

Original Research Article

Health-related quality of life of HIV-infected patients taking different antiretroviral regimens at a tertiary healthcare facility in northern Nigeria

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Abstract

Purpose: To evaluate the health-related quality of life (HRQoL) of patients taking different antiretroviral regimens.

Methods: A cross-sectional descriptive design was used to evaluate HRQoL of patients on Highly Active Antiretroviral Therapy (HAART) at Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto, Nigeria. Data were collected using HIV/AIDS-Targeted Quality of Life instrument between May and November, 2015 from 872 adult outpatients who had been on their regimen for at least 6 months. Data were statistically analysed.

Results: The overall HRQoL score of the patients was 59.40 ± 18.66 . Among patients on the first-line regimens, those on TDF + FTC + EFZ (60.52 ± 19.17) and those on TDF + 3TC + EFZ (64.41 ± 18.04) reported the best HRQoL scores. The difference between the scores of patients on the two most utilised regimens; AZT + 3TC + NVP (58.14 ± 18.53) and TDF + 3TC + EFZ (64.41 ± 18.04) was significant ($p < 0.05$). Among patients on second-line regimens, those on TDF + FTC + LPVr (67.58 ± 14.80) reported the highest HRQoL score.

Conclusion: Patients in this facility had a moderate HRQoL. TDF + 3TC + EFZ, TDF + FTC + EFZ and TDF + FTC + LPVr were the regimens with the best HRQoL outcomes. The use of these regimens should be encouraged for better patient well-being.

Keywords: HIV, Health-related quality of life, Antiretroviral therapy, First-line antiretroviral regimen, Second-line antiretroviral regimen

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INTRODUCTION

The global epidemic of human immunodeficiency virus (HIV), which affects the human immune system is alarming as the number of people living with HIV/AIDS (PLWHA) continues to

increase annually [1,2]. As at the year 2010, Sub-Saharan Africa was the most heavily affected region with 68 and 66 % of all HIV cases and deaths respectively [3]. Nigeria has the second largest number of PLWHA, after South-Africa, with 3.4 million in 2012 [4].

Even though the annual global incidence and AIDS-related death decrease gradually [1,2], the burden of lifelong antiretroviral therapy (ART) and the chronic nature of this disease could negatively affect the Health-Related Quality of Life (HRQoL) of PLWHA. Thus, antiretroviral (ARV) regimens that would provide the best outcome to the patients is required.

Several studies were conducted on the clinical outcomes of ART with the aim of identifying the best course of managing PLWHA but only few were on the patients' HRQoL (humanistic outcome). Unlike humanistic, the clinical outcomes are important in providing information about treatment progress but not always on patients' wellbeing and prognosis [5,6]. Thus, patients' HRQoL is increasingly preferred as the measure of patients' outcome of therapy [7,8].

Studies comparing the HRQoL outcome of different ARV regimens appear to be few. Although, studies on the QoL of patients on different dosage forms of Lopinavir/ritonavir in monotherapy [9], and that of patients on efavirenz-based regimens, who were previously on Protease inhibitor-based regimens [10] were conducted. Others were on the overall HRQoL of PLWHA receiving ART and the effects of sociodemographic and clinical variables [6,11,12].

Clinical outcomes of different ARV regimens were more studied. Some of those studies reported the superiority of some first-line regimens in terms of improvement, adverse effects or cost effectiveness [13-17].

In this study, the HRQoL of patients taking different ARV regimens was evaluated.

METHODS

Study setting

The study was carried out at Usmanu Danfodiyo University Teaching Hospital, Sokoto (UDUTH). The hospital is a tertiary health facility located in the capital city of Sokoto State, North-western Nigeria. It offers health services to the residents of the State and serves as the referral centre to other states, especially the neighbouring Niger, Kebbi and Zamfara States. According to the health record department of the hospital, as at year 2014, the hospital has 700 beds capacity and an average of 850 daily outpatient attendance. Comprehensive HIV treatment and care services, are offered in the hospital, including HAART.

Study design

A cross-sectional descriptive design was used for the study.

Study population

HIV-infected outpatients attending UDUTH were used for this study.

