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Review Article

Associated factors and virologic outcomes of cisgender groups among people living with HIV/AIDS attending a tertiary health facility in Rivers State, Nigeria

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ABSTRACT

Virologic outcome is the assessment of an human immuno-deficiency virus (HIV)-positive patient response antiretroviral therapy adherence using real-time polymerase chain reaction assays after two consecutive viral load measurements ≥3 months apart. This study aimed to assess the associated factors of virologic outcomes among cisgender groups of people living with HIV/AIDS attending a tertiary health facility in Rivers State, Nigeria. This comparative cross-sectional study was conducted at the antiretroviral therapy clinic of the University of Port Harcourt Teaching Hospital from September 2020 to November 2020. The systematic sampling technique was employed to select 1600 participants; females (800), and males (800). Data was collected using a 3-item structured interviewer-administered questionnaire. Statistical package for social science (SPSS) version-25 was used to analyze data. Test of association was done using Chi-square, Fisher's exact and spearman rho test and set at a significance level of $p<0.05$ and 95% CI. Confounding variables were controlled using multiple logistic regression analysis. A total of 1600 participants; males (800), and females (800) were recruited. The study reported a mean age and standard deviation: male (44.53±10.50), female (40.58±9.34); virologic suppression levels; male (89.5%), female (89.6%). Having a treatment supporter (aOR=0.382; 95% CI=0.206-0.707; p=0.002) among the female gender was influenced by virologic outcome. The cisgender female group had slightly better virologic outcomes as opposed to the cisgender male group and this was significantly influenced by having a treatment supporter. Therefore, PLWHA should make personal efforts to participate in adherence counselling sessions and other HIV/AIDS support services offered at the ARV therapy clinics.

Keywords: Associated factors, Virologic outcomes, Cisgender groups, People living with HIV/AIDS

INTRODUCTION

Universally, the human rights of women are violated every day as several women are dependent on their male spouses/partners for their livelihood as a result of poverty, inequalities of wealth, low female empowerment, and poor decision-making power.[1,2] The economically disadvantaged female gender, are less likely to negotiate safe sex and take charge of their sexuality, but more likely to engage in risky sexual behaviours, and encounter diverse barriers to HIV/AIDS treatment, care and support compared to their male counterparts.[3-5] These findings are not farfetched from the fact that gender which is defined as a society's shared belief in the socio-cultural,

psychological and behavioural traits that distinguish males from females plays a crucial role which is implicated in defining the disparities in the management of HIV/AIDS.[6-8] Even though, statistics have shown that access, adherence and virologic outcome of people living with HIV/AIDS (PLWHA) is higher in the female gender compared to their male counterpart; these disparities as reported in previous studies may be tantamount to the fact that the study participants were mostly females, knowing that the prevalence of HIV/AIDS is almost twice higher among adult females than males.[9-11] However, the factors associated with the virologic outcome of HIV-positive patients are dynamic with interventions that enhance retention in treatment, care and support regardless of where they access care.[12,13] These factors can be broadly categorized into; socio-demographic, socio-cultural, socio-economic, psycho-social and HIV-support services.[14,15] Moreover, the negative influences of these factors in the absence of good family and social support predispose HIV-infected patients on management to stigmatization or/and discrimination with resultant poor virologic outcomes.[14,16] Hence, assessing how these factors influence virologic outcomes will improve the quality of healthcare services and retention in care for PLWHA within treatment centres and community-based pharmacies.[17,18]

The virologic outcome of HIV-infected persons is one of the various ways of measuring adherence to HIV/AIDS management. Monitoring adherence to antiretroviral therapy (ART) is essentially dependent on; clinical, immunologic, and virologic outcome.[19,20] This can be influenced by the diverse socio-cultural (non-disclosure of HIV status, stigmatization/discrimination), psychosocial (depression, alcohol and substance abuse) and economic barriers that PLWHA encounter in the course of their management.[3,5] However, these factors, predominant among the female gender as opposed to their male counterparts, can be addressed by improving retention in care through; HIV support services, community pharmacy, and adherence counselling.[17,21] Although, adherence to ART which is defined as the ability of an HIV-positive patient to consistently and accurately take prescribed highly active antiretroviral therapy (HAART) approximately at the same time according to the treatment plan in order to achieve virologic suppression.[22,23] This goes beyond a client consistently and accurately taking ART but extends to strictly sticking to scheduled ARV-therapy clinic appointments, lifestyle modification, nutritional plan, family and social support and viral load monitoring.[19,20] HAART which is a combination of three or more antiretroviral drugs to treat HIV infection is often used interchangeably with ART.[20,22]

