

HIV and Hepatitis B seroprevalence in trauma patients in North Central Nigeria.

*B. T. Ugwu¹, T. D. Thacher², G. E. Imade³, A. S. Sagay³, E. I. Isamade⁴ and R. W. Ford⁵

Departments of Surgery¹, Family Medicine², Obstetrics & Gynaecology⁴ and Medicine⁴, Jos University Teaching Hospital, Jos, Nigeria.
World Health Mission⁵, 2721 Oak Hill Drive, Allison Park, PA 151012627, USA.
E-mail: ugwub@yahoo.com

Summary

Background: With the high prevalence rate of HIV and Hepatitis B virus infections in sub-Saharan Africa, infected surgical patients, especially those with fresh open wounds, pose significant danger of occupationally-acquired infections to health workers.

Method: A two-year double blind study aimed at determining the seroprevalence rates of HIV and Hepatitis B virus infections among trauma patients with fresh open wounds in North Central Nigeria.

Results: There were 134 patients with fresh open wounds in this study; their ages ranged between 17-80 years with a mean of 30.9±9.6 years and the male:female ratio was 5:1. All the patients were tested for both HIV and Hepatitis B virus infections. Six (4.5%) patients were positive for HIV-1 while 95 (70.9%) patients were positive for Hepatitis B. In all, 3 (2.2%) male and 3 (2.2%) female patients tested positive for HIV-1 while 77 (57.4%) males and 18 (13.4%) females tested positive for Hepatitis B; 5 (3.7%) patients tested positive for both HIV and Hepatitis B. Though every social class was represented, HIV infection rate was higher in Social Class V than in Social Class I but the class incidence rate for Hepatitis B was about the same ranging between 1.2 and 1.6 for both the upper and lower classes. The significance of this study was that the incidence of Hepatitis B virus infection in trauma patients was remarkably higher than the incidence of HIV infection. The implication is that emphasis on control of exposure of health care workers to blood borne infections in the workplace should be as strong for Hepatitis B virus infection as it is for HIV.

Conclusion: The main finding of this study was the determination of the seroprevalence of HIV and Hepatitis B virus infections in trauma patients with open wounds which underpinned the dangers they pose to health care workers.

Key-words: HIV/Hepatitis B seroprevalence, Trauma patients, Social class, Occupational hazards.

Résumé

Introduction: Avec la fréquence élevée du taux du VIH et de l'infection du virus hépatite B au sous Sahara de l'Afrique, des patients chirurgicalement infectés, en particulier ceux avec des plaies récentes, pose un danger

important des infections acquises occupationnelles aux officiers sanitaire.

Méthode: Une étude à double insu pour but de décider le taux de séroprévalence du VIH et infections du virus hépatite B parmi des patients atteints de traumatisme avec des plaies récentes au Nord central du Nigéria.

Résultats: Il s'agit d'un nombre total de 134 patients avec des plaies récentes dans cette étude. La tranche d'âge était de 17-80 ans avec un moyen de 30,9± 9,6 ans. Et la proportion sexe masculin: sexe féminin de 5: 1. Tous les patients avaient subi le teste du dépistage de VIH et l'infection de virus Hépatite B les deux. Six soit 4,5% de patients étaient révélés positif pour le VIH -1 tandis que 95 soit 70,9 patients étaient révelés positif pour l'hépatite B.

Dans l'ensemble, 3 soit 2,2% de sexe masculin et 3 soit 2,2% du sexe féminin des patients s'étaient révélés positif pour le VIH-1, tandis que 77 soit 57,4% du sexe masculin, et 18 soit 13,4 du sexe féminin s'étaient révélés positif pour l'hépatite B. 5 soit 3,7% des patients s'étaient révélés positif pour VIH et Hépatite B les deux. Quoique toute la classe sociale soit représentée, le taux de l'infection du VIH était plus élevé dans la classe sociale V plus que dans la classe sociale I mais le taux de la fréquence de la classe d'hépatite B était presque semblable environ entre 1,2 et 1,6 pour les classes supérieure et inférieure, les deux.

L'importance de cette étude était que l'incidence de l'infection du virus d'hépatite B chez des patients atteints du traumatisme était sensiblement élevé plus que l'incidence de l'infection du VIH. Implicitement, c'est nécessaire de metre l'accent sur le contrôle d'exposition des officiers des soins sanitaire.

