Hepatitis B and C co-infection among HIV-1 positive individuals in the North-East of Nigeria: prevalence and implication of high risk sexual behaviour in the transmission of hepatitis C virus

James Ameh, Joseph Okwori, Humphrey Musuluma, Henry Mbah


Department of Microbiology, Federal College of Medical Laboratory Technology and Veterinary, Vom, Plateau State, Nigeria

Abstract

Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV) are devastating disease agents that share common modes of transmission. It is also, known that HIV co-infection with hepatitis virus increases the risk for hepatotoxicity, reduced CD4+ count, reduced survival and likelihood of onset of an AIDS-defining illness, compared with infection with HIV alone. The study aimed at determining the prevalence of hepatitis among HIV positive clients. This study was conducted in four Family Health International (FHI) supported health facilities in North East Nigeria. Between March to December 2007, a total of 1,980 clients from 18 years old who voluntarily visited the facilities were screened for HIV following the national testing algorithm. From which 200 HIV positives were selected. The age groups 20-25 and 26-30, constituted 30.0% and 35.5% of the patients respectively. Males constituted 31.0% and female 69.0%. These HIV positive patients and the control group of 200 HIV negative blood donors all males were also screened for hepatitis viruses. Screenings were performed using rapid test for qualitative detection of HIV antibodies and HBV and HCV antigens. Of the 200 client’s positive for HIV; 19% were positive for HBV, 9.5% for HCV and 2.0% for HBV+HCV. The age group of 26-30 that was mostly (28.5%) affected by HIV had 26.3%, HBV, and 21.0% HCV. Most (50.0%) of the HBV+HCV occurred among 20-25 age group. The prevalence of hepatitis virus among the 200 HIV negative controls group was 2% with HBV and 0.5% with HCV. The prevalence of HIV and its co-infection with HBV, HCV and HBV+HCV showed the highest infection among females (70.1%). The findings show a higher occurrence of HBV and HCV amongst HIV infected individuals compared to HIV negative ones. There may be benefit to include hepatitis screening before patients are enrolled for pre-antiretroviral treatment.

Key words: Hepatitis B, hepatitis C, HIV, sexual behaviour, Nigeria.

INTRODUCTION

Human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) have been identified to share the same common routes of infection (Santiago-Munoz et al., 2005). However, there were arguments that HCV transmission still remains unclear as reported, especially in the implication of high risk sexual behavior (Wright et al., 1994; Lodenyo et al., 2000). Co-infection of hepatitis viruses with HIV-1 have been associated with an increased risk of progression to liver disease, reduced survival rate, lower CD4 cell count, an increased risk of hepatotoxicity associated with...
antiretroviral therapy, and advanced HIV clinical stage (Filippini et al., 2003; Simiatacz T and Zieliska et al., 1996; Lincoln et al., 2003; Agwale et al. 2007) compared with HIV-1 infection alone or hepatitis viruses only (Feld et al., 2005). HIV-1 co-infection with HBV has been extensively reported in different settings, with different prevalence rates especially in Nigeria (Bello and Olabode, 2011; Baba et al., 1998; Mustapha and Jibril, 2004; Olokoba et al., 2008; Agwale et al. 2007; Nwokedi et al., 2006; Uneke et al., 2005; Balogun et al., 2010; Sirisena et al., 2002; Ejele et al., 2004).

However, limited data is available in our setting on HIV-1 co-infection with HBV and HCV, only one study was documented in the North Central of Nigeria (Agwale et al., 2007) and none in the North East. However, three studies in the North East of Nigeria documented HIV-1 co-infection with HBV (Bello and Olabode, 2011a, Mustapha and Jibril, 2004, Baba et al., 1998) and to the best of our knowledge no study has been reported on HIV-1 co-infection with HCV in this region.

It is against this background, this study was carried out in public health facilities located in different Local Government Areas where awareness about HIV is relatively high. The patients were screened at the point of service where HIV counseling and testing is offered and it is at this point HIV infected individuals are determined, referred and enrolled into the HIV care and treatment program supported by FHI. We also compared the recruited HIV-1 positive clients with the HIV-1 negative screened blood donors per hepatitis screening.

METHODS

Setting and Subjects: The study was done in four FHI supported State Level Health Facilities (Zing general hospital, Wukari general hospital, First referral Mutumbi, and Mabilla Baptist hospital) in the North East of Nigeria. Between March to December 2007, a total of 1,980 clients from the age of 18 years old that voluntarily walked into the health facilities was counseled and tested for HIV-1 according to the national HIV testing algorithm. Out of the screened clients, 200 individuals were positive for HIV-1. These HIV-1 positive clients were further examined for HBV and HCV. All the clients were screened based on their informed consent. As controls, 200 HIV-1 negative blood donors were also screened for HBV and HCV from the same health facilities.

Sample collection and test procedure: A drop of blood after finger prick was used for the detection of HIV antibodies using rapid test kit (Inverness Medical, Japan and Statpak) and the procedure performed was according to the manufacturer’s instructions.

