Human Immunodeficiency Virus and Hepatitis B Virus Co-infection Studies among Patients attending Selected Hospitals in Gusau, Zamfara State, Nigeria

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Abstract: Human Immunodeficiency virus (HIV) and Hepatitis B virus are among the leading causes of fatal infections worldwide. This study was conducted between August-December 2018 to determine the sero-prevalence of HIV/HBV co-infection among patients attending two selected Hospitals in Gusau, Nigeria. One hundred and sixty eight (168) study subjects were recruited for this study. Blood samples were collected by venepuncture and screened for the presence of HIV antibodies and Hepatitis B surface antigen (HbsAg) using determine and Hepatitis B first response rapid detection kits respectively. The HIV positive blood samples were retested using *uni-gold* and analyzed for $CD4^+$ count. HbsAg positive blood samples were confirmed by ELISA and retested for various markers of HBV. Antibodies against HIV were detected in 8.3% (14/168) while HbsAg in 7.7% (13/168) and a coinfection of 2.9% (5/168). The mean $CD4^+$ count in HIV positive subject was 354.4cells/µl of blood. Test for markers of HBV indicate Anti-HBc as the most predominant (46.1%) while Anti-HBs was the least predominant. Both HIV and HBV were significantly associated with family type and history of sexually STDs. The findings of this study suggest that thorough investigations be employed especially for blood donors so that adequate clinical management can be planned for the infected persons as soon as they are diagnosed.

Key words: Prevalence, HIV, HBV and Coinfections.

INTRODUCTION

Human Immunodeficiency Virus (HIV) is a member of the retrovirus family that infects cells of the immune system (Sadoh *et al*., 2011). When CD_4 T cells number decline below a critical value, cell mediated immune response is lost and the body becomes more progressively susceptible to opportunistic infections leading to immune deficiency (Aliyu *et al*., 2013). The illness was first described in 1981 and the virus isolated in 1983, since then HIV infection became a worldwide epidemic, expanding in scope and magnitude and affecting various populations and geographic regions claiming millions of lives (WHO, 2012).

Hepatitis is the inflammation of the liver; it may be caused by exposure to certain chemicals, autoimmune diseases, or by bacterial infections, but is often caused by one of several viruses (Oladele, 2013). Hepatitis B virus is a major global health problem of public importance (WHO, 2017). Approximately, 350 million people are infected with HBV worldwide of whom almost one million die annually of HBV related liver diseases (Liu and Hou, 2006).

HIV/HBV co-infection is a state in which an individual is infected with both HIV and the HBV viruses (Omonkhelin and Owolabi, 2010). Most HBV infections in Africa occur within the first 5 years of life through perinatal transmission or close contact within households and medical or cultural procedures, such as scarification and tattoos (Ortblad *et al.,* 2013). In these settings, the prevalence of HBV infection is often close to 15%, regardless of HIV co-infection (Lacombe *et al.,* 2010). In Nigeria and other parts of sub-Saharan Africa, where HBV is endemic, prevalence of HBV among HIV infected individuals range from 6-20% (Hoffman *et al*., 2010).

HIV/HBV co-infected patients can lead to higher rates of chronicity and increased viral replication, the immuno-compromised HIV infected patients mount poorer antibody response to HBV vaccination (Aghasadeghi *et al.,* 2011). Managing co-infection is further complicated by dual activity of several nucleoside analogues and emergence of resistant HBV strain (Hoffman *et al.,* 2010).

Knowledge of the status of blood donors will help in advising and taking precursionary measures to protect and provide information required for prevention or management of the infection.

This study is aimed to determine the prevalence of HIV/HBV co-infection among patients attending two selected hospitals in Gusau, Zamfara State.

MATERIALS AND METHODS

Study area

This study was conducted in Gusau metropolis of Zamfara state Nigeria, at the laboratories of Federal Medical Centre and Yariman Bakura Specialist Hospital. The hospitals serve as major referral centers in the state.

Study population

The study population consists of intending blood donors, patients recommended for retroviral screening (RVS) and or HbsAg test by the physicians.

Ethical approval

Approval to carry out the study was obtained from ethical committees of the Hospitals (appendix I and II). Consent was obtained from all the participants and confidentiality of the information was assured.

