FR, VD, and CD).

HBV serologic markers	FR, n=131 No. (%) of positive samples	VD, n=15 No. (%) of positive samples	CD, n=34 No. (%) of positive samples	Total n=180 (%)	Chi-Square (p-value)
Anti-HBs	9(5.0)	1(0.6)	2(1.1)	12(6.7)	0.042(0.979)
HBeAg	0	0	0	0	0
Anti-HB_e	24(13.3)	1(0.6)	7(3.9)	32(17.8)	1.477(0.487)
Anti-HB_C	53(29.4)	3(1.7)	14(7.8)	70(38.9)	2.463(0.292)
HBV DNA	0	0	0	0	0

VD = voluntary donors, FRD = family relative donors, CD = Commercial donors,
*Statistical significant $p<0.05$.

DISCUSSION

Blood donation plays an essential role in healthcare by providing life-saving blood products to individuals in need of transfusions (Jersild and Hafner, 2017). However, ensuring the safety of blood donations remains a paramount concern due to the potential transmission of infectious diseases, such as HBV (Busch *etal.*, 2019). A 7.69% prevalence rate of HBsAg positive donors indicates a moderate level of HBsAg positivity among the donor population. Although these donors were excluded in this study but it suggests that a significant portion of the donor population in Ilorin may be infected with the Hepatitis B virus. It's important to compare this rate to that of HBsAg negative donors used in this study, since higher rate than average; it could indicate a higher transmission rate of Hepatitis B in our study area, Ilorin (Adamu, 2021).The detection and prevention of HBV transmission through blood donation require rigorous screening procedures. Blood donors are typically categorized into three types: commercial donors (who donate for monetary gain), family replacement donors (who donate for a family member or friend in need), and voluntary donors (who donate altruistically) (Saleh *etal.*, 2021). Understanding the demographic and clinical characteristics of these donor types and their association with HBV serologic markers is crucial for public health policies and strategies aimed at enhancing blood safety. This study aimed to analyze the demographic characteristics of 180 blood donors and to examine the prevalence of HBV serological markers among them.

The study also explored associations between donor characteristics such as gender, age, marital status, education level, and other variables with blood donation. In addition, it assessed the HBV status of these donors using rapid diagnostic tests (RDT), enzyme-linked immunosorbent assay (ELISA), and real- time quantitative polymerase chain reaction (R-T PCR).This study revealed that family replacement donors exhibited the highest prevalence of blood donation compared to commercial and voluntary donors. This finding suggests that in the population under study, family ties and the urgency of a loved one's need for a blood transfusion may be stronger motivators for donation than altruism or financial compensation (Tevdoradze and Margvelashvili, 2015). Family replacement donors often donate when a family member is in immediate need of blood, making this group highly relevant for targeted donor recruitment strategies (Rossmann*etal*., 2022). Family replacement donors were more prevalent in the study, which may reflect the socio-cultural context in which individuals feel a stronger obligation to donate blood when it is needed for a loved one as previously reported by Ugwu*etal*. (2019). This finding could inform donor recruitment strategies that emphasize the importance of regular voluntary donation to reduce reliance on family replacement donors in emergency situations. Family replacement donors' higher prevalence could be influenced by the urgency and emotional connection associated with saving a family member's life (Kyari*etal*., 2018). Commercial donors, on the other hand, may be motivated primarily by financial incentives, while voluntary donors donate out of a sense of altruism (Sykora, 2016). Each of these motivations plays a distinct role in the overall blood donation ecosystem.

One of the key findings of this study was the strong association between male donors and blood donation compared to female donors. This gender disparity may stem from social, cultural, or biological factors. Historically, males have been more likely to donate blood, possibly due to perceptions of blood donation as a physically demanding process or societal expectations (Glynn *etal*., 2002). In addition, reports have disclosed that women may be less likely to donate due to factors such as menstruation, pregnancy, or anemia, which could temporarily disqualify them from donating (Avu-Tamakloe, 2019). The age group 26-35 years was also found to be more associated with blood donation compared to other age groups. In concurrence with previous studies, this age group may represent individuals who are in the prime of their health and therefore more likely to meet the eligibility criteria for blood donation (Kathpal, 2019). Younger individuals (under 26) may be less likely to donate due to a lack of awareness or perceived inconvenience, while older donors (over 35) may be less eligible due to health issues or a reduction in physical capacity (Hadjesfandiari*etal*., 2021).

