ORIGINAL PAPER

Nig. J. Pharm. Res. 2017, 13 (1), pp 53-64
ISSN 0189-8434 **Available online at http://www.nigjpharmres.com**

MEDICINE USE AMONG HIV/AIDS PATIENTS IN PUBLIC HOSPITALS, KWARA STATE

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of article.

Abstract

Background: The prognosis of HIV/AIDS and HIV-related comorbidities has been revolutionized by the use of medicines. However, World Health Organization reported that 50% of patients do not use their medicines as prescribed.
Objective: To assess HIV/AIDS patients' knowledge of the use of medicines dispensed to them.
Method: This study was conducted in seven public hospitals in six local government areas, Kwara State. Exit interviews of 780 eligible HIV/AIDS patients were conducted through use of structured questionnaire. Additionally, there were exit observational checks of medicines dispensed to these patients. Descriptive statistics and Fisher Exact test were used for data analyses.
Results: Of the 780 study participants, 36.1% had no formal education, 99.9% knew the 'quantity' of medicines to be administered, while 99.2% knew the frequency of administration. All the patients knew the route of administration, 96.7% and 94.3% knew the general precautions to avoid concomitant use of dispensed medicines with alcohol or herbal products respectively, while 93.7% of those who received co-trimoxazole knew of the precaution to use "plenty of water" as the vehicle for its administration. There were no significant associations between the patients' knowledge of these precautions and duration of antiretroviral therapy ($P>0.05$). However, the patients lacked knowledge of specific precautions of some dispensed medicines.
Conclusion: Most of the patients knew of the administration and the general precautions of dispensed medicines. However, lack of knowledge of specific precautions of some dispensed medicines calls for intervention.

Keywords: HIV/AIDS patients, Medicine use, Duration of antiretroviral therapy, Public hospitals, Kwara State

INTRODUCTION

Globally, 36.9 million people were living with HIV as the end of 2014, of which 2.0 million people were new infections and 1.2 million people died from AIDS-related illness (Joint United Nations Programme on HIV/AIDS [UNAIDS], 2015) . In the sub-Saharan Africa, there were 25.8 million people living with HIV in 2014, of which 1.4 million were estimated to be new infections and 790, 000 people died of AIDS-related causes (Joint United Nations Programme on HIV/AIDS [UNAIDS], 2015). In Nigeria, 3.2 million people were living with HIV/AIDS in 2013, of which 220, 000 were new infections while 210, 000 people died of AIDS-related causes (AVERT, 2015).
Within 25 years of introduction, antiretroviral medicines (ARVs) have changed the HIV from being an inherently untreatable infection to a controllable, chronic disease (May *et al.*, 2006; Weiss, 2008; Mahungu *et al.*, 2009; Broder, 2010). The recommended antiretroviral treatment regimen is highly active antiretroviral therapy (HAART). This is at least, a triple antiretroviral medicines (ARVs) combination therapy which could be first line, second line or salvage HAART (Federal Ministry of Health, Nigeria [FMOHN], 2007; FMOHN, 2010). Use of mono and dual therapies are no more recommended due to development of resistance (FMOHN, 2010). In Nigeria, HAART involves the use of ARVs such as zidovudine, nevirapine, lamivudine, efavirenz, abacavir, emtricitabine, tenofovir, (first line; lopinavir, atazanavir and ritonavir (second line) [FMOHN, 2010; FMOHN, 2007]). Due to its toxicity, stavudine has been phased out of the treatment regimen

(FMOHN, 2007). In addition, active management of opportunistic infections (OIs) as adjunct to HAART in HIV/AIDS patients involves the use of co-trimaxazole preventive therapy (CPT), Isoniazid Preventive therapy (IPT) and other antimicrobial agents (FMOHN, 2010). This not only helps HIV positive people to live longer healthier lives but can also prevent the spread of these opportunistic infections to others with consequent reduction in the burden of HIV co-infections (FMOHN, 2010).

Currently, there is no cure for HIV and, the antiretroviral therapy (ART) is life-long. A high level of adherence to prescribed ARV regimen (greater or equal to 95%) is required in order to achieve and maintain suppression of viral replication Shaahu *et al.*, 2008; Adewuya *et al.*, 2010; Kagee *et al.*, 2011 and Oku *et al.*, 2013) and subsequently prevent drug resistance. Since, the patient optimally benefits from the dispensed medicines only if the medicines are used, it is crucial that patients receive and possess appropriate information on the use of dispensed medicines (FMOHN, 2005). Such knowledge enhances the patient adherence to the medical advice and medication use (Spivey, 1997; FMOHN, 2010).
However, reports from World Health Organization (WHO) showed that, 50% of patients do not use their medicines as prescribed (WHO, 2002). Previous studies showed that only 37.2% of the patients had adequate knowledge of their medicines in a study conducted in Sudan (Awad and Himad, 2006), 87.1% had knowledge of the dosage schedule of their medication in a study conducted in Bhopal (De Costa *et al.*, 2008), 64.5% knew the correct use of the dispensed medicines in West Bengal (Hazra *et al.*, 2000); 53.8% had knowledge of time of use of their medicines and duration of therapy in a study conducted in a tertiary healthcare, Western Nepal (Alam *et al.*, 2006) while a later study in Western Nepal showed that, all patients had knowledge of time of use of their medicines and duration of therapy (Upadhyay *et al.*, 2008). Another study in Kuwait showed that only 26.9% of the patients demonstrated adequate knowledge about the drugs they received (Awad and Al-Saffar, 2010), while 55% knew the correct dosage of their drugs in a study conducted in Cambodia (Chareonkul *et al.*, 2002). A study of patients' knowledge of medicines dispensed from Ghanaian community pharmacies showed that 50% of the 280 patients knew the precautions they needed to observe while taking their medications (Marfo *et al.*, 2013).

