Retrospective trend analysis of HIV viral load suppression among antiretroviral therapy clients in Bauchi State, Nigeria

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Abstract

The negative effects of HIV have affected all spheres of public lives such as individual health, economy and the employment opportunity globally. The most common way to tackle the disease is the use of Antiretroviral Therapy (ART), this has proved to be an effective way to manage HIV worldwide. The use of ART has substantially suppressed the Human Immunodeficiency Virus (HIV) Viral Load (VL) and reduced the risk of HIV infection. This study evaluates the trends analysis of HIV Viral load suppression among ART Clients in Bauchi State Nigeria for the year 2017. The study used 18 healthcare facilities providing Antiretroviral Therapy (ART) in Bauchi State. The population comprises all people living with HIV/AIDS who are residents in the study area of the 18 healthcare facilities and a convenient sampling method were used. The study found that highest number of viral load suppression existed in Toro General Hospital, even though all the sample health facilities considered in the study recorded viral load suppression. The study also tested for percentage proportion of TB/HIV co-infection among people on ART with suppressed viral loads (1000c/mL) and found that in all the 18 healthcare facilities except Jama'are General Hospital, presumptive TB/HIV co-infection recorded higher proportion compare to active TB/HIV co-infection among people on ART with suppressed viral loads (1000c/mL). The study recommends that for UNAIDS target of 90-90-90 to be achieved to help end the HIV epidemics, aggressive strategies should be put in place to improve adherence to ART by patients and access to viral load monitoring should also be improved in order to detect the patients with risk of HIV.

Introduction

In the last three decades, HIV has impacted negatively on individual health, public health, economy and the employment opportunity in all social and ethnic groups globally. The prevalence of HIV in Nigeria has continued to rise from 1.8% in 1991 to 4.1% in 2010[1] and was estimated at 3.2% in 2014.[2] There is a steady increase in the number of patients initiated on Antiretroviral Therapy (ART) from 90,008 in 2006[3] to an estimated 300,000 in 2012 with a total of 491,021 receiving therapy.[4] Antiretroviral Therapy (ART) has proved to be an effective way to manage HIV. The use of ART has substantially suppressed the Human Immunodeficiency Virus (HIV) Viral Load (VL) and reduced the risk of HIV infection.[5] Clinical trials have shown that ART regimen containing two protease inhibitors, or a protease plus two reverse transcriptase inhibitors have been found to reduce the viral load to unquantifiable levels 200–500 (2.3–2.7 log10) HIV RNA copies/mL plasma in up to 80-90% of patients.[6,7,8] The positive benefits from viral suppression includes reduced morbidity and mortality, improved overall health and quality of life in patients adhering to treatment and keeping appointments.[9,10]

Furthermore, achieving HIV viral load suppression is one of the benefits of ART widespread viral suppression. Moreover, in achieving this objective, ART clients must be consistent and adhere to medication at all times. ART has proved to reduce HIV

transmission,[11] it has also increasingly reduced morbidity and mortality and has been demonstrated to substantially reduce further transmission.[12] This is in line with the UNAIDS HIV epidemic targets for detection, sustained ART, and viral suppression. In addition, UNAIDS set a target of 90-90-90 to help end the HIV epidemics (90% of HIV+ diagnosed, 90% of HIV+ treated, 90% of people on treatment achieving supressed viral load). As a result, by the end of 2015, the number of patients receiving ART increased substantially and was estimated at more than 15.8 million people.[13]

However, the World Health Organization (WHO) estimated that about 36.7 million people worldwide were living with HIV at the end of year 2015, with Africa as the most affected region in the world with 70% of the affected persons with HIV burden leaving in the region.[14] On the basis of this, Nigeria having occupy a strategic position in Africa and stood as the giant in the region is also affected, this reason also informed the basis of carrying out the research. Efforts have been made to reverse and tackle the HIV pandemic both by the Millennium Development Goal (MDG) and the WHO, these organizations called for an unprecedented mobilization to halt and reverse the AIDS epidemic all over the globe, for example WHO guidelines for HIV care recommend viral load monitoring at 6 months since ART initiation, at 12 months and then every 12 months.[4,15] The switch to 2nd line ART is recommended if the confirmed viral load exceeds the threshold of 1000 copies/ML. Although, this is still not widely available in routine care service, viral load monitoring is preferred to CD4 count monitoring for the follow-up of HIV patients. However, with the increase in the diseases, researchers challenge the effectiveness of ART, therefore, this study finds it significant to examine the trend analysis of viral load suppression among ART clients in Bauchi State for the year 2017. It is imperative to reduce viral suppression, supporting this, Stadeli and Richman (2013) stated that reducing viral load is critical for achieving durable viral suppression and preventing drug resistance.[16] Similarly, UNAIDS set goal to achieve 73% HIV epidemic targets for detection, sustained ART and overall community viral suppression by the year 2020.