Although, adherence can be measured in the following ways: Self-reporting, pharmacy refill, pill count, medication event monitoring system (MEMSCap) and viral load monitoring, this research will focus only on viral load monitoring.[24,25] Viral load measurement used to assess the virologic outcome of HIV-positive persons, serves as an indicator for treatment failure (virologic failure). This is defined as the inability to accomplish or sustain the suppression of viral replication ≤1000 copies/mL based on two consecutive viral load measurements 3-months apart, with adherence support following ≥6-months of initiation of effective HAART.[26,27] On the other hand, virologic suppression is achieved when a patient's plasma HIV RNA level is ≤1000 copies/mL after two consecutive viral load measurements ≥3-months apart or below the lower limits of detection (LLOD) of currently used highly sensitive assays over a long-term adherence to ART.[24,28] Detection of viraemia at this threshold is frequently done using real-time polymerase chain reaction (PCR) assays, which has high sensitivity compared to the previously used PCR-based viral load platforms. Another important term to note is zero transmission, which is seen as a patient's plasma HIV RNA level is undetectable (<50 copies/ml), and this is commonly seen among those optimally adherent to ART over a long period. Nevertheless, some regimen require a longer duration to suppress HIV RNA levels, though a patient's baseline HIV RNA level may affect the time course of the response.[29,30] In the course of this study, the terms above will be applied to all study participants using viral load monitoring to measure virologic outcome. To achieve sustained virologic suppression, a patient depends on four main factors: The ART regimen, adherence counselling, patient's understanding of the concept of HIV, side effects of ART and outcome of treatment, and family/social support.[31]

Figure 1 shows the progression of viral load in PLWHA from the time of infection, initiation of medication, implementation and through the persistence phase on ART.

At the end of 2019, 38 million people were infected with HIV, of which 36.2 million were adults (≥15 years) with a prevalence of 0.8%; 1.7 million new infections and 690,000 deaths from AIDS-related diseases worldwide. Within the adult population, 79% of PLWHA knew their status; 68% [males (61%), females (73%)], of those who were aware of their status had access to ART; and 53% of those who were on ART achieved virologic suppression.[9,11] Based on the 2015 United Nations, 90-90-90 treatment target reported that only three out of eight WHO regions have achieved virologic suppression: Asia and the Pacific (91%); the Middle East and North Africa (83%); Eastern Europe and Central Asia (93%); Western and Central Europe and North America (82%); Latin America (88%); Caribbean (80%); Eastern and Southern Africa (90%); Western and Central Africa (78%). Also, only 41 of the 196 countries worldwide have achieved virologic suppression (Nigeria not inclusive). However, only 14 of these countries (Australia, Netherland, Switzerland, Germany, Ireland, Monaco, Ukraine, Japan, Cambodia, Myanmar, Thailand, Vietnam, Botswana, Eswatini) have surpassed the current UNAIDS 95-95-95 treatment target. It is important to note that females showed better virologic suppression than the males, except in five countries (Chile, Mexico, Singapore, Kenya, and

Lesotho).[9,11] This is probably because the PLWHA among the female gender make personal efforts to access and adhere to their treatment irrespective of the socio-cultural, economic and psychosocial experiences they encounter in the course of their therapy.[9,11,33]

Despite the enormous global progress in the scale-up of treatment and prevention of HIV/AIDS, some high burden resource-poor settings are yet to achieve the earlier 'UNAIDS 90-90-90' treatment target.[33]

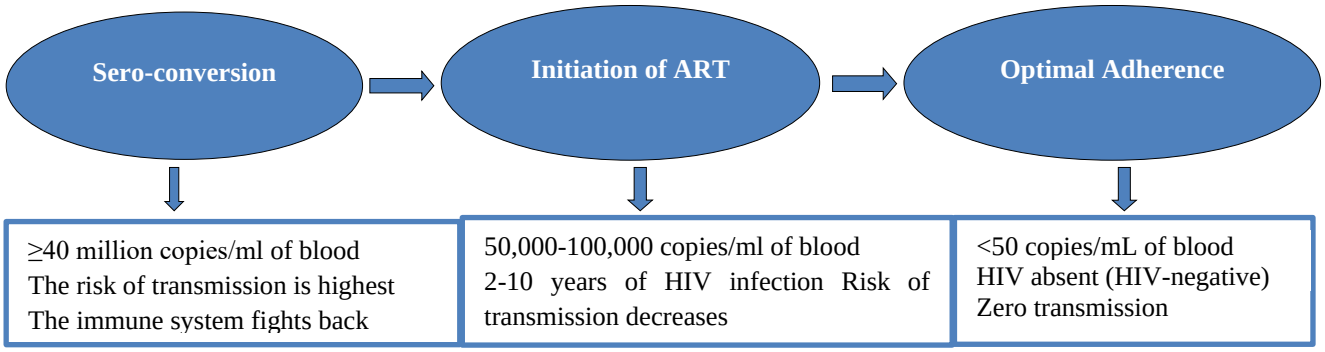

Figure 1: Viral load level as HIV infection progresses.[32]