In a study conducted in Nigeria more than 12 years ago, most of the patients (97%) had adequate knowledge of their antiretroviral medicine regimen (FMOHN, 2003). The dearth of information on medicine use (antiretroviral and non-antiretroviral medicines [ARVs and NARVs]) among HIV/AIDS patients and HIV-related comorbidities has attracted concerns. This study assessed the knowledge of HIV/AIDS patients attending public hospitals in Kwara State about the use of the medicines dispensed to them. Possession of appropriate knowledge about the use of the medicine would enhance the patient adherence to the medical advice and medication use (Spivey, 1997).

METHODS

Study location

This cross-sectional study was conducted in seven (7) public hospitals that provided healthcare to adult HIV/AIDS patients in Kwara State. These hospitals were located in six (6) local government areas representing the three (3) Senatorial Districts of Kwara State. The study sites were: University of Ilorin Teaching Hospital, Ilorin in Ilorin East Local Government Area (LGA); Specialist Hospital, Sobi, Ilorin in Ilorin South LGA; General Hospital, Offa in Offa LGA; General Hospital, Omuaran in Irepodun LGA; General Hospital, Lafiagi in Edu LGA; Comprehensive Health Center, Shonga in Edu LGA and Cottage Hospital, Adewole, Ilorin in Ilorin West LGA. The three Senatorial Districts of Kwara State were Kwara Central, Kwara North and Kwara South. The State was created on 27th May 1967, has 16 Local Government Areas (Kwara State Ministry of Planning and Economic Development [KWMPED], 2010), is located in the North-Central geopolitical zone of Nigeria and is the gateway between the Southern and Northern parts of Nigeria. The easy accessibility to Lagos and Abuja facilitates socio-economic exchanges. It is bounded in the North by Niger State, in the South by Ekiti, Osun and Oyo states, in the East by Kogi State and in the West by the Republic of Benin. Based on the 2006 National population census, Kwara State has population projection of 2,748,100 million (National Population Commission of Nigeria, 2015). The state is hugely involved in agricultural activities. The main ethnic groups in the state are Baruba, Fulani, Nupe, and Yoruba (KWMPED, 2010). However other tribes inhabiting Kwara State are Ebira, Igbo, Igala, Gobirs, and Urhobo. The major religion of the indigenes is Islam. But, there are Christians and few individuals who practice traditional religion . There are public and private healthcare and educational institutions, pharmaceutical manufacturing industries, pharmaceutical wholesaling and pharmaceutical retailing organizations in the state.

Study design

This cross-sectional hospital-based study was conducted through use of structured questionnaire-guided interviews among HIV/AIDS patients. The questionnaire contains questions on administration of medicine with regards the quantity of medicines to be administered, frequency and route of administration. There were also questions on general and specific precautions to be observed while using the dispensed medicines. The patients were interviewed after they had received their medicines from the pharmacies of the HIV/AIDS treatment clinics and about to exit the clinics. Exit observational checks of the medicines that were dispensed to these patients were also conducted.

Inclusion criteria

The inclusion criteria were:

i. HIV/AIDS patients who attended public hospitals in Kwara State, with age range 18 – 70 years, who gave voluntary informed consent to participate in the study.
ii. HIV/AIDS patients who attended public hospitals in Kwara State, with or without co-morbidities who gave voluntary informed consent to participate in the study.
iii. HIV/AIDS patients who attended public hospitals in Kwara State and were on highly active antiretroviral therapy (HAART)

Exclusion Criteria

i. HIV/AIDS patients who were too ill to participate in the study.
ii. HIV/AIDS patients who had psychiatric illness (observed to have irrational monologue or dialogue) that might have impaired their ability to give voluntary informed consent.

Sample Size Determination and sampling

Representative sample size was determined based on Fisher's formula (Fisher *et al.*, 1998; Araoye, 2004) at 95% confidence level and 5% margin of error. The antiretroviral therapy coverage of 23% for Nigeria (AVERT, 2012) was used as the proportion in target population estimated to have a particular characteristic. The obtained minimum sample size of 260 was tripled in order to make the sample more representative of the entire population. Thus, 780 copies of questionnaires were administered.

The 780 sample size was proportionally allocated to the 7 study sites based on the population of registered HIV/AIDS patients per HIV Treatment Center and total population of registered HIV patients for the 7 hospitals. HIV/AIDS patients who gave voluntary informed consent were systematically sampled at each HAART clinic day.