Moreover, in Bauchi State, patients who exhibit HIV positive have been receiving ART for over 15 years through the Federal Government policy on access to ART, yet still there is paucity of data on the virological response to the common ART regimen being used by the patients and the factors associated with non-suppression of viral load in the State, some of the factors attributed to this includes previous ART, poor adherence to treatment regimen and high baseline viral load prevent the suppression of the viral RNA to an undetectable level. Corroborating this, studies have stated that despite increasing availability of Antiretroviral (ARV) drugs, the genetic diversity, Previous antiviral therapy, poor adherence to treatment regimen and high baseline viral load posed a challenge to global management of HIV infection.[17-19] Though the use of ART proved highly effective yet treatment failure remains a common occurrence among patients in Nigeria.

In addition, Udeze, Olaleye and Odaibo (2020)[2] also mentioned that since the commencement of ART program in Nigeria in 2001, government has collaborated with some donor agencies such as Global Fund to Fight AIDS, Tuberculosis, and Malaria and US President's Emergency Plan for AIDS Relief (PEPFAR) to scale up its ART clinics, also subsequently revision of the treatment guidelines by WHO first in the year 2010, 2013 and recently in 2016 initiation of ART for infected individuals is now recommended in the country. This study pooled data from the healthcare facilities operating in Bauchi State that attend HIV patients, the findings from this study will help in the implementation of public health policy in order to address the burden of HIV/AIDS in Nigeria. The information obtained from the study would be useful in improving the general wellbeing of the patients living with HIV/AIDS epidemic in the Bauchi State as it is obvious public health benefits from suppressed community viral load by the use of ART. We conducted a population study in Bauchi State Approved Health Care Facilities that attends HIV positive patients. The study evaluates viral load suppression among people living with HIV/AIDS accessing care in the 31 healthcare facilities in Bauchi state, Nigeria; however, we extracted data from the 18 healthcare facilities due to the inadequate records of the 13 remaining healthcare facilities. Therefore, it is against this backdrop that the study evaluates trends analysis of HIV Viral load suppression among ART Clients in Bauchi State Nigeria for the year 2017.

Materials and Methods

Study area and data collection

The study area was Bauchi State Nigeria. The State health system is in line with the National health policy (2016), which places the State ministry of health at the central to coordinate all health sector activities and to provide strategic leadership and direction, and policy framework on health matters for Public and Private health sector. The state health system was decentralized for effective implementation namely State ministry of health Headquarter, Bauchi State Agency for the Control of HIV/AIDS, TB, Leprosy and Malaria, Health Management Board, Drug Medical Consumable Agency (DMMA), Bauchi State Environmental Protection Agency (BASEPA), while the State Primary health care development agency (SPHCDA) is saddled with service delivery, the implementation of health services at the service delivery points in both urban and rural areas down to the grass root community health system. The LGAs PHC departments supervise the activities of the grassroots and health facilities.

The study is a retrospective survey of the records of pregnant women accessing comprehensive Antenatal Care Services (ANC) including those living with HIV in Bauchi State, Nigeria. The report analyses 70 facilities, which comprised of public and private facilities consisting of primary, secondary and tertiary facilities providing comprehensive HIV/AIDS care services across the state was assessed. Data obtained from Bauchi State Agency for the Control of HIV, Malaria, Tuberculosis and Leprosy Bauchi ranged from July 2017 to June 2018, a period of 12 months.

Study population

Study population consisted of pregnant women living with HIV and attending antenatal care services in both public and private health facilities providing HIV/AIDS services in Bauchi State.

