

Knowledge and Attitudes of HIV Infected Patients on the Adverse Effects of Antiretroviral Medicines in Ghana

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Abstract

Antiretroviral Therapy (ART) is effective in reducing morbidity and mortality in patients living with HIV/AIDS (PLWHA). However, Adverse Effects (AEs) to ART pose major problems and threaten adherence to therapy. We evaluated the knowledge and attitudes of patients to ART following routine adherence counselling and education in the Korle Bu Teaching Hospital in Accra, Ghana. This cross-sectional study was conducted by administering a questionnaire on socio-demographics, knowledge of AEs of antiretrovirals and attitude to AEs to 98 patients who were on antiretroviral therapy. A 3-point Likert-scale was used to assess knowledge of AEs of ART and a 5 point Likert-scale to assess attitudes to AEs. Mean rated scores for attitude to AEs were estimated and factor analysis was used to reduce the dimensions of the attitudes observed to identify relevant latent constructs. Sixty one percent of participants were females and most of the participants were aged 35-44 years (35%). Ninety nine percent of participants answered that they had been counselled on unpleasant effects of their medicines and 93% knew that all medicines could cause some unpleasant effects. Concerning attitude, 90% of study participants strongly agreed that they benefit from their medicines and get better taking them (mean rated score=4.87 ± 0.49) whilst 27% strongly agreed that medicines may have side effects (mean rated score=3.12 ± 1.55). Majority of the study participants (74%) strongly disagreed that there was no need to tell their doctor/pharmacist about AEs to antiretrovirals (mean rated score=4.60 ± 0.83). Factor analysis yielded two underlying dimensions (cognitive and behavioural/affective aspects) that described participants' attitude towards AEs. Study participants rating for participants' knowledge on AEs was good and exhibited positive attitudes to AEs of ART. Adherence counselling and education provided to PLWHA before initiation of antiretroviral therapy is beneficial and should be continued.

Keywords: Antiretroviral therapy; Adverse effects; Attitude; Knowledge; Factor analysis; PLWHA

Abbreviations:

AEs: Adverse Effects; ART: Antiretroviral Therapy; KBTH: Korle-bu Teaching Hospital; KMO: Kaiser-Meyer-Olkin; PLWHA: Patients Living with HIV/AIDS; RMS: Rated Score Means

Introduction

Antiretroviral Therapy (ART) has been very effective in reducing rates of morbidity and mortality in patients living with HIV/AIDS [1-3]. If started early or the right time, current ART substantially reduces HIV-related morbidities, lowers risk to premature death and improves the quality of life for prolonged periods. The viral suppressive effect of ART leads to reductions in infectivity and lowered likelihood of disease transmission among sexual partners. These attributes and benefits are strong infection prevention paths of HIV therapy [4,5] and

have resulted in improved health seeking attitudes in patients leading to an improved quality of life for patients living with the condition.

Antiretroviral therapy improves the quality of life of patients and also reduces mortality and morbidity, but Adverse Effects (AEs) accompanying the use of ART can deter treatment, impact quality of life and impede adherence to ART [6]. These AEs from ART are often linked to lower levels of medication adherence and result in discontinuation of otherwise appropriate and effective therapy [7]. Adherence counselling sessions with patients normally focus on known AEs associated with specific ARTs in use, and therefore this study reported on such AEs. Early onset of adverse effects of ARVs include gastrointestinal such as diarrhoea, nausea, vomiting and flu-like symptoms, headache, dizziness, vivid dreams, rash and hepatitis [7].

Some studies have shown that there are significant deficits in patients' knowledge of their medications and their adverse effects while others reported good knowledge [8-10]. Patients' good or poor

perceptions on AEs result in attitudes, which positively or negatively affect the benefits of antiretroviral therapy or lead to poor compliance and discontinuation in the management of HIV. In addition, AEs could impact physically and psychologically on patients resulting in the development of attitudes like the avoidance in seeking treatment, reporting AEs or deciding to use alternative medicines on their own.

Knowledge is defined as facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject [11]. A study conducted in Gabon [12], concluded that patients want to be provided the complete drug information including the side effects and any difficulties that could be experienced. Another study supported the fact that we need to educate and manage the AEs of medicines on patients to motivate and retain them in chronic disease treatment [13]. Generally, patients dislike the discretion of health professionals to pick and choose when to educate them about their clinical condition or the medicines they are being given [14].