Study Instrument and administration

Pre-testing of the questionnaire was done at Civil Service Hospital, Ilorin using 10% (n =78) of the study sample size. The content validity of the questionnaire was assessed by four scholars. Some of the questions were modified based on the feedback of the pre-testing and the validity assessment in order to remove ambiguity. The questions on medicine administration (quantity to be administered, frequency and route of administration) and precautions (general and specific) were for each of the medicines the patients received instead of the medicines as a group. The structured questionnaire was interviewer-administered to the HIV/AIDS patients by one of the researchers and four trained research assistants. The interview was conducted in English language. However, the interviewers used the local language in the community (Yoruba or Nupe) for patients who cannot communicate in English.

Data analyses

The filled questionnaires were sorted and coded for easy reference. Data were analyzed using simple descriptive statistics. Fisher Exact test was used to determine associations between the patients' duration of antiretroviral therapy and their knowledge about the administration; and precautions to be observed while using the dispensed medicines. Statistical significance was set at $p < 0.05$.

Ethical issues

Ethical approvals were sought and obtained from the Ethical Review Committees of the University of Ilorin, Ilorin (UITH) and Kwara State Ministry of Health. Relevant cooperation and assistance of the various heads of the departments were sought and obtained. Voluntary informed consent was obtained from the patients before inclusion into the study. Confidentiality of the data and information obtained was ensured. All research ethics such as anonymity and freedom to decline or consent to participate in the research were observed.

RESULTS

A total of 780 HIV/AIDS patients participated in the study, of which 192 (25%) were males (Table 1). The modal age class was 31 – 40 years; modal age was 35 years; the mean age was 39.52 ± 10.37 years while the median age was 38 years. Most of the study participants (83.3 %) were married; majority (71.8%) had annual income that was less than ₦120, 000.00, while about 90% had annual income that was less than ₦240, 000.00. Regarding educational status, more than one-third of the study participants (36.1%) had no formal education. In addition, more than two-thirds (68.6%) were of Yoruba ethnic group while over 10% were of other ethnic groups and nationalities (Table 1).

Over a quarter (29.8%) of the HIV/AIDS patients who participated in the study had less than 1.5 years duration of illness since diagnosis (DISD) while 21.4% had more than or equal to 4.5 years DISD (Table 2). The maximum DISD was 12.6 years. The median DISD was 2.8 years, while the mode was 0.04 years. Also, about one-third (32.8%) of the study participants had less than 1.5 years duration of antiretroviral therapy (DART) while 19% had more than or equal to 4.5 years DART (Table 2). The maximum DART was 12.5 years. The median DART was 2.6 years, while the mode was 0.04 years.

Table 1: Socio-demographic Characteristics of the HIV/AIDS patients (N = 780)

Variable	Frequency (%)
Gender	
Male	192 (25)
Female	588 (75)
Age (years)	
≤ 20	10 (1.3)
21 - 30	149 (19.1)
31 - 40	297 (38.1)
41 - 50	190 (24.3)
51 – 60	109 (14.0)
≥ 61	25 (3.2)
Marital Status	
Married	650 (83.3)
Single	44 (5.7)
Widow	65 (8.3)
Widower	5 (0.7)
Divorced	12 (1.5)
Separated	4 (0.5)
Income p.a. (₦)	
< 120,000.00	560 (71.8)
120,000.00 – 239,999.00	122 (15.6)
≥ 240,000.00	98 (12.6)
Educational Status	
No formal education	282 (36.1)
Primary education	153 (19.6)
Secondary education	208 (26.7)
Tertiary education	137 (17.6)
Ethnicity	
Yoruba	535 (68.6)
Nupe	115 (14.8)
Hausa	22 (2.8)
Ibo	29 (3.7)
Others	79 (10.1)

Table 2: Durations of illness since diagnosis and antiretroviral therapy of the study participants (N = 780)

Variable	Frequency (%)
Duration of illness since diagnosis (years)	
< 1.5	232 (29.8)
1.5 – 2.999	189 (24.2)
3.0 – 4.999	192 (24.6)
≥ 4.5	167 (21.4)
Duration of antiretroviral therapy (years)	
< 1.5	256 (32.8)
1.5 – 2.999	191 (22.5)
3.0 – 4.999	185 (23.7)
≥ 4.5	148 (19.0)

A total of 1077 antiretroviral medicines (ARVs) were dispensed to the 780 patients. More than half of the patients (55.1%) received ZLN (Zidovudine/Lamivudine/Nevirapine) a 3 "fixed dose combination" FDC ARV (Figure 1). Most of the patients (96.4%) received first line ARV treatment regimen (all medicines except Atazanavir/Ritonavir and Lopinavir/Ritonavir [ATV/R and LPV/R]).

