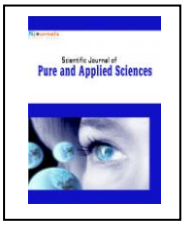
Sjournals
Scientific Journals
Scientific Journal of Pure and Applied Sciences (2015) 4(10) 193-199
ISSN 2322-2956
doi: 10.14196/sjpas.v4i10.1930

Contents lists available at Sjournals
Scientific Journal of
Pure and Applied Sciences
Journal homepage: www.Sjournals.com



Original article

Prevalence and risk factors associated with Hepatitis B virus coinfection with HIV amon patients attending some selected hospitals in Kaduna metropolis

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ARTICLE INFO

Article history,
Received 19 September 2015
Accepted 20 October 2015
Available online 29 October 2015

Keywords,
Hepatitis B virus
Human immunodeficiency virus
Co-infection
Prevalence

ABSTRACT

300 blood samples were analyzed for the presence of Hepatitis B surface antigen (HBsAg), using smart checkTM HBsAg strip. 270 were HIV positive while 30 were HIV negative patients. Out of the 270 HIV positive patients 35 (13.0%) were HBsAg positive while out of the 30 HIV negative patients 1 (3.3%) was HBsAg positive. Prevalence was highest in age group 15-20 (25.0%) with zero prevalence in age group below 15 and above 51 in HIV positive patients, there is significant statistical association between age and the occurrence of HBV infection ($P<0.05$). Higher prevalence was recorded in males 16.2% than females 11.7%, there is no significant association between the occurrence of HBV and sex ($P>0.05$). Multiple sex partners have the highest prevalence (50.0%) and no sex partner have the lowest prevalence (5.3%).This reveals that patients that are HIV positive are at risk of contracting HBV infection.

1. Introduction

Hepatitis B is an acute and common infection of the liver in which the liver cells (hepatocytes) are inflamed. It is one of the major and common infectious diseases of the liver worldwide caused by a small enveloped DNA, the hepatitis B virus (HBV). The virus was first discovered as Austria antigen, later named hepatitis B surface antigen (HBsAg), in patient blood. Hepatitis B envelop antigen (HBVeAg) was identified several years later as a marker for patients at high risk for transmission of the disease (Tong et al., 2005).

Hepatitis can be induced by both infectious and non-infectious agents. The former include a variety of different viruses such as hepatitis A, B, C, D and E. The latter includes an over active immune system, use of drugs, alcoholism, chemicals and environmental toxins. Hepatitis B is caused by hepatitis B virus (HBV), an enveloped virus containing a partial or incomplete double stranded circular DNA genome. It belongs to the family hepadnaviridae. It is 42nm long and composed of 2nm nucleocapsid core surrounded by an outer lipoprotein coat containing the hepatitis B surface antigen (HBsAg). The virus interferes with the liver function while replicating in the cytoplasm of hepatocytes. HBV is present in body fluids of the infected persons such as blood, serum, vaginal secretions and saliva though in low concentrations. Although surrounded by a host cell derived envelop, HBV is remarkably stable to organic solvents. It is also heat and PH resistant (Jawetz et al., 2007).

Hepatitis B virus infection and its associated complications (cirrhosis and hepatocellular carcinoma) are the leading cause of chronic liver disease worldwide. An estimated one third of the global population has been infected with the virus and more than 350 million people are chronic carriers (Mahoney, 1999, Pouti et al., 2008).

Diseases of the hepatobiliary system are a major problem in patients with human immunodeficiency virus (HIV) infection. An estimated one third of deaths in HIV patients are directly or indirectly related to liver diseases. Liver disease in HIV infected persons can occur due to hepatitis B virus, chronic alcoholism, hepatic tuberculosis or due to the effects of anti-retroviral therapy (ART). Since the principal routes for HIV transmission are similar to that followed by the hepatotropic viruses, as a consequence, infections with HBV are expected in the HIV infected patients. Co- infections of HBV with HIV have been associated with reduced survival, increased risk of progression to liver disease and increased risk of hepatotoxicity associated with anti-retroviral therapy.