Nigeria is the third largest HIV/AIDS burden in the world only next to South Africa and India with over 1.3-2.4 million PLWHA, and only 55% of HIV-positive adults are on ART.[10,11] The national HIV/AIDS Indicator and Impact Survey (NAIIS) reported a gender disparity in the prevalence 1.4% [women (1.9%), men (1.1%)] and virologic suppression 44.5% [men (40.9%), women (46.2%)] within the adult population (15-64 years).[10] The higher proportion of virologic suppression among the female gender may be attributed to the higher prevalence rate shown to be slightly greater than twice the value for the male gender. The south-south region where this study area is situated has the highest HIV/AIDS prevalence (3.1%) but the lowest virologic suppression level (31.1%) among the six geopolitical zones of Nigeria.[10] However, these findings may not be different from Rivers state, an oil-rich zone in the south-south region of Nigeria with multi-ethnic groups, diverse traditions, and increasing urbanization that has positively and negatively impacted the country's economy and HIV/AIDS burden respectively. The State is currently has the third-highest HIV/AIDS prevalence (3.8%) almost thrice the national value with ART coverage of 43% and the least virologic suppression (27%), only second to Bayelsa State.[10] Despite the progress in the scale-up and strengthening of treatment aimed to improve access and achieve viral load suppression among PLWHA, Rivers State is yet to attain the previous 2015 ("third 90"), notwithstanding the current 2020 ("third 95") UNAIDS treatment target.[9,11] This study considered an equal proportion of male and female HIV-positive patients receiving ART in the study area. Although, there are seven types of gender groups (agender, cisgender, genderfluid, genderqueer, intersex, gender nonconforming, transgender), this study focused only on the cisgender group. In this population the biological sex assigned to an individual at birth corresponds to his/her identity as perceived in the society.[34] Findings from this study will increase the understanding of how gender influences the virologic outcome of PLWHA on treatment. This will enable key stakeholders involved in HIV/AIDS response programmes to focus more on holistic client-oriented, gender-based strategies, community-driven interventions and social policies that will improve the decision-making power of the female gender. These measures will consequently improve adherence to HIV/AIDS management, achieve and surpass the "third 95" of the current UNAIDS treatment target, and finally end the HIV/AIDS pandemic by 2030.[35]

METHODS

The study was conducted at the University of Port Harcourt Teaching Hospital located in Alakahia, Obio-Akpor LGA, along the East-West Road, and shares a boundary with the University of Port Harcourt. The hospital is a 950-bed tertiary health facility with sixteen clinical departments. This tertiary health facility with multi-disciplinary specialists provides care for in-patient, out-patient and emergency services to HIV-positive patients as it serves as a major referral point for primary and secondary health facilities within the State. The HIV/AIDS service within the ARV therapy centre reviews a range of 120-135 PLWHA on weekdays apart from public holidays, constituting a proportion of males (30%) and females (70%), as assessed 3-months before the study was conducted. This study was designed as a hospital-based comparative cross-sectional study to assess the associated factors of virologic outcomes among cisgender groups of people living with HIV/AIDS attending a tertiary health facility in Rivers State, Nigeria.

On daily basis, the systematic random sampling technique was employed to select eligible participants using the ARV therapy clinic register between September 2020 and November 2020 until the total sample size of 1600 (cisgender females-800, cisgender males-800) respondents was reached. Data was collected using a 3-item interviewer-administered structured questionnaire sub-divided into different sections, adapted from the brief medication questionnaire.[36] During the study, each eligible

respondent after administration of the questionnaire was sent to the clinic's side laboratory for viral load monitoring which was done using Roche COBAS TaqMan96 (version 2.0) for real-time PCR HIV-1 RNA assay.[25] The virologic outcome of each eligible participant was determined by comparing the results of the viral load test (VLT) done 6-12 months before (recorded on the patient's folder/care card) and during the study. Each participant's viral load test was categorized into 2; virologic suppression (<1000 copies/mL), and virologic non-suppression (≥1000 copies/ml) and an overall result was grouped and compared between the gender groups.[37] Data were entered into Microsoft excel sheet, checked for completeness, coded, cleaned and analyzed on statistical package for the social sciences (SPSS) version-25 software. Categorical variables were presented as frequencies and proportions, while the continuous variables were summarized as mean and standard deviation. To assess for the association between dependent and independent variables, Pearson's Chi-square and Fishers' exact tests were used for categorical variables, while the spearman rho rank test was used for continuous variables. The statistical significance level was set at p<0.05 and a 95% confidence interval, and confounding variables were controlled for, using multiple logistic regression.

