



PREVALENCE OF HEPATITIS B AND C VIRUSES AMONG HUMAN IMMUNODEFICIENCY VIRUS INFECTED CHILDREN ATTENDING AN ANTIRETROVIRAL THERAPY CLINIC IN LAFIA, NIGERIA

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ABSTRACT

Nigeria has the largest burden of children living with HIV in the world but because of antiretroviral therapy, they are living longer. However, hepatitis B and C viruses are emerging important co-morbidities to consider especially for management decisions. This study set out to determine the prevalence of hepatitis B and C viruses among these children and to identify possible risk factors associated with the infections. Two hundred HIV-infected children at an antiretroviral treatment center were screened for Hepatitis B and C seromarkers using rapid test kits (ABCON Laboratories Hangzhou China). Informed written consent was obtained from their parents/guardian and information on their sociodemographics and exposure to some possible risk factors were obtained. A general prevalence of infection with hepatitis B and C virus in the study population was 14.0%. The prevalence of HBV was 3.0% while HCV was 11.0% and no child was coinfecting with all 3 viruses. The HIV/HBV and HIV/HCV coinfection prevalence of 3.0% and 11.0% respectively is a cause for alarm. It is therefore pertinent that HIV infected children are screened for these viruses before commencement and during antiretroviral therapy.

Keywords: HBV, HCV, HIV, Seroprevalence, Children.

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Contribution/ Originality

This study has contributed in documenting the prevalence of the coinfections in Lafia, Nigeria using rapid test kits and has used the Chi square statistical test. This study is one of the very few studies which have investigated the prevalence of Hepatitis B and C infections in North Central, Nigeria. The paper has contributed in logical analysis and in estimating the prevalence and risk factors of the infections in Lafia. The study documented a relatively high overall prevalence of the coinfection. There is a coinfection of the 3 viruses among the study population.

1. INTRODUCTION

Human immunodeficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV) have gained a lot of attention in recent times because their impact goes beyond the infected person to affect even national economies. Despite their biological differences they share common routes of transmission and risk factors. They only differ in their efficiency by which certain types of exposures transmit them. HBsAg and anti-HCV are the seromarkers for HBV and HCV infections.

Vertical transmission is the main route of HIV transmission in children and they rapidly progress to immune deficiency syndrome (AIDS) with a median age of mortality being 2-3 years. Their rate of mortality is 7-18 times

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higher than in non infected children [1]. Of the 2.3 million burden of HIV infected children worldwide, 90% live in sub-Saharan Africa and Nigeria accounts for 10% of them [2].

Vertical transmission has also been reported as the most important route of hepatitis virus transmission in children [3] hence the ease of coinfection especially in a HIV and hepatitis endemic area. In fact, the World Health Organization (WHO) recommends screening for these viruses before initiating antiretroviral therapy [2, 4].

Two billion people worldwide have been infected by HBV with 400 million being chronically infected, while 170 million are infected with HCV [5]. About 10% of HIV positive persons are infected with HBV and HCV. This coinfection is known to accelerate disease progression in both HBV and HCV infections [6]. These coinfections have been associated with reduced survival, drug resistance, drug related hepatotoxicity, cross resistance and sub-optimal response [6, 7].

With the introduction of highly active antiretroviral therapy (HAART), more people are living longer. However, this gain is being threatened by the emerging challenges posed by co-morbidity with HBV and HCV. And unfortunately while HBV is vaccine preventable, HCV is not yet.

Researchers have reported the preponderance of HIV/HBV and HIV/HCV infections in Africa [6, 8].

There is paucity of data on seroprevalence of hepatitis among HIV infected children in Nigeria. This study was therefore undertaken to determine the seroprevalence and risk factors among HIV positive children on antiretroviral therapy. Such information will be relevant for initiating guidelines for disease management, control and prevention policies.

2. MATERIALS AND METHODS

2.1. Study Population

A total of 200 HIV infected children registered for antiretroviral therapy in Lafia, Nasarawa State participated in this cross sectional study after an informed consent was extracted from their parents/guardians. Their demographic information was obtained by oral interview before sample collection.