An attitude is defined as "A relatively enduring organization of beliefs, feelings, and behavioural tendencies towards socially significant objects, groups, events or symbols" [15] and has a structure which can be described in three ways. First, an affective component involving one's feelings and emotions, e.g. "I am afraid of the AEs of my medicines." Second, a behavioural component where one acts as a result of e.g. "I will not persist in taking my medicines" and third the cognitive aspect which involves one's knowledge/ beliefs about an attitude object like medicines e.g. "I get better when I take my medicines". Even though, every attitude has these three components, an individual's particular attitude can reflect one of the components more than the others. We can therefore summarise these components as affective based, behavioural based and cognitively based attitudes. These components of attitude emerged in studies of adherence, where non-adherence has been linked to several outcomes. These outcomes include doubts on treatment efficacy, concerns about side effects as well as long-term toxicities, challenges associated with meeting scheduling demands and personal capacity to adhere to treatment. Also, concerns about the impact of ART on self-identity, and the possibility of treatment leading to disclosure of one's HIV status [8,16,17].

Several studies have been conducted to assess the knowledge, attitudes, and practices of patients as regards AEs to ART [18-20]. A study in Nigeria [21] reported good knowledge of AEs and positive attitudes, whereas another study [10] reported significant deficits in patients' knowledge leading to poor attitudes culminating in discontinuation of therapy. Another study in Nigeria concluded that respondents with good knowledge about the AEs of ARTs present positive attitudes, which results in better adherence to ART than those with poor knowledge [22].

Since 2003, when antiretroviral services were introduced in Ghana, no study has been done to assess the knowledge, attitude and practices of PLWHA to AEs of ART at the KBTH. The present study therefore is aimed at improving patient care by investigating the level of knowledge, the attitudes and practices of these patients with a view to identify any gaps in their knowledge which could be affecting their behaviours. We adopted a similar approach to the study carried out in Nigeria [21] but emphasized on three different components of attitude namely affective, behavioural and cognitive. We used factor analysis to help identify and differentiate these components.

Materials and Methods

Study area

The study was carried out in the Fevers Unit and the Pharmacy Department of the Korle Bu Teaching Hospital in Accra, Ghana.

Study design

This is a cross-sectional study. We collected primary data from answers to questionnaires served on HIV patients attending review clinics at the Korle-bu Teaching Hospital, to evaluate their knowledge and attitudes on the Antiretroviral Therapy (ART) they receive. Participants had received routine adherence counselling and education.

Study population

About 10,000 patients living with HIV/AIDS receive ART from the Korle Bu Teaching Hospital. From this number, about 1000 patients are attended to monthly. The sample size was determined by the assumption that at least 10 study participants for each questionnaire items used as proposed by Nunnally [23]. Based on the 6-questionnaire items used for attitude to the adverse effects of HIV medicines, 15 study participants were sampled for each of the attitude questionnaire item giving a minimum sample size of 90 study participants. A total of 100 patients were sampled as study participants for this study. Patients were approached on three clinic days of Mondays, Wednesdays, and Fridays weekly for a month. Ten patients were randomly selected from the list of patients' attendance on that day. All adult HIV-positive patients above the age of 18 years currently receiving ART at the pharmacy department for more than six months and who agreed to sign informed consent form were eligible for the study. Study participants were recruited and administered the questionnaire at the Pharmacy Department of the Korle-Bu Teaching Hospital.

Data collection methods and instruments

An 18-item questionnaire with a 3-point Likert-scale format was used to assess knowledge of AEs of ART and a 5-point Likert-scale to assess attitudes to AEs. The study instrument covered three sections namely socio-demographic information (6-questionnaire items), knowledge of adverse effects of HIV medicines and proposed action if participants were to experience such AEs (6-questionnaire items), and attitude to the adverse effects of HIV medicines (6-questionnaire items). The administration of the instrument to study participants was done by the study team.

Data analysis

Data analysis was done using SPSS version 16. Descriptive statistics of the responses were estimated. Chi-square test was conducted to test differences between socio-demographic variables among participants. P values were two-tailed and $P < 0.05$ used to determine statistical significance.