Study design

It is a cross sectional, quantitative study design involving the review of secondary data collated monthly from public and private health facilities providing comprehensive HIV care. The study examine data collated from reporting health facilities comprised of primary, secondary and tertiary facilities in government owned and private facilities. The study reviewed data on Hepatitis B Virus (HBV) and/or Hepatitis C Virus (HCV) co-infection among HIV positive pregnant women in Bauchi State. Information gathered in each facility included; availability of data in each facility within the study period; July 2017 to June 2018 (One Year data). Total number of pregnant women tested for HIV and received test result (CTRR) and number tested positive, total number of new ANC

attendee tested for HBV and number tested positive, number of new ANC attendee tested for HCV and number tested positive. Also, number of new ANC attendee coinfected with HIV-HBV and HIV-HBC.

Prevalence study of HIV-HCB, HIV-HBV co-infections

The prevalence of HIV with HBV or HCV co-infections among the ANC attendees in each health facility was determined using the method described in the report of Center for Disease Control and Prevention (2012) as; Prevalence of disease = (All new and pre-existing cases during a given time / Population during the same time period) x 100. Categorisation of endemicity of HBV and HCV infection was conducted by the method described by Wasley and Alter (2000), Perz et al. (2004) and Alter (2006) as high (prevalence ≥3%) moderate (prevalence 2–2.9%), low (prevalence 1.0–1.9%), and very low (prevalence <1.0%).

Data analysis

All data were statistically analyzed using simple excel and Statistical package for social sciences (SPSS, Version 20.0). P value <0.05 was considered statistically significant. Categorical variables were compared using chi-squared test, while paired -test was used for comparing continuous variables. Pearson's correlation coefficient was used to see the degree of correlation between continuous variables.

Ethical consideration

Research protocol was submitted to Bauchi State health research ethics committee, it was reviewed and expedited approval was given since it involved secondary analysis of an already existing data.

Results

From the data obtained, GH Darazo had the highest record of 14.21%, this was followed by Urban Maternity with 5.54% and Azare General Hospital with 5.52% as shown in Figure 1 below. However, the least records of percentage were in General Hospital Ningi with (0.24%) and Bayara Infectious Disease Hospital with (1.01%) of viral load assessment (Figure 1).

Moreover, Toro General Hospital records the highest number of viral load suppression of (85.3%), this closely followed by the General Hospital Alkaleri with (78.6%) and Azare General Hospital with (78%) as shown in Figure 2 below. Other healthcare facilities in the study also recorded more than half of people assessed with suppressed viral loads for instance Tafawa-Balewa General Hospital and urban maternity Bauchi both with the proportion of 53.1% and 59.0 respectively (Figure 2).

Meanwhile, Figure 3 shows percentage proportion of TB/HIV co infection among people on ART with suppressed viral loads (1000c/mL).

Nevertheless, Table 1 below shows the correlation analysis indicating the relationships among facility types, facility categories and Local Government Area (LGA) of the facilities, with their records of viral load and TB/HIV co-infection showing that proportion of HIV patients with suppressed viral loads is positively correlated at 37% (r = 0.371).
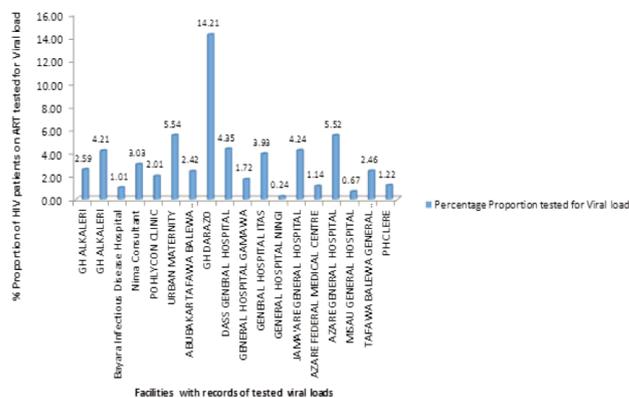