Introduction

UNAIDS has reported that 37.8 million people worldwide were living with HIV/AIDS and that 25 million (66%) of them lived in Sub-Saharan Africa as at the end of December 2003; majority of the patients were adults aged between 15 and 49 years¹. In Nigeria, by the end of December 2003, 3.2- 3.8 million Nigerians were living with HIV/AIDS and the National median HIV prevalence was 5%². No subset or segment of any population worldwide is excluded from HIV infection and this includes trauma patients with fresh open wounds. The risk of acquiring HIV infection from all types of reported percutaneous exposures to HIV-infected blood is 0.3% worldwide³, and

*Correspondence

amongst health care associated sources of infection, unsafe injections account for 3.9 - 7% of new infections of HIV worldwide⁴. The prevalence of Hepatitis B infection is high affecting millions of people worldwide with the prevalence rate in trauma patients as high as 20% in the United States of America⁵. There is a high risk of developing liver cirrhosis and hepatocellular carcinoma in people living with Hepatitis B virus infection⁶. HIV and Hepatitis B infections share common routes of infection which include unprotected sexual intercourse, intravenous routes and inoculation with contaminated blood⁷. Infection of health workers at workplace by HIV and Hepatitis B virus is usually by direct introduction of contaminated blood through the skin and exposed mucous membranes. Though the modes of transmission of these two viral diseases are similar, the risk of Hepatitis B viral infection in health care settings by far exceeds that for HIV infection⁷. With the high prevalence rates for these blood borne viral diseases in sub-Saharan African countries, occupationally acquired infections of HIV and Hepatitis B in health care workers remain constant dangers at the Accident & Emergency Units in Africa⁸. Though the prevalence rates for these blood borne diseases in trauma patients have been determined in industrialized countries,^{5,9,10,11} such documentation is scanty in developing countries. In order to determine the seroprevalence of HIV and Hepatitis B infections in trauma patients we studied 134 patients aged 15 years and above who presented with fresh open wounds at the Accident & Emergency Department of a tertiary hospital in the North Central Nigeria within a two-year period.

Materials and methods

Trauma patients aged 15 years and above with fresh open wounds managed between September 1999 and August 2001 at the Jos University Teaching Hospital, Jos, Nigeria were eligible for inclusion in this study. Ethical approval was obtained from the hospital. The age, sex and the occupation of each patient were recorded and 5 ml of blood was collected. No patient identifiers were recorded to ensure anonymous testing for HIV-1 and Hepatitis B core antibodies. Serum was separated from each sample and stored frozen at -20 °C. Sera were transported in ice packs for analysis by the Allegheny County Health Department, Pittsburg, USA. Antibodies to the human immunodeficiency virus (HIV-1) were measured using an enzyme immunoassay technique (Vironostika HIV Microelisa System, USA). Positive samples were retested using Western Blot (Epitope Inc., USA). Antibody to Hepatitis B virus core antigen was tested for each sample using an enzyme immunoassay technique (Corzyme, Abbott Laboratories, USA). Statistical analysis was performed using Epi Info version 2002 (CDC, Atlanta, GA). The chi square statistic and Fisher exact test were used to compare differences in proportions.

Results

A total of 134 patients with fresh open wounds were managed within the two year period of this study. Their ages ranged between 17 and 80 years with a mean (±SD) age of 30.9±9.6 years. There were 110 (82%) males and 24 (18%) females with a male:female ratio of 5:1. All the patients were tested for both HIV and Hepatitis B infections. Six (4.5%) patients tested positive for HIV-1. On the other hand, 95 (70.9%) patients tested positive for Hepatitis B core antibody as shown in Table 1. Three male (2.7%) and three female (12.5%) patients tested

Table 1 Sero-positivity of HIV and Hepatitis B virus in 134 trauma patients in Jos, Nigeria

Investigations	No. of patients tested	No. of patients positive (%)	No. of patients negative (%)
HIV-1	134	6(4.5)	128(95.5)
Hepatitis B virus (Core antibody)	134	95(70.9)	39(29.1)
Both HIV-1 & Hepatitis B	134	5(3.7%)	-

Table 2 Distribution of HIV and Hepatitis B virus sero-positivity by gender

Investigation	No. of positive males (%)	No. of positive females (%)	Total (%)
HIV	3(2.2)	3(2.2)	6(4.5)
Hepatitis B virus (core antibody)	77(57.4)	18(13.4)	95(70.9)

Table 3 Distribution of HIV and Hepatitis B virus sero-prevalence by occupation in trauma patients

Occupation	Number(%)	No. positive for HIV antibodies (%)	No. positive for Hepatitis B core antibodies (%)
Student	24(17.9)	2(8.3)	16(66.6)
Business	18(13.4)	0(0)	12(66.6)
Trader	16(11.9)	0(0)	11(68.8)
Civil servant	5(3.7)	0(0)	5(100)
Teacher	3(2.2)	0(0)	0(0)
Driver	7(5.2)	0(0)	4(57.1)
Housewife	5(3.7)	0(0)	4(80.0)
Unskilled/unemployed	50(37.3)	3(6.0)	40(80.0)
Professional	6(4.5)	1(16.6)	3(50.0)
Total	134(100)	6(4.5)	95(70.9)

