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Assessment of treatment outcomes for HIV Positives transitioned from Tenofovir/Lamivudine/Efavirenz to Tenofovir/Lamivudine/Dolutegravir in a Nigerian Tertiary Hospital

Ojo OY[1], Ahmed AK[1], Adeniran A[2,3], Onigbogi OO[4,5], Onigbogi MO[6,7], Alausa KO[1]

[1]*Department of Community Medicine and Primary Care. Federal Medical Centre, Abeokuta, Ogun State. Nigeria.*
[2]*Department of Community Health and Primary Health Care, Faculty of Clinical Sciences, Lagos State University College of Medicine, Ikeja, Nigeria.*
[3]*Department of Community Health and Primary Health Care, Faculty of Clinical Sciences, Lagos State University Teaching Hospital, Ikeja, Nigeria.*
[4]*Department of Family and Preventive Medicine, University of Utah, United States.*
[5]*Department of Community Health and Primary Care, College of Medicine, University of Lagos, Idi Araba, Nigeria.*
[6]*Department of Epidemiology, Human Genetics and Environmental Health Houston Texas, United States.*
[7]*The University of Texas Health Science. School of Public Health Houston Texas, United States.*

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Abstract

Objective: Dolutegravir, an integrase inhibitor replaced nevirapine or efavirenz (both NRTIs) in a fixed dose combination with Tenofovir/Lamivudine, as the preferred first-line option for the prevention and treatment of HIV infection. This study aimed to assess the treatment outcomes of the new Tenofovir/Lamivudine/Dolutegravir (TLD) regimen at the Federal Medical Centre Abeokuta.

Methods: This retrospective study used data drawn from the treatment register of patients who transitioned from Tenofovir/Lamivudine/Efavirenz (TLE) to TLD. Data were analyzed using SPSS v23. Descriptive statistics were used to describe categorical and continuous variables. Statistically significant independent variables in univariate analyses were included in the multivariate model. The level of significance was set at $p<0.05$.

Results: The 358 cases reviewed showed a mean age of 44.29 ± 11.5 years. The majority (267; 74.6%) were females. Viral load suppression (≤1000 copies/ml) was achieved in 313 (87.4%) while on TLE but increased to 339 (94.7%) when transitioned to TLD. Also, 36.3% had a high CD4 count while on TLE, this increased to 67.3%. The mean CD4 counts (428.59±251.85) while using TLE increased exponentially when transitioned to TLD (634.89±244.72) (t-31.601; p-value- 0.001). Before the transition, 90.5% of respondents were at WHO stage 1 compared to 92.5% after the transition to TDF/3TC/DTG.

Conclusion: Treatment outcome was greatly improved in terms of virologic, immunologic and clinical parameters among patients who transitioned from TDF/3TC/EFV to TDF/3TC/DTG. The outcome of this work supports and encourages the use of TDF/3TC/DTG as the preferred first-line regimen in HIV treatment for the patient's maximum clinical benefit.

Keywords: HIV-Positive, Dolutegravir, Transitioned, Treatment-outcome, Nigeria

Correspondence:
Ahmed, AbdulMumin K
Department of Community Medicine and Primary Care,
Federal Medical Centre, Idi-Aba, Abeokuta,
Ogun State. Nigeria.
+2348035756623, abdulmuminahmed070@gmail.com

Plain English Summary
This study aimed to assess the treatment outcomes of the new Tenofovir/Lamivudine/Dolutegravir (TLD) regimen at the Federal Medical Centre Abeokuta. The backbone for Human Immunodeficiency Virus treatment has been the combination t least two two classes of drugs nucleoside (or nucleotide) reverse transcriptase inhibitors (NRTIs) such as tenofovir disoproxil fumarate (TDF), lamivudine (3TC), and emtricitabine (FTC) and a third drug. This study used data drawn from the treatment register of patients who transitioned from Tenofovir/Lamivudine/Efavirenz (TLE) to TLD. A total of 358 cases were reviewed. The mean age was 44.29 ± 11.5 years and the majority 267 (74.6%) were females. Treatment outcome was greatly improved in terms of virologic, immunologic and clinical presentation among patients who transitioned from TDF/3TC/EFV to TDF/3TC/DTG in this study. The outcome of this work supports and encourages the use of TDF/3TC/DTG as the preferred first-line regimen in HIV treatment for the patient's maximum clinical benefit.