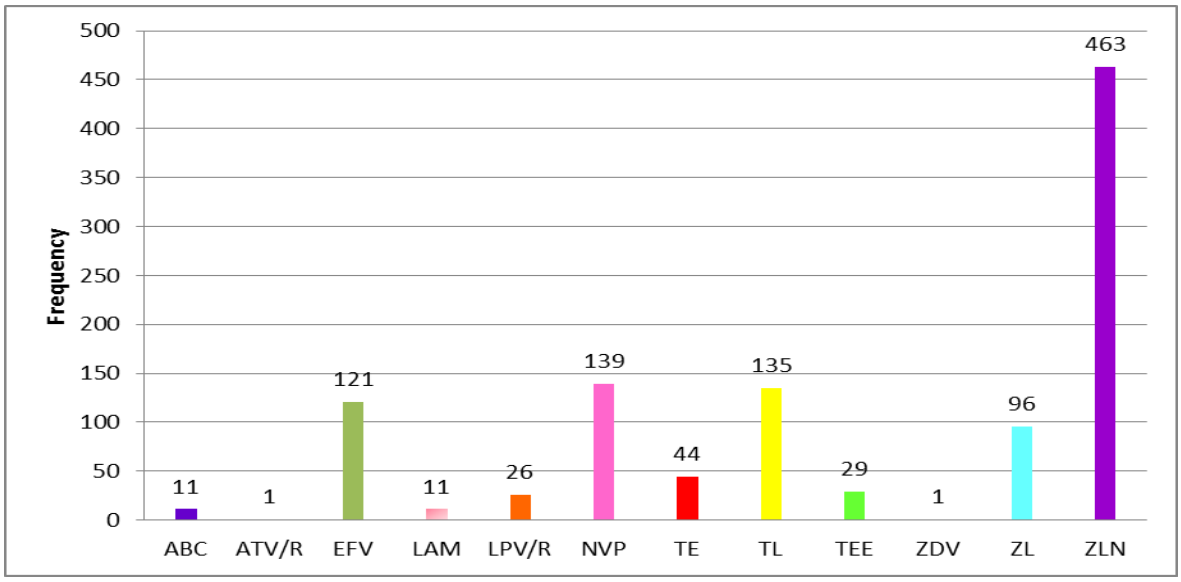

Figure 1: Antiretroviral medicines that were dispensed to the HIV/AIDS patients

Legend

ABC: Abacavir;
ATV/R: Atazanavir/Ritonavir;
EFV: Efavirenz;
LAM: Lamivudine;
LPV/R: Lopinavir/Ritonavir;
NVP: Nevirapine;
TE: Tenofovir/Emtricitabine;
TL: Tenefovir/Lamivudine;
TEE: Tenofovir/Emtricitabine/Efavirenz;
ZDV: Zidovudine;
ZL: Zidovudine/Lamivudine;
ZLN: Zidovudine/Lamivudine/Nevirapine.

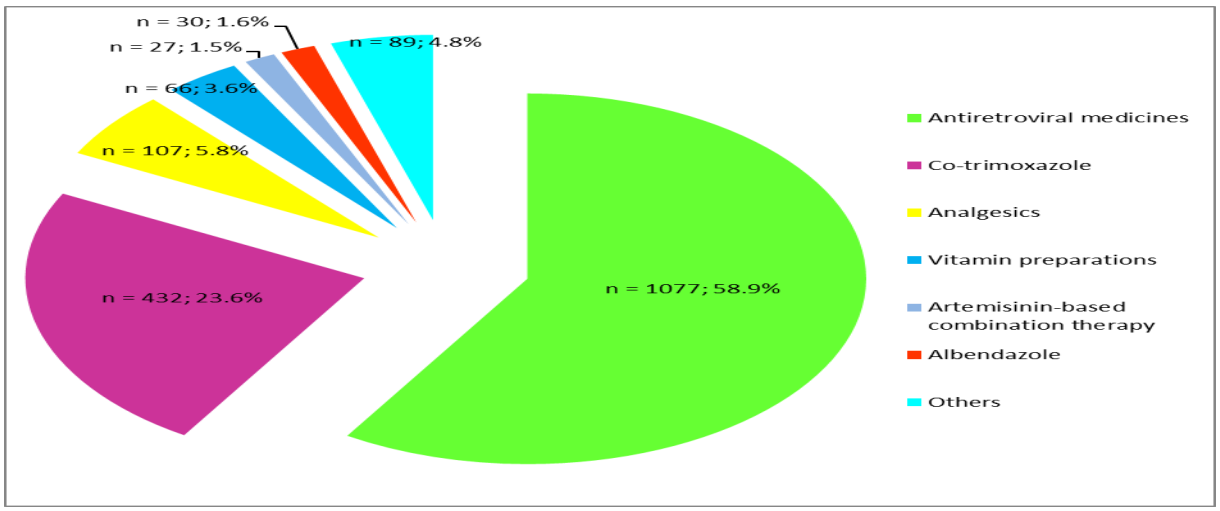

Figure 2: Medicines dispensed to the HIV/AIDS patients

Antiretroviral medicines (ARVs) constituted 58.9% of all the medicines (N = 1828) that were dispensed to the 780 HIV/AIDS patients (Figure 2). Of the non-antiretroviral medicines (NARVs), co-trimoxazole (co-trimoxazole preventive therapy [CPT]) constituted 23.6%, analgesics was 5.8% while artemisinin-based combination therapy (ACT) was 1.5%. Furthermore, 55.3%, 13.7% and 3.5% of the 780 HIV/AIDS patients received CPT, analgesics and ACT respectively. None of the patients received isoniazid preventive therapy (IPT).

All the patients (100%) were instructed on the use of dispensed medicines. They were all knowledgeable about route of administration of dispensed medicines. Almost all the study participants (99.9%) were knowledgeable about the quantity of medicines to be administered for 99.9% of the dispensed medicines. Additionally, 99.2% of the study participants were knowledgeable about the frequency of administration of 99.6% of the dispensed medicines (Table 3).