Included in the study were all HIV positive adults (18 years and above) and have been on their current ART regimen for at least 6 months were included. All patients that could not meet the inclusion criteria or have declined treatment within the last 6 months were excluded for this study.

Data collection instrument

HIV/AIDS-Targeted Quality of Life (HAT-QoL) instrument is a QoL instrument specific to People Leaving with HIV/AIDS. It consists of 34 item stems in nine domains: overall function, health worries, life satisfaction, disclosure worries, financial worries, medication concerns, provider trust, HIV mastery and sexual function.

The questionnaire was developed and validated by Holmes and Shea [18]. Its reliability has further been proven by its successful application in Africa in a study by Greeff *et al* [19] and two studies in Nigeria by Ekott *et al* [20] and Oparah *et al* [11].

Response to the questionnaire items were anchored on a 5-point scale: "All of the time", "A lot of the time", "Some of the time", "A little of the time", and "None of the time", corresponding to 5, 4, 3, 2 and 1 respectively. Negatively worded questions were reversed prior to analysis. The highest score (5) corresponded to best possible HRQoL and the lowest score (1) corresponded to worst possible HRQoL.

Data collection procedure

All patients who gave their consent and attended clinic within the study period were studied. Patients' sociodemographic characteristics, clinical as well as their medication data were collected from their folders using a data collection form. Data on patients' HRQoL were gathered by using the HIV/AIDS- Targeted Quality of Life (HAT-QoL) instrument. A total of 872 outpatients who attended clinic within the period of May and November, 2015 were evaluated.

Ethical considerations

The ethical approval for this study was obtained from the Ethical Committee of the Usmanu Danfodiyo University Teaching Hospital, Sokoto (no. UDUTH/HREC/2014/No.279). The data collection procedure was in accordance with the ethical standards of World Medical Association Declaration of Helsinki [21]. Oral and written consent was obtained from each participant and they were assured of the confidentiality of the information that they would give.

Data analysis

Data coding and scoring

Responses from the questionnaire were coded and entered into a Microsoft Excel spreadsheet 2013 version and then imported into Statistical Product and Service Solutions (SPSS) version 20.0 for analysis. The coding was done in two ways, depending on the nature of the question in the questionnaire. For positively worded questions, "All of the time" to "None of the time" responses were scored 5 to 1 respectively. While for the negatively worded ones, "All of the time" to "None of the time" responses were scored 1 to 5, respectively.

Table 1: Scoring system

Domain	Scoring formula
Overall function:	$OVFXN100 = (100/(30-6)) \times (OVFXN-6)$
Life satisfaction:	$LISAT100 = (100/(20-4)) \times (LISAT-4)$
Health worries:	$HEAWO100 = (100/(20-4)) \times (HEAWO-4)$
Financial worries:	$FINWO100 = (100/(15-3)) \times (FINWO-3)$
Medication worries:	$MEDWO100 = (100/(25-5)) \times (MEDWO-5)$
HIV mastery:	$HIVMA100 = (100/(10-2)) \times (HIVMA-2)$
Disclosure worries:	$DISWO100 = (100/(25-5)) \times (DISWO-5)$
Provider trust:	$PROTR100 = (100/(15-3)) \times (PROTR-3)$
Sexual function:	$SXFXN100 = (100/(10-2)) \times (SXFXN-2)$
Overall HRQoL score	$OVSCOR100 = (100/(170-34)) \times (SXFXN-34)$

All HAT-QoL domains were scored and the final domain score was transformed into a linear 0 to 100 scale where 0 represented the worst score possible and 100 the best score possible. The total score of items, within each domain was used to calculate the domain score (on a 0 to

100 scale). Similarly, the overall domain scores were used to calculate the overall HRQoL score of the patients. The scoring system is shown Table 1.

Finally, the overall HRQoL scores of the patients were classified into "Low HRQoL", "Moderate HRQoL" and "High HRQoL" for patients with "0 to 49.9", "50 to 69.9" and "70 to 100" scores respectively.

Statistical analysis

The sociodemographic and clinical characteristics, the distribution of antiretroviral regimens used as well as HRQoL scores of the population were analysed using descriptive statistics. The difference in the frequency distribution of categorised HRQoL scores and ARV regimens used in the facility was tested using Chi square. Difference between the HRQoL scores of patients taking some ARV regimens used in the facility was tested using Students' T-test. Confidence interval was set at 95 % and level of statistical significance at $p < 0.05$.