Ethical approval was sought from the research ethics committee in the study area with the approval number: UPTH/ADM/90/S.II/VOL.XI/885 and written informed consent were obtained from each participant before commencing the study. All eligible respondents were made to understand the aim of the study and given the option of participating willfully or not and also refrain from answering any uncomfortable questions where they choose to participate. The clinic care card numbers were used to guarantee anonymity and absolute confidentiality.

A total of 1700 questionnaires were administered to eligible participants. A response rate of 94% with 1600 questionnaires (800 HIV-positive males, 800 HIV-positive females) was analyzed as 100 questionnaires of respondents who gave informed consent were excluded from the data analysis; 67 did not respond to the majority of the key questions, while the remaining 33 refused to partake in the viral load test.

There was an observed mean age and standard deviation of 44.53±10.50 and 40.58±9.34 for the male and female groups respectively. The male group compared to their female counterparts had higher proportion of respondents among the following socio-demographic characteristics: Age group; ≥40 (67.0% versus 45.9%, p<0.001); married (75.8% versus 58.6%, p<0.001); secondary education (64.5% versus 57.3%, p=0.001); urban setting (81.1% versus 62.5%, p<0.001); and religion (97.4% versus 96.5%, p=0.171). On the contrary, the female group as opposed to the male group showed a higher proportion of participants in the following categories of variables: Igbo ethnic group (38.4% versus 34.0%, p=0.003); and business (29.5% versus 27.9%, p<0.001).

A greater proportion of the female group (89.6%) achieved virologic suppression as opposed to their male (89.5%) counterparts, though there was no statistically significant gender difference.

Concerning the factors associated with the virologic outcome of participants, the female group as opposed to the male group showed a greater proportion of respondents who had achieved viral load suppression. However, among those on first-line ART (92.3% versus 89.9%, p<0.001); once-daily ART doses (91.1% versus 89.7%, p=0.003); current ART in the last 1-year (90.8% versus 89.6%, p=0.023). On the other hand, the male group than the female group reported greater frequency of respondents who were virally suppressed among: participants who married between the ages of 30-39 years (n=346 versus n=124, p=0.023); those whose spouses/partners are HIV-positive (n=280 versus n=182, p=0.776); those who were never denied HIV services (n=707 versus n=698, p=0.403); never been verbally abused (n=702 versus n=684, p=0.331); received HIV support services (n=611 versus n=535, p<0.001); had undergone adherence counselling sessions (n=708 versus n=696, p=0.952); did not have treatment support (n=621 versus n=557, p=0.390).

The male group also showed a weak but positive correlation between income, level of education and virologic outcome. Although, the age group of participants had a weak and negative correlation with virologic outcomes. Conversely, the female respondents revealed a weak and negative correlation between age group, income, level of education and virologic outcomes. There was no statistical significance between the gender groups.

To control for confounding, the multiple logistic regression analysis revealed that participants who did not have a treatment support were less likely to optimally adhere to HIV/AIDS management as opposed to those who had, and this was statistically significant among the female group (aOR=0.382; 95% CI=0.206-0.707; p=0.002).

Table 1: Socio-demographic characteristics of HIV-positive male and female respondents.

Variables	Males (n=800)	Females (n=800)	Test statistic (p value)
Age group (years)			
Less than 20	5 (0.6)	1 (0.1)	106.161 (<0.001) [b]*
20-29	65 (8.1)	94 (11.8)	
30-39	194 (24.3)	367 (45.9)	

Continued.

