

Prevalence of Blood-Borne Infections Among College Students of a Nigerian University

ABSTRACT

Background: Bloodborne infections (BBI) are caused by pathogens such as microorganisms carried via blood, such as bacteria or viruses capable of causing diseases that alter the normal state of the human body. The most common BBIs are syphilis, HIV, HPTLV-1, HBV, and HCV.

Objectives: To determine the prevalence, level of awareness, and knowledge of some blood-borne infections among students in the College of Health Sciences, LAUTECH, Ogbomoso, South-western Nigeria.

Methods: A total number of 84 subjects (33 females and 51 males) were recruited. A self-structured questionnaire was used to obtain socio-demographic data and research questions. Blood was collected and screened, using an enzyme-linked immunosorbent assay specific for each blood-borne infection (Syphilis, Hepatitis B, Hepatitis C, HIV, and HTLV-1). The data obtained were analysed using Statistical Package for Social Sciences version 25 with the result presented in tables and charts.

Results: The prevalence includes 4.8% syphilis, 3.8% Hepatitis B, 1.2% Hepatitis C and 1.2% HIV. A high level of awareness of these infectious diseases was observed (86.9% for Syphilis, 77.4% for Hepatitis B, 71% for Hepatitis C, 89.3% for HIV, and 75% for HTLV-1) and a high knowledge of the causes and transmission of these blood-borne infections.

Conclusion: The prevalence of bloodborne infections is relatively low among the subjects as reported in these findings, despite this, it is very important to raise the awareness level of BBIs in institutions and communities to continue it downtrend prevalence and occurrence in the population.

Keywords: Bloodborne infections, microorganism, Immunosorbent assay, Ogbomoso Nigeria

UNDER PEER REVIEW

Introduction

Blood-borne infections (BBIs) are caused by blood-borne pathogens that circulate in the human blood, like viruses and bacteria¹ e.g. Syphilis, malaria, HCV, HBV, HIV and HTLV (Human T-cell lymphotropic virus), can be transmitted through sharing sharp objects like pin or needle that can cause injuries from mother to baby during pregnancy and through breastfeeding.

Blood-borne infections, such as HIV, hepatitis B, and C, are a significant global health risk affecting millions of people and communities. It is very important to have a critical understanding of their transmission mechanisms, risk factors, and prophylactic actions are crucial for effective prevention and reduction.

In Nigeria, the prevalence of HBV is 12%, low HCV prevalence of 0.5 to 4%, and HIV prevalence of 3.1%, 170 million population, 23 million live with HBV, 1 to 6 million with HCV, and 3.5 million with HIV, causing over 20% mortality.² Nevertheless, the above study was conducted in the Eastern part of Nigeria and it is very important to examine the prevalence of these BBIs in the Southwest part of the country and specifically among students.

Syphilis is a sexually transmitted infection caused by *Treponema pallidum* subspecies *pallidum*, with three other organisms causing nonvenereal or endemic treponematoses: yaws, endemic syphilis, and pinta.³ Early syphilis increases HIV transmission risk due to genital ulcers⁴ Syphilis is transmitted through vaginal, anal, and oral sex, and pregnant women can pass the disease to babies.⁵

Some studies have attributed the spread of BBIs to the socioeconomic status and the sexual behaviour of the residents of the community in which these infections are common. This strengthens the argument that the transmission of BBIs is tied to multiple sexual partners, overcrowding in correctional institutions, drug use, occupational hazard, and environmental sanitation of the inhabitants of such communities.^{1,6} Therefore, it is crucial to bring this study to the student population to determine not just the prevalence but their awareness of the transmission and causes of some of these blood-borne infections among college of health science students.

Methodology

Study Design

This study was a cross-sectional descriptive design conducted among 84 students between the age group 15 years to 35 years at the College of Health Sciences, Ladoke Akintola University of Technology, Ogbomosho, Oyo state, a Southwestern state in Nigeria.

Procedures

Sampling Technique

Participants were selected using a simple random sampling technique. An informed consent was sought from each subject. A health talk on the possible transmission of blood-borne infections was given. A pretested, self-administered, and structured questionnaire was administered and 5ml of venous blood was collected from the antecubital vein into sterile plain tubes. The blood was allowed to clot, and sera was separated by centrifugation at 3000 rpm and stored in the freezer at -20°C.

Screening

A. Hepatitis B and C: Hepatitis B and C virus antibody detection in serum was performed using HBV and HCV ELISA which is a 3rd generation Enzyme Immunoassay (EIA).