The Likert rating scale used was: strongly disagree=1, disagree=2, neutral=3, agree=4 and strongly agree=5. The negatively worded items were reverse coded so that higher scores represent higher knowledge and attitudes. Rated attitude scores were treated as interval data suited for quantitative analysis. Rated Score Means (RSM) were computed for each of the six individual questionnaire attitude items by summing

individual scores for that questionnaire item and dividing by the total number of participants who responded to that questionnaire item. An average midpoint for all the six questionnaire items (on attitude to adverse effects of HIV medicines) was calculated as the sum of the rated score means calculated divided by the six questionnaire items. Individual questionnaire items with rated score means above the average midpoint were regarded as positive attitudes while below the mid-point were considered as negative attitudes [21]. To confirm whether the questionnaire items generated responses associated to other constructs that could not be directly measured; we conducted a confirmatory factor analysis, a data reduction tool which removes duplication from a set of correlated variables. We first used the Kaiser-Meyer-Olkin (KMO) measure to determine whether the sampling was adequate for factor analysis. KMO values greater than 0.5 are termed adequate, whilst values of 0.7 and 0.8 are considered good. Values greater than 0.90 are rated as "superb" for factor analysis [24]. Bartlett's test of sphericity was also performed. A value less than 0.05 indicate that a factor analysis may be useful with the obtained variables. Factor analysis was performed using principal components extraction [25] and varimax rotation with Kaiser normalization. Factors selected for rotation had eigenvalues greater than 1. The relationship of each variable to the potential underlying construct is expressed by the factor loading, which can be interpreted in a similar way as standardized regression coefficients. Items with factor loadings greater than or equal to 0.40 were considered important, and loadings of 0.50 or greater were considered very significant [25]. Reliability analysis was performed to determine the internal consistency of the questionnaire using Cronbach's alpha.

Ethical clearance

Ethical permission was obtained as part of the ongoing research work on the pharmacovigilance of antiretroviral medicines in use on patients living with HIV/AIDS from the College of Health Sciences, University of Ghana Ethical and Protocol Review Committee [MS-Et/M.6-P.5.3/2009-10]. Written consent was also obtained from each study participant.

Results

Of the 98 study participants, 61% (n=60) were female, 35% (n=34) were between the ages of 35-44 years old; 49% (n=48) were married, 78% (n=76) were Christians with 60% (n=59) having completed secondary/tertiary education. A total of 61% (n=60) reported to be self-employed (Table 1).

Of the 98 participants, 99% (n=97) reported to have been counselled on the AEs of their medicines: 93% (n=91) said they knew that all medicines cause AEs irrespective of how good they were and a 65% (n=64) were aware of the AEs of their ART and what to do in the event of AEs (Table 2).

Majority of the patients 82% (n=80) indicated they will report suspected AEs to their healthcare professional whilst a few 6% (n=6) indicated that they will choose other drugs to administer by themselves; 5% (n=5) were not prepared to do anything but relax and wait whilst 2% were prepared to use herbal medicines to treat AEs (Table 3).

Participant's knowledge of AEs in terms "all medicines irrespective of how good they are can cause some AEs", "knows unpleasant effects of ARVs" and "knowledge of what action to take when participants

experience AEs" had no association with gender, educational status, age, religion, marital status and type of occupation (data not shown).

Characteristic	N	%
Gender		
Female	60	61
Male	38	39
Age (years)		
25-34	16	16
35-44	34	35
45-54	29	30
55-64	17	17
>64	2	2
Marital status		
Single	24	24
Married	48	49
Divorced/Widowed/Separated	26	27
Religion		
Christianity	76	78
Muslim	22	22
Level of formal education		
None	10	10
Basic/Primary	29	30
Secondary	34	35
Tertiary	25	25
Type of occupation		
Unemployed	7	7
Self-employed	60	61
Formal employment	28	29
Others	3	3

Table 1: Demographic characteristics of respondents (N=98).