RESULTS

Sociodemographic and clinical characteristics of the patients

Among the 872 patients studied (Table 2), 651 (75.9 %) of them were female. On their educational level, those with no formal education 254 (29.8 %) were the highest followed by those with post-secondary education 227 (26.6 %). Most of the patients were married 471 (59.8 %), with less than 250.00 USD earnings per month 590 (91.1 %). On the average, their family size and age were 7.06 ± 5.72 and 35.68 ± 9.41 respectively.

The clinical characteristics of the patient with respect to duration (years) of HIV diagnosis, years on ART and years on the current ART regimen was 5.25 ± 3.07 , 4.93 ± 3.00 and 3.83 ± 2.43 , respectively. Their mean CD4 count and body weight were 458.59 ± 258.3 and 64.30 ± 14.48 , respectively. Predominantly, the patients had greater than 95 % adherence – 425 (84 %) and were on WHO clinical stage one 451 (58.4 %).

About 45.8 % (399 out of 872) of the patients had at least one co-morbidity. The patients mostly suffer from malaria (46.87 %), then body pains (11.78 %), hypertension (10.03 %) and peptic ulcer disease (9.77 %).

Overall HRQoL of patients receiving antiretroviral therapy

The mean overall HRQoL score was 59.4 (table 3). According to the domains, the highest score was observed in the domains of Provider Trust (88.81 ± 19.3), then, Medication Worries (69.40 ± 33.27) and Overall Function (69.28 ± 27.75). The domains of HIV Mastery (61.67 ± 39.98), Life Satisfaction (59.07 ± 15.33) and Sexual Function (55.67 ± 41.17) had the moderate score, while the low scores were observed in the domains of Financial Worries (38.67 ± 22.14), Disclosure Worries (34.75 ± 28.73) and Health Worries (30.36 ± 21.03).

After categorising the overall HRQoL scores, the frequency and percentage of the patients with Low HRQoL, Moderate HRQoL and High HRQoL were, 286 (33.4 %), 282 (32.9 %) and 289 (33.7 %) respectively. Chi-square showed that there was no significant difference between the frequencies of the three categories.

Distribution of WHO-recommended ART regimens used in the facility

The frequency and percentage of each WHO-recommended antiretroviral regimen used in the facility is shown in Table 3. Zidovudine (AZT) + lamivudine (3TC) + nevirapine (NVP) regimen (479) account for 54.9 %, most of the antiretroviral regimen used in the facility. Followed by tenofovir (TDF) + lamivudine (3TC) + efavirenz (EFZ) regimen (212) which account for 24.3%. Among the second-line regimens however, the most common were tenofovir + lamivudine + lopinavir-ritonavir (LPV/r) 27 (3.1 %), followed by tenofovir + lamivudine + atazanavir-ritonavir (ATV/r) 13 (1.5 %) and tenofovir + emtricitabine (FTC) + lopinavir-ritonavir regimen 12 (1.4 %). Abacavir (ABC)-based regimens were only used by five (0.5%) patients. Chi-Square test shows that there was a significant difference in the distribution of the regimens.

HRQoL of patients taking WHO-recommended ART regimen

The result, on Table 3, showed that patients on tenofovir + emtricitabine + lopinavir-ritonavir regimen reported the highest HRQoL (67.58 ± 14.80), followed by the patients on abacavir + lamivudine + nevirapine regimen, having reported 65.40 ± 9.40 score. However, among the two most utilised regimens, zidovudine + lamivudine + nevirapine and tenofovir + lamivudine + efavirenz, patients on the later reported higher HRQoL score of 64.41 ± 18.04

than those on the former whose HRQoL score was 58.14 ± 18.53 . Lowest scores were reported by patients on zidovudine + lamivudine + atazanavir-ritonavir and zidovudine + lamivudine + lopinavir-ritonavir with the HRQoL scores of 46.15 ± 20.66 and 44.11 ± 17.41 respectively. Patients on the other regimens reported moderate HRQoL scores.