B. HTLV: Each sample was screened and detected for HTLV using ELISA (Cortez Diagnostic Inc.) method.

C. Syphilis: All samples were screened for detection of *T.pallidum* antigen, using a sandwich third generation enzyme linked immunosorbent assay ELISA for Syphilis

D. HIV: Each sample was screened and detected for human immunodeficiency virus using ELISA method.

Statistical Analysis

Data were analysed using statistical tools within SPSS software 25.0 version. Relationships between variables were determined using Pearson's chi square with level of significance set at 0.05 ($p < 0.05$) to determine level of statistical significance.

Results

Nearly half of the subjects 36(42.9%) were between the ages of 20-24 years, more than half of the subjects were male 51(60.7%), the majority 46(64.8%) of the subjects were single, 27(32.1%), 26(31.0%) were in their second and fifth year of study. table 1.

Table 1: Sociodemographic profile of the subjects

Variable	Categories	Frequency (n)	Percentage (%)	<i>Mean ± SD</i>
Age group	15-19 years	15	17.9	23.30 ± 3.56
	20-24 years	36	42.9	
	25-29 years	27	32.1	
	30-34 years	6	7.1	
Gender	Male	51	60.7	
	Female	33	39.3	
Marital status	Single	46	54.8	
	Engaged	23	27.3	
	Married	15	17.9	
Department	MLS	27	32.1	
	Medicine	10	11.9	
	Nursing	9	10.7	
	Anatomy	10	11.9	
	Physiology	11	13.1	
	Biochemistry	17	20.2	
Year of study	First	4	4.8	
	Second	26	31.0	
	Third	14	16.7	
	Fourth	14	16.7	
	Fifth	26	31.0	
Religion	Christianity	52	61.9	
	Islam	24	28.6	
	Traditional	8	9.5	
Ethnicity	Igbo	11	13.1	
	Hausa/Fulani	14	16.7	
	Yoruba	59	70.2	

The prevalence of HBV among the students was 3.6% and 1(1.2 %) of the 36 participants screened aged 20-24 years old was positive for HBsAg, 2(2.4 %) of the 27 participants screened aged 25-29 years old were positive for HBsAg, and all other age groups were negative. Only three students have the virus as at the time of screening revealing a prevalence of 3.6% among the students. Only one tested positive for HCV accounting for 1.2%. The prevalence of the human T-cell leukaemia virus in this study was found to be zero. Only four students had the bacteria (*Treponema pallidum*) infection as at the time of screening revealing 4.8% prevalence among the students.

Out of the 84 students screened for syphilis, only one student tested positive for the human immunodeficiency virus (HIV) infection as at the time of screening revealing 1.2%

Table 2: Distribution of HBV infection

Variable	Categories	Frequency (n)	Percentage (%)
Hepatitis B virus Screening	Reactive	3	3.6
	Non-reactive	81	96.4
Total		84(100.0%)	
Hepatitis C virus Screening	Reactive	1	1.2
	Non-reactive	83	98.8
Total		84(100.0%)	
HTLV Screening	Reactive	0	0.0
	Non-reactive	84	100.0
Total		84(100.0%)	
Syphilis Screening	Reactive	4	4.8
	Non-reactive	80	95.2
Total		84(100.0%)	
HIV Screening	Reactive	1	1.2
	Non-reactive	83	98.8
Total		84(100.0%)	

This study reveals that majority of the students showed a high level of awareness with a percentage ranging from 71% to 89%, they also showed a high level of knowledge of the causes and transmission of blood borne. Over 54.6 % of them have a sound knowledge of good/safety practices although concerning syphilis, a low and not encouraging safe practice for the prevention of syphilis was observed.

Table 3: Level of knowledge, awareness, and safety practices among participants

Variable	Level of Awareness (%)	Safe (good) practice (%)	Knowledge (transmission and causes) (%)
HBV	77.4	72.6	81.0 and 82.1
HCV	71	56.0	67.9 and 65.5
HTLV	75	54.6	75 and 84
Syphilis	89.3	41.7	88.1 and 84.5

Discussions

This study revealed a low prevalence of Hepatitis B compared to 4.1% reported by Ugwuja and Ugwu⁷ among apparently healthy adolescents in Abakaliki, Southern Eastern, 12.4% reported by Alikor and Erhabor⁸ in children attending tertiary health institutions in the Niger Delta, Nigeria and 25.7% reported by a study conducted in Lagos.⁹

Nevertheless, this prevalence is higher than the 0% prevalence reported by Chipetah *et al.*¹⁰, among foundation year medical students at the University of Malawi and 1.5% HBsAg seropositivity reported by Enitan *et al.*¹¹ among undergraduate students of Babcock University, Ilishan-Remo, Ogun State, south-western Nigeria. The variation in prevalence may be due to the variation in knowledge, awareness, and safety practise about HBV in different populations.