Background
The backbone for Human Immunodeficiency Virus treatment has been the combination of at least two nucleoside (or nucleotide) reverse transcriptase inhibitors (NRTIs) such as tenofovir disoproxil fumarate (TDF), lamivudine (3TC), and emtricitabine (FTC) and a third drug from any of the following medication groups: Non-nucleoside reverse transcriptase inhibitors (NNRTIs): nevirapine and efavirenz (EFV); Protease inhibitors (PIs): lopinavir/ritonavir (LPV/r), atazanavir; Integrase strand transfer inhibitors (INSTIs): dolutegravir (DTG), raltegravir (RAL) (1, 2). This combination has been the source of success in antiretroviral treatment because the combination of three drugs allows options for protection against viral division and inhibiting the virus (1, 2, 3). Guidelines on antiretroviral (ARV) drug use in the management of Human Immunodeficiency Virus (HIV)/ Acquired Immune Deficiency Syndrome (AIDS) have evolved since the onset of the HIV pandemic (4). Until recently, TDF/3TC/EFV was the preferred and commonest combination used in most developing countries such as Nigeria. However, in 2016 the World Health Organization (WHO) consolidated the use of ARVs for the prevention and treatment of HIV infection and introduced the use of Tenofovir Disoproxil Fumarate (TDF) or Abacavir (ABC) + Lamivudine (3TC) [or Emtricitabine FTC] + Dolutegravir (DTG) as an alternative first line for patients who are DTG eligible. It acknowledged the clinical and programme advantages of DTG including; improved tolerability, lower potential for drug interactions, shorter time to viral suppression and a higher genetic barrier to resistance (5, 6, 7).
The effectiveness of dolutegravir (DTG) has been demonstrated in several randomized controlled trials conducted among antiretroviral therapy (ART) naïve and experienced patients (8, 9, 10, 11). Among the treatment-naïve patients, DTG was superior to both efavirenz (EFV) and ritonavir-boosted darunavir and equal effect to raltegravir-a twice-daily dosed integrase inhibitor (12). Recent studies on Integrase-based drug combinations have also shown that DTG is a well-tolerated drug, with a lower overall incidence of adverse events (AEs). The most commonly reported adverse effects (AEs) associated with DTG are gastrointestinal symptoms (nausea, vomiting), hypersensitivity skin reactions, and central nervous system effects (insomnia, dizziness) which are most often mild and self-limited. Discontinuation rates observed in clinical trials and programme data were also found to be low (2, 3). Systematic reviews conducted by WHO have shown that DTG-based regimens are better tolerated and tend to be protective against treatment discontinuation due to adverse events following medication when compared with EFV (600) (12). Among stable, virologically suppressed patients on non-nucleoside reverse transcriptase inhibitor (NNRTI) or protease inhibitor-based first-line antiretroviral (ARV) treatments, substitution with a DTG-containing regimen was also well tolerated and non-inferior in maintaining viral suppression, with high rates of satisfaction compared to those remaining on their existing regimen. Furthermore, it is also effective against HIV-2 (which is naturally resistant to NNRTIs) (13, 14, 15). In addition, pharmacokinetic studies have shown that DTG is effective in subpopulations, including pregnant women and tuberculosis (TB) co-infection, with a dose increase of DTG to overcome drug-drug interactions with rifampicin in the latter (16, 17).
Therefore, DTG-containing regimens are now recommended as the preferred first-line antiretroviral therapy (ART) (17). Dolutegravir thus replaced NRTI in 2018 as the first-line therapy alongside two NRTIs and solved the problem of the increase in efavirenz resistance (7). The Fixed Dose Combination (FDC) of Tenofovir/Lamivudine/Dolutegravir (TLD) is also available at a cost affordable to low- and middle-income countries (18). Many of these countries including Nigeria have hence included dolutegravir (DTG) containing