The study showed that the difference between the mean overall HRQoL score of the patients on the two most utilised regimens (zidovudine + lamivudine + nevirapine and tenofovir + lamivudine + efavirenz) was statistically significant ($p = 0.0001$) at 95 % confidence interval.

Comparison was made between the domains HRQoL scores of the patients on each regimen. It was observed that there was significance difference in their HRQoL scores. In the two most utilised regimens, patients on tenofovir + lamivudine + efavirenz regimen reported a higher HRQoL score than their counterparts on zidovudine + lamivudine + nevirapine in all the domains except life satisfaction. Patients on tenofovir + emtricitabine + lopinavir-ritonavir, a second-line regimen, were better than patients on other second-line regimens in almost all the domains.

DISCUSSION

The result of this study showed that patients in the facility reported a moderate HRQoL score. Financial Worries, Disclosure Worries and Health Worries were the problems worsening the HRQoL of the patients in this facility. The two most utilised regimens were AZT + 3TC + NVP and TDF + 3TC + EFZ. Patients on the later, just like those on other tenofovir-based regimens reported a significantly better HRQoL scores.

From the findings of this study, the overall HRQoL score of the patients in this facility suggests that patients in this facility were averagely doing well with their therapy. The domain scores were high in Provider Trust, Medication Worries and Overall Function. This could indicate that the patients in this facility do receive a good relationship, care plan and education from their care providers which translates to them having less worries about their medication and thus, having a very good overall function. Cunningham *et al* in US, found that Physical HRQoL domain (in this case, Overall Function domain) was associated with good prognosis of HIV/AIDS [5]. In another study, Physical domain was among the domains having

the highest score [22]. Thus, this finding is consistent with the results of these studies.

Similarly, the findings of Oparah *et al* suggest that the evaluated PLWHA reported good HRQoL in all the domains except the domain of Disclosure Worries [11]. This is unlike the findings of this study where in three domains (Financial Worries, Disclosure Worries, and Health Worries), low HRQoL scores were reported. However, just like their findings low score was also seen in the domain of Disclosure Worries. This could be due to the discrimination among Nigerians leaving with HIV/AIDS. The low score in the domain of Financial Worries could indicate the level of poverty among the patients in this facility. In this study, it was found that 41.7 % of the patients earn less than \$50.00 per month, another 49.4% of them earn between \$50.00 to \$250.00 per month. The poor score in the domain of Health Worries could be the reflection of the psychological effects of the perception of worse health related outcomes normally suffered by PLWHA.

In this facility, it was found out that zidovudine + lamivudine + nevirapine regimen was the most utilised/used regimen, followed by tenofovir + lamivudine + efavirenz, among the first-line regimens. This may be due to their recommendation by WHO as alternative and preferred regimens, respectively [23]. Among the second-line regimens, tenofovir + lamivudine + lopinavir-ritonavir followed by tenofovir + lamivudine + atazanavir-ritonavir and tenofovir + emtricitabine + lopinavir-ritonavir were the most utilised regimens. Since the second-line regimens are reserved for patients that failed the first-line regimen, their distribution may be related to the availability, good health outcome, provider's or patient's preference. Abacavir-based regimen were used by few patients, which may be because the WHO recommended that the regimen should be reserved for patients that may not be able to use the 'preferred' and 'alternative' regimens [23].

From the results, the patients showing the highest HRQoL score were those on tenofovir + emtricitabine + lopinavir-ritonavir, a second-line regimen. This could be preferred when switching patients to second line regimen. Patients on abacavir + lamivudine + nevirapine showed the second highest HRQoL score, but the group was represented by only three patients, hence, it has a very weak statistical power to be recommended as a preferred regimen.

