Sero-prevalence of Hepatitis B and C Viruses among Students of the Faculty of Allied Health Sciences, College of Medical Sciences, Ahmadu Bello University, Zaria: A Cross-sectional Study

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Abstract

Introduction: Hepatitis B virus (HBV) and hepatitis C virus (HCV) remain major causes of chronic liver disease, cirrhosis and hepatocellular carcinoma. Students in allied health sciences occupy a strategic position because they are future health workers, potential recipients and transmitters of infection-control knowledge, and a population exposed to clinical training environments. This article refines and critically contextualises a cross-sectional study on HBV and HCV sero-prevalence among students of the Faculty of Allied Health Sciences, College of Medical Sciences, Ahmadu Bello University, Zaria, Nigeria.

Methodology: The primary source was the pasted study article reporting serological screening of 217 consenting undergraduate allied health science students for hepatitis B surface antigen (HBsAg) and anti-HCV antibodies using rapid immunochromatographic strips. The manuscript was strengthened through critical narrative engagement with published literature on viral hepatitis epidemiology, blood safety, occupational risk, health-worker vaccination, Nigerian health systems and Islamic public-health ethics. Tables were standardised, prevalence estimates were presented with confidence intervals, and sparse risk-factor associations were interpreted cautiously using exact statistics.

Results: Of 217 students screened, 6 were HBsAg positive, giving an HBV sero-prevalence of 2.76% (95% CI: 1.27-5.90), while 1 was anti-HCV positive, giving an HCV sero-prevalence of 0.46% (95% CI: 0.08-2.56). HBV positivity was slightly higher among males, single students, students aged 28-32 years, 200-level students and Bachelor of Nursing Science students. HCV positivity was observed in one male, single, 200-level Bachelor of Medical Laboratory Science student aged 23-27 years. In the standardised risk-factor analysis, history of blood transfusion showed the strongest signal for HBV infection. Associations involving HCV were unstable because only one participant tested positive.

Conclusion: The study suggests low observed sero-prevalence of HBV and HCV in this allied health student cohort, but the small number of positive results, absence of vaccination-status data, reliance on rapid screening assays and limited multivariable analysis restrict causal inference. The findings support a campus-wide hepatitis prevention programme that combines confidential screening, confirmatory testing, complete HBV vaccination, safer clinical training, blood-safety education, linkage to care, and culturally competent Islamic psychoeducation that protects life, dignity, privacy and equity.

Keywords: Hepatitis B, Hepatitis C, sero-prevalence, allied health students, Nigeria.

Introduction

Viral hepatitis remains one of the most important but under-addressed infectious disease problems in global health. HBV and HCV are blood-borne viruses with overlapping transmission routes, including perinatal exposure, unsafe injections, exposure to contaminated sharps, inadequately screened blood products, high-risk sexual exposure and sharing of contaminated instruments. Their public health importance lies not only in acute infection but also in chronic liver disease, cirrhosis, hepatocellular carcinoma and preventable mortality. WHO estimates that 254 million people were living with chronic HBV infection in 2022, with 1.2 million new infections each year. HCV is curable in more than 95% of treated persons using direct-acting antivirals, but diagnosis and treatment access remain insufficient in many low- and middle-income settings.1-4

Nigeria is a high-priority country for viral hepatitis prevention and control. A national survey reported substantial HBV endemicity and showed the need for improved vaccination, screening and linkage to care.5 Earlier systematic reviews also described a high pooled HBV burden across Nigerian populations, although estimates vary by population group, assay method, geography and time period.6 Such variation is expected because Nigeria includes

highly diverse states, urban and rural settings, different healthcare access patterns, and variable exposure to childhood immunisation, transfusion safety and informal injection practices.

Allied health science students are an epidemiologically and programmatically important group. They are often young adults, sexually active in varying degrees, exposed to campus social networks and increasingly introduced to clinical laboratories, wards, radiology suites, community postings and procedure-related settings. They may later become nurses, medical laboratory scientists, radiographers and other health professionals whose own vaccination status and infection-control behaviour influence patient safety. For this reason, a low measured prevalence in such students should not lead to complacency. It should be used as an opportunity to institutionalise prevention before clinical exposure intensifies.