Figure 1. Proportion of people living with HIV on ART tested for viral load suppression in the 31 healthcare facilities in Bauchi State.
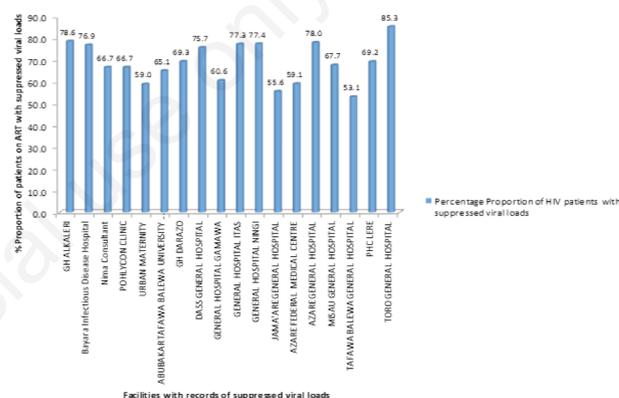

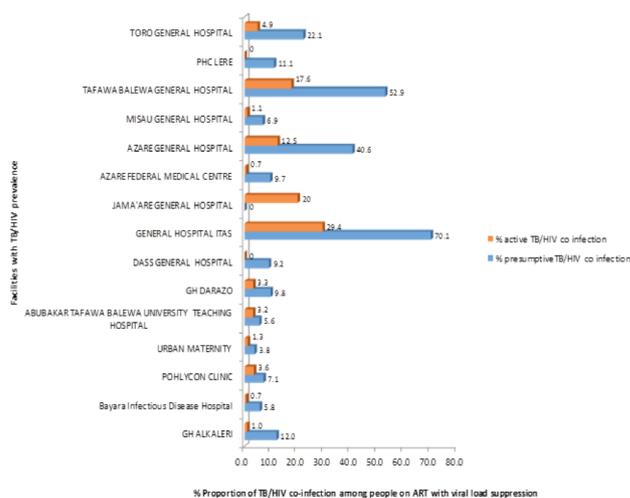**Figure 2. Percentage proportion of people living with HIV on ART with suppressed viral loads.**

Figure 3. Percentage of proportion of TB/HIV co-infection among people on ART with suppressed viral loads (1000c/mL).

Discussion

Studies have discovered that viral load suppression can be achieved within 3 to 6 months of initiation of therapy.[20,21] For instance, the study of O'Connor *et al.* (2017) reported on the durability of viral suppression on ART in a large unit of HIV patients from the United Kingdom and found that there were extremely low rates of viral rebound in those that are virally suppressed for a long-term and suggested that many people on ART will not have viral rebound over their lifetime. They also found that there was durable viral load suppression after 9 months of ART initiation, which indicated patients' adherence to well tolerated and highly effective ART regimen.[21] Based on the data gathered in this study, viral load suppression was evaluated among people living with HIV/AIDS accessing healthcare in the approved 31 healthcare facilities within Bauchi State, Nigeria. However, out of the 31 healthcare facilities, only 18 showed adequate records namely; GH Alkaleri, Bayara infectious Diseases hospital, Niima Consultant Clinics, Phylycon Clinic, Urban Maternity, ATBU Teaching Hopital, General Hospital Darazo, Dass General Hospital, General Hospital Gamawa, General Hospital Itas, General Hospital Ningi, Jamaare General Hospital, Azare General Hospital, Misau General hospital, Tafawa-Balewa General Hospital, Primary Healthcare Lere, and Toro General Hospital (Figure 1). In addition, the facilities with records of viral load assessments, variations in the proportion of HIV patients with suppressed viral loads exists in relation to the total number assessed for the viral loads.

In all the 18 healthcare facilities evaluated in this study except Jama' are General Hospital, presumptive TB/HIV co-infection recorded higher proportion compare to active TB/HIV co-infection among people on ART with suppressed viral loads (1000c/mL). General Hospital Itas showed the highest record of active viral load of (29.4%) and presumptive (70.1%) TB/HIV co-infections. This is followed by Tafawa-Balewa General Hospital with (17.6%, 52.9%) and Azare General with (12.5%, 40.6%).

However, other healthcare facilities show lower proportions. Although, PHC Lere and Dass General Hospital recorded 0% active TB/HIV respectively with the 11.1% and 9.2% presumptive TB/HIV and Jama' are General Hospital showed 20% active TB/HIV but 0% presumptive TB/HIV cases (Figure 3).