regimens in their national protocols, as the preferred first-line option, particularly the fixed-dose combination (FDC) tenofovir/lamivudine/dolutegravir (TLD) in line with the international best practices (19).
However, there have been few reports on the effectiveness and safety of FDC based on Integrase containing Dolutegravir/Lamivudine/Tenofovir over the initial combination treatment of Tenofovir/Lamivudine/Efavirenz in Nigeria as a country has limited study reports. It is therefore pertinent to assess this transition in drug regimen to improve the knowledge of the safety of DTG, identify the occurrence of side effects of cases and provide feedback for health policy formulation for better care. This study is aimed at assessing the treatment outcomes (virological, immunological, side effects and tolerability) of the dolutegravir combination in PLHIV who were on tenofovir/lamivudine/efavirenz for at least 2 years before being transitioned to TLD according to the new national guideline and have been on it for at least one year to determine associated factors with the treatment outcomes amongst them.

Materials and Methods

Study design

A facility-based retrospective study design of the ART dataset using the electronic medical records of adults who are HIV positive at the clinic and the review of case files of identified patients.

Study setting and population

This study was carried out at the Federal Medical Centre (FMC), Idi-Aba, Abeokuta, a 500-bed tertiary hospital with more than 3000 staff, located in Ogun State, Southwest, Nigeria. The FMC Abeokuta serves as a referral centre, with an ART clinic coordinated by the Department of Community Medicine and Primary Care. At the time of the study, there were an estimated 1,703 patients receiving care at the health centre for HIV/AIDS treatment. This study comprised patients who transitioned from TLE to TLD between January 2016 and January 2018 and had consistently received at least one year of antiretroviral therapy of TLD and were on first-line treatment.

Sampling technique

All patients who met the inclusion criteria for the study and transitioned from TDF/3TC/EFV to TDF/3TC/DTG had their data sought out from the archives and drafted to the study population. This cohort formed the entire sample representatives. The study was between January 2016 to January 2018.

Sample size

The sample size was calculated using the formula for before and after study;
Where:
n = the estimate of the population of clients at FMCA, ART clinic (approx. 1,703 clients).
n = sample size

$$n = \frac{(Z_{1-\alpha/2})^2 p(1-p)}{d^2}$$ (20)

$Z_{1-\alpha/2}$= Standard normal deviate set at 1.96 which corresponds to the 95% confidence interval at 5% type 1 error
p= Expected proportion in population based on previous studies (0.812) (21).
1-p = 1-0.812= 0.188
d= Absolute error or precision, degree of accuracy (0.05)

$$\text{Therefore, } n = \frac{1.96^2 \times 0.812 \times 0.188}{0.05^2}$$

$$= \frac{3.8416 \times 0.812 \times 0.188}{0.0025}$$

$$= \frac{0.5864}{0.0025} = 235$$

To adjust the estimated minimum sample size for non-response.
Ns = n/expected response rate
The expected response rate is 90%
Ns = 235/0.9 = 261
Two hundred and sixty-one (261) respondents was the calculated sample size but three hundred and fifty-eight (358) respondents in total were in transition during the period of study and all were used for the study.

Independent/predictor variables

The independent variables are the socio-demographic age, gender, level of education, religion, residence, employment status, spouse health and participation in health insurance.

Outcome variables/dependent variables

These variables include the time of enrollment, duration on initiation of ART, ART medications taken, acceptability of the medications, any history of discontinuation, WHO clinical staging, other routine medications taken, history of adherence to medications, history of admission, any record of opportunistic infections, any history of side effects, list them and progression of the side effects, virological outcomes, immunological outcome-Viral Load and history of adverse events, is there any that requires treatment interruption, discontinuation and switching to any other.

Data collection tools

Secondary data were extracted from electronic medical records in the clinic dataset with the use of the adapted questionnaire (22) by trained research assistants. Preliminary data were also collected through a review of case files. Both the face and construct validity of the questionnaire were done. Face validity was assessed during the pretest and modifications were made to make the question more understandable. Construct validity was ensured by making an accurate operational definition for each variable. Content validity was ensured through engaging colleagues to have an input in the research work.

Data collection

Demographic variables such as sex, age, education, and occupation of respondents were collected. Data extracted using data extraction format was analyzed using Statistical Package for Social Sciences (SPSS) version 23.0, descriptive data were presented as simple frequencies and percentages. Chi-square was used to test for categorical variables. Logistic regression was used to deal with confounders. The level of significance is set at p≤0.05.