2.2. Sample Collection

About 3ml of blood was collected from each participant by venepuncture into a labeled plain tube. This was allowed to clot at room temperature and spun for 5 minutes at 3,000rpm. The sera were harvested into well labeled cryovials and stored at -20°C until ready for use.

2.3. HBsAg Detection

A rapid chromatographic immunoassay which is a qualitative test was used for screening the sera for HBsAg. The test kit (HBsAg one step test strips, ACON Laboratories Inc. USA) utilizes a combination of monoclonal and polyclonal antibodies to detect HBsAg in serum. The test procedure and result interpretation were carried out according to the manufacturer's instructions.

2.4. Anti-HCV Detection

A rapid chromatographic immunoassay kit (HCV one step strip, ACON Laboratories Inc. USA) was used for the detection of anti- HCV in serum.

This kit uses recombinant proteins and synthesized peptides derived from core and structural regions of HCV for the detection of anti-HCV in serum. The test procedure and result interpretation were carried out according to the manufacturer's instructions.

The prevalence of viral infection was determined and expressed as a percentage. This was further subjected to chi-square test to determine the statistical relationship between prevalence and the studied risk factors. A value of $p \leq 0.05$ was accepted as statistically significant.

3. RESULTS

Two hundred children whose parents/guardians consented were recruited for this study. Among them were 83 (41.5%) males and 117 (58.5%) females.

The overall prevalence of hepatitis in these children population was 14.0%. Of these, 11.0% were reactive to anti-HCV and 3.0% to HBsAg. Females had higher infection rates for both viruses ($p > 0.05$)

Table-1. Seroprevalence of HBsAg and anti-HCV among HIV infected children attending an antiretroviral therapy clinic in Lafia, Nigeria

Risk Factors	No. Examined	No. Positive	
		HBV (%)	HCV (%)
Sex			
Male	117	3 (2.6)	12 (10.2)
Female	83	3 (3.6)	10 (12.0)
Age (Years)			
<2	23	1 (4.3)	4 (17.3)
2-5	76	3 (3.9)	8 (10.5)
6-9	62	2 (3.2)	4 (6.5)
10-13	24	0 (0.0)	6 (25.0)
14-17	15	0 (0.0)	0 (0.0)
History of blood transfusion			
Yes	48	3 (6.3)	1 (2.0)
No	152	3 (2.0)	21 (13.8)
Scarification marks			
Yes	96	3 (3.1)	9 (9.3)
No	104	3 (2.9)	13 (12.5)

Source: Pennap, et al. [9]

There were more infections among females than males for both HBV and HCV infections. And when stratified for age, all the HBsAg reactive cases were below 10 years of age while anti-HCV was detected in children even above 10 years old. Infection rates with blood transfusion as a risk factor were more for HBV than HCV, and likewise scarification ($p > 0.05$)

4. DISCUSSION

The prevalence of hepatitis carriage among HIV infected children in this study was 14.0%. This is higher than findings of 12.9% in a study in HIV positive children [10] 3.9% among patients [6] in Nigeria and 7.5% among HIV positive children in Ethiopia [4].

HBsAg the seromarker used for HBV detection in this study was found in 3.0% of the children. This prevalence is lower than findings of 10.0% in Ilorin [3] 6.2% in Uyo [11] 7.7% from Benin [10] 5.8% in Owerri [12] and 7.8% from Benue [13] among HIV positive children. Reports from other countries found 4.9% in China [14] 6.9 in Uganda [5] and 1.4% in Swaziland [15].

These differences in prevalence might among other reasons be as a result of type of population, geographical location of study especially as it affects cultural practices and social indices, and sensitivity of tests used for

screening. The low rate reported is very likely to be a reflection of the success being recorded in the improved uptake of the HBV vaccine in Nigeria.