Table 4 Distribution of patients according to social-class

Class	Description	No. of patients (%)	No. positive for HIV (%)	No. positive for Hepatitis B (%)
I	Professionals and business men/women	24(17.9)	1(0.7)	15(11.2)
II	Lesser professional, traders and teachers	19(14.2)	0(0)	11(8.2)
IIIN	Skilled non-manual e.g. clerical staff, students	29(21.6)	2(1.5)	21(15.6)
IIIM	Skilled manual e.g. electricians, lorry drivers	7(5.2)	0(0)	4(3)
IV	Semi-skilled manual e.g. machine operators, farm workers	5(3.7)	0(0)	4(3)
V	Unskilled manual to the unemployed e.g. labourers	50(37.3)	3(2.2)	40(29.8)

Upper Class= Classes I & II; Middle Class= Classes IIIN & IIIM; Lower Class= Classes IV & V.

positive for HIV-1 ($p=0.07$) while 77 (57.4%) males and 18 (13.4%) females patients tested positive for Hepatitis B virus as shown in Table 2. Five (3.7%) patients (3 males and 2 females) tested positive for both HIV and Hepatitis B. Examination of socioeconomic class subgroups (Table 4) failed to demonstrate any differences in seroprevalence of HIV ($p=0.83$) or of hepatitis B infection ($p=0.38$).

Discussion

The main finding of this study was that the seroprevalence rate for HIV in trauma patients with fresh open wounds was 4.5% while the seroprevalence rate for Hepatitis B for the same group of patients was 71%. We also found out that 3.7% of the patients tested positive for both HIV and Hepatitis B virus antibodies. The significance of the result was that the HIV seroprevalence rate in trauma patients with open wounds was almost the same as the current national adult prevalence rate of 5% in Nigeria². HIV seroprevalence in this study did not show predilection for gender.

While HIV seroprevalence rate in trauma patients ranged between 0.15-1.32% in the United States^{9,10} the rate was as high as 18% in trauma patients in intensive care patients in Zambia¹¹ and 7% in orthopaedic patients

in Puerto Rico¹². HIV-1 seroprevalence used in this study was indeed a true reflection of the HIV infection rate in the trauma patients studied. This is so because the 2003 National HIV Sentinel Survey in Nigeria showed that of all the positive blood samples for HIV, only about 0.2% tested positive for HIV-2 while about 99.8% tested positive for HIV-1.

The high prevalence rate of 71% for Hepatitis B underpins the importance of Hepatitis B virus infection in trauma patients in North Central Nigeria. Hepatitis B virus infection could lead to liver cirrhosis and hepatocellular carcinoma with devastating consequences⁶. The incidence is by far higher than that for HIV in this report but while both diseases share the same modes of infection⁷, awareness of Hepatitis B infection and hence emphasis on its prevention remained low even among health workers^{13,14}. Doctors, nurses, anaesthetists and support staff who were exposed to HIV by trauma patients were also at risk of infection with Hepatitis B virus.

In this study, HIV or Hepatitis B infection in trauma patients could not be predicted on social class as the distribution of these diseases did not follow any class pattern as shown in Table 4.

Occupational exposure to HIV and Hepatitis B occurs in the form of contaminated needlestick injuries, cuts with sharp objects, contact with mucus membranes or contact with abraded skin or skin with dermatitis. Ansa and coworkers¹³ as well as Adegboye and colleagues¹⁴ had shown in their works in tertiary health institutions in Nigeria, that the incidence of needlestick injuries and the risk of acquiring HIV and Hepatitis B infections are high while materials and equipment needed for protection of healthcare workers are inadequate. The same pattern of risk was highlighted by Mujeeb and coworkers in Pakistan¹⁵. Though the supply of materials and equipment need for protection of healthcare workers were adequate in industrialized countries, the risk of occupationally acquired HIV and Hepatitis B infections remained high¹⁶⁻²⁰. This underscored the fact that for universal precaution guidelines to be effective, healthcare workers should be well informed and motivated to use the materials and equipment so provided. The main limitations of this study were in ensuring the availability of materials required for collecting the blood samples especially after work hours as well as the logistics of transporting the samples to the United States for analysis by our research collaborators.

Hepatitis B vaccine²¹ is effective in protecting health workers at risk against Hepatitis B infections and has been recommended by various researchers in both developing and developed countries^{5,12,13,15}.

Even in the absence of effective vaccine against HIV, health care workers could minimize the risk of HIV infection when inoculated with HIV contaminated blood at their work place by cleansing the wound with appropriate disinfectants and adhering strictly to result-oriented antiretroviral drugs for HIV post-exposure prophylaxis^{22,23}.

In conclusion, the seroprevalence rates of HIV and Hepatitis B infections in trauma patients with fresh open wounds were high and while HIV infection was more common in patients in the lower social class, the incidence of Hepatitis B infection was about the same for both the upper and lower socio-economic classes. Our findings tend to show that universal precautions against these occupationally acquired viral infections, a complete course of Hepatitis B vaccination for care providers at risk, and HIV post-exposure antiretroviral prophylaxis may be necessary.

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