Table 3: Patients' knowledge about the administration of dispensed medicines

Variable	Frequency (%)
What quantity of each medicine are you to take?	
Number of patients having right knowledge	779 (99.9)
Number of patients having wrong knowledge	1 (0.1)
Number of medicines on which patients have right knowledge	1826 (99.9)
Number of medicines on which patients have wrong knowledge	1 (0.1)
How many times are you to take the medicines each day?	
Number of patients having right knowledge	774 (99.2)
Number of patients having wrong knowledge	6 (0.8)
Number of medicines on which patients have right knowledge	1820 (99.6)
Number of medicines on which patients have wrong knowledge	7 (0.4)

Almost all the study participants (96.7%) had knowledge of the general precaution to avoid concomitant use of the dispensed medicines with alcoholic beverages (Table 4). Also, 739 (94.8%) of the study participants knew of the precaution to avoid concomitant use of the dispensed medicines with herbs.

The precaution to use water instead of other liquids as 'vehicle' for the administration of dispensed oral solid dosage medicines was known to most (95.5%) of the study participants (Table 4).

Table 4: Patients' knowledge of general precautions of dispensed medicines

Variable	Frequency (%)
Can you take this medicine together with alcoholic beverages? (N = 780)	
Yes	5 (0.6)
No	754 (96.7)
Do not know	21 (2.7)
Number of medicines on which patients have right knowledge	1768 (96.8)
Number of medicines on which patients have wrong knowledge	11 (0.6)
Number of medicines on which patients do not know if the medicine can be taken together with alcoholic beverages	48 (2.6)
Can you take this medicine together with herbs? (N = 780)	
Yes	5 (0.6)
No	739 (94.8)
Do not know	36 (4.6)
Number of medicines on which patients have right knowledge	1723 (94.3)
Number of medicines on which patients have wrong knowledge	15 (0.8)
Number of medicines on which patients do not know if the medicine can be taken together with herbs	89 (4.9)
Is it best to use water as the liquid to swallow the medicines? (N = 780)	
Yes	745 (95.5)
No	5 (0.6)
Do not know	30 (3.9)
Number of medicines on which patients have right knowledge	1740 (95.4)
Number of medicines on which patients have wrong knowledge	10 (0.6)
Number of medicines on which patients do not know that it is best to use water as the liquid to swallow the medicines	73 (4.0)

With regards to specific precautions to be observed while taking the medicines, majority (93.7%) of the patients who received Co-trimoxazole Prevention Therapy (CPT) were knowledgeable of the precaution, to use 'plenty' water (a tumbler full; 250 ml) as the 'vehicle' for its administration (Table 5). Also, all the patients who received pyrimethamine+sulfadoxine, loratadine and erythromycin tablets had the knowledge about this precaution to use plenty water (a tumbler full; 250 ml) as the 'vehicle' for their administration (Table 5).

However, none of the HIV/AIDS patients who received azithromycin and doxycycline capsules; ciprofloxacin, pefloxacin, ferrous sulfate and erythromycin tablets had knowledge of the precaution to avoid concomitant use of these medicines with antacids/hematinics (blood tonic)/milk (Table 5).

Table 5: Patients' knowledge of specific precautions of dispensed medicines

Variable	Frequency (%)
Should 'plenty' water (a tumbler full; 250 ml) be used to swallow this medicine?	
A: co-trimoxazole tablet (n = 431)	
Yes	404 (93.7)
No	8 (1.9)
Do not know	19 (4.4)
B: Pyrimethamine plus sulfadoxine tablet (n = 4)	
Yes	4 (100.0)
No	0 (0.0)
C: Loratadine tablet (n = 2)	
Yes	2 (100.0)
No	0 (0.0)
D: Erythromycin tablet (n = 2)	
Yes	2 (100.0)
No	0 (0.0)
Can you take this medicine together with antacids/hematinics (blood tonic)/milk?	
A: Azithromycin tablet (n = 5)	
Yes	5(100.0)
No	0 (0.0)
B: Doxycycline (n = 2)	
Yes	2 (100.0)
No	0 (0.0)
C: Ciprofloxacin tablet (n = 10)	
Yes	10 (100.0)
No	0 (0.0)
D: Perfloxacine tablet (n = 1)	
Yes	1 (100.0)
No	0 (0.0)
E: Ferrous sulphate (n = 6)	
Yes	6 (100.0)
No	0 (0.0)
F: Erythromycin tablet (n = 2)	
Yes	2 (100.0)
No	0 (0.0)

There was no statistically significant association (Table 6) between the patients' knowledge about the quantity of the dispensed medicines to be administered and the duration of antiretroviral therapy ($p < 0.05$).

There was also no statistically significant association between the patients' knowledge about the frequency of administration of dispensed medicines and the duration of antiretroviral therapy ($p < 0.05$).