Concerning attitudes, 90% (n=88) strongly agreed that they benefit from their medicines with 36% agreeing that sometimes medicines have AEs which can worsen health conditions. However, a majority of patients (81%) strongly disagreed that AEs were their problem for which they should worry about and take responsibility, indicating positive attitude. Majority of patients (74%) also strongly disagreed that they will stop their medication if they know the AEs associated with them indicating positive attitude (Table 4). The estimated average midpoint for all rated score means was 4.31. The rated score means were higher than the midpoint of 4.31 in questionnaire items 1, 3, 4 and 6, indicating positive attitudes whereas they were lower for items 2 and 5, denoting negative attitudes (Table 4).

Type	Yes	No	Not sure
	n (%)	n (%)	n (%)
Were you educated about your clinical condition?	97 (99)	0 (0)	1 (1)
Were you counselled on the unpleasant effects of your medicines?	97 (99)	1 (1)	0 (0)
Do you know that all medicines irrespective of how good they are can cause some unpleasant effects?	91 (93)	4 (4)	3 (3)
Do you know the unpleasant effects of the particular medicines you are taking for your condition?	64 (65)	21 (22)	13 (13)
Do you know what to do when you experience some of these unpleasant effects suspected to be caused by your medicines?	69 (71)	16 (16)	13 (13)

Table 2: Knowledge of adverse effects of HIV medicines as reported by respondents (N=98).

If you know what to do when you experience unpleasant effects suspected to be caused by your medicines, please tell us? (N=98)	Response, n (%)		
	Yes	No	Not sure
Report to healthcare provider (doctor, pharmacist, etc.) at the hospital	80 (82)	1 (1)	2 (2)
Take another drug (s) to treat the suspected adverse effects	6 (6)	0 (0)	0 (0)
Relax and do nothing as the adverse effects will resolve as my body gets used to the medicines	5 (5)	1 (1)	0 (0)
Change the drug (s) suspected to cause the adverse effects of my medicines	0	0 (0)	0 (0)
Reduce the dose of the drug (s) suspected to cause the adverse effects	1 (1)	0 (0)	0 (0)
Use local herbal medicines to treat suspected adverse effects	2 (2)	0 (0)	0 (0)
Total	94	2	2

Table 3: Participants reported actions when they experience unpleasant effects to medicines.

	Strongly disagree n, %	Disagree n, %	Neutral n, %	Agree n, %	Strongly agree n, %	Rated score means (±SD)	Factor	
							1	2
1."I benefit from my medicines and I get better when I take them" (N=98)	1 (1)	0 (0)	0 (0)	9 (9)	88 (90)	4.87 (0.49)	-0.23	0.807
2."Medicines sometimes have adverse effects and can make one's health condition worse" (N=98)	26 (27)	13 (13)	3 (3)	35 (36)	21 (21)	3.12 (1.55)	0.285	0.675
3."It is of no use to ask my doctor or pharmacist about any unpleasant effects of my medicine because knowing will scare me from taking them as instructed" (N=98)	67 (68)	26 (27)	1 (1)	2 (2.0)	2 (2.0)	4.57 (0.80)	0.912	-0.11
4."It is of no use to tell my doctor or pharmacist about my unpleasant experience (side effects) with my medicines because I will end up getting more additional medicines" (N=98)	72 (74)	20 (20)	1 (1)	3 (3)	2 (2)	4.60 (0.83)	0.94	-0.13
5."Adverse effects of my medicines are my problem for which I should worry about and take responsibility" (N=98)	57 (58)	18 (18)	2 (2)	5 (5)	16 (16)	3.97 (1.52)	0.518	0.091
6."I will stop or feel scared to continue my medications if I know that my medicines can cause undesirable/horrible effects when I take them" (N=98)	79 (81)	15 (15)	0 (0)	3 (3)	1 (1)	4.71 (0.72)	0.73	0.17

Table 4: Attitudes towards adverse effects as reported by participants.

Factor analysis of the six questionnaire items yielded two underlying dimensions of attitude towards AEs of ART by patients with Eigen value of 1.0. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.669, and the Bartlett test of sphericity was statistically significant ($p < 0.001$), both confirming adequacy of the sample size for factor analysis. The internal consistency of the six questionnaire item attitudinal scale as measured by Cronbach's alpha was 0.531.

One dimension of the factor analysis consisted of the lowest four questionnaire items, i.e., 3, 4, 5 and 6; the other dimension consisted of the first two items namely 1 and 2. Using the criterion of an eigenvalue of 1.0, the two identified dimensions put together accounted for 63.7% of variability of the original six item variables. All the questionnaire items categorized into the two dimension constructs had communalities greater than 0.518 indicating high internal consistency (Table 4).