Variables	Males (n=800)	Females (n=800)	Test statistic (p value)
40 and more	536 (67.0)	338 (42.3)	
Mean age±SD	44.53±10.50	40.58±9.34	
Marital status			
Single	144 (18.0)	160 (20.0)	93.782 (<0.001) [b]*
Cohabiting	6 (0.8)	9 (1.1)	
Married	606 (75.8)	469 (58.6)	
Separated	2 (0.3)	25 (3.1)	
Divorced	3 (0.4)	7 (0.9)	
Widowed	39 (4.9)	130 (16.3)	
Tribe			
Igbo	272 (34.0)	307 (38.4)	17.888 (0.003) [b]*
Hausa	10 (1.3)	0 (0.0)	
Yoruba	23 (2.9)	13 (1.6)	
Ikwerre	150 (18.8)	134 (16.8)	
Kalabari	22 (2.8)	16 (2.0)	
Others	323 (40.4)	330 (41.3)	
Education			
No formal education	4 (0.5)	18 (2.3)	20.660 (0.001) [b]*
Primary	76 (9.5)	96 (12.0)	
Secondary	516 (64.5)	458 (57.3)	
Undergraduate	11 (1.4)	25 (3.1)	
Tertiary	177 (22.1)	189 (23.6)	
Post graduate	16 (2.0)	14 (1.8)	
Occupation			
Trading	71 (8.9)	141 (17.6)	317.133 (<0.001) b*
Business	221 (27.9)	236 (29.5)	
Civil/Public servant	133 (16.6)	86 (10.8)	
Engineering	16 (2.0)	0 (0.0)	
Retired	34 (4.3)	19 (2.4)	
Students	33 (4.1)	22 (2.8)	
Artisan	164 (20.5)	82 (10.3)	
Housewife	0 (0.0)	152 (19.0)	
Others	97 (12.1)	8 (1.0)	
Unemployed	31 (3.9)	54 (6.8)	
Residence			
Rural	72 (9.0)	147 (18.4)	68.610 (<0.001) *
Semi-urban	79 (9.9)	153 (19.1)	
Urban	649 (81.1)	500 (62.5)	
Religion			
Christianity	779 (97.4)	772 (96.5)	3.532 (0.171) b
Islam	15 (1.9)	25 (3.1)	
African tradition	6 (0.8)	3 (0.4)	

*Significant, [b]Fisher's exact

Table 2: Association between socio-demographic factors and virologic outcome of HIV-positive male and female respondents.

Variables	Males (n=800)			Females (n=800)		
	Virologic outcome suppressed	Unsuppr-essed	Test statistic (p value)	Suppressed	Unsuppr-essed	Test statistic (p value)
Age (in years)						
30	66 (94.3)	4 (5.7)	1.870 (0.172)	87 (91.6)	8 (8.4)	0.443 (0.506)[b]
>30	650 (89.0)	80 (11.0)		630 (89.4)	7 (10.6)	

Continued.

Variables	Males (n=800)			Females (n=800)		
	Virologic outcome suppressed	Unsuppr-essed	Test statistic (p value)	Suppressed	Unsuppr-essed	Test statistic (p value)
Marital status						
Single	128 (88.9)	16 (11.1)	3.413 (0.424)[b]	142 (88.8)	18 (11.3)	3.178 (0.489)[b]
Cohabiting	4 (66.7)	2 (33.3)		8 (88.9)	1 (11.1)	
Married	544 (89.8)	62 (10.2)		423 (90.2)	46 (9.8)	
Divorced	5 (100)	0 (0.0)		26 (81.3)	6 (18.8)	
Widowed	35 (89.7)	4 (10.3)		118 (90.8)	12 (9.2)	
Employment status						
Professional	54 (94.7)	3 (5.3)	6.056 (0.109)[b]	84 (87.5)	12 (12.5)	6.451 (0.077)[b]
Skilled manual	154 (90.6)	16 (9.4)		141 (94.6)	8 (5.4)	
Skilled non- manual	477 (89.3)	57 (10.7)		480 (88.4)	63 (11.6)	
Unskilled	31 (79.5)	8 (20.5)		12 (100.0)	0 (0.0)	
Residence						
Rural	63 (87.5)	9 (12.5)	0.340 (0.844)	129 (87.8)	18 (12.2)	0.816 (0.679)
Semi-urban	71 (89.9)	8 (10.1)		139 (90.8)	14 (9.2)	
Urban	582 (89.7)	67 (10.3)		449 (89.8)	51 (10.2)	
Religion						
Christian	695 (89.2)	84 (10.8)	1.302 (0.465)[b]	694 (89.9)	78 (10.1)	2.731 (0.278)[b]
Islam	15 (100.0)	0 (0.0)		20 (80.0)	5 (20.0)	
Others	6 (100.0)	0 (0.0)		3 (100.0)	0 (0.0)	
Education						
No formal education	4 (100.0)	0 (0.0)	0.528 (0.883)[b]	14 (77.8)	4 (22.2)	4.291 (0.215)[b]
Primary	69 (90.8)	7 (9.2)		83 (86.5)	13 (13.5)	
Secondary	463 (89.7)	53 (10.3)		414 (90.4)	44 (9.6)	
Tertiary	180 (88.2)	24 (11.8)		206 (90.4)	22 (9.6)	