Table 6 : Associations between patients' knowledge about the administration of dispensed medicines and duration of antiretroviral therapy (years) (N = 780)

Variable	Patient's knowledge Yes n (%)	No n (%)	Fisher's Exact Test P-value
Patients' knowledge about the quantity of medicines to be administered			
Duration of antiretroviral therapy (years)			
< 3.000	447 (100.0)	0 (0.0)	
≥ 3.000	332 (99.7)	1 (0.3)	0.427
Patients' knowledge about the frequency of administration of the dispensed medicines			
Duration of antiretroviral therapy (years)			
< 3.000	444 (99.3)	3 (0.7)	
≥ 3.000	330 (99.1)	3 (0.9)	0.704

The knowledge of the patients about the precautions to avoid concomitant use of the dispensed medicines with alcoholic beverages or herbs had no statistically significant associations with the duration of antiretroviral therapy (DART [$p < 0.05$]).

Furthermore, the knowledge of the patients about the precautions to use water instead of other liquids as 'vehicle' for administration of oral solid dosage medicines or use 'plenty' water (250 ml; tumbler full) as the 'vehicle' for administration of co-trimoxazole tablet had no statistically significant associations with the DART ($p < 0.05$ [Table 7]).

Table 7: Associations between patients' knowledge about the precautions of dispensed medicines and duration of antiretroviral therapy (years)

Variable	Patient's knowledge Yes n (%)	No n (%)	Fisher's Exact Test P-value
Patients' knowledge about precaution to avoid concomitant use of dispensed medicines and alcoholic beverages			
Duration of antiretroviral therapy (years) (N = 759)			
< 3.000	428 (99.1)	4 (0.9)	
≥ 3.000	326 (99.7)	1 (0.3)	0.397
Patients' knowledge about precaution to avoid concomitant use of dispensed medicines and herbs			
Duration of antiretroviral therapy (years) (N = 744)			
< 3.000	422 (98.9)	5 (1.1)	
≥ 3.000	317 (100.0)	0 (0.0)	0.075
Patients' knowledge to use water instead of other liquid as 'vehicle' for oral solid dosage medicines			
Duration of antiretroviral therapy (years) (N = 750)			
< 3.000	428 (98.8)	5 (1.2)	
≥ 3.000	317 (100.0)	0 (0.0)	0.077
Patients' knowledge to use 'plenty' (250 ml or tumbler full) as 'vehicle' for co-trimoxazole tablet			
Duration of antiretroviral therapy (years) (N = 404)			
< 3.000	281 (97.2)	8 (2.8)	
≥ 3.000	123 (100.0)	0 (0.00)	0.427

DISCUSSION

Of the 780 HIV/AIDS patients who participated in this study, the gender ratio of one male to three females (1:3) does not corroborate the findings of an earlier study (FMOHN, 2003) in which 49% male HIV/AIDS patients participated in the study while 51% were female HIV/AIDS patients. The difference could be due to the participants' treatment seeking behaviour and the location of the studies.

The age distribution with regards to modal age class (31 - 40 years), modal age (35 years) and median age (38 years) fall within the reproductive age that is most affected by HIV/AIDS. This is similar to the findings of earlier study in which the mean age is 33.6 ± 8.5 years (Oku *et al.,* 2013). The finding that about three-quarters (71.8%) of the participants had annual income below N120, 000 (₦ 329 per day) is below the poverty threshold ($1.25 [₦400] per day). Also, the finding that 87.4% of the participants had annual income below N240, 000 (₦ 658 per day) is similar to that of an earlier study (Oku *et al.,* 2013) in which 77% of the study participants had annual income below N228, 000 (₦ 625 per day). This finding is not surprising since poverty is one of the social risk factors for HIV/AIDS. This low level of annual income among participants could result in patient non-adherence to hospital appointments (Kagee *et al* 2011) and access to medication with consequent development and spread of resistant strains of the virus which negates all efforts put in place to control the HIV pandemic. More than one-third (36.1%) of the study participants had no formal education which could be responsible for the low annual income of participants. This is not consistent with the findings of an earlier study (Oku *et al.,* 2013) in which only 5% the study participants had no education. This could be due to the difference in locations of the study. The earlier study was in Southern Nigeria while this study was in North Central Nigeria. The distribution of the study participants with regards to ethnicity could be due to the location of the study (Kwara State in North Central Nigeria).

The maximum duration of illness since diagnosis (12.6) years and maximum duration of antiretroviral therapy (12.5) years amongst the participants, could be indication of good treatment seeking behaviour which could stem the transmission of HIV. These findings confirmed the success associated with use of antiretroviral medicines in the management of HIV/AIDS thereby revolutionizing the prognosis of HIV/AIDS from being an inherently untreatable infection to a controllable, chronic disease (May *et al.,* 2006; Weiss, 2008; Mahungu *et al.,* 2009; Broder, 2010). The duration of ART is not surprising since ART programme in Nigeria commenced on January 2002 (FMOHN, 2003).

As regards the patients' knowledge about administration of dispensed medicines, the findings of this study revealed that almost all the patients were knowledgeable about the administration of almost all the dispensed medicine with regards to the quantity of medicines to be administered and frequency of administration. All the patients knew the route of administration of all the dispensed medicines. The findings of this study are similar to the findings of an earlier study in Western Nepal (Upadhyay *et al.,* 2008) where all the patients knew the time of use of their medicines and duration of therapy. However, the patients' knowledge about administration of dispensed medicines in this study is high compared to the findings obtained from studies in Cambodia (Chareonkul *et al.,* 2002), West Nepal (Alam *et al.,* 2006), Bhopal (De Costa *et al.,* 2006), Sudan (Awad and Himad, 2006) and West Bengal (Hazra *et al.,* 2000). The patients' knowledge about administration of dispensed medicines obtained in this study could be due to better communication skills of the dispensers and better healthcare providers/patient relationship. This knowledge of patients about the administration of the dispensed medicines enhances adequate adherence since inadequate knowledge of patient about medicine administration is one of the deterrents of adherence (Spivey, 1997; FMOHN, 2010).