Discussion

This study evaluated the knowledge and attitudes of HIV positive patients on ART concerning adverse effects of their antiretroviral medicines following routine adherence counselling and education sessions. Majority of patients presented good knowledge and positive attitudes towards AEs of their medicines irrespective of possible discomfort they were likely to encounter. A few were not very comfortable with the possibility of adverse effects of their medications. Majority of the participants acknowledged that all medicines irrespective of how good they are, still present AEs. Importantly, more than half of these patients reported to know the AEs associated with their particular medicines and also what to do in the event of AEs. A study conducted in South Africa showed good knowledge of ART [11] but this sharply contrasted with findings by other investigators which reported poor knowledge [9,17]. The study designs were similar to what was employed in this study as knowledge was based on "patients self-report" events. In these studies, it was evident that good knowledge of the AEs of ART supports positive attitudes in patient medication-taking behaviour [9]. All the measured socio-demographic characteristics of the study participants were found not to be associated with knowledge of AEs. This is contrary to a study reported by Agu et al. in 2012 which found that knowledge of AEs was associated with female gender, self-employment status and older age [21]. This might be due to the low numbers in our sample size as compared with the multi-centre approach incorporating over 2329 patients from 36 public hospitals reported by Agu et al. [21]. Out of 98 participants, 80 (82%) were willing to report their AEs to their healthcare provider in the hospital, but 6 (6%) indicated they will take another drug to treat suspected AEs on their own as against 5 (5%) who preferred to relax and do nothing. These results are similar to a KAPS study in Nigeria [21]. Only 2% of the 98 patients were willing to use herbal medicine to resolve AEs of their medicines while one patient preferred to reduce the dose recommended personally. These indicate positive attitudes as the knowledge acquired obviously from the counselling session is preventing them from doing things their own way, usually supported by common sense beliefs about medicines, which are strongly influenced by subjective experiences of their illness and the innate fear of self-medication. A study by Horne et al. [17] also made similar findings and comments about knowledge and attitudes on the uptake and adherence to ART.

Majority of participants were convinced that they get better when they take their medicines, another positive attitude to drug therapy. An interesting point is an attitude statement like "medicines sometimes

have adverse effects and can make one's health condition worse" scoring higher than the midpoint therefore indicating a positive attitude. This indicates that awareness of the likelihood of AEs in reaction to their medications is not seen as a "bad thing" but rather an unavoidable effect of medicine use, which they must adapt to. Patients' experiences resulting from possible lower CD4 count and immune reconstitution syndrome effects, when they initially start ART, lead to severe AEs and this can influence negative attitudes. Previous studies [6,26,27], reported that AEs are often cited as lowering quality of life when the impact of ART is evaluated. However, patients who can adhere to their ART despite the initial discomfort soon experience a better quality of life and develop positive attitude to their medicine [28]. Regarding the rated score means, attitude items like "AEs of my medicines are my problem for which I should worry about and take responsibility" are clearly negative attitudes and scored a low of 3.97 below the midpoint of 4.31, clearly showing a negative tendency. The study reported by Agu et al. [21] had similar scorings below midpoint clearly reflecting negative attitudes. Such demonstrations of negativity are presented by patients who are developing neuroticism to long-term chronic therapy as demonstrated by Johnson and Neilands [7].