HBV and HCV screening were performed using the rapid chromatographic immunoassay for the qualitative detection of the viral antigens (ACON Laboratories, USA). 5ml of venous blood was collected into a plain tube and centrifuge for 10 minutes at 1,500 rpm. Two to three drops of the separated serum were dropped onto the specimen pad using Pasteur pipette and allowed to migrate via capillary force and results were interpreted after 15 minutes according to manufacturer’s instructions.

The test strips had two lines; a control line which indicated the validity of the test and the test line that showed an infection with the viral antigens. The combination of both lines indicated positive samples while the absence of test line with the presence of only control line was interpreted as negative. The detection of the test line without the control line was considered invalid.

Data analysis: All the results recorded were analyzed using descriptive statistics and Chi-square.

RESULTS

HIV prevalence among the screened clients represented 10.1%. The results of HIV co-infection with HBV, HCV and HBV+HCV infection are shown in Table 1. Out of the 200 client’s positive for HIV; 19% (38/200) were positive for HBV, 9.5% (19/200) for HCV and 2.0% (4/200) for HBV+HCV. The age group of 26-30 was mostly affected by HIV (28.5%), HBV (26.3%) and HCV (21.0%) while HBV+HCV (50.0%) occurred most among 20-25 age group, as indicated in Table 1.

The prevalence of the hepatitis viruses among the 200 HIV control group is 2% (4/200) for HBV and 0.5% (1/200) HCV. Among the control group, HBV and HCV infection occurred only in the age group of 26-30 like among the client’s earlier mentioned. The prevalence of HIV and its co-infection with HBV, HCV and HBV+HCV showed that the highest infection occurred among the females (70.1%). The detailed prevalence of infection compared with sex is indicated in Table 2.

DISCUSSION

This study reported 19.0%, 9.5% and 2% HBV, HCV and HBV+HCV positivity among HIV-1 positive clients respectively. HIV positive females represented 69% among the recruited clients compared with 30% of males, p<0.05. It is also not surprising that 70.1% of these females accounted for co-infection with HBV, HCV and HBV and HCV. This significance suggests that women tend to attend to their health care needs quickly in the studied areas when compared with the men. As per HBV, the reported seroprevalence rate in this work is higher than previous prevalence rate of 3.6% in Biu region (Bello and Olabode, 2011a), 9.7% in Niger Delta.
Table 1. Age distribution showing seroprevalence of HBV and HCV among HIV-1 positive clients.

<table>
<thead>
<tr>
<th>Age group (Years)</th>
<th>Frequencies of HIV (%)</th>
<th>Frequencies of HBV (%)</th>
<th>Frequencies of HCV (%)</th>
<th>Frequencies of HBV and HCV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-19</td>
<td>9 (4.5)</td>
<td>2 (5.3)</td>
<td>1 (5.3)</td>
<td>1 (25.0)</td>
</tr>
<tr>
<td>20-25</td>
<td>45 (22.5)</td>
<td>9 (23.7)</td>
<td>5 (26.3)</td>
<td>2 (50.0)</td>
</tr>
<tr>
<td>26-30</td>
<td>57 (28.5)</td>
<td>10 (26.3)</td>
<td>4 (21.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>31-35</td>
<td>25 (12.5)</td>
<td>8 (21.0)</td>
<td>3 (15.8)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>36-40</td>
<td>26 (13.0)</td>
<td>3 (7.9)</td>
<td>4 (21.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>41-45</td>
<td>12 (6.0)</td>
<td>1 (2.6)</td>
<td>0 (0.0)</td>
<td>1 (25.0)</td>
</tr>
<tr>
<td>46-50</td>
<td>12 (6.0)</td>
<td>3 (7.9)</td>
<td>1 (5.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>51-55</td>
<td>6 (3.0)</td>
<td>2 (5.3)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>56-60</td>
<td>3 (1.5)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>61-65</td>
<td>2 (1.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>66-70</td>
<td>3 (1.5)</td>
<td>0 (0.0)</td>
<td>1 (5.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>38</td>
<td>19</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 2. Sex distribution showing seroprevalence of positive HBV and HCV among HIV-1 positive clients.

<table>
<thead>
<tr>
<th>Types of infection</th>
<th>Males (%)</th>
<th>Females (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>62 (31.0)</td>
<td>138 (69.0)</td>
<td>200</td>
</tr>
<tr>
<td>HBV</td>
<td>13 (34.2)</td>
<td>25 (65.8)</td>
<td>38</td>
</tr>
<tr>
<td>HCV</td>
<td>3 (15.8)</td>
<td>16 (84.2)</td>
<td>19</td>
</tr>
<tr>
<td>HBV and HCV</td>
<td>0 (0.0)</td>
<td>4 (100.0)</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>183</td>
<td>261</td>
</tr>
</tbody>
</table>