The patients' knowledge of general precaution to be observed while taking the medicines is very high (> 93%) compared to that of an earlier study in which 50% of the patients knew of the precaution they needed to observe while taking their medication (Marfo *et al.,* 2013). This could be due to the health education the patients received at the HIV treatment center on each clinic visit before the prescribers' consultation. This implies that patients are more likely to adhere to their medications, preventing potential drug interactions and adverse drug reactions from becoming actual occurrences (prevention of potential medicine therapy problems from becoming actual medicine therapy problem). These would result in attainment of optimal plasma concentration of ARVs. This has positive public health implications. These include suppression of viral replication and prevention of HIV progression to AIDS; decreased transmissibility HIV infection, HIV-related morbidity and mortality; and improvement on the quality of life and well-being of the PLWHA.

However, the patients' knowledge of specific precaution such as avoidance of concomitant use of azithromycin, doxycycline, ciprofloxacin, pefloxacin, ferrous sulfate and erythromycin with antacids/hematinics (blood tonic)/ milk/ is lacking among all respondents who received these medicines. This is different from the finding of an earlier study in which 50% of the patients knew of the precaution they needed to observe while taking their medication (Marfo *et al.,* 2013). The patients' lack of knowledge about the specific precautions to be observed while taking the medicines could result in actual medicine therapy problems such as drug interactions and adverse drug reactions with consequent under-dose leading to sub-optimal medicine plasma levels and development of antiretroviral medicines resistance or over-dose resulting

in toxicities, even death (Evans–Jone *et al.*, 2010). Thus, the patients would not benefit optimally from the use of the prescribed medicines. The public health implications include non-suppression of viral replication and progression of HIV to AIDS; obsolescence of efficacious life–saving ARVs; increased transmissibility HIV infection, HIV-related morbidity and mortality; and deterioration of the quality of life and well-being of the PLWHA.

The patients' lack of knowledge about the specific precautions to be observed while taking the medicines could be due to inadequate patient counselling. Since the pharmacy is the last patient contact with the healthcare system, it is imperative that patients receive adequate information for the appropriate medicine in order to benefit optimally from the medicines (FMOHN, 2005).

The patients' knowledge about the administration of dispensed medicine is not significantly associated with duration of antiretroviral therapy (DART). This could due to proper patient counselling with regards to the administration of the ARVs. Additionally, the patients' knowledge about general precautions to be observed while taking the medicines is not statistically significantly associated with DART. This could be due to the health education the patients received at the HIV treatment center on each clinic visit before the prescribers' consultation.

CONCLUSION

The HIV/AIDS patients were knowledgeable about the administration of dispensed medicines (ARVs and NARVs) and general precautions to be observed while taking the medicines. However, the patients had poor knowledge of specific precautions of the dispensed medicines. The study therefore recommends improvement on patient counselling with regards to medicine-specific precautions the patients need to observe while taking dispensed medicines.

ACKNOWLEGEMENTS

The authors wish to express their gratitude to the management and staff of the HIV Treatment Centers of University of Ilorin Teaching Hospital, Ilorin; Specialist Hospital, Sobi, Ilorin; General Hospital, Offa; General Hospital, Omuaran; General Hospital, Lafiagi; Comprehensive Health Center, Shonga; Cottage Hospital, Adewole, Ilorin and Civil Service Hospital Ilorin. Their invaluable supports and contributions to this work are highly appreciated.

REFERENCES

Adewuya, A.O., Afolabi, M.O., Ola, B.A., Ogundele, O.A., Ajibare, A.O., Oladipo BF, *et al*. (2010). The effect of psychological distress on medication adherence in person with HIV infection in Nigeria, *Psychosomatics*, 51(1): 68-73.

Alam, k., Mishra, P., Prabhu, M., Shankar, P.R., Palaian, S. and Bhandari R.B. (2006). A study on rational prescribing and dispensing in outpatients in a tertiary care teaching hospital of Western Nepal. *Kathmandu University Medical Journal*, 4(4): 436-443.

Araoye, M.O. (2004). Research Methodology with Statistics for Health and Social Sciences. Ilorin: Nathadex Publishers.

AVERT (2015). HIV and AIDS in Nigeria. Available from http://www.avert.org/professionals/hiv-around-world/sub-saharan-africa/nigeria. Accessed on 6/6 2016.

AVERT (2012). Worldwide HIV and AIDS Statistics. Available from http://www.avert.org/worldstats.htm. Accessed on 28/07/2012.

Awad, A. and Al-Saffar, N. (2010). Evaluation of drug use practices at primary healthcare centers of Kuwait. *European Journal of Clinical Pharmacology*, 66(12): 1247-1255.