Furthermore, a study shows that viral load monitoring did not improve survival over CD4 monitoring over 5 years of ART but can improve immunological response, reduce the time spent on a failing regimen and prevent unnecessary switches to second-line ART. In addition, they also found that there was continuous close correlation between HIV persistence and immune activation during consistently suppressive therapy.[22] In this study, however, the correlation analysis shows relationships among facility types, facility categories and Local Government Area (LGA) of the facilities, with their records of viral load and TB/HIV co-infection showed that proportion of HIV patients with suppressed viral loads is positively correlated at 37% (r = 0.371), this is correlated with the proportion of active TB/HIV co-infections at p<0.05 which implies that the result is significant. Meanwhile, the relationship between proportion of presumptive TB/HIV and proportion of active TB/HIV co-infections is also highly significant at (r=0.725) with p-value of p<0.01 which shows significant at 5%. However, associations among the LGA, facility type and facility category did not show significant correlation levels with the subjects under consideration (Table 1).

Similarly, a study done in the USA reported that viral load suppression could be associated with racial differences in ART responses from the data obtained as there was 40% higher risk of virological failure in black subjects as compared to the white subjects.[23] However, they emphasized it could be as a result of the subject's duration of HIV infection before diagnosis, missed clinic visits, ART adherence, socioeconomic factors, access to health care and drug availability. From the foregoing we understood that studies have been conducted in different settings with different aims and objectives and they reported different outcomes of the viral load. Nonetheless, viral load suppression can be achieved by

Table 1. Relationship among facility types, categories and LGA with their record of viral load and TB/HIV co-infection assessments.

Correlation	LGA	Facility type	Facility category	Proportion tested for viral load	Proportion with suppressed viral load	Proportion of presumptive TB/HIV	Proportion of active TB/HIV
Local Government Area (LGA)							
Facility type	0.063						
Facility category	-0.337	0.068					
Proportion tested for viral load	0.088	0.132	-0.79				
Proportion with suppressed viral load	0.093	0.35	0.043	-0.042			
Proportion of presumptive TB/HIV	0.047	0.051	-0.07	-0.039	0.236		
Proportion of active TB/HIV co-infection	0.26	0.137	-0.09	-0.105	0.371*	0.725**	1

an intensive earlier retention in HIV care with timely initiation of ART and patient's adherence.[24,25]

Conclusions

The study evaluates the trends analysis of HIV Viral Load Suppression among ART Clients in Bauchi State, Nigeria. Obviously, increasing ART coverage can significantly lower the risk of new HIV infections but this must be commiserated with adhering to ART guidance by the infected individuals. The study was able to bring to notice the virological outcomes of Antiretroviral Therapy among HIV Patients initiated on Antiretroviral treatment between January-December 2017 in Bauchi State, determinants of viral suppression in HIV-infected individuals in Bauchi state and factors associated with Virological non-suppression among HIV-positive patients on Antiretroviral. However, after the analysis of the collected data we found that highest number of viral load suppression exist in Toro General Hospital, even though all the sample health facilities considered in the study records viral load suppression. The study also tests for percentage proportion of TB/HIV co-infection among people on ART with suppressed viral loads (1000c/mL) and found that in all the 18 healthcare facilities evaluated in the study except Jama' are General Hospital, presumptive TB/HIV co-infection recorded higher proportion compare to active TB/HIV co-infection among people on ART with suppressed viral loads (1000 c/mL). Meanwhile, correlation analysis on the relationships among facility types, facility categories and local government area of the facilities, with their records of viral load and TB/HIV co-infection showed that proportion of HIV patients with suppressed viral loads is positive which correlated with active TB/HIV co-infections and the result is significant at $p<0.05$ which is 5%, so also the relationship between proportion of presumptive TB/HIV and proportion of active TB/HIV co-infections is significant at $p<0.01$ which also shows significant at 5%. The study recommends that for UNAIDS target of 90-90-90 to be achieve to help end the HIV epidemics, aggressive strategies should be put in place to improve adherence to ART by patients and access to viral load monitoring should also be improved in order to detect the patients with risk of HIV.

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