Similarly, the HCV/HIV coinfection in the present study was 11.0% i.e. more than 3 times that of HBV among these children. This is higher than reports of 1.7% in Ilorin [3] 5.2% in Benin [10] and 6.8% in Enugu [2] but lower than 14.7% in South Western Nigeria [6]. Similar studies from other countries recorded lower rates than the present study. It was 5.5% in Ethiopia [4] 9.6% in China [14] and 5.6% in Uganda [5].

The result of this study is in contrast to the expected 5.7% prevalence for HIV infected patients from a Sub Saharan Africa meta-analysis [16]. Mbotto and associates noted that other studies have reported 5-36% HCV infection prevalence among children born to HIV/HCV coinfecting women. And also that accurate data on HCV infection are generally elusive especially because its natural history is poorly understood [17]. Several epidemiological studies have reported high HCV prevalence but with no apparent risk factors [17].

This high prevalence recorded in the present study especially with no obvious efficient risk factor like seen in intravenous drug use supports the obscurity of risk factors as reported by other researchers. However, some researchers posited that transmission efficiency is determined by the amount of virus in a body fluid and the type and extent of contact [2]. Unfortunately unlike HBV, HCV is not vaccine preventable.

On the whole, the prevalence of HIV/HBV and HIV/HCV in these children might be a reflection of the viral prevalence in their community. Thus also suggesting that predisposition to infection is the same for every member of their community.

The age stratification in this study did not show any statistical significance in age specific prevalence. HBsAg was detected among children that were not above 9 years old. This might be suggestive of some vertical transmission. The non detection of HbsAg infection among children above 9 years of age might be suggestive of a poor horizontal transmission of the virus. This could be as a result of herd immunity. In contrast an Ethiopian study observed that infection was more common among the older children [4]. Ideally, no HBsAg would have been detected if the immunization up take was perfect. Some of the children whose parents/guardians admitted their having been vaccinated still had detectable HBsAg. It is therefore very possible that such children were either not immunized, took incomplete dose of the vaccine or they could be cases of vaccine failure [10].

Coinfection of HIV with HCV was highest among those aged 10 – 13 years (25%). This predominance in older children may be as a result of the long incubation period of the virus [17]. However, its high prevalence among children less than 2 years old might lend credence to vertical transmission. Such was also suggested in a similar study in Tanzania [18].

Gender was also not found to be associated with this viral prevalence although both infections were higher among females than males. The same observation was reported from a study in Ilorin [3] and another among apparently healthy adults [19]. However, a similar study in Owerri reported HBV as higher in males [12]. The reason for this preponderance of infection among females is not obvious especially because at this age, boys and girls are not yet sexually active and they basically are exposed to the same probable risk factors. Moreover those in their early teens were even those with no detectable infections.

This study found that only children that had had a blood transfusion were reactive to HBsAg. They had a high prevalence with respect to blood transfusion as a probable risk factor for infection, likewise presence of scarification although none of these associations was statistically significant. Other researchers have made the same observations in Nigeria [10, 12] Tanzania [18, 20] and Ethiopia [4].

Achieving this level of infection might not be unrelated with the increase awareness on sexually transmitted infections especially HIV and methods of prevention and control. Being that these viruses share modes of transmission with HIV, the improved practices like screening blood and blood products before use and using only

sterile sharp objects for all cultural and medical procedures must have helped in reducing the incidence through blood transfusion and scarification.

5. CONCLUSION

The present study has shown a high burden of HBV (3.0%) and HCV (11.0%) among HIV infected children in the study area although with obscure risk factors which could be suggestive of vertical transmission. Alternatively, it maybe those children have different risk factors from adults especially as a peculiar age group. This burden is a cause for alarm especially as concurrent infection with different infective agents leads to an overlap of their clinical features with a consequent diagnostic dilemma to the treating Physician. This finding underscores the urgent need for more proactive HBV immunization programs and screening of HIV patients for HBV and HCV before and even during antiretroviral therapy. Public enlightenment campaigns against these silent killers should be mounted. Longitudinal studies of larger numbers are recommended to help study some locale-specific risk factors for infection.

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