Awad, A.I. and Himad, H.A. (2006). Drug-use practices in teaching hospitals of Khartoum State, Sudan. *European Journal of Clinical Pharmacology*, 62(12): 1087-1093.

Broder S. (2010). The development of antiretroviral therapy and its impact on HIV-1/AIDS pandemic. *Antiviral Research*, 85(1): 1-18.

Chareonkul, C., Khun, V.L. and Boonshuyar, C. (2002). Rational drug use in Cambodia: study of three pilot health centers in Kampong Thom Province. *Southeast Asian Journal of Tropical Medicine and Public Health*, 33(2): 418-424.

De Costa, A., Bhartiya, S., Eltayb, A., Nandeswar, S. and Diwan, V.K. (2008). Patterns of drug use in the public sector primary health centers of Bhopal. *Pharmacy World & Science*, 30(5): 584-549.

Evans–Jone, J.G., Cottle, L.E., Back, D.J., Gibbson, S., Beeching, N.J., Carey, P.B. *et al*. (2010). Recognition of risk of clinically significant drug interactions among HIV infected patients receiving antiretroviral Therapy. *Clinical Infectious Diseases*, 50 (10): 1419-1421.

Federal Ministry of Health, Nigeria (2005). National Drug Policy. Abuja: Federal Ministry of Health.

Federal Ministry of Health, Nigeria (2007). Guidelines for the use of Antiretroviral (ARV) Drugs in Nigeria.

Federal Ministry of Health, Nigeria (2010). National Guidelines for HIV and AIDS treatment and care in adolescents and adults. Abuja, Nigeria: Federal Ministry of Health.

Federal Ministry of Health, Nigeria/ World Health Organization (2003). Situation of antiretroviral drug use in Nigeria. Abuja, Nigeria: Federal Ministry of Health.

Fisher, A.A., Lang, J.E., Stoekel, J.E. and Townsend, J.W. (1998). *Handbook for family planning and operation Design*. 2nd edition. New York: Population Council New York.

Hazra, A., Tripathi, S.K. and Alam, M.S. (2000). Prescribing and dispensing activities at the health facilities of a non-governmental organization. *National Medical Journal of India*, 13(4): 177-182.

Joint United Nations Programme on HIV/AIDS (UNAIDS) (2015) .Global statistics. Available from http://www.unaids.org/en/resources/campaigns/HowAIDSchangedeverything/factsheet. Accessed on 6/6 2016.

Kagee, A., Remien, R.H., Berkman, A., Hoffman, S., Campos, L. and Swartz, L. (2011). Structural barriers to ART in Southern Africa: challenges and potential ways forward. *Global Public Health*, 6(1): 83-97.

Kwara State Ministry of Planning and Economic Development (2010). *Facts and Figure about Kwara State*. Ilorin: Kwara State Ministry of Planning and Economic Development.

Mahungu, T.W., Roger, A.J. and Johnson, M.A. (2009). HIV as a chronic disease. *Clinical Medicine (London)*, 9(2): 125-128.

Marfo, A.F., Owusu-Daaku, F.T. and Kyerewaa-Akromah, E. (2013). Patient knowledge of medicines dispensed from Ghanaian community pharmacies. *Pharmacy Practice. (Granada)*, 11(2): 66-70.

May, M.T., Sterne, J.A., Costagliola, D., Sabin, C.A., Philips, A.N., Justice, A.C., *et al*. (2006). HIV treatment response and prognosis in Europe and North America in the first decade of highly active antiretroviral therapy: a collaborative analysis. *Lancet*, 5; 368 (9534): 451-458.

National Population Commission of Nigeria. 2015. Available from http://www.citypopulation.de/php/nigeria-admin.php?adm1id=NGA024. Accessed on 5/6/2015.

Oku, A.O., Owoaje, E.T., Oku, O.O. and Monjok E. (2013). Prevalence and determinants of adherence to Highly Active Antiretroviral Therapy (HAART) amongst a cohort of HIV positive women accessing treatment in a tertiary health facility in Southern Nigeria. *Journal of HIV/AIDS & Infectious Diseases*, 1: 1-8.

Shaahu, V.N., Lawoyin, T.O. and Sangowawa, A.O. (2008). Adherence to highly active antiretroviral therapy (HAART) at a Federal Medical Centre. *African journal medicine and medical sciences*, 37(1): 29-36.

Spivey, P.D. (1997). Ensuring good dispensing practices. In: Quick, J.A., Rankin, J.R., Laing, R.O., O'connor, R.W., Hogerzeil, H.V., Dukes, M.N.G. *et al* (eds). *Managing Drug Supply*. 2nd ed. Connecticut USA: Kumarin Press.

Upadhyay, D.K., Palaian. S., Shankar, P.R. and Mishra, P. (2008). Rational drug prescribing and dispensing in tertiary care teaching hospital of Western Nepal. *Journal of Institute of Medicine*, 30(2): 33-38.

Weiss, R.A. (2008). Special anniversary review: twenty five years of human immunodeficiency virus research: success and challenges. *Clinical & Experimental Immunology*, 152(2): 201-210.

World Health Organization. (2002). Promoting rational use of medicines: core components. *WHO Policy Perspectives on Medicines*, 5: 1-6.

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Conflict of Interest: None declared

Received: 9 September, 2016

Accepted: February 15, 2017