Among the two most utilised regimens in the facility, patients on tenofovir + lamivudine +

efavirenz showed a significantly higher HRQoL score that could suggest that it will be more preferable than zidovudine + lamivudine + nevirapine regimen. It has better HRQoL in all

Table 2: Sociodemographic and HIV-related clinical characteristics of the patients (N = 872)

Variable	Frequency (%)
<i>Gender</i>	
Female	651 (75.9)
Male	207 (24.1)
<i>Level of education</i>	
No formal education	254 (29.8)
Primary education	155 (18.2)
Secondary education	217 (25.4)
Post-secondary education	227 (26.6)
<i>Marital status</i>	
Single	138 (17.5)
Married	471 (59.8)
Widowed	136 (17.3)
Separated	43 (5.5)
<i>Monthly income (USD)</i>	
Less than 50.00	270 (41.7)
>50.00 to 250.00	320 (49.4)
>250.00 to 500.00	40 (6.2)
>500.00	18 (2.8)
<i>Occupation</i>	
Student	96 (15.8)
Self employed	338 (55.8)
Employee	161 (26.6)
Retired	11 (1.8)
<i>Residential arrangement</i>	
Lives alone	42 (5.0)
Lives with family	756 (90.5)
Lives with care-giver	37 (4.5)
<i>Smoking status</i>	
Non-smoker	681 (89.1)
Current smoker	83 (10.9)
<i>Engagement in physical activities</i>	
Do not engage	114 (13.3)
Do engage	741 (86.7)
<i>Current WHO clinical stage</i>	
Stage 1	451 (58.4)
Stage 2	307 (39.8)
Stage 3	13 (1.7)
Stage 4	1 (0.1)
<i>Adherence to ARV medication</i>	
Less than 95%	81 (16)
Greater than 95%	425 (84)
<i>Family size and age of the patients</i>	
Family size	7.06±5.72
Age	35.68±9.41
<i>Years of HIV diagnosis</i>	5.25±3.07
<i>Number of years on ART</i>	4.93±3.00
<i>Number of years on the current ART regimen</i>	3.83±2.43
<i>CD4 count (within the last 3 months) (cells/μl)</i>	458.59±258.3
<i>Current body weight (kg)</i>	64.30±14.48

Table 3: HRQoL overall and domain scores of patients on each antiretroviral regimen used in the facility (N = 872)

Regimen	Frequency (%) ^a	Domain function scores (%)									
		Overall function	Life satisfaction	Health worries	Financial worries	HIV medications	HIV mastery	Disclosure worries	Provider trust	Sexual function	HRQoL Diff Regimen Scores (mean ±SD)
AZT+3TC+NVP	479 (54.9)	66.79	59.47	29.60	37.34	67.11	60.26	33.07	87.82	56.25	58.14±18.53*
AZT+3TC+EFZ	34 (3.9)	69.24	59.71	23.18	34.71	72.00	54.58	30.46	84.31	51.84	56.37±19.80
TDF+3TC+NVP	35 (4.0)	65.79	54.69	35.31	39.84	71.32	68.75	36.52	83.59	62.12	58.33±16.88
TDF+3TC+EFZ	212 (24.3)	76.26	58.84	33.67	42.71	76.84	68.59	42.24	92.30	56.74	64.41±18.04*
TDF+FTC+NVP	8 (0.9)	66.41	57.50	24.38	38.58	74.29	43.75	11.25	86.45	46.88	51.30±19.24
TDF+FTC+EFZ	32 (3.7)	70.43	60.97	34.06	43.57	67.03	49.58	35.31	91.04	41.41	60.52±19.17
AZT+3TC+LPV/r	10 (1.1)	51.40	57.22	22.78	29.19	37.22	34.38	11.67	82.41	40.63	44.11±17.41
TDF+3TC+LPV/r	27 (3.1)	72.44	59.58	23.20	33.35	65.37	54.33	30.00	86.42	61.11	55.56±22.39
TDF+FTC+LPV/r	12 (1.4)	83.33	60.83	34.17	46.63	77.92	77.68	31.25	91.67	55.21	67.58±14.80
AZT+3TC+ATV/r	4 (0.5)	49.98	55.00	22.50	33.37	43.75	37.50	18.75	85.43	34.38	46.15±20.66
TDF+3TC+ATV/r	13 (1.5)	63.15	55.00	23.46	30.39	56.92	63.54	22.50	94.23	53.13	52.09±11.44
TDF+FTC+ATV/r	1 (0.1)	16.70	55.00	25.00	18.80	90.00	100.00	50.00	100.00	0.00	54.40±00.00
ABC+3TC+NVP	3 (0.3)	77.10	32.50	45.00	37.55	52.50	62.50	42.50	83.35	87.50	57.37±19.51
ABC+3TC+EFZ	2 (0.2)	77.10	32.50	45.00	37.55	52.50	62.50	42.50	83.35	87.50	65.45±9.40
HRQoL Domain Scores (Mean ±SD)		69.28±27.75	59.07±15.33		38.67±22.14	69.40±33.27	61.67±39.98	34.75±28.73	88.81±19.30	55.67±41.17	59.40±18.66