Results

Socio-demographic analysis

Table 1 shows the mean age of 44.29±11.95 years with the modal age group of 40-49 years. The majority 277 (74.6%) of the respondents were women with a greater percentage of the respondents 198 (55.3%) having secondary education. Those in school constituted 16 (4.5%) of the participants, while the majority 229 (64.0%) were employed in various trades. Although Yorubas' 306 (85.5%) remained the predominant ethnic group in the study, other ethnic groups were also represented.

Table 1: Socio-demographic characteristics of respondents.

Variables	Frequency	Percentage (%)
Age		
10-19	11	3.1
20-29	19	5.3
30-39	93	26.0
40-49	124	34.0
50-59	71	19.8
60-69	29	8.1
≥70	11	3.1
Mean ±SD	**44.29±11.5 Years**	
Gender		
Male	91	25.4
Female	267	74.6
Religion		
Christianity	249	69.6
Islam	109	30.4
Marital Status		
Cohabiting	7	2.0
Divorced	4	1.1
Married	277	77.4
Single	64	17.9
Widowed	6	1.7
Highest Educational Status		
No formal education	12	3.4
Primary school education	123	34.4
Secondary school education	198	55.3
Tertiary education	22	6.1
Postgraduate education	3	0.8
Ethnicity		
Yoruba	306	85.5
Hausa	11	3.1
Igbo	19	5.3
Others	22	6.1
Occupation		
Employed	278	77.7
Unemployed	61	17.0
Student	16	4.5
Retired	3	0.8

Outcome variable analysis

Table 2 reveals that all participants 358 (100.0%) who participated in the study were on TDF/3TC/EFV initially, but consented to be transitioned to the new drug combination of TDF/3TC/DTG. During five years of transition, only 43 (12.0%) had a history of discontinuation of medication at any time. Also, 13 (3.8%) of the respondents had various forms of opportunistic infections, hypertension 17 (4.7%) ranked high among participants with co-morbidities while the majority 337 (94.1%) had no co-morbidities. There was a slight improvement in the number of respondents with viral load ≤1000. Three hundred and thirteen (87.4%) of those on the TDF/3TC/EFV combination had viral load ≤1000 compared with 339 (94.7%) when transitioned to the TDF/3TC/DTG drug combination, corresponding to a 7.3% improvement in viral load performance. Figure 1 showed that before transition 90.5% of respondents were at stage-1 WHO classification compared with 92.5% who were at stage-1 after years of transition to TDF/3TC/DTG.

Table 2: Outcome characteristics before and after ART DTG combination transitioned.

Variables	Frequency	Percentage (%)
Acceptability of TLD	358	100.0
History of discontinuation		
Yes	43	12.0
No	315	88.0
History of admission in last 1 year	358	100.0
Any opportunistic infection		
Yes	13	3.8
No	345	96.4
Any Comorbidity		
Catarract	1	0.3
Hypertension	17	4.7
None	337	94.1
Goitre	1	0.3
COPD	2	0.6`
VL before transition (copies/ml)		
≤1000	313	87.4
>1000	45	12.6
VL after transition (copies/ml)		
≤1000	339	94.7
>1000	19	5.3