The reported co-infection rates of HBV in HIV patients have been variable worldwide depending on the geographical regions, risk groups and the type of exposure involved (Alter, 2006). In Europe and USA, HIV-HBV co-infection has been seen in 6-4% of all patients (Rockstroh, 2003). Evidence of exposure to HBV has been found in 8.7% of HIV patients from Thailand in Southeast Asia (Sungkanuparph et al., 2004). It has been estimated that about 3 million people from sub-saharan Africa are co-infected with HIV and HBV, many of them are immunotolerant children with high levels of HBV replication (Souza et al., 2004). Nigeria is known to be highly endemic for HBV infection. A few studies have reported rates ranging from prevalence of 7.7% to 19% of HIV/HBV co-infection in Nigerian children (Sadoh et al., 2011).

Complex interactions between HIV and HBV have been well documented in adult population (Colin et al., 1999). Higher HBV DNA levels have been found in those co-infected with HIV and HBe antibody seroconversion occurring less frequently in HIV-co-infected individuals, there by delaying transition to the inactive carrier state with its attendant's higher risk of advanced liver disease (Colin et. al., 1999). The impact of HBV on HIV disease is less clear. Whilst one study showed an increased rate of the progression to AIDS (Eskild et al., 1992), other investigators did not show any change in the progression of HIV disease or survival (Gilson et, al., 1997). However, co-infection with HBV has been associated with increased hepatotoxicity to highly active antiretroviral therapy (HAART) (Livty et al., 2003).

In general, HBV tends to be more aggressive in HIV-positive individuals than in mono-infected individuals (Pouti, 2008). With higher HBV carrier rates, higher levels of HBV viremia, more frequent episodes of activation, and faster progression to cirrhosis. Hepatocellular carcinoma occurs more often, its onset is earlier, and its course is more aggressive in co-infected individuals than in mono-infected individuals (Pouti et al., 2008). Many people infected with hepatitis B virus never develop signs and symptoms. However in others, it is associated with loss of appetite, nausea and vomiting, weakness and fatigue, abdominal pain, especially around the liver, dark, yellowing of skin and the eyes, joint pain, mild fever, headache, muscle aches, diarrhoea and dark coffer coloured stools (Jawetz et al., 2007).

The original assay for the detection of HBV infection involves serum or blood test that detect either viral antigens or antibodies(Jawetz et al., 2007).There are no specific treatments for the acute symptoms of HBV infection, but in most cases, bed rest, prevention of dehydration, balanced diet and avoidance of alcoholic

beverages are recommended. It can be prevented by avoiding contact with infected blood and body fluids, including semen and vagina secretions of infected individuals.

This research is aimed at determining the prevalence and risk factors associated with hepatitis B virus co-infection among HIV positive patients within Kaduna metropolis.

2. Materials and methods

2.1. Study area

The study was conducted in Kaduna metropolis, a state in North Central Nigeria and covering an area of 46,053 square kilometres (km2). It lies between latitude 10^{o}20N of the equator and longitude 7^{o}45E of the Greenwich meridian. It has a population of 6,113,503 (2006 census figures) and a population density of 130 people per square kilometre. It accounts for 4.3% of Nigeria's total population.

2.2. Study population

The study population comprised 270 HIV positive patients attending Yusuf Dantsoho memorial hospital, Gwamna Awan General Hospital and Barau Dikko specialist hospital respectively (90 patients were used from each of the hospitals). The control group comprised 30 apparently non-reactive HIV patients.

2.3. Sample collection

Blood samples were collected by venepuncture. Each blood sample was transferred into a labelled plastic micro litre tube containing ethylene diamine tetra acetic acid (EDTA) which is an anticoagulant.

2.4. Detection of Hepatitis B surface antigen (HBsAg)

The smart checkTM HBsAg strip, a rapid chromatographic immunoassay for the qualitative detection of HBsAg in serum/plasma was used. It utilises a combination of monoclonal and polyclonal antibodies to selectively detect elevated levels of HBsAg in serum/plasma the test was carried out and interpreted according to the manufactures' instructions.

Methods: test strip, serum/plasma and control were allowed to equilibrate to room temperature (15-30) prior to testing.