Viral diagnosis

The serum samples collected from each of the participants were coded and stored at -4^0c until analyzed (FMOH, 2010b). The serum was tested for antibodies to HIV using the "Determine test kit" (Abbot Laboratories, U.S.A) and the HIV positive specimen were retested using "Unigold test kit (Trinity Biotech Plc, Ireland). HbsAg test was carried out by immune-chromatography (Diaspot Blumbe, U.S.A).The HbsAg positive samples were confirmed by ELISA (Biorex Laboratory, UK). The CD4 counts of patients was determine using BDFACS counting machine (BD Biosciences, USA). The reagent tube was mixed and opened using a coring station. Fifty microlitres patient's blood, the tube was then incubated for 1 hour in and the machine was allowed to display the result.

Questionnaire

A structured questionnaire was used to obtain socio demographic data, clinical information and risk factors associated with HIV/HBV co-infection.

Statistical analysis

The data obtained from the result of the laboratory analyses and questionnaire was analyzed using SPSS 23 (Statistical Package for Social Sciences version 23). Chi-square test was used to determine relationships between the demographic data and clinical information with HIV and HBV infection and p value < 0.05 was considered significant at 95% confidence interval.

RESULTS

A total of 168 blood samples were collected from blood donors and patients attending Federal Medical Centre and Yarima Bakura Specialist Hospital Gusau, Nigeria. HIV was detected with a prevalence of 8.3% (14/168), HBV was detected with a prevalence of 7.7% (13/168) and a co-infection prevalence of 2.9% (5/168) was obtained. The distribution of HIV/HBV co-infection according to gender was analyzed; male had prevalence 3.5% (4/112) while female had 1.7% (1(56). The distribution of HIV/HBV co-infection according age group gives a prevalence of 10% (2/20) among age group >41years while 0% prevalence was recorded among 16-20 and 26-30years respectively. The distribution of the co-infection according to educational status reveals a prevalence of 7.7% (3/39) for participant in tertiary category while those with primary education recorded a prevalence of 0%. According to marital status participant that were divorced recorded a high prevalence 9% (1/11) while those that are single recorded a prevalence of 1.7% (1/58). According to family type, a co-infection prevalence of 4.1% (3/73) was recorded among participants that practice monogamy and 2.1% (1/98) for those that practice polygamy. Participants that undergo blood transfusion had a co-infection prevalence of 5.7% (4/70) while a prevalence of 1% (1/98) was recorded for those that do not undergo

blood transfusion. Participants with tribal marks recorded a high co-infection prevalence of 3.2% while those with no tribal marks recorded a prevalence of 2.2%. Although there was no significant difference statistically, participants with history of sexually transmitted disease recorded a co-infection prevalence of 6.5% (3/46) whisle those with no STDs had a prevalence of 1.8% (2/122). The mean $CD4^+$ count for HIV patients was 354.4 cells/µl of blood while for HIV/HBV co-infection, the mean $CD4^+$ count was 194/µl of blood. The distribution of serological markers of HBV was analyzed and the result indicate 7.6% had detectable Hepatitis B surface antibody Anti-HBs, 15.3% of the patients had Hepatitis B envelop antibody Anti-HBe, 46.1% of the patients had Hepatitis B core antibody while 30.7% of the patients had Hepatitis B envelop antigen.

Table 1: The distribution of HIV/HBV co-infection based on sex

Sex distribution	Total Number of Sample (n=168)	No. Positive (%)	*p-value*
Male	112	4 (3.5)	
Female	56	1 (1.7)	0.459

Table 2: the distribution of HIV/HBV co-infection based on Age

Age	Total Number of Sample (n=168)	No. Positive (%)	*p-value*
16 - 20	21	0	
21 - 25	43	1 (2.3)	
26 - 30	36	0.324	
31 - 35	32	1 (3.1)	
36 - 40	16	1 (6.25)	
> 41	20	2 (10)	

Table 3: the distribution of HIV/HBV co-infection based on Education

Education	no. of samples (n=168)	No. positive (%)	*p-value*
Tertiary	39	3 (7.7)	
Secondary	67	1 (1.5)	
Primary	42	0	0.167
Others	20	1 (5.0)	

Table 4: the distribution of HIV/HBV co-infection based on marital status

Marital status	no. of samples (n=168)	no. positive (%)	*p-value*
Single	58	1 (1.7)	
Married	99	3 (3.0)	0.419
Divorced	11	1 (9.0)	