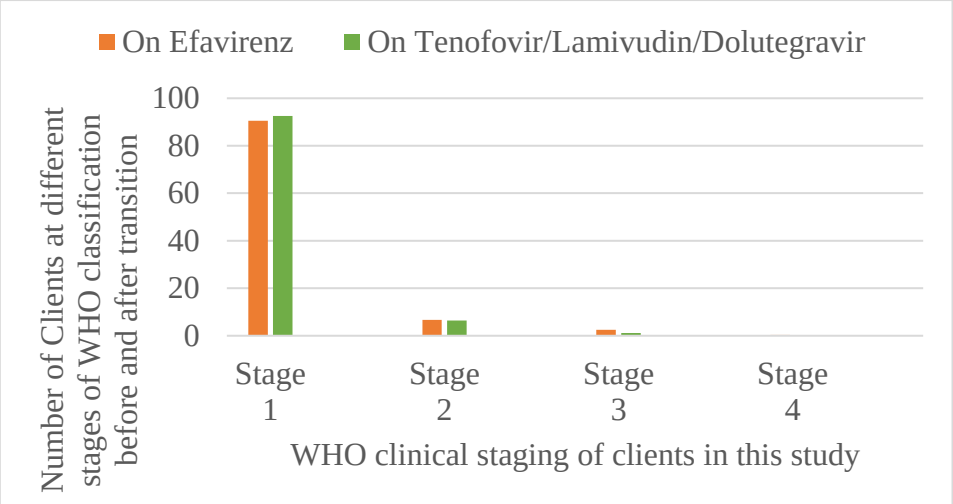

Figure 1: WHO Staging when on Tenofovir/Lamivudine/Efavirenz and then transitioned to the Tenofovir/Lamivudine/Dolutegravir

Table 3 shows most of the participants 295 (82.4%) had good adherence to medication compared with 24 (6.7%) who had poor adherence while on the TDF/3TC/DTG combination. The Majority, 354 (98.9%) of the respondents had no side effects to the

TDF/3TC/DTG combination while the presence of side effects was seen among two patients (0.6%) who complained of body itching, one (0.3%) had tingling sensation and one (0.3%) with skin discolourations. There were more respondents 44 (12.3%) who had unsuppressed viral load with TDF/3TC/EFV drug combination compared with 25 (7.0%) who had unsuppressed viral load with TDF/3TC/DTG drug combination. An improvement in CD4 count was recorded among respondents from 130 (36.3%) in those on TDF/3TC/EFV compared with 241 (67.3%) while on TDF/3TC/DTG drug combination.

Table 3: Outcome variables after the transition to DTG combination therapy

Variables	Frequency n=358	Percentage (%)
History of adherence		
Poor	24	6.7
Fair	39	10.9
Good	295	82.4
History of side effects		
Body itching	2	0.6
Skin discoloration	1	0.3
Tingling sensation (lower limp)	1	0.3
None	354	98.9
CD4 count when on EFV		
Low	76	21.2
Medium	152	42.5
High	130	36.3
CD4 count when on TLD		
Medium	117	32.7
High	241	67.3

Table 4 indicates the Mean ± SD for viral load was 14,450±10,471 while on TDF/3TC/EFV compared with 15,659±13,287 when on TDF/3TC/DTG combination (p-value 0.863). Similarly, the Mean ± SD value for the CD4 count was found to be 428.59±251.85 with TDF/3TC/EFEV compared with 634.89±244.72 when on TDF/3TC/DTG drug combination (p p-value ≤ 0.001).

Table 4- Viral load and CD4 count values with Efavirenz and TLD combination

Variable	Mean ± SD	SE	Paired t-test	p-value
VL when on EFV combination	14450±10471	5534.32		
VL when on TLD combination	15659±13287	7022.40	0.173	0.863
CD4 count when on EFV combination	428.59±251.85	13.31	31.601	0.001*
D4 count when on TLD	634.89±244.72	12.93		

*Statistically significant.

Univariate variable analysis

In Table 5, the logistic regression of independent socio-demographic variables of the respondents showed a positive association with viral load suppression at all thematic areas, with only gender being statistically significant (χ^2 –=3.014, α=0.03). However, the age group 41-50 years had a greater viral load suppression effect compared to all other age groups though not statistically significant (χ^2-6.864, α-0.143).

Table 5- Association of Socio-demographic characteristics and Outcome variables

Socio-demographic characteristics	VL categories			df	Chi-square value	p-value
	Suppressed	Unsuppressed	Total			
Age categories						
≤30	20	1	21			
31-40	97	6	103	4	6.864	0.143
41-50	114	8	122			
51-60	66	3	69			

>60	36	7	43			
Sex						
Male	81	10	91	1	3.014	0.03*
Female	252	15	267			
Marital Status						
Married	256	17	273	1	1.338	0.247
Never Married	72	8	80			
Educational Status						
Primary school	135	6	141			
Secondary school	198	19	217	1	2.665	0.103
Employment status						
Not applicable	74	7	81			
Employee	215	14	229	3		
Student	14	2	16		1.948	0.583
Unemployed	28	1	29			
Ethnicity						
Yoruba	282	23	305			
Hausa	19	0	19	3	2.035	0.991
Igbo	10	1	11			
Others	22	1	23			
Religion						
Christianity	237	13	250	1	4.163	0.041
Islam	95	12	107			