The pasted study article titled "Sero-prevalence of Hepatitis B and C Viruses among the Students of Faculty of Allied Health Sciences, College of Medical Sciences, Ahmadu Bello University, Zaria" provides valuable primary data from 217 students. It reports low HBsAg and anti-HCV positivity, identifies possible risk factors and recommends vaccination, awareness and screening.7 This revised manuscript retains the study focus while strengthening the article for peer review. It standardises the tables, clarifies the meaning of the results, critiques analytic limitations, and situates the findings within global evidence, Nigerian health-system realities and Islamic public-health ethics.

The Islamic health-education component is not presented as a substitute for virological science. Rather, it is framed as a culturally meaningful implementation pathway. Islamic psychoeducation can reinforce evidence-based hepatitis prevention through the principles of preservation of life, avoidance of harm, trustworthiness, cleanliness, privacy, non-stigmatisation and responsible care-seeking. In a religiously plural country such as Nigeria, this approach must be inclusive, voluntary and compatible with secular public-health standards. It should support, not replace, laboratory diagnosis, vaccination, clinical treatment and regulated health financing.

Methodology

Study design and setting

The primary study used a cross-sectional design. It was conducted among undergraduate students of the Faculty of Allied Health Sciences, College of Medical Sciences, Ahmadu Bello University, Zaria, with laboratory work linked to Ahmadu Bello University Teaching Hospital, Shika, Kaduna State. ABUTH is a major tertiary and training centre in north-western Nigeria and serves Kaduna State and neighbouring states, including Katsina, Kano, Zamfara, Niger, Kebbi, Jigawa and Sokoto, as well as cross-border populations from Niger, Chad and Cameroon according to the source manuscript.7

Study population, sampling and sample size

The study population comprised full-time undergraduate allied health science students aged 18 years and above who gave consent. Students from departments not included in the study were excluded. The source manuscript reports simple random sampling and a final sample of 217 students. The sample size was calculated using a previous ABUTH Zaria antenatal HBV prevalence estimate of approximately 15%.7,8

Sample collection and laboratory analysis

Five millilitres of venous blood were collected aseptically. Serum was separated after clotting and centrifugation. Samples not tested immediately were stored at 2-8 degrees Celsius. HBsAg and anti-HCV screening were performed using rapid immunochromatographic test strips according to the manufacturer's instructions. The result was read after 15-20 minutes, with a visible control line indicating a valid test.7

Data analysis and table standardisation

Descriptive statistics were used to summarise socio-demographic characteristics, serological results and selected risk factors. The sero-prevalence of HBV and HCV was calculated as the number positive divided by the number screened, expressed as percentages with Wilson 95% confidence intervals. Because the number of positive HBV and HCV results was small, risk-factor analyses were interpreted cautiously. Where two-by-two tables had sparse cells, Fisher's exact test and exact-risk interpretation are preferable to uncorrected chi-square tests. The tables were standardised by presenting denominators, positive counts, negative

counts and prevalence within exposure categories rather than only column percentages.

Ethical considerations

The source manuscript states that ethical approval was obtained through ABUTH, participants signed consent forms, data were treated confidentially and analysed anonymously, and participants incurred no financial obligation.7 For journal submission, the exact ethics approval number and date should be inserted.