*Significant difference in their mean HRQoL scores using independent sample T-test at $p < 0.05$; ^a Significant difference in their frequency using Chi Square test at $p < 0.05$; AZT (Zidovudine), 3TC (Lamivudine), NVP (Nevirapine), EFZ (Efavirenz), TDF (Tenofovir), FTC (Emtricitabine), LPV/r (Lopinavir/Ritonavir), ATV/r (Atazanavir/Ritonavir), ABC (Abacavir)

the domains except the domain of Life Satisfaction. Its higher score in the domain of HIV medication may be, in addition to other possible reasons, related to its once daily dosing, hence preferred by patients.

WHO recommended that the preferred first-line antiretroviral regimen for adults (including pregnant and breastfeeding women and people with TB and HBV co-infection) is tenofovir + lamivudine (or emtricitabine) + efavirenz. Furthermore, the recommended alternative regimen is zidovudine + lamivudine + efavirenz (or nevirapine) or tenofovir + lamivudine (or emtricitabine) + nevirapine [23]. The recommendation is due to some clinical evidence with the aim of simplifying the regimens, preferably to once daily dosing and reducing the number of preferred regimens. These would provide a clinical, operational and programmatic benefits. This recommendation, according to WHO, is strong but with moderate-quality evidence. The finding of this study is in line with the WHO recommendation and could add to its moderate-quality evidence for their recommendation.

Another first-line regimen that is preferred by the WHO is tenofovir + emtricitabine + efavirenz which also was, according to this study, associated with higher HRQoL score than the score of patients on other alternative first-line regimens. The difference offered by this regimen compared to other alternative regimens was not statistically significant, which was due to its smaller sample size [24], but clinically significant, because the difference might matter a lot to patients [24,25].

Moreover, with the exception of abacavir-based regimen (that has weak number for statistical comparison with other regimens), only the patients on Tenofovir-based regimen had up to 60.0 of the overall HRQoL score which could indicate the possibility of tenofovir-based regimens being the better regimens.

Similar studies that evaluated the HRQoL of patients taking different ARV regimens appear to be rare. Campo *et al* observed that Efavirenz-based ARV regimens improves QoL, treatment satisfaction and adherence with low rates of virological failure in virologically suppressed patients taking protease inhibitor-based regimens [10]. In this study, out of the 6 groups patients each on different protease inhibitor-based regimens, only those on tenofovir + emtricitabine + lopinavir-ritonavir reported a higher HRQoL

than any of the 3 groups of patients on different efavirenz-based regimen.

In some studies, however, clinical outcomes of patients on some ART were studied. Some of the findings are similar to those reported here despite the difference in the outcome parameters. In a systematic review and meta-analysis, it was reported that nevirapine-based regimens were associated with more adverse effects and treatment discontinuation than efavirenz-based regimens [16]. Similarly, efavirenz-based regimens were reported to be less likely to cause virologic failure compared to nevirapine-based regimens [17]. This might be an additional reason why the WHO consider nevirapine among the combinations for alternative regimen. This could also be the reason why in this study, only the patients on one Efavirenz-based regimen (zidovudine + lamivudine + efavirenz) reported a HRQoL score that is lower than that of some patients on nevirapine-based regimens. However, all patients on other efavirenz-based regimens reported higher scores.

In addition to better outcomes of efavirenz-based regimens, other studies reported a better outcomes of tenofovir-based regimens compared to that of other first-line ARV regimens. Patients on tenofovir were reported to have better improvement in survival and cost-effectiveness than those patients on stavudine and zidovudine [13]. Amoroso, *et al.* found out that patients on tenofovir + lamivudine (or emtricitabine) + efavirenz were better in terms of clinical outcomes than those on tenofovir + lamivudine (or emtricitabine) + nevirapine or others on zidovudine + lamivudine + nevirapine (or efavirenz) [15]. On the contrary, patients on tenofovir + emtricitabine/lamivudine + nevirapine were found to be associated with higher mortality compared to those on zidovudine + lamivudine + nevirapine although this finding was not consistent across sensitivity analyses [14].