*Significant, [b]Fisher's exact

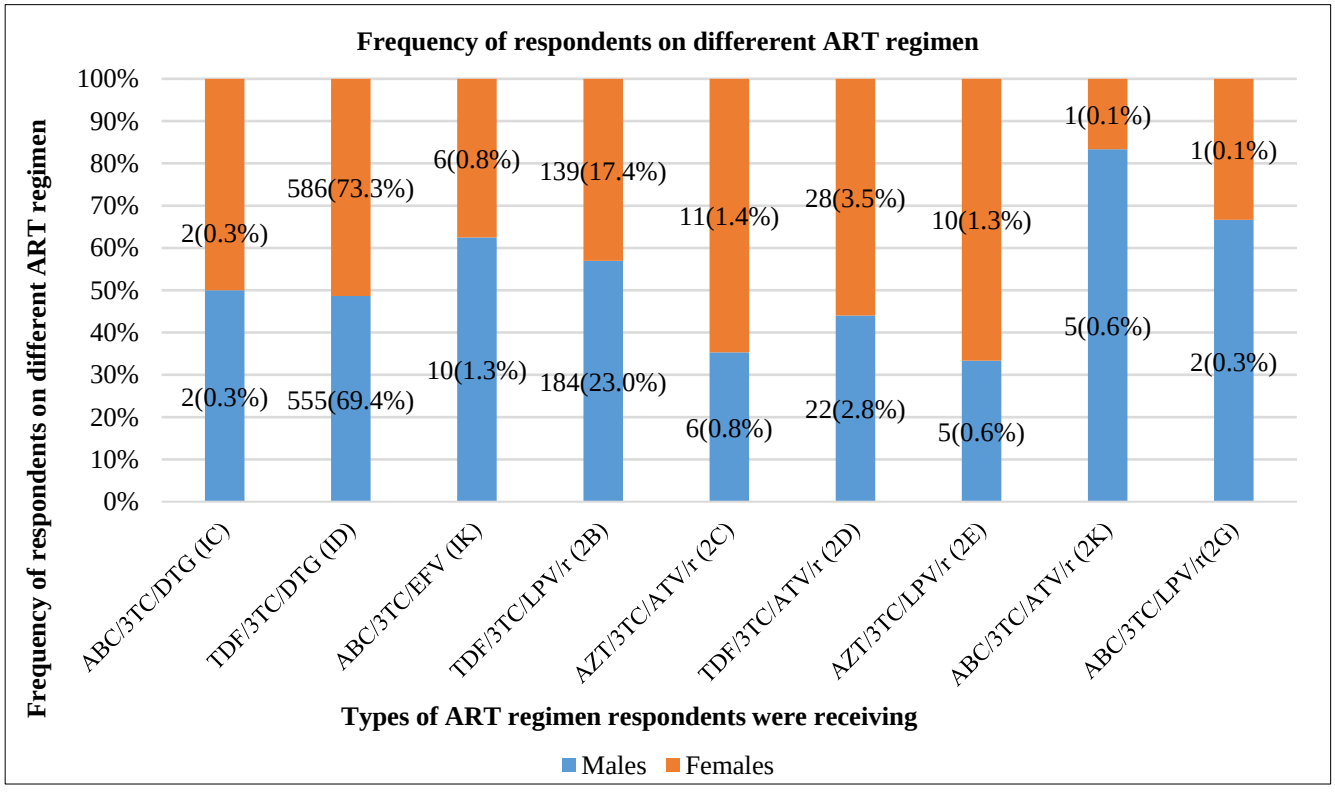

Figure 2: Bar-chart showing the frequency of respondents on different ART regimens.

Table 3: Association between socio-cultural factors and virologic outcome of HIV-positive male and female respondents.