Also, HCV prevalence in this study is higher than the 0.7% reported by Omolade and Adeyemi¹² among universities students in Nigeria, this may be due to the sample size used in this study, young population subgroup, and accuracy of the diagnostic method used. Similarly, a previous study conducted in Ogbomoso recorded a prevalence rate of 0.4% by Jemilohun *et al.*¹³, a higher rate of 8% was found in Ilorin¹⁴ and zero prevalence in Port-Harcourt.²

Furthermore, the syphilis seroprevalence obtained in this study is lower compared to the prevalence recorded in some part of the country, e.g. 19.3% prevalence for syphilis reported among similar population in Ilorin¹⁵ in south-eastern part of the country a seroprevalence of 6.5% was reported¹⁶ and lower than some other tertiary institutions in Nigeria like Benin and Ekpoma.¹⁷ This prevalence is however higher than 1.2% recorded among the inhabitants of Yemetu in Ibadan¹⁸ which is a city close to Ogbomoso in Southwest Nigeria, also in Osogbo with a prevalence of 1.0% reported among pregnant women.¹⁹

A contributing factor to this variation might be the socio-economic life of people in these cities with impact of booming economy might be responsible for the high prevalence compared to the semi-urban city status of Ogbomosho where this study was carried out. This is not in agreement with some studies that show a higher prevalence in population with lower socio-economic status.¹⁶ Variation observed may be due to geographical variation, cultural practices, and differences in the laboratory techniques employed to detect syphilis infection.

Unlike other blood borne infections (BBIs), human T-cell leukaemia virus prevalence in this study is zero which is similar to the result obtained in a study carried out in different hospitals in Abuja, a cosmopolitan city and capital of Nigeria.²⁰ Zero prevalence rates have also been reported in other parts of Africa like Mali and Benin Republic.^{21,22} Nevertheless, Terry *et al.*²³ contradicts this result with a prevalence of 3.8% found among blood donors in Osogbo. The zero-prevalence recorded in this study may be due to the high level of awareness, good safety practice and knowledge about HTLV among the students.

HIV is an endemic disease in Nigeria due to the sexual behaviour of young people as this particular demography make up a large percentage of the total population of the country. Few studies have been conducted among youths in higher institutions. This study reveals a prevalence higher compared to the study conducted by Nworie *et al.*²⁴ with a prevalence of 0.22% which was recorded among newly admitted student. Emeka-Nwabunnia *et al.*²⁵ reported a higher prevalence of 5.6% among these group, only a study conducted by the National HIV & AIDS and Reproductive Health Survey (NARHS) in the southeast in 2012, reported a prevalence of 1.1% which is consistent with the prevalence recorded in this study (1.2%).

The low prevalence recorded in this study may be due to the high awareness of HIV (89.3%), good safety practise (90.5%) and sound knowledge of the causes and transmission of the infection (89.3% and 94% respectively), this hypothesis was supported by Oppong and Oti-Baoidi,²⁶ which shows that high awareness of HIV among students contributes to the decrease in prevalence of the infection.

The low prevalence of BBIs recorded in this study may be because the location of the study, where clinical and pre-clinical courses are taught therefore, most of the participants have a high knowledge and good awareness level of these infections.

Conclusion

BBIs like hepatitis B, hepatitis C, HTLV, syphilis and HIV have profound impact on communities and cultures all over the world as showed in this study. The prevalence of the BBIs among college of health sciences students, LAUTECH, Ogbomoso is low compared to other communities and institutions in Nigeria and this may be due to the high level of awareness as the study site is an institution that trains potential healthcare workers. Even with the high level of awareness, transmission of these BBIs remain possible.

Ethical Approval

Ethical approval was obtained from Ethical Review Committee of Ladoko Akintola University of Technology College of Health Sciences, Ogbomoso.

Consent

As per international standards or university standards, Participants' written consent and parental written consent for minor participants has been collected and preserved by the author(s)

Disclaimer (Artificial intelligence)

Author(s) hereby declared 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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