Critical contextualisation

A narrative critical approach was used to deepen the primary study. Relevant literature was used to contextualise global and Nigerian viral hepatitis burden, health-worker and student risk, blood safety, vaccination, confirmatory diagnosis, health financing, Islamic medical ethics and faith-sensitive health promotion. The IMAN Medical Journal review on falls among elderly patients was used only as a packaging and flow guide: title page, structured abstract, keywords, clear thematic subheadings, practical conclusion and Vancouver references.9

Results

Table 1 shows that most participants were aged 23-27 years (47.9%) or 18-22 years (38.2%). Males constituted 63.6% of the sample and females 36.4%. Most respondents were single (92.2%). By programme, Bachelor of Medical Laboratory Science students formed the largest group (51.2%), followed by Bachelor of Nursing Science students (28.1%) and Bachelor of Radiography students (20.7%). Participants were distributed across 100 to 500 levels, with the largest group in 200 level (23.0%).

Table 2 shows that 6 of 217 participants were HBsAg positive, giving an HBV sero-prevalence of 2.76%. One participant was anti-HCV positive, giving an HCV sero-prevalence of 0.46%. The wide confidence intervals, especially for HCV, reflect the small number of positive cases.

Table 3 shows the distribution of HBsAg positivity by socio-demographic variables. HBV positivity was slightly higher among males than females, but the difference was small. The highest age-specific HBV prevalence was in the 28-32 years group. All positive cases occurred among single students. By programme, B.NSc students had the highest proportion, followed by B.MLS and B.RAD students. By level, 200-level students had the highest HBV prevalence.

Table 4 presents anti-HCV sero-prevalence. Only one participant tested positive, so subgroup comparisons are descriptive rather than inferential. The single HCV-positive participant was male, single, aged 23-27 years, enroled in B.MLS and in 200 level.

Table 5 standardises HBV risk-factor findings by showing prevalence among exposed and unexposed participants. History of blood transfusion had the clearest association with HBsAg positivity. Although five of six HBsAg-positive participants reported injectable drug use, the large number of exposed but negative respondents makes the exact association statistically unstable. The table therefore supports a cautious interpretation: blood transfusion is a strong signal, while other exposures require larger studies and better exposure measurement.

Table 6 standardises HCV risk-factor findings. Because only one participant was anti-HCV positive, all associations are highly uncertain. Blood transfusion, injectable drug use and unprotected sex each included the single positive case among exposed participants, but this does not establish causality. Confirmatory HCV RNA testing and a larger sample would be required before robust epidemiological claims can be made.

Discussion

Principal findings

This study found low observed sero-prevalence of HBV and HCV among allied health science students at Ahmadu Bello University, Zaria. The HBV prevalence of 2.76% is lower than many Nigerian community and clinical estimates, while the HCV prevalence of 0.46% is also low. These findings may reflect the health-related knowledge of the student population, possible prior vaccination, institutional screening practices, lower risk exposure, or the specific diagnostic methods used. However, low observed prevalence should not be confused with low institutional responsibility. Allied health students are entering professions where exposure to blood and body fluids is foreseeable, so prevention must be systematic rather than reactive.

Table 1: Socio-demographic characteristics of study participants (N = 217)

Variable	Frequency	Percentage
Age group (years)	**n**	**(%)**
18-22	83	38.2
23-27	104	47.9
28-32	25	11.5
33-37	4	1.8
38-42	1	0.5
Sex		
Male	138	63.6
Female	79	36.4
Marital status		
Single	200	92.2
Married	17	7.8
Programme of study		
B.NSc	61	28.1
B.MLS	111	51.2
B.RAD	45	20.7
Level of study		
100	34	15.7
200	50	23.0
300	42	19.4
400	45	20.7
500	46	21.2

Table 2: Overall sero-prevalence of hepatitis B and C markers among participants (N=217)

Marker	Positive n	Negative n	Prevalence % (95% CI)
HBsAg	6	211	2.76 (1.27-5.90)
Anti-HCV	1	216	0.46 (0.08-2.56)