*Denotes significant associations at p<0.05; df = degree of freedom

Multivariate variable analysis

Table 6 shows the association between viral load suppression and other dependent variables. The WHO Stage 1 showed a greater proportion of 306(85.5%) in terms of viral load suppression compared with Stage 2, 20 (5.6%); Stage 3, 6 (0.2%) and Stage 4, 1 (0.3%). This was found to be statistically significant (χ^2-11.643, α-0.009). TLD-drug combination had shown dominance of 306 (85.5%) among viral load-suppressed respondents compared with others on drug combinations 25 (7.0%). This was also statistically significant (χ^2-91.533, α=0.001).

Table 6: Association of Viral Load Suppression and Outcome Variables

Variables	Outcome status			df	Chi-square value	p-value
	Suppressed	Unsuppressed	Total			
WHO Staging						
Stage 1	306 (85.5)	19 (5.3)	325(90.8)		11.643	0.009**
Stage 2	20 (5.6)	3 (0.8)	23 (6.4)			
Stage 3	6 (0.2)	2 (0.6)	8 (2.2)	3		
Stage 4	1 (0.3)	1 (0.3)	2 (0.6)			
Continuation with other combination						
No	308 (86.0)	7 (2.0)	315(88.0)	1	91.533	0.001**
Yes	25 (7.0)	18 (5.0)	43 (12.0)			
History of Adherence						
Fair	38 (10.6)	1 (0.3)	39 (10.9)			
Good	294 (82.1)	1 (0.3)	295(82.4)	2	312.903	0.001**
Poor	1 (0.3)	23 (6.4)	24 (6.7)			
Current ART Combination therapy						
3TC/AZT/ATA/r	1 (0.3)	0(0.0)	1 (0.3)			
TDF/3TC/DTG	331 (92.5)	23 (6.4)	354(98.9)	2	16.656	0.001**
TDF/3TC/ATZ/r	1 (0.3)	2 (0.6)	3 (0.8)			

**Denotes significant associations at p<0.01; df = degree of freedom

Adherence to TLD had also remained a predictor of viral load suppression. The study found those who were adherent 294 (82.1%) were virally suppressed compared to poor drug-compliant respondents who had 1 (0.3%) virally suppressed and was statistically significant (χ^2-312.903, α-0.001). TLD a fixed drug combination therapy had shown to be very efficient in the suppression of viral load in this study with 331 (92.5%) virally suppressed compared with other drug combinations 3TC/AZT/ATA/r, 1 (0.3%) suppressed and TDF/3TC/ATZ/r, 1 (0.3%) virally suppressed. This was also statistically significant. Overall, a good history of medication adherence was shown to be a stronger predictive factor for viral load suppression 294 (82.1%).

Discussion

The Nigeria HIV/AIDS Indicator and Impact Survey (NAIIS) estimated an overall, HIV prevalence among adults in Nigeria to be 1.4%, with an adult respondent of 87.3% aged between 15-49 years (23). In a related study in southern Nigeria (24), it was found that the majority of their respondents 75.5% were within the 25-49 age range compared to a mean age of 44.29 ± 11.5 years among our respondents. Our study also revealed that 77.4% of the respondents are married compared with 57.5% of the national average who were either married or living together. In addition, our study found 55.3% of the respondents with secondary education compared with 41.8% of the national survey who attained secondary education and 3.4% had no formal education (23). Our study showed that the cross-section of the respondents had better education and health-seeking behaviour compared to the national outlook, these again might be responsible for the improved outcome in this study. However, the gaps in the epidemiologic response to HIV infection in Nigeria were due to weak political, legislative, environmental and socio-cultural barriers which can be addressed when efforts are geared towards creating awareness and improvement in the education of the populace in all age groups (24). These gaps over the years