The pouch was brought to room temperature before opening. The test strip was removed from sealed pouch and used as soon as possible.

With arrows pointing towards the serum/plasma, the test strip was immersed vertically in the serum/plasma for 10-15 seconds

The test strip was placed on a non-absorbent flat surface. The timer was started and the strip watched for the appearance of the red line.

The result was read after 15 minutes.

3. Results

Of the 270 HIV positive samples screened for HBsAg 35(13.0%) were positive, while out of the 30 non HIV samples screened (control), 1(3.3%) were positive for HBsAg.

Table 2 shows HBV infection among HIV positive and HIV negative patients with respect to age group. Prevalence was highest in age groups 15-20(25.0%), with zero prevalence at age group below 15 and above 51 in HIV positive patients, while in HIV negative patients is highest in age group 31-40(11.1%) and zero in all other age groups. X^2=12.016, (P<0.05)

Table 1
The prevalence HBsAg among HIV positive and negative patients.

HIV status	No screened	HIV/HBV(%)	No HBsAg negative (%)
Positive	270	35 (13.0)	235 (87.0)
Negative	30	1 (3.3)	29 (96.7)
Total	300	36	264

X^2=3.118 P=0.098 at 95% CL

Table 2
Hepatitis B virus infection among HIV positive and HIV negative patients across the age group.

Age group (years)	No HIV positive tested	HIV-HVB positive (%)	No HIV Negative tested	HIV(negative) HBV positive (%)
Below 15	17	0(0)	1	0(0)
15-20	4	1(25)	1	0(0)
21-30	108	11(10.2)	14	0(0)
31-40	108	21(19.4)	9	1(11.1)
41-50	27	2(7.4)	3	0(0)
51 above	6	0(0)	2	0(0)
Total	270	35(13.0)	30	1(3.3)

X2=12.016 P=0.035 at 95% CL

Table 3 shows HBV infection among HIV positive and HIV negative patients with respect to sex. Males have higher prevalence in both HIV positive (16.2%) and HIV negative patients (7.1%) than females HIV positive (11.7%) and HIV negative patients (0.0%). X^2=0.956, (P>0.05).

Table 3
Hepatitis B virus infection among HIV positive and HIV negative patients with respect to sex.

Sex	No of HIV Positive tested	HIV- HBV positive(%)	No of HIV negative tested	HIVnegative HVBpositive(%)
Male	74	12 (16.2)	14	1 (7.1)
Female	196	23 (11.7)	16	0 (0.0)
Total	270	35 (13.0)	30	1 (3.3)

X^2=0.956, P=0.217 at 95% CL

Table 4 shows Hepatitis B virus infection among HIV positive and HIV negative patients with respect to some risk factors. Multiple sex partners have the highest (50.0%) and no sex partner have the lowest (5.3%) among HIV positive, while alcoholic consumption has highest (16.7%) and polygamy, sex partners, and blood transfusion has lowest (0.0%).

Table 5 shows the Hepatitis B virus infection between HIV positive and HIV negative patients with respect to their socio-economical status. The chi-square value is X^2= 4.56 with a significant level of P=0.479 therefore indicating that there is no significant association between HIV-HBV co infection and socio-economic status of the respondent.

The prevalence of HBV infection varies from country to country and depends upon a complex mix of behavioural, environmental and host factors. In this research, out of the 270 HIV patients screened for the presence of HBsAg, 35 were positive, giving a prevalence rate of 13.0%. this agree with the findings of Hamza et al., 2013 and Rouet et al., 2008 who recorded 12.5%, and 12% respectively, and in contrast to the work of Uneke et al., who recorded 25.9%.

Table 4
Hepatitis B virus infection among HIV positive and HIV negative patients with respect to some risk factors.