Table 3: HBsAg sero-prevalence by socio-demographic characteristics

Variable	n	HBsAg positive	HBsAg negative
Age group (years)		**n (%)**	**n (%)**
18-22	83	2 (2.4)	81 (97.6)
23-27	104	3 (2.9)	101 (97.1)
28-32	25	1 (4.0)	24 (96.0)
33-37	4	0 (0.0)	4 (100.0)
38-42	1	0 (0.0)	1 (100.0)
Sex			
Male	138	4 (2.9)	134 (97.1)
Female	79	2 (2.5)	77 (97.5)
Marital status			
Single	200	6 (3.0)	194 (97.0)
Married	17	0 (0.0)	17 (100.0)
Programme of study			
B.NSc	61	2 (3.3)	59 (96.7)
B.MLS	111	3 (2.7)	108 (97.3)
B.RAD	45	1 (2.2)	44 (97.8)
Level			
100	34	1 (2.9)	33 (97.1)
200	50	2 (4.0)	48 (96.0)
300	42	1 (2.4)	41 (97.6)
400	45	1 (2.2)	44 (97.8)
500	46	1 (2.2)	45 (97.8)

Table 4: Anti-HCV antibody sero-prevalence by socio-demographic characteristics

Variable	n	Anti-HCV positive	Anti-HCV negative
Age group (years)		**n (%)**	**n (%)**
18-22	83	0 (0.0)	83 (100.0)
23-27	104	1 (1.0)	103 (99.0)
28-32	25	0 (0.0)	25 (100.0)
33-37	4	0 (0.0)	4 (100.0)
38-42	1	0 (0.0)	1 (100.0)
Sex			
Male	138	1 (0.7)	137 (99.3)
Female	79	0 (0.0)	79 (100.0)
Marital status			
Single	200	1 (0.5)	199 (99.5)
Married	17	0 (0.0)	17 (100.0)
Programme of study			
B.NSc	61	0 (0.0)	61 (100.0)
B.MLS	111	1 (0.9)	110 (99.1)
B.RAD	45	0 (0.0)	45 (100.0)
Level			
100	34	0 (0.0)	34 (100.0)
200	50	1 (2.0)	49 (98.0)
300	42	0 (0.0)	42 (100.0)
400	45	0 (0.0)	45 (100.0)
500	46	0 (0.0)	46 (100.0)

Comparison with Nigerian and global literature

The low HBsAg prevalence in this cohort contrasts with Nigeria's higher general-population burden reported in national and pooled studies.5,6 It is closer to findings from some student and trainee studies that reported lower prevalence in medical or university populations.10 Such differences are plausible because health science students may have better awareness and more access to vaccination than the general population. However, the finding should be interpreted alongside the absence of vaccination-status data. Without anti-HBs testing or documented vaccination history, it is not possible to know whether low HBsAg prevalence reflects successful immunisation, low exposure, under-detection or sampling variation.

The HCV result is even more difficult to interpret. Anti-HCV positivity indicates exposure to the virus but does not confirm current viraemia. WHO recommends simplified HCV service delivery and access to direct-acting antiviral therapy, but diagnosis still requires a pathway from antibody screening to confirmatory viral testing and treatment.3,4,11 In this study, one anti-HCV positive result cannot support strong subgroup claims. It should instead trigger a recommendation for confirmatory HCV RNA testing, counselling and linkage to care.

Risk factors and the need for cautious inference

The strongest risk signal was history of blood transfusion. This is biologically plausible because transfusion can transmit HBV and HCV when donor screening, storage, laboratory quality assurance or window-period detection is inadequate. Blood safety has improved in Nigeria, but replacement donation and uneven laboratory capacity remain concerns in many settings.12 The result supports stronger education about transfusion safety, but students should not be discouraged from receiving medically indicated blood. The correct public-health response is safer blood systems, not avoidance of lifesaving treatment.

The source manuscript described injectable drug use as significantly associated with viral hepatitis. After reconstructing the two-by-two table, exact testing suggests that this association is statistically unstable for HBV and not interpretable for HCV. The difference arises because the absolute number of positives was very small. This does not mean injectable drug use is unimportant. Unsafe injection practices, sharing of injecting equipment and informal therapeutic injections are recognised transmission risks. It means that this specific dataset cannot quantify the risk precisely.