Literature showed that as part of an intensified effort to accelerate HIV epidemic control, the government of Nigeria (GoN) and the President's Emergency Plan for AIDS Relief (PEPFAR) implemented a phased transitioning of clients from efavirenz to dolutegravir-based regimen (25, 26). Other sub-Saharan African countries and Papua New Guinea also keyed into the development of a new guideline based on recommendations released by the World Health Organization (WHO) in its 2013 revised guidance for national programs (27). By January 2017, more than 50,000 people living with HIV in Brazil were taking the regimen of TDF/3TC + DTG in the first line (and another 30, 000 were using DTG-containing regimens in the third line) (28). A World Health Organization (WHO) supported pharmacovigilance system recorded 2% of people on DTG with adverse effects, and nearly all adverse events (89%) were rated as mild [29]. In line with this observation, most adverse effects found in our study were generally mild, supporting the study cited in the Southern American country (29). Our study found that 0.6% of our respondents had body itching, 0.3% complained of skin discolourations and 0.3% of tingling sensation while 98.9% of the respondents had no side effects with the use of TDF/3TC/DTG combination therapy. These adverse effects were not enough to warrant drug discontinuation among the participants, which in our view presents a strong case for the effectiveness of the DTG-based combination therapy.

There was an appreciable improvement in the viral load of the majority of our respondents. We found 87.4% of respondents on the combination of TDF/3TC/EFV had a viral load of ≤1000 copies/ml compared with 94.7% who attained a viral load of ≤1000 copies/ml after being transitioned to TDF/3TC/DTG within the period of study. In a related study amongst key populations in Nigeria (24), seven out of ten participants on TDF/3TC/EFV drug combination were able to achieve transmutable viral load of less than 200 copies/ml, compared with 9 out of 10 clients with VL suppression when on TDF/3TC/DTG. This indicates that TDF/3TC/DTG is more effective in achieving viral suppression [24]. Furthermore, clients on a TDF/3TC/DTG-based regimen showed superior virology suppression despite only being on TDF/3TC/DTG combination for three months when compared to those on TDF/3TC/EFV for a longer period of six months (24). The effectiveness of a DTG-based regimen to achieve viral load suppression and improve clinical condition was again cited in a WHO study carried out in Brazil, where undetectable viral load (<50 copies/mL) were observed among more than 81% in 3-month treatment regimen, reaching 88% at 10–11 months of being on treatment (30). At 12 months of ART initiation, 88% of DTG-based treated individuals presented a viral load <50 copies/mL, compared to 83% with EFV-based regimens (24). We observed similar findings in our study where 93% were able to achieve a

viral load of ≤1000 copies/mL after transition to a DTG-based regimen. Another study reported that viral suppression was also attained faster among those on DTG-based regimens compared to EFV-based regimens; 81% of individuals who started with a DTG-based regimen presented a viral load below 50 copies/mL after 3 months of treatment, compared to 61% for those on an EFV-based regimen (31).

In addition, 3.8% of our respondents had opportunistic infections of various degrees and no emergency hospitalization was reported, this was after being transitioned to DTG-based combination therapy. The highest co-morbidity reported in this study was hypertension with a proportion of 4.7%. These findings correlate well with the discovery of a significant difference between the mean CD4 count of our clients at 428.59±251.85 with TDF/3TC/EFV versus 634.89±244.72 with TDF/3TC/DTG drug combination (t-31.601, p-value- 0.001). The higher mean CD4 count among the transitioned patients might be responsible for the reduced incidence of comorbidity in this study.

Medication adherence is critically important to treatment success and for achieving sustained viral suppression. Viral replication in the presence of sub-optimal doses of ART may lead to the emergence of drug resistance and loss of future treatment options (32). Our study amongst other findings showed that medication adherence was a major factor for viral load suppression, 82.4% of our clients who had a good history of adherence were also virally suppressed compared with 6.7% who were not adherent to their medication and recorded poor viral suppression. Other considerations observed in this study were DTG-based regimens and WHO staging of clinical conditions of patients as they influence viral suppression. We found that clinical manifestation was better with most respondents while on DTF/3TC/EFV (90.5%) compared with (92.5%) after being transitioned to DTF/3TC/DTG at WHO stage 1 and were clinically stable compared with respondents who were in WHO stages 3 and 4 respectively and were also virally suppressed. The improved CD4 counts translate exponentially to better clinical presentation at the clinic, in the same vein the study population showed fewer comorbidity which could be a result of increased immunologic response from the patients.