First-time donors were significantly associated with blood donation. This association suggests that there may be a substantial number of people willing to donate blood at least once, but there may be barriers preventing them from becoming repeat donors (Bednall and Bove, 2011). These barriers could include a lack of knowledge about

the need for ongoing blood donations, fear of the donation process, or logistical issues such as the availability of donation centers. Encouraging repeat donations among first-time donors could be a key strategy for increasing the overall blood supply. Donors with one sexual or marital partner were also significantly associated with blood donation. This finding may be linked to lower perceived risk of sexually transmitted infections (STIs), which are a concern in the blood donation process (Awili, 2020). Donors with multiple partners may be more likely to engage in behaviors that increase the risk of STIs, which could lead to deferrals from blood donation (Gonçalez*etal*., 2019). Interestingly, blood group, level of education, and body piercing were not significantly associated with blood donation. The lack of association between blood group and donation could be attributed to the fact that blood type is not a criterion for donor eligibility (Eder *etal*., 2009). The absence of a relationship between education level and donation suggests that individuals from various educational backgrounds may be equally motivated to donate blood. Similarly, body piercings, while sometimes considered a risk factor for bloodborne infections, did not significantly impact donor eligibility or behavior in this study.

Among the 180 HBsAg-negative blood samples tested using RDT (confirmed with ELISA) and R-T PCR, none were positive for HBV DNA. This result indicates that the blood samples in this study were free of active HBV infection, highlighting the effectiveness of the screening process in preventing HBV transmission through blood transfusion particularly those confirmed with ELISA. The absence of HBV DNA in these samples also supports the use of multiple testing methods (RDT, ELISA, and R-T PCR) as a comprehensive approach to blood screening (Liu *etal*., 2023). In a study in Ibadan the presence of HBV DNA was 0.93% among serologically screened donors (Fasola, *etat*2022). This is higher than 0.0% found in this study and lower than 0.56% found in blood donors in Cameroon(Fopa*etal*., 2019) and 0.5% in Ghana(El-Zayadi*etal*,. 2008).This difference may due to differences in differences in location of studies. However, while no active HBV infection was detected, the study identified varying levels of seropositivity for different HBV markers. Table 3 showed thatout of 180 samples tested for HBV serologic markers, 82 were positive for either one or more viral markers. The presence of Anti-HBs/Anti-HBein some donors indicates that these individuals have had been exposed to HBV in the past and had developed immunity that successfully cleared the virus throughvaccination against HBV (Egbe *etal*., 2023). On the other hand, the presence of Anti-HBc suggests prior exposure to the virus, even in the absence of active infection (Akpan *etal*., 2023). This finding raises concerns about the potential for occult HBV infection, where individuals may have low levels of viral DNA that are not detected by standard tests but could still pose a risk to recipients. The finding that 98 donors tested negative for all HBV markers but may be susceptible to HBV infection is also noteworthy. These individuals could be at risk of contracting HBV in the future, especially if they engage in high-risk behaviors or live in areas with high HBV prevalence (Umego*etal*., 2018). Public health interventions aimed at increasing HBV

vaccination coverage among blood donors could reduce the proportion of susceptible individuals and further enhance the safety of the blood supply. The study found no significant difference in the frequency of positive HBV serologic markers among the three donor categories (commercial, family replacement, and voluntary). This lack of variation suggests that HBV exposure and immunity may be similar across different types of donors (Fasola*etal*., 2022).

CONCLUSION

This study identified that family replacement donors, male donors, those aged 26-35, first-time donors, and individuals with one sexual or marital partner had the highest prevalence of blood donation. The result of Real time PCR revealed that none of the HBsAg-negative blood samples were positive for HBV DNA, indicating past exposure to HBV as well as raising concern about occult infections. This study highpoints the importance of expanding serological screening beyond HBsAg to include additional markers (anti-HBc, HBeAg, anti-HBeand anti-HBs) and use of more sensitive testing methods (Real time PCR)for thedetection of HBV DNA to reduce the risk of HBV transmission through blood transfusion.

Disclaimer (Artificial intelligence)

Option 1:

We hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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