What the study does well

The study has several strengths. It addresses an important population of future health workers in a high-burden country. It combines biological testing

Table 5: HBsAg sero-prevalence by selected risk factors

Risk factor	Exposed: positive/total (%)	Unexposed: positive/total (%)	Odds ratio (95% CI)	Fisher exact p-value
History of blood transfusion	2/11 (18.2)	4/206 (1.9)	11.22 (1.81-69.54)	0.031
Use of injectable drugs	5/134 (3.7)	1/83 (1.2)	3.18 (0.36-27.69)	0.411
Unprotected sex	2/24 (8.3)	4/193 (2.1)	4.30 (0.74-24.82)	0.134
Surgical procedure	1/26 (3.8)	5/191 (2.6)	1.49 (0.17-13.26)	0.539
Shared personal items	2/48 (4.2)	4/169 (2.4)	1.79 (0.32-10.10)	0.616

Table 6: Anti-HCV antibody sero-prevalence by selected risk factors

Risk factor	Exposed: positive/total (%)	Unexposed: positive/total (%)	Odds ratio* (95% CI)	Fisher exact p-value
History of blood transfusion	1/11 (9.1)	0/206 (0.0)	59.00 (2.26-1537.19)	0.051
Use of injectable drugs	1/134 (0.7)	0/83 (0.0)	1.88 (0.08-46.60)	1.000
Unprotected sex	1/24 (4.2)	0/193 (0.0)	24.70 (0.98-623.95)	0.111
Surgical procedure	0/26 (0.0)	1/191 (0.5)	2.40 (0.10-60.36)	1.000
Shared personal items	0/48 (0.0)	1/169 (0.6)	1.16 (0.05-28.88)	1.000

with questionnaire-based risk assessment. It uses a simple field-compatible testing approach. It reports on both HBV and HCV markers. It also makes practical recommendations on vaccination, awareness and screening. These features make the study useful for university health services, medical educators and campus infection-control policy.

What remains underdeveloped

Several areas need strengthening before journal submission. First, the original tables mixed column percentages and prevalence percentages, leading to possible misinterpretation. The revised tables correct denominators and present findings more transparently. Second, the method states that multivariate analysis was conducted, but no multivariable results were presented. With only six HBV positives and one HCV positive, multivariable modelling would be statistically underpowered. Third, the study did not assess HBV vaccination history, number of doses, post-vaccination anti-HBs titres, history of needle-stick injury, clinical posting level, prior jaundice, family history, tattooing, scarification, barbering exposure, dental procedures or maternal HBV history. Fourth, rapid screening alone cannot differentiate acute infection, chronic infection, resolved infection, vaccine-induced immunity or false positives. Fifth, the article needs

stronger linkage between results and a costed prevention plan.

Actuarial and health-financing implications

The study provides prevalence estimates but does not develop an actuarial design for prevention. A university hepatitis programme requires estimation of the expected cost of screening, vaccination, confirmatory testing, post-exposure prophylaxis, liver-function assessment, antiviral treatment and follow-up. It also requires risk pooling so that students are not forced to pay out-of-pocket at the point of need. The NHIA Act 2022 makes health insurance mandatory in Nigeria and creates a framework for wider pooling, including vulnerable groups and informal-sector populations.13,14 University health schemes, state social health insurance agencies and campus clinics can use such pooling principles to purchase vaccines and confirmatory tests more efficiently. In Muslim-majority or faith-linked institutions, zakat and waqf may support indigent students, but they should complement regulated health financing rather than create fragmented parallel systems.