Risk factor	No HIV positive Tested	HIV-HBV positive (%)	No HIV negative tested	HIV(neg)HVB positive (%)
Marriage settings				
Monogamy	144	19(13.2)	15	1(6.7)
Polygamy	40	5(12.5)	1	0(0)
Sex partner				
Single	35	4(11.4)	6	0(0)
Multiple	10	5(50.0)	2	0(0)
None	38	2(5.3)	6	0(0)
Blood transfusion				
Yes	37	2(5.4)	3	0(0)
No	233	33(14.2)	27	1(3.7)
Alcoholic consumption				
Yes	31	4(12.9)	6	1(16.7)
No	239	31(13.0)	24	0(0)

Table 5
Hepatitis B virus infection between HIV positive and HIV negative patients with respect to their socio-economic status.

Socio-economic status		**No of HIV Positive**	**HIV-HBV positivity (%)**	**No of HIV Negative (%)**	**HIV(neg)-HBV positivity**
Marital status	Married	159	20 (12.6)	14	0 (0)
Single		83	11 (13.3)	14	0 (0)
D/W/S		28	4 (14.3)	2	1 (50)
Occupation	Student	34	3 (8.8)	11	0 (0)
C/servant		35	8 (22.9)	4	0 (0)
Trader		12	0 (0)	1	0 (0)
Farmer		3	0 (0)	0	0 (0)
Business		86	10 (11.6)	0	0 (0)
Others		71	11 (15.5)	4	1 (25.0)
None		29	3 (10.3)	4	0 (0)
Residence	Urban	259	35 (13.5)	29	1 (3.4)
	Rural	11	0 (0)	1	0 (0)
Educational	Nursery	5	0 (0)	0	0 (0)
Status	Primary	58	5 (8.6)	6	1 (16.7)
Secondary		109	16 (14.7)	7	0 (0)
Tertiary		71	12 (16.9)	13	0 (0)
Informal		14	1(7.1)	1	0 (0)
None		13	1 (7.7)	3	0 (0)

4. Discussion

Prevalence rate was recorded for age groups 15-20 (25%), 21-30 (10.2%), 31-40 (19.4%), and 41-50 (7.4%). There is significant statistical association between age and the occurrence of HBV infection. This could be the fact that at this age people are sexually active. It agrees with the findings of Hamza et al., 2013 who recorded 40.0% in age group 40 and younger.

According to gender, males have higher prevalence than females (16.2%) to (11.7%) even though there is no significant statistical association between HIV-HBV co-infection and sex. This conforms to the findings of Hamza et al., who recorded a higher prevalence in males (16.9%) than females (9.2%). This higher prevalence in males could be due to societal acceptance of multiple sexual partners for men. This may contribute to the higher HBV prevalence among HIV infected men.

With regards to the risk factors, 13.2% of co infected individuals were from monogamous homes and 12.5% are from polygamous homes. Possible reason for a higher co infection rate in the monogamous home could be due to behavioural defects (infidelity), that is not sticking to one wife or husband) as regards sexual practices. In the case of polygamous man having 2 or more wives, if all the wives are faithful and the man is also faithful, the infection can still be prevented. For sex partners, multiple sex partners have the highest prevalence of 50.0%, and the lowest prevalence of 5.3% was observed in patients with no sex partner. This justifies the number of sex partners being a risk factor for HBV and HIV co infection. The most common risk factors for acquiring HBV as an adult are injection, drug use, and sexual contact, particularly with multiple sexual partners (Fix et al., 2007).

There was no statistical significant association between HIV-HBV co infection and socio-economic status of the correspondents ($P>0.05$). in low endemic areas, HBV infects 5-7% of the population and in those areas most HBV infection occur in adolescence and young adults in relation to well defined high risk groups, including injections, drug users, homosexuals males, health care workers, patients who require blood transfusion or haemodialysis (Toukan et al., 1990).

5. Conclusion

Due to shared modes of transmission, co-infection with HBV and HIV is common. With this finding, it is estimated that HIV positive patients are 1.092 times more likely to be infected with HBV infection, while HIV negative patients are 0.253 less times likely to be infected with HBV infection the result suggest that the odds of being infected with HBV infection are 4.319 times higher for HIV positive patients than HIV negative patients.

Patients who are HIV/HBV infected should be informed about routes of transmission and method to prevent further spread of the viruses.

HIV patients who test HBV negative should be vaccinated with HBV vaccine in order to prevent future infection thereby improving the prognosis of HIV status.

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