Variables	Males (n=800)			Females (n=800)		
	Virologic outcome suppressed	Unsuppr-essed	Test statistic (p value)	Suppressed	Unsuppr-essed	Test statistic (p value)
Are you married						
Yes	548 (90.1)	60 (9.9)	1.075 (0.300)	493 (90.1)	54 (9.9)	0.471 (0.493)
No	168 (87.5)	24 (12.5)		224 (88.5)	29 (11.5)	
Age at marriage						
≤20	9 (90.0)	1 (10.0)	3.388 (0.301)[b]	88 (82.2)	19 (17.8)	9.064 (0.023)[b]*
21-29	158 (92.4)	13 (7.6)		275 (92.0)	24 (8.0)	
30-39	346 (89.9)	39 (10.1)		124 (92.5)	10 (7.5)	
≥40	36 (83.3)	7 (16.7)		6 (85.7)	1 (14.3)	
Partner also positive						
Yes	280 (90.6)	29 (9.4)	0.441 (0.776)[b]	182 (89.2)	22 (10.8)	0.304 (0.862)[b]
No	253 (89.7)	29 (10.3)		272 (90.7)	28 (9.3)	
Don't know	15 (88.2)	2 (11.8)		39 (90.70)	4 (9.3)	
Take medication frequently						
Yes	706 (89.6)	82 (10.4)	0.493 (0.483)[b]	700 (89.5)	82 (10.5)	0.460 (0.498)[b]
No	10 (83.3)	2 (16.7)		17 (94.4)	1 (5.60)	

Table 4: Association between psychosocial factors and virologic outcome of HIV-positive male and female respondents.

Variables	Males (n=800)			Females (n=800)		
	Virologic outcome suppressed	Unsuppr-essed	Test statistic (p value)	Suppressed	Unsuppressed	Test statistic (p value)
Sexual preference						
Homosexual	14 (93.3)	1 (6.7)	5.035 (0.085) [b]	12 (92.3)	1 (7.7)	1.569 (0.449) [b]
Heterosexual	700 (89.6)	81 (10.4)		702 (89.7)	81 (10.3)	
Bisexual	2 (50.0)	2 (50.0)		3 (75.0)	1 (25.0)	
Disclosed status						
Yes	656 (89.3)	79 (10.7)	0.593 (0.441)	643 (89.7)	74 (10.3)	0.022 (0.882)
No	60 (92.3)	5 (7.7)		74 (89.2)	9 (10.8)	
Denied treatment						
Yes	9 (81.8)	2 (18.2)	0.700 (0.403) [b]	19 (95.0)	1 (5.0)	0.637 (0.425) [b]
No	707 (89.6)	82 (10.4)		698 (89.5)	82 (10.5)	
Abused verbally						
Yes	14 (82.4)	3 (17.6)	0.944 (0.331) [b]	33 (94.3)	2 (5.7)	0.855 (0.355) [b]
No	702 (89.5)	81 (10.3)		684 (89.4)	81 (10.6)	

[b]Fisher's exact

Table 5: Correlation between age group, income level and virologic outcome of HIV-positive male and female respondents.

Variables	Males (n=800) Virologic outcome		Females (n=800) Virologic outcome	
		P value		P value
Age group	-0.016	0.653	-0.013	0.721
Income	0.002	0.954	-0.042	0.240
Education	0.010	0.779	-0.042	0.237

Table 6: Association between HIV support services and virologic outcome of HIV-positive male and female respondents.

Variables	Males (n=800)			Females (n=800)		
	Suppressed	Unsuppr-essed	Test statistic (p value)	Suppressed	Unsuppr-essed	Test statistic (p value)
HIV support services						
Yes	611 (88.8)	77 (11.2)	2.503 (0.114)	535 (92.1)	46 (7.9)	13.786 (<0.001)*
No	105 (93.8)	7 (6.3)		182 (83.1)	37 (16.9)	
Counselled						
Yes	708 (89.5)	83 (10.5)	0.004 (0.952)[b]	696 (89.6)	81 (10.4)	0.072 (0.789)[b]
No	8 (88.9)	1 (11.1)		21 (91.3)	2 (8.7)	
Treatment support						
Yes	95 (87.2)	14 (12.8)	0.738 (0.390)	160 (88.9)	20 (11.1)	0.135 (0.713)
No	621 (89.9)	70 (10.1)		557 (89.8)	63 (10.2)	
A family member also positive						
Yes	67 (87.0)	10 (13.0)	0.561 (0.454)	114 (89.1)	14 (10.9)	0.052 (0.820)
No	649 (89.8)	74 (10.2)		603 (89.7)	69 (10.3)	
Paid for HIV services						
Yes	66 (88.0)	9 (12.0)	0.198 (0.656)	150 (90.4)	16 (9.6)	0.122 (0.727)
No	650 (89.7)	75 (10.3)		567 (89.4)	67 (10.6)	

*Significant, [b]Fisher's exact

Table 7: Multiple logistics regression analysis of virologic outcome among HIV- positive female respondents.