Table 5: the distribution of HIV/HBV co-infection based on blood transfusion history

Blood transfusion	no. of samples (n=168)	no. positive (%)	*p-value*
Yes	70	4 (5.7)	0.407
No	98	1 (1)	

Table 6: the distribution of HIV/HBV co-infection based on tribal mark

Tribal mark	no. of samples (n=168)	no. positive (%)	*p-value*
Yes	91	3 (3.2)	0.564
No	77	2 (2.2)	

Table 7: the distribution of HIV/HBV co-infection based on STDs

Sexually transmitted disease	no. of samples (n=168)	no. positive (%)	*p-value*
Yes	46	3 (6.5)	0.968
No	122	2 (1.8)	

DISCUSSION

HIV/HBV co-infection have been associated with a reduced survival rate, this increase the risk of HBV related advanced liver diseases in people hence, diagnosis a priority (Aba, 2013). It's well known fact that HIV/HBV co-infection is most often linked to sexual contact (Sadoh *et al*., 2011), the co-infection prevalence of 2.9% (5/168) for HIV/HBV obtained is a clear indication that HBV is a major threat to HIV/AIDS patients in Nigeria as reported in other parts of the world (Aliyu *et al*., 2013). This result was higher than 0.5% obtained among blood donors in Osogbo, Osun state (Oladele *et al.,* 2013), but lower than 5.1% among adult patients in Botswana (Azhani and Stephane, 2017). In relation to gender, out of the 168 study subjects used in this study, the number of males (112) outweighs the number of females (56), this showed that more men were tested than females hence inconsistent with sex distribution as documented in majority of treatment centers even though kanu *et al (*2015) reported that females are more sensitive to changes in their health, the obvious reason for this is due to the high percentage of sample obtained from blood donors are for male participants. Although there was no significant difference in the distribution of HIV/HBV co-infection with respect to gender, male participants had a high prevalence of 3.5% (4/112) as against female 1.7% (1/56), this suggests other route of exposure other than sex and could be attributed to use of unsterilized barbing razors and nail cutters which expose male clients in case of bleeding (Saeed *et al*., 2005) or due to high frequency of exposure to infected blood by male clients as result of occupation or societal behavior (Omonkhelin and Owolabi, 2010). In relation to age distributions, participants in >41years category had a high prevalence of 10% (2/20) while participants in 16-20years, 26-30years category recorded a prevalence of 0%. The reason for this might be as result of latency period of the disease which could have been contracted when the patients are teen or young adults and finally manifest the first symptoms while in their 40's, although in all epidemiological studies, younger age has always proved to be most important factor, (Olokoba *et al*., 2011), which contrasted with this study.

In relation to marital status, participants that are divorced have a highest prevalence of 9% (1/11) followed by participants that are married, single with prevalence of 3% (3/99) and 1.7% (1/58) respectively, this suggest that marital status is not a risk factor for the co-infection, since unmarried people may tend to have many sexual partners or unprotected sex (Aliyu *et al*. 2013). In relation to history of blood transfusion a co--infection prevalence of 6.8% was recorded for participants that were once transfused against 1% for those that were not. This may be attributed to transfusion of improperly screened blood or seroconversion after blood transfusion. This was consistent with Buseri *et al*. (2010) that found high prevalence in patient that have been exposed to blood transfusion. In relation to tribal mark, participants who had no tribal marks had the highest prevalence 2.7% while those with tribal mark recorded a prevalence of 2.1%.This was inconsistent with Adewole *et al*. (2009) who identified tribal mark as risk factor associated with co-infection. The mean $CD4^+$ count among HIV/HBV co-infected participants was 194cells/µl. People living with HIV who have $CD4^+$ count over 500 are usually in good health. Those with $CD4^+$ count below 200 are at high risk of developing opportunistic infection (WHO, 2012).

CONCLUSION

A prevalence of HIV/HBV co-infection was found to be 2.9% among the patients. However, there was significant association between family type, presence of sexually transmitted infections and the co- infections. Patients who had only HIV infection had higher CD4+ counts than those who where co-infected with HBV. The findings of this study suggest that thorough investigations should be employed especially for blood donors so that adequate clinical management can be planned for the infected persons as soon as they are diagnosed**.**

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