The findings of most other studies discussed indicated the superiority of Tenofovir- and Efavirenz-based first-line antiretroviral regimens. These findings, just as observed in this study and recommended by WHO, could suggest that tenofovir + lamivudine (or emtricitabine) + efavirenz regimens are the preferred first-line antiretroviral regimens.

Limitations of the study

The HRQoL outcome of patients over time was not evaluated in this study, because the study

was cross-sectional. A longitudinal survey could have taken care of that.

Also, convenient sampling technique was used in this study, randomisation of patients would have been better.

CONCLUSION

Patients taking different ARV regimen in this facility reported a moderate HRQoL. The HRQoL scores in aspects of provider trust and medication worries were low. Zidovudine + lamivudine + nevirapine and tenofovir + lamivudine + efavirenz regimens were the most utilised regimen in the facility. Among patients on first-line regimens, those on tenofovir + lamivudine + efavirenz, followed by tenofovir + emtricitabine + efavirenz reported the highest HRQoL. On the other hand, among patients on second-line regimens, those on tenofovir + emtricitabine + lopinavir-ritonavir reported the best HRQoL outcomes. This finding could guide the choice of clinicians and other decision makers in selecting antiretroviral regimen for their clients' optimal benefit.

DECLARATIONS

Conflict of Interest

No conflict of interest associated with this work.

Contribution of Authors

We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. All authors listed herein have contributed significantly to the publication.

REFERENCES

- UNAIDS. *UNAIDS report on the global AIDS epidemic 2010*. Geneva: Joint United Nations Programme on HIV/AIDS. 2010; Report No.: JC1958E.
- UNAIDS. *The 2013 report on the global AIDS epidemic*. Geneva: Joint United Nations Programme on HIV and AIDS. 2013; Report No.: 978-92-9253-032-7.
- UNAIDS. *UNAIDS world AIDS day report*. Geneva: Joint United Nations Programme on HIV/AIDS. 2011; Report No.: 978-92-9173-904-2 / JC2216E.
- UNAIDS Nigeria. *Nigeria HIV/AIDS estimate 2012*. [Online]. [cited 2014 Jul 17]. Available from: <http://www.unaids.org/en/regionscountries/countries/nigeria/>.
- Cunningham WE, Crystal S, Bozzette S, Hays RD. *The association of health-related quality of life with survival among persons with HIV infection in the United States*. *J Gen Intern Med*. 2005; 20: 21-27. DOI: 10.1111/j.1525-1497.2005.30402.x
- Tran BX. *Quality of life outcomes of antiretroviral treatment for HIV/AIDS patients in Vietnam*. *PLoS ONE*. 2012; 7(7): e41062. DOI: 10.1371/journal.pone.0041062
- Hinshaw AS. *Patient outcomes research: examining the effectiveness of nursing practice*. In *Patient outcome research conference*; Washington DC: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, 1992.
- Burns N, Grove SK. *Understanding nursing research: building an evidence-based practice*. 4th ed. Philadelphia: Elsevier, Saunders; 2007.
- Yeh RF, Lipman BA, Mayberry C, Miguel B, Nemecek JJ, Gathe Jr JC. *Lopinavir/ritonavir dosage form affects quality of life during monotherapy in HIV-positive adults*. *JIA PAC*. 2010; 9(5): 273-727. DOI: 10.1177/1545109710374997
- Campo RE, Cohen C, Grimm K, Shangguan T, Maa J, Seekins D. *Switch from protease inhibitor- to efavirenz-based antiretroviral therapy improves quality of life, treatment satisfaction and adherence with low rates of virological failure in virologically suppressed patients*. *Int J STD AIDS*. 2010; 21(3): 166-171. DOI: 10.1258/ijsa.2009.008487
- Oparah AC, Soni JS, Arinze HI, Chiazor IE. *Patient-reported quality of life during antiretroviral therapy in a Nigerian hospital*. *Value Health Reg Issues*. 2013; 2(2): 254-258. DOI: 10.1016/j.vhri.2013.07.004
- Jin Y, Liu Z, Wang X, Liu H, Ding G, Su Y, Zhu L, Wang N. *A systematic review of cohort studies of the quality of life in HIV/AIDS patients after antiretroviral therapy*. *Int J STD AIDS*. 2014; 25(11): 771-777. DOI: 10.1177/0956462414525769
- Bender MA, Kumarasamy N, Mayer H, Wang B, Walensky RP, Flanigan T, Schackman BR, Scott CA, Lu Z. *Cost-effectiveness of tenofovir as first-line antiretroviral therapy in India*. *Clin Infect Dis*. 2010; 50(3): 416-425. DOI: 10.1086/649884
- Chi BH, Mwango A, Giganti MJ, Sikazwe I, Moyo C, Schuttner L, Mulenga LB, Bolton-Moore C, Chintu NT, Sheneberger R, et al. *Comparative outcomes of tenofovir- and zidovudine-based antiretroviral therapy regimens in Lusaka, Zambia*. *Acquir Immune Defic Syndr*. 2011; 58(5): 475-481. DOI: 10.1097/qai.0b013e31823058a3
- Amoroso A, Etienne-Mesubi M, Edozien A, Ojoo S, Sheneberger R, Obiefune M, Hossain M B, Stafford K, Redfield RR. *Treatment outcomes of recommended first-line antiretroviral regimens in resource-limited clinics*. *J Acquir Immune Defic Syndr*. 2012; 60(3): 314-320. DOI: 10.1097/qai.0b013e31824e5256
- Shubber Z, Calmy A, Andrieux-Meyer I, Vitoria M, Renaud-Thery F, Shaffer N, Hargreaves S, Mills EJ, Ford N. *Adverse events associated with nevirapine and efavirenz-based first-line antiretroviral therapy: a*