Of additional interest is the factor analysis, which reduced the six variable items of the questionnaire on attitude to 2-factor constructs which in general represented the components of attitude being reflected from the survey findings and supported the rated score means analysis of the results. The findings indicate that attitude variable items 1 and 2 (numbers stated on the questionnaire items in Table 4) carry similar latent attitudinal components as reflected by their scores and appear to lean towards the cognitive aspect of attitude. In other words, these participants will persist in adhering to their medication irrespective of AEs, believing they will get better and experience an improvement in their quality of life. On the other hand, items 3, 4, 5, and 6 carry the other aspects of attitude namely "behavioural and affective." Here, a patient may resign to the fears and emotions associated with AEs of ART and may choose not to discuss problems encountered with their healthcare professionals. This group of patients are likely to discontinue ART or may not adhere or comply with ART as expected. These two constructs of attitude resulting from the survey give an indication that although the education and counselling provided at ART initiation appear useful, continuous engagement, monitoring for signs of neuroticism and prompting of patients to report on the AEs they encounter could improve on the general outcomes of ART in PLWHA. This finding is corroborated by a study in Nigeria [29] which found that lack of adherence to ART medications and attrition or discontinuation from health services contribute to poorer health outcomes and waste limited resources. Identifying patient characteristics, which are associated with poorer outcomes, could be used for making evidence-based decisions to improve patient care. The findings of this study consistent with the findings of Agu et al. [21] that HIV patients are well informed about the AEs of their medications and the majority have positive attitudes towards reporting AEs to their health professionals. It also challenges previous studies [30] that argue that patients do not want to know about the AEs of their medicines. It also emphasizes the need for continuous engagement with patients to determine their challenges with AEs and quality of life perceptions. This could help identify attitudes, which could result in additional interventions to prevent treatment attrition, discontinuation, and neuroticism and help improve treatment outcomes.

The adherence counselling and education on the disease and drug therapy provided as part of the clinical care services may have

contributed to the better knowledge and positive attitudes of patients, but this survey clearly indicates that continuous education and counselling is necessary to achieve maximum outcomes. Other studies have also shown that patients desire to be told the full AEs of their medications and their attitudes should be continuously assessed to improve treatment outcomes and that health providers should not depend on their discretion alone to choose when and where to inform them [14]. Limitations of this study include the possibility of excluding very sick patients either on admission, defaulters over the period of the study and patients whose relatives refill their medication on proxy grounds. Again, some patients may have exaggerated their responses towards good knowledge attitudes to their medicines to impress the researcher (response bias) which may overestimate the effects being measured in this study. There may also be recall bias when responding to the survey questionnaire leading to the possibility of overestimating or underestimating the effects measured. The sample size of 98 study participants is also a limitation as it prevents possible generalization of the results to the population of PLWHA in Ghana.

Conclusion

In conclusion, most of the patients living with HIV/AIDS who participated in this study were counselled about their disease condition as well as the adverse effects of their antiretroviral medicines. Majority of patients reported good knowledge of, and positive attitudes to the adverse effects of their medicines. Good knowledge of AEs as reported by most patients may have influenced the positive attitudes towards medication taking habits of participants. The adherence counselling and education being provided should be continuous and not at the discretion of health professionals but as part of the clinical care services. The use of factor analysis in determining possible attitudinal traits could also help in determining the possibility of discontinuation of ART due to AEs by patient.