The observation in this study was supported by a retrospective cohort study carried out in Brazil which analyzed cumulative viraemia under the most frequently used ART regimens, TLD and TLE over 12 months and concluded that cumulative viraemia was lower in clients on TLD compared to those on TLE (30). The outcome of our retrospective descriptive-analytic study supports the WHO's recommendation of a dolutegravir-based regimen as the preferred first-line ART regimen in the management of HIV in achieving viral load suppression faster than any other regimen (25, 26).

Study limitations

Our study showed certain weaknesses or limitations which include the time-line within which the manifestation of viral load suppression and improvement in CD4 counts were achieved. Also, this study made use of secondary data from the archive of clients managed in our facility between January 2016 and January 2018. The study made an inferential analysis of transitioned clients based on records of virological, immunological and clinical evidence of the participants. A future experimental study among control and cases may reveal more insight into the efficacy and effectiveness of the use of DTG-based regimens.

Conclusion

In conclusion, our study has shown better performance and treatment outcomes among the participants who were on TDF/3TC/DTG compared to TDF/3TC/EFV, the observed improvement cut across virologic, immunologic and clinical presentation among patients who transitioned from TDF/3TC/EFV to TDF/3TC/DTG in this study. The outcome of this work supports and encourages the use of TDF/3TC/DTG as the preferred first-line regimen in HIV treatment for the patient's maximum clinical benefit.

This study therefore recommends the continual use of the TDF/3TC/DTG drug combination as the preferred first-line treatment option for better improvement and to help in getting maximum benefit and an improved quality of life.

List of Abbreviations

3TC: Lamivudine
ABC: Abacavir
AIDS: Acquired Immunodeficiency Syndrome
ART: Antiretroviral treatment.
ARV: Antiretroviral
ATA/r: Ritonavir boosted Atazanavir
AZT: Zidovudine
CD4: Cellular Differential-4
COPD: Chronic Obstructive Pulmonary Disease
DTG: Dolutegravir
EFV: Efavirenz

FDC: Fix Dose Combination
FMCA: Federal Medical Centre, Abeokuta
FTC: Emtricitabine
GoN: Government of Nigeria
HIV: Human Immunodeficiency Virus
INSTIs: Integrase Strand Transfer Inhibitors
LPV/r: Ritonavir boosted Lopinavir
NAIIS: Nigeria AIDS Indicator and Impact Survey
NHREC: National Health Research Ethics Committee
NRTI: Nucleoside Reverse Transcriptase Inhibitor
NNRTI: Non-Nucleoside Reverse Transcriptase Inhibitor
PEPFAR: US President's Emergency Plan for AIDS Relief
PI: Protease Inhibitor
RAL: Raltegravir
SPSS: Statistical Package for Social Science
TB: Tuberculosis
TDF: Tenofovir
TLD: Tenofovir/Lamivudine/Dolutegravir
TLE: Tenofovir/Lamivudine/Efavirenz
VL: Viral Load
WHO: World Health Organization

Declarations

Ethics approval and consent to participate

Ethical approval NHREC/00/10/2015 was obtained from the Health Research and Ethics Committee of the Federal Medical Centre, Abeokuta Ogun State. Confidentiality was guaranteed by using numbers rather than names to identify the information extracted from each client. Since participants were not interviewed, there was an assurance that the data collected would be used solely for research purposes and there was feedback of the findings to the participants.

Consent for publication

All the authors gave consent for the publication of the work under the Creative Commons Attribution-Non-Commercial 4.0 license. We otherwise convey all copyright ownership, including all rights incidental thereto, exclusively to the journal when published.

Availability of data and materials

Data generated in this study are contained in this manuscript.

Competing interests

The authors have declared that no competing interests exist.

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Authors' contributions

OOY was responsible for concept, design, data acquisition, data analysis, manuscript draft and revision. AAK was responsible for concept, design, manuscript draft and revision. AA was responsible for concept, design, manuscript revision and editing. OOO was responsible for editing and manuscript review. OMO was responsible for editing and manuscript review. AOK was responsible for editing and manuscript review. All the authors approved the final version of the manuscript.

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