Islamic psychoeducation and hepatitis prevention

Islamic psychoeducation can help translate biomedical prevention into morally meaningful and culturally resonant behaviour. The key ethical concepts are preservation of life, avoidance of harm, cleanliness, trust, confidentiality, justice and compassion. These principles can support vaccination, safe clinical practice, blood-safety awareness, avoidance of unsafe injections, responsible sexual health education and non-stigmatising care for infected students. Islamic medical ethics also emphasises that illness is not a basis for humiliation. Therefore, campus programmes should protect infected students from gossip, exclusion and moral blame.15

In Muslim-majority settings such as many parts of Kaduna, Kano, Katsina, Sokoto, Jigawa, Zamfara, Kebbi, Yobe and Borno, imams, Muslim student societies, Islamic medical associations and family networks can strengthen health literacy when messages are scientifically accurate and non-coercive. In mixed settings such as Kaduna metropolis, Ilorin, Jos, Abuja and many university campuses, health messages should use inclusive public language while allowing optional faith-sensitive counselling. In urban plural settings such as Lagos, Abuja and Port Harcourt, digital campaigns, confidential campus clinics and interprofessional education may be more effective than mosque-based messaging alone.

Informal sector and multicultural realities

Although this study focused on university students, their risk environment extends into the informal sector. Students receive haircuts, manicures, injections, dental care, traditional procedures and informal medical services outside the university. Many households pay out-of-pocket for care and may use unregulated providers when formal services are unaffordable. This makes hepatitis prevention a health-system issue, not only a campus issue. Messages should therefore address barbers, beauticians, informal injection providers, patent medicine vendors, private clinics and blood-donation networks. Nigeria's religious diversity also requires care. Islamic framing can improve acceptability among Muslim students, but implementation in public institutions must remain respectful of Christians, traditional religion adherents and students with no stated religious affiliation.

Implications for clinical training and occupational health

Allied health students should be treated as future health personnel with foreseeable occupational exposure. International guidance supports HBV vaccination for healthcare personnel at risk of blood or body-fluid exposure, documentation of vaccine response where feasible, and clear post-exposure management pathways.16,17 A campus protocol should include baseline HBV screening, vaccination for susceptible students, anti-HBs testing after completion where resources permit, training on sharps safety, reporting of needle-stick injuries, immediate post-exposure assessment, confidential records and non-punitive follow-up.

Policy and research recommendation

ABU Zaria and similar Nigerian institutions should implement mandatory offer, not coercive compulsion, of HBV screening and vaccination for all health science students at matriculation or before clinical posting.

Positive HBsAg results should be confirmed and followed by clinical staging, counselling, assessment for chronic infection and linkage to antiviral care where indicated.

Positive anti-HCV results should be followed by HCV RNA testing and referral for direct-acting antiviral treatment when viraemia is confirmed.

Student health services should maintain confidential occupational-health records, including HBV vaccination dates, anti-HBs response where feasible and needle-stick exposure history.

Health education should include blood safety, safer injection practice, sexual health, avoidance of shared sharp instruments and stigma reduction.

Faith-based psychoeducation should be evidence-based, inclusive and non-coercive, using Islamic values to reinforce preservation of life, confidentiality, dignity and responsible care-seeking.

Future research should use larger multi-centre samples, validated assays, confirmatory testing, vaccination-status documentation, multivariable analysis and economic evaluation of university hepatitis prevention packages.

Conclusion

The sero-prevalence of HBsAg and anti-HCV in this allied health student cohort was low, at 2.76% and 0.46% respectively. The findings are encouraging but should not be over-interpreted. The low number of positive cases limits statistical inference, and rapid screening without confirmatory testing cannot define the full burden of current, chronic, resolved or vaccine-prevented infection. Blood transfusion emerged as the clearest risk signal, while other associations require larger and more rigorous studies.

The study's practical importance lies in prevention. Allied health students should enter clinical training with documented HBV vaccination, accurate knowledge, safe procedural habits, confidential access to testing and clear post-exposure pathways. In Nigeria, such programmes must address informal-sector risks, out-of-pocket costs, religious diversity and regional differences. Islamic psychoeducation can strengthen hepatitis prevention when it is used to promote life, dignity, trust, cleanliness, justice and compassion. It must remain aligned with laboratory science, vaccination, clinical treatment and public-health law. A well-designed university hepatitis programme can protect students, future patients and the wider community.

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