- systematic review and meta-analysis. *AIDS*. 2013; 27(9): 1403-1412. DOI: 10.1097/qad.0b013e32835f1db0
17. Pillay P, Ford N, Shubber Z, Ferrand RA. Outcomes for Efavirenz versus Nevirapine-containing regimens for treatment of HIV-1 Infection: a systematic review and meta-analysis. *PLoS ONE*. 2013; 8(7): e68995. DOI: 10.1371/journal.pone.0068995
 18. Holmes WC, Shea JA. A new HIV/AIDS-targeted quality of life (HAT-QoL) instrument: development, reliability, and validity. *Med Care*. 1998; 36: 138-154. DOI: 10.1097/00005650-199802000-00004
 19. Greeff M, Uys LR, Wantland D, Makoe L. Perceived HIV stigma and life satisfaction among persons living with HIV infection in five African countries: a longitudinal study. *Int J Nurs Stud* 2009; (NS-1559:12).
 20. Ekott FA, Basseyy JU, Etukumana AE. Quality of life in people living with HIV/AIDS in Niger Delta Region, Nigeria. *J Ment Health*. 2010; 19: 211-218.
 21. World Medical Association. World medical association declaration of Helsinki. *Bull world Heal Organ [Internet]*. 2001; 79(4): 373-374. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2566407&tool=pmcentrez&rendertype=abstract>
 22. Folasire F, Irabor AE, Folasire AM. Quality of life of People living with HIV and AIDS attending the antiretroviral clinic, university college hospital, Nigeria. *Afr J Prm Health Care Fam Med*. 2012; 4(1): 294-302. DOI: 10.4102/phcfm.v4i1.294
 23. WHO. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach. Geneva, Switzerland: World Health Organisation, Department of HIV/AIDS 2013. Report No.: 978 92 4 150572 7.
 24. McGlothlin AE, Lewis RJ. Minimal clinically important difference: defining what really matters to patients. *JAMA*. 2014; 312(13): 1342-1343. DOI: 10.1001/jama.2014.13128
 25. Jaeschke R, Singer J, Guyatt G. Measurement of health status: ascertaining the minimally clinically important difference. *Control Clin Trials*. 1989; 10(4): 407-415.