Adherence to antiretroviral therapy among people living with HIV and AIDS in Monze and Nyimba districts of Zambia

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Abstract

Background: The control of human immunodeficiency virus and acquired immune deficiency syndrome depends on several factors which include life-long commitment to antiretroviral therapy. Poor adherence to antiretroviral therapy leads to serious consequences such as drug resistance and eventually high morbidity and mortality. We assessed adherence to antiretroviral therapy and associated factors among people living with human Immunodeficiency virus and acquired immune deficiency syndrome.

Materials and methods: This cross-sectional study was conducted in Monze and Nyimba districts of Zambia. A simple random sample of 364 consenting participants attending antiretroviral therapy clinic was selected between February and March 2015. A structured interview schedule was used to collect data. Multivariate binary logistic regression analysis was carried out using IBM®SPSS® for windows version 20.0 to ascertain the factors associated with adherence to antiretroviral therapy among the participants.

Results: Of the 364 participants, 83.5% had high adherence to antiretroviral therapy while 16.5% had low adherence. Knowledge of antiretroviral therapy (OR 0.27, 95% CI: 0.14 - 0.54) and antiretroviral therapy clinic site (OR 2.34, CI: 1.25 - 4.40) were statistically significantly associated with adherence to antiretroviral therapy in our study.

Conclusion: Most of the participants were adherent to antiretroviral therapy. There is still need to give more information on human immunodeficiency virus and acquired immune deficiency syndrome and adherence to people living with human immunodeficiency virus and acquired immune deficiency syndrome especially before the initiation of antiretroviral therapy. Also, health care providers need to establish other possible barriers to antiretroviral therapy adherence so as to manage the patients better.

Keywords: Human Immunodeficiency Virus, Acquired Immune Deficiency Syndrome, Adherence, Antiretroviral Therapy

Background

The human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS) crisis is the worst the world has ever experienced. There were approximately 36.9 million people living with HIV and AIDS (PLWHA) at the end of 2014 with 2.0 million people becoming newly infected with HIV in 2014 globally [1].

The vast majority of PLWHA are in low- and middle-income countries. The sub-Saharan Africa to which Zambia belongs is the most affected region, with about 25.8 million PLWHA in 2014 and accounts for almost 70% of the global total of new HIV infections [1]. The majority of the HIV infected people are adults between 15 and 49 years. The significant higher proportions of the infected are women [1]. In Zambia, 13% of adults age 15-49 are infected with HIV (15% of women and 11% of men) with an estimated 30,000 deaths [2].

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The HIV continues to be a major global public health issue, having claimed more than 34 million lives so far. In 2014, about 1.2 million people died from HIV-related causes globally [1]. The HIV epidemic not only affects the health of individuals, it impacts households, communities, and the development and economic growth of nations. Many of the countries hardest hit by HIV also suffer from other infectious diseases, food insecurity, and other serious problems [3].

There is no cure for HIV infection. However, effective treatment with antiretroviral (ARV) drugs can control the virus so that people with HIV can enjoy healthy and productive lives and reduce the risk of transmitting the virus to others [1]. Thus, the WHO and Joint United Nations Programme on HIV and AIDS (UNAIDS) launched the "3 by 5" program to provide quality care with ART to 3 million PLWHA by the end of 2005 worldwide [4]. Regionally, some African countries have put interventions to promote adherence such as poverty reduction, fight illiteracy, building of more infrastructure and communication to promote accessibility to ART, sensitization and education campaigns on adherence due to cultural and religious beliefs so rife in most African countries [5].

There has been therefore, free ART provision to promote adherence due to social, financial and economic constraints [6]. The number of PLWHA on ART in resource-poor countries has dramatically increased in the past decade. In 2014, 14.9 million PLWHA were receiving ART globally, of which 13.5 million were receiving ART in low- and middle-income countries. The 14.9 million people on ART represent about 40% of PLWHA globally [1].

Zambia started free antiretroviral (ARV) drugs provision in public health institutions in 2004 to help clients who were unable to sustain the cost of ARV drugs [7]. Zambia has rapidly scaled up ART provision and rolled out even in hard to reach areas through mobile ART activities as one of the recent initiatives to enhance adherence to ART [8]. There are approximately 75,000 PLWHA on ART and only represents about 63% of people in Zambia who need them [9].

Although provision of ART has been a major stride in the mitigation of HIV and AIDS in Zambia, adherence to ART needs more attention. Increased funding for ART in developing countries has brought to the attention the special emphasis on adherence to all those on ART [10].

In recent years, the WHO has reported that, adherence among patients suffering from HIV and AIDS averages 70% [11]. Several studies have been conducted among PLWHA in developed and developing countries to ascertain adherence. In the United States of America (USA), adherence rates of <80% were reported and nonadherence was related to substance and alcohol abuse [12]. Kim et al. [13] reported that the adolescents and young adults population were adherent to ART. The lowest average ART adