SERO SURVEY OF HUMAN T-LYMPHOTROPHIC VIRUS TYPE 1 SECONDARY INFECTION AMONG PEOPLE LIVING WITH HIV/AIDS IN DUTSE METROPOLIS, NORTH-WESTERN NIGERIA

Mohammed Yahaya¹ Usman Aliyu Dutsinma² Yusuf Mohammed³

¹Department of Medical Laboratory, Rasheed Shekoni Specialist Hospital, Dutse, Nigeria
²Department of Microbiology, Bayero University, Kano, Nigeria
³Department of Medical Microbiology and Parasitology, Bayero University, Kano, Nigeria

Correspondence:mohbnyah@gmail.com +2348063707712

Abstract

Human T-lymphotrophic virus type 1 (HTLV-1) is a causative agent of tropic spastic paraparesis and adult T-cell leukaemia. Evidence is accumulating that HTLV-1 may be responsible for some degree of subclinical immune suppression that may result in increased rate of HIV. Sixty (60) people living with HIV/AIDS consisting of 20 males and 40 females were recruited in this study. HIV diagnosis was confirmed using Nigerian National Serial Algorithm for HIV test. ELISA technique was used for the detection of HTLV-1 IgG and IgM antibodies, and Cyflow partec was used for CD4 count. The prevalence of HTLV-1 IgG and IgM antibodies among HIV subjects was 15% and 6.6% respectively. Male patients have a percentage prevalence of 4(6.6%) and female 5(8.3%) of IgG antibodies, IgM antibodies prevalence was 2(3.3%) for male and female each respectively. CD4 Counts of the HIV subjects was evaluated which reveals that patients with counts 0-200 cells/µl tested negative to HTLV-1 IgG and IgM antibodies. Conclusion: The percentage prevalence recorded in this study shows that HTLV-1 infection is relatively high compared to the previous studies even though limited information was obtained in relation to HIV/HTLV-1 co-infection in these study area.

Keywords: Human T-lymphotrophic virus -1, HIV/AIDS, CD4,
Determination of HIV: HIV status of the subjects for this study were tested and confirmed in accordance with National serial algorithm for HIV testing. Protective foil of Determine test kitcover was removed, with the help of pipette 50ul of plasma/serum was added to the sample pad marked by arrow symbol and results were read in a minimum of 15 minutes and maximum of 60 minutes. The results were read as either negative or positive, samples that tested positive were confirmed using Unigold test kits as guided by National serial algorithms.

ELISA technique for HTLV-1 Determination: 50µl of negative and positive controls were added to the negative and positive control wells respectively. In sample wells, 40µl Sample dilution buffer and 10µl sample were added. Samples were loaded onto the bottom without touching the well wall and mix well with gentle shaking. After 30 minutes of incubation at room temperature and sealed with closure plate membrane, diluted with buffer 30 times for 96T and washed 5 times. 50µl HRP-Conjugate reagent was added to each well except the blank control well, it was incubated for 30 minutes and washed. 50µl Chromogen Solution A and 50µl Chromogen Solution B was added to each well, mixed with gentle shaking and incubated at 37 °C for 15 minutes, light was avoided during colouring. Lastly, 50µl of stop solution was added to each well to terminate the reaction and colour in the well changed from blue to yellow. Absorbance was Read at 450nm using a Microtiter Plate Reader and OD value of the blank control well is set as zero.

Ethical Clearance: An ethical approval was obtained from Jigawa State Ministry of health ethical committee before the commencement of the study, and the consent/accept of the subjects was sought for during this study. The subject was giving an opportunity to accept or reject enrolment into the study.

Statistical Analysis: The data obtained were entered in Microsoft Excel, analysed and presented as numerical simple proportions and percentages using statistical software SPSS Version 20. Chi-square test was also used to compared variables using P<0.05 as statistically significant.

RESULTS
Table 1 shows the prevalence of HTLV-1 IgG and IgM antibodies among HIV patients enrolled in this study. 15% that is nine out of sixty tested positives to HTLV-1 IgG antibodies while 6.6% that is four out of sixty tested positives to HTLV-1 IgM antibodies. However statistical analysis shows that there is no significant difference between IgG and IgM antibodies among the HIV subjects.

Table 2 shows the evaluation of CD+4 cells counts of HIV patients and its relationship with HTLV-1 IgG and IgM antibodies. The HIV patients are grouped based on Centre for Disease control(CDC) categorization. Individuals with CD4 counts 0-200 tested negative to both IgG and IgM antibodies, those with CD4 of 200-499 has 10% and 3.3% who tested positive to HTLV-1 IgG and IgM antibodies respectively. Individuals with CD4 counts >500 has 5% and 3.3% who tested positive to HTLV-1 IgG and IgM antibodies.

Table 3 shows age distribution with respect to HTLV-1 IgG and IgM antibodies among HIV subjects. Age group 5-14 and 55-64 all tested negative to both HTLV-1 IgG and IgM antibodies. Age group 15-24, 24-34, 35-44 and 45-54 has a percentage prevalence of IgG antibodies of 3.3%, 5%, 5% and 1.6% respectively. However, age group 25-34 is the only age group that has individuals who tested positive to HTLV-1 IgM antibodies with 6.6%.

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. Screened</th>
<th>IgG (%)</th>
<th>IgM (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>20</td>
<td>04(6.6)</td>
<td>02(3.3)</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>05(8.3)</td>
<td>02(3.3)</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>09(15)</td>
<td>04(6.6)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CD4 -cells counts/µl</th>
<th>No. Screened</th>
<th>IgG %</th>
<th>IgM%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 200</td>
<td>05</td>
<td>00(0)</td>
<td>00(0)</td>
</tr>
<tr>
<td>200 - 499</td>
<td>32</td>
<td>06(10)</td>
<td>02(3.3)</td>
</tr>
<tr>
<td>&gt;500</td>
<td>23</td>
<td>03(5)</td>
<td>02(3.3)</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>09(15)</td>
<td>04(6.6)</td>
</tr>
</tbody>
</table>

Table 1: Prevalence of HTLV -1 IgG and IgM Antibodies Among Study Subjects

Table 2: Relationship between CD4+ cells counts and HTLV -1 IgG and IgM Antibodies Among HIV Subjects According to CDC Categorization.
DISCUSSION

Human T-cell virus type 1 (HTLV-1) is the causative agent of tropical spastic paraparesis (TSP), a disease also known as HTLV-1-associated myelopathy (HAM) (Guzman and Sands, 2007) and also Adult T-cell Luekemia (ATL), the earlier is an upper motor neuron syndrome affecting lower extremities. There is contradicting evidence that HTLV-1 can remain latent for up to 20-30 years after initial infection but an average of 3years is more typical (Szczypinska et al., 2014).

The highest prevalence of HTLV-1 infection has been reported in Caribbean island and south America, with moderate distribution in Japan and Africa (Proietti et al., 2005). According to the results obtained from the present study, an overall prevalence of (15% for IgG and 6.6% for IgM) antibodies were recorded among HIV patients, this is in line with work of Piehl et al. (1988) who reported an overwhelming 14% of HTLV-1 infection in Papua New Guinea. A study conducted by Shmuel et al. (2009) documented 5.8% of HTLV-1 infection among blood donors in Israel. In Nigeria a study conducted by Mohammed et al. (2006) recorded a lower prevalence of 3.2% among blood donors in Jos Nigeria. Similarly, it is reported that about 5-10 million individuals are infected with HTLV-1 among 1.5 billion of people living in HTLV-1 endemic areas (Gessain et al., 1992). However, in Nigeria, most of the HTLV-1 seroprevalence research were mostly on blood donors. In northwestern Nigeria Analo 1998) reported percentage prevalence of 3.7 in Zaria. More recently, [19] reported a prevalence of 4.9% among HIV patients attending National Hospital Abuja capital city of Nigeria.

The current finding revealed 15% prevalence of HIV co-infected with HTLV-1 (Table 1.) (Sobesky et al., 2000; Goon et al., 2004) both reported percentage prevalence of 9.9% and 31.8% respectively. The co-infection of HIV-HTLV-1 may be due to upward regulation of HTLV-1 by HIV which results in consequent pathological manifestation such as TSP/HAM and ATL leading to faster progression of AIDS and shorter survival rate, the existence of the same transmission route for both HIV and HTLV-1 and same tropism for T-lymphocytes may play significant role in co-infection. Irrespective of sex or baseline CD4 counts, HIV-HTLV-1 co-infected individuals are more prone to death than individuals who HIV mono infected (Brites et al., 2001).

Some degree of immunosuppression caused by HTLV-1 infection has been documented by[20] resulting to other maladies such as crusted scabies, strongyloidiasis and Tuberculosis (Brites et al., 2002; Porto et al., 2002). The two most indispensable tools used before commencing antiretroviral therapy (ART) in Nigeria are CD4 counts and recently viral load, but the most commonly used tool used in Nigeria in monitoring antiretroviral therapy is monitoring of patients CD4 counts. This study evaluates CD4 counts of HIV subjects in relation to HTLV-1 infection and it was found that individuals with CD4 counts 0- 200 cells/µl has zero percent prevalence of both HTLV-1 IgG and IgM antibodies, while those with CD4 counts 200-499 cells/µl have 10% and 3.3% prevalence of HTLV-1 IgG and IgM antibodies respectively, HIV patients with CD4 Counts greater than 500cells/µl have 5% and 3.3%. These findings are in agreement with that of Mazanderani et al. (2013) who documented raised CD4 counts in HIV/HTLV-1 co-infection. HTLV-1 promotes clonal expansion of CD4-infected T-lymphocytes causing an elevation of less competent CD4+ T-cells in coinfected persons (Zane et al., 2009) the higher CD4 counts may have resulted in a delay in introduction of antiretroviral therapy in these co-infected patients. Looking at the age distribution of the study individuals in the age group 25-34 and 35-44 have equal percentage prevalence of 5% for HTLV-1 IgG antibodies, age group 25-34 is the only age group with individuals who tested positive to HTLV-1 IgM antibodies with 6.6% prevalence.

CONCLUSION

Recently, Human T-lymphotrophic virus type 1 draws the attention of researchers in the 21st century because of its pathological significance. The present study evaluated HIV subjects in Dutse Metropolis for HTLV-1 IgG and IgM antibodies, of which high prevalence of 3.7% and same tropism for T-lymphocytes may play significant role in co-infection. Irrespective of sex or baseline CD4 counts, HIV-HTLV-1 co-infected individuals are more prone to death than individuals who HIV mono infected (Brites et al., 2001).

Some degree of immunosuppression caused by HTLV-1 infection has been documented by[20] resulting to other maladies such as crusted scabies, strongyloidiasis and Tuberculosis (Brites et al., 2002; Porto et al., 2002). The two most indispensable tools used before commencing antiretroviral therapy (ART) in Nigeria are CD4 counts and recently viral load, but the most commonly used tool used in Nigeria in monitoring antiretroviral therapy is monitoring of patients CD4 counts. This study evaluates CD4 counts of HIV subjects in relation to HTLV-1 infection and it was found that individuals with CD4 counts 0- 200 cells/µl has zero percent prevalence of both HTLV-1 IgG and IgM antibodies, while those with CD4 counts 200-499 cells/µl have 10% and 3.3% prevalence of HTLV-1 IgG and IgM antibodies respectively, HIV patients with CD4 Counts greater than 500cells/µl have 5% and 3.3%. These findings are in agreement with that of Mazanderani et al. (2013) who documented raised CD4 counts in HIV/HTLV-1 co-infection. HTLV-1 promotes clonal expansion of CD4-infected T-lymphocytes causing an elevation of less competent CD4+ T-cells in coinfected persons (Zane et al., 2009) the higher CD4 counts may have resulted in a delay in introduction of antiretroviral therapy in these co-infected patients. Looking at the age distribution of the study individuals in the age group 25-34 and 35-44 have equal percentage prevalence of 5% for HTLV-1 IgG antibodies, age group 25-34 is the only age group with individuals who tested positive to HTLV-1 IgM antibodies with 6.6% prevalence.
Among the subjects with CD4 counts 0-200 cells/µl were tested negative to both HTLV-1 IgG and IgM antibodies while those with counts 201-499 cells/µl has 10% and 3.3% respectively. Health care centres in Nigeria needs to include HTLV-1 diagnosis because this will go long way in creating awareness about the virus as well as reduce the chances of its spread.

RECOMMENDATION

Human T-Lymphotrophic Virus type-1 is one of the poorly diagnosed virus in Nigeria, most of the studies conducted in Nigeria and other African countries shows that its conducted on blood transfusion subjects, however this virus needs to be diagnosed among HIV and patients in Nigeria looking at the facts that co-infection with HTLV-1 among these subject’s increase immunosuppression and mortality.

REFERENCES


Goncalves, DU., Proeitti., FA., Ribas, JG et al. (2010): Epidemiology, treatment, and prevention of human t-cell leukemia virus type1 associated diseases. Clinical microbial; 23(3)577-589


Shmuel S, Vered Y, Eli S, Elat S, Gad S, and Yechezkel S. (2009). Epidemiology of Human T-cellLymphotropicVirusType 1 Infection in Blood Donors, Israel Emerging Infectious Diseases; (15)7, Sobesky, M., Couppie, P., Pradinaud, R., Godard, M.C., Alvarez, F., Benoit, B.


Zane L, Sibon D, Mortreux F, et al. (2009). Clonal expansion of HTLV-1 infected cells depends on the CD4 versus CD8 phenotype. Front Biosci; 14:3935-3941