References

1. Agu KA, Ochei UM, Oparah CA, Onoh O (2010) Treatment outcomes in patients receiving combination antiretroviral therapy in central hospital Benin, Nigeria. *Trop J Pharm Res* 9: 1-10.
2. Coetzee D, Hildebrand K, Boule A, Maartens G, Louis F, et al. (2004) Outcomes after two years of providing antiretroviral treatment in Khayelitsha, South Africa. *AIDS* 18: 887-895.
3. Palella FJ, Delaney KM, Moorman AC, Loveless MO, Fuhrer J, et al. (1998) Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV Outpatient Study Investigators. *N Engl J Med* 338: 853-860.
4. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, et al. (2011) Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med* 365: 493-505.
5. Dieffenbach CW, Fauci AS (2009) Universal voluntary testing and treatment for prevention of HIV transmission. *JAMA* 301: 2380-2382.
6. Ammassari A, Murri R, Pezzotti P, Trotta MP, Ravasio L, et al. (2001) Self-reported symptoms and medication side effects influence adherence to highly active antiretroviral therapy in persons with HIV infection. *J Acquir Immune Defic Syndr* 28: 445-449.
7. Johnson MO, Neilands TB (2007) Neuroticism, side effects, and health perceptions among HIV-Infected individuals on antiretroviral medications. *J Clin Psychol Med Settings* 14: 69-77.
8. Altice FL, Mostashari F, Friedland GH (2001) Trust and the acceptance of and adherence to antiretroviral therapy. *J Acquir Immune Defic Syndr* 28: 47-58.
9. Cullen G, Kelly E, Murray FE (2006) Patients' knowledge of adverse reactions to current medications. *Br J Clin Pharmacol* 62: 232-236.
10. Cumber E, Wald H, Kutner J (2010) Lack of patient knowledge regarding hospital medications. *J Hosp Med* 5: 83-86.
11. Nachege JB, Lehman DA, Hlatshwayo D, Mthopeng R, Chaisson RE, et al. (2005) HIV/AIDS and antiretroviral treatment knowledge, attitudes, beliefs, and practices in HIV-infected adults in Soweto, South Africa. *J Acquir Immune Defic Syndr* 38: 196-201.
12. Nziengui U, Zamba C, Rev JL (2006) Difficulties of the patients to undergo their ARV treatment at the Libreville outpatient health centre, Gabon. *Bull Soc Pathol Exot* 99: 23-27.
13. Bartlett JA (2002) Addressing the challenges of adherence. *J Acquir Immune Defic Syndr* 29: S2-S10.
14. Ziegler DK, Mosier MC, Buenaver M, Okuyemi K (2001) How much information about adverse effects of medication do patients want from physicians? *Arch Intern Med* 161: 706-713.
15. Hogg M, Vaughan G (2005) *Social psychology*. London: Prentice-Hall.
16. Aversa SL, Kimberlin C (1996) Psychosocial aspects of antiretroviral medication use among HIV patients. *Patient Educ Couns* 29: 207-219.
17. Horne R, Cooper V, Gellaitry G, Date HL, Fisher M (2007) Patients' perceptions of highly active antiretroviral therapy in relation to treatment uptake and adherence: the utility of the necessity-concerns framework. *J Acquir Immune Defic Syndr* 45: 334-341.
18. Fadare JO, Enwere OO, Afolabi AO, Chedi B, Musa A (2011) Knowledge, attitude and practice of adverse drug reaction reporting among healthcare workers in a tertiary center in Northern Nigeria. *Trop J Pharm Res* 10: 235-242.
19. Hasford J, Goettler M, Munter KH, Muller-Oerlinghausen B (2002) Physicians' knowledge and attitudes regarding the spontaneous reporting system for adverse drug reactions. *J Clin Epidemiol* 55: 945-950.
20. Lazarou J, Pomeranz BH, Corey PN (1998) Incidence of adverse drug reactions in hospitalized patients: a meta-analysis of prospective studies. *JAMA* 279: 1200-1205.
21. Agu KA, Oparah AC, Ochei UM (2012) Knowledge and attitudes of HIV-infected patients on antiretroviral therapy regarding adverse drug reactions (ADRs) in selected hospitals in Nigeria. *Perspect Clin Res* 3: 95-101.
22. Olowookere SA, Fatiregun AA, Adewole IF (2012) Knowledge and attitudes regarding HIV/AIDS and antiretroviral therapy among patients at a Nigerian treatment clinic. *J Infect Dev Ctries* 6: 809-816.
23. Nunnally JC (1978) *Psychometric theory*. New York: McGraw Hill Inc.
24. Field AP (2000) *Discovering statistics using SPSS for windows: advanced techniques for the Beginner*. Illustrated, Reprint edn., London, England: SAGE p: 496.
25. Stewart DW (1981) The application and misapplication of factor analysis in marketing research. *JMR* 18: 51-62.
26. Volberding PA (2003) HIV therapy in 2003: consensus and controversy. *AIDS* 17: S4-S11.
27. Bates CM (1996) HIV medicine: drug side effects and interactions. *Postgrad Med J* 72: 30-36.
28. Butt TF, Cox AR, Lewis H, Ferner RE (2011) Patient experiences of serious adverse drug reactions and their attitudes to medicines: a qualitative study of survivors of Stevens-Johnson syndrome and toxic epidermal necrolysis in the UK. *Drug Saf* 34: 319-328.
29. Charurat M, Oyegunle M, Benjamin R, Habib A, Eze E, et al. (2010) Patient retention and adherence to antiretrovirals in a large antiretroviral therapy program in Nigeria: a longitudinal analysis for risk factors. *PLoS One* 5: e10584.
30. Hoang D, Dinh AT, Groce N, Sullivan LE (2015) Knowledge and perceptions of HIV-infected patients regarding HIV transmission and treatment in Ho Chi Minh City, Vietnam. *Asia Pac J Public Health* 27: NP746-NP757.