region (Ejele et al., 2004) and 15% in Maiduguri region (Baba et al., 1998). Two of the studies (Biu and Maiduguri) were conducted in the same North East region where this work was carried out. This findings suggests that there may be an increase of HBV among HIV infected patients and it is also evident when compared with the controls that accounted for 2% which is statistically significant, p<0.05. While it is lower than 28.4% in Lagos region (Balogun et al., 2010), 31.4% in Ilorin (Olokoba et al., 2008), 20.6% in Keffi (Agwale et al., 2007), 70% in Kano (Nwokedi et al., 2006), 25.9% and 28.7% in Jos (Uneke et al., 2005 and Sirisena et al., 2002), and 26.5% in Gombe (Mustapha and Jibril, 2004). This low occurrence could be as a result of the studied areas because the settings are semi urban-rural settings with less population when compared with previous studies locations that were predominantly urban with more population.

Females had a higher rate of this group of co-infection (25%) compared to males (13%) in this study, p>0.05. This finding is comparable with the findings in Niger Delta region (Ejele et al., 2004) and Kano (Nwokedi et al., 2006) and it is at variance with the studies in Jos (Sirisena et al., 2002) and Lagos (Balogun et al., 2010). It is not uncommon that the risks associated with this co-infection could be parenteral or non-parenteral as documented (Balogun et al., 2010; Bello and Olabode, 2011b) and this could be responsible for the high prevalence in different settings across Nigeria irrespective of the gender.

In this study, HCV co-infection (9.5%) was higher than similar studies in Gambia -0.6% (Jewell et al., 2009), Ilorin -0.0% (Olokoba et al., 2008), Jos - 8.2% (Agwale et al., 2004) and Johannesburg -1.0% (Lodenyo et al., 2000). This finding is also comparable with Agwale et al., (2007) findings of 11.1% in Keffi. Although this study did not evaluate the history of drug use, blood transfusion, circumcision, skin tattoo, surgery and sexual pattern of the recruited clients and controls but it can be suggested that it is likely that HCV may be transmitted through sexual activity considering the increase in positivity rate when compared with previous studies. However, the suggested potential role of sexual transmission can also be considered, considering frequent HIV infections. This assertion was also reported in Gambia (Jewell et al., 2009). Again, our findings indicated that more HIV positive females were co-infected with HCV (16%) compared with their male counterpart (3%) which is statistically significant, p<0.05. This suggest that these women may not have engaged in the use of intravenous drug or exposed themselves to other risk factors documented to have been associated
with the transmission of HCV in developed countries (Brau et al., 2002, Bodsworth et al., 1996 and Bove, 1987). The high infection rate among the female gender is also contrary to the study reported in Gambia (Jewell et al., 2009). We can also suggest that the traditional practices indicative of parenteral route like circumcision and skin tattoo are less common due to public campaign against such vices in Nigeria. Furthermore, the distribution of the co-infection between the age of 20 and 40 years and only one participant at the age of 19 years (Table 1) is highly suggestive of active sexual activity. This suggestion of sexual activity as responsible for HCV transmission may be contrary to the already established opinion that the principal route of HCV is intravenous drug abuse or through other parenteral route as reported in the developed countries. When compared with the controls, one donor was infected with HCV and this is of public health concern and it is also indicative of increase in HCV among HIV-1 positive individuals, p<0.05.

This study also identified double co-infection of HBV and HCV among HIV-1 clients. This group of client is uncommon as only one study to the best of our knowledge reported 7.2% of these patients in Keffi (Agwale et al., 2007), and this was only observed among three females within the age of 19 and 25 years old except for one of the females. Factors responsible for this observation in this study may not be different from the risks commonly linked with HBV or HCV co-infection with HIV especially multiple sexual partners. Therefore, it can be suggested that this group of client are likely to be highly exposed to risk behaviour compared to other groups like HIV+HBV and HIV+HCV. This is therefore suggestive of same mode of transmission for all the hepatitis viruses that are endemic in Nigeria. Also, this group of client may further make antiretroviral treatment difficult as reported by Agwale et al., 2007.

The findings of this study suggest the inclusion of hepatitis screening in the national HIV testing algorithm. This will subsequently lead to improved patient’s care. This suggestion can also be supported with previous study in Johannesburg that reported that HBV infections are acquired while the patients are still immunocompetent (Lodeny et al., 2000). This proposal was also reported by Bello and Olabode, 2011a and Olokoba et al., 2008.

In conclusion, the benefits associated with antiretroviral therapy in the treatment of HIV could be compromised by co-infection with hepatitis viruses as they are known to have adverse effects on the prognosis of HIV and hepatitis infections (Feld et al., 2005). Consequently, increased attention need to be paid on co-infection of hepatitis viruses and HIV especially in public health facilities in Nigeria. Also, clinicians managing people living with HIV infection should get the laboratory to assess the HBV and HCV status in all patients prior to the initiation of antiretroviral therapy because it would guide appropriate choice of drugs and help to reduce morbidity and mortality from antiretroviral drug hepatotoxicity.

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REFERENCES