Variables	Crude odds	95% C.I.		P value	Ad odds	95% C.I.		P value
Type of regimen								
First line	0.366	0.229	0.585	>0.001*	0.393	0.152	1.018	0.054
Second line					Ref			
How many times a day								
Once	0.460	0.275	0.770	0.003*	1.029	0.380	2.782	0.956
More than once					Ref			
Age married								
≥30	2.278	0.883	5.876	0.088	2.225	0.852	5.806	0.102
<30								
Art duration								
One year	0.471	0.270	0.824	0.008*	0.873	0.361	2.113	0.764
Two years and more								
Have support								
Yes	0.423	0.266	0.673	<0.001*	0.382	0.206	0.707	0.002*
No					Ref			

*Significant, [b]Fisher's exact

DISCUSSION

The present study observed a better viral load suppression among the female group compared to their male counterpart. Although the proportion of respondents who were virally suppressed was closely approaching the previous UNAIDS "third 90" treatment target but yet to reach the current "third 95." However, these values are way beyond those of the Nigerian AIDS indicator and impact survey (NAIIS) conducted in 2018 which also reported a higher virologic suppression among the female gender as opposed to their male gender. Moreover, the present study observed much higher virologic suppression levels compared to the national and Rivers State values respectively.[10] Also, the obvious improvement in the virologic outcome observed among HIV-positive females attending the study area may be attributed to the fact that females make personal efforts in adhering to their treatment, irrespective of the challenges they encounter. This is in agreement with the latest UNAIDS global data, which reported that a greater proportion of the female gender had attained virologic suppression than the male gender except in countries like; Chile, Mexico, Singapore, Kenya, and Lesotho.[9,11] Additionally, previous studies carried out in South Africa, Haiti, and other nations observed greater viral load suppression levels among the female gender than the male gender, though below the "third 90" of the previous UNAIDS treatment target, but with no significant gender difference.[9,11,33,38,39] On the

contrary, studies conducted in Zambia, Nepal, and the United States of America revealed that the male gender had a higher likelihood of achieving viral load suppression than the female gender, though there was no statistically significant gender difference.[40-42]

Regarding the treatment characteristics of respondents, being on first-line ART, a once-daily regimen and being on current ART ≥1 year duration, positively influenced their virologic outcome which was significantly in favour of the female group. This perhaps is a result of the inclusion of Dolutegravir into the HIV/AIDS treatment guideline which had been implemented in the study area about 18-months before this study was conducted. Moreover, virtually all those on the first-line regimen were substituted from Efavirenz-based ART (TDF+3TC+EFV) to the Dolutegravir-based regimen (TDF+3TC+DTG). These findings are in concordance with a meta-analysis[43] and previous studies conducted in Nigeria and Brazil.[44-46] The study also reported that within a period of ≥12-months, all the participants who were transitioned to the TDF+3TC+DTG regimen had increased odds of achieving virologic suppression as opposed to those retained on the previous fixed-dose ART (TDF+3TC+EFV).

Furthermore, the multiple regression analysis revealed that having at least a treatment supporter was reportedly associated with better virologic outcomes, which was only observed among the female group as opposed to their male counterpart. This finding may be attributed to the fact that having at least a treatment supporter, is a major HIV support service rendered to PLWHA at the ARV therapy centre in addition to others (viral load testing, adherence counselling, text messages and phone calls reminders). It is important to note that, to prevent non-adherence to HIV/AIDS therapy, the ARV therapy clinic in the study area sends reminders to clients through short message service (SMS), telephone calls and even deliver medications to the homes of their patients at no cost. This implies that if all HIV support services are rendered without payment, virologic outcomes of HIV-positive patients may improve. This is in agreement with the findings from previous studies carried out in Nigeria, Ethiopia, and the United States of America, which revealed better virologic outcomes among PLWHA accessing HIV support services at no cost, though the gender difference was not assessed.[47-50]

Strengths

The adequate training of interviewers, systematic sampling technique, confidentiality, and the use of standardized questionnaire were adopted to minimize anticipated biases.

The questionnaires were written and administered in both English language and pidgin at the convenience of the respondents.

Multiple logistic regression analysis was used to control for confounding variables at the multivariate level.

Limitations

The study being descriptive in design; also sampling, interviewer, and information biases were anticipated in the course of the study.

CONCLUSION

The cisgender female group had slightly better virologic outcomes as opposed to the cisgender male group and this was significantly influenced by having a treatment supporter. Therefore, rendering HIV support services such as; having a treatment supporter, and adherence counselling at the treatment centre is shown to improve the virologic outcome of PLWHA, irrespective of the barriers they encountered.

Recommendations

PLWHA should make personal efforts to fully participate in adherence counselling sessions, attend scheduled clinic appointments and ensure that they benefit from other treatment support services offered by their respective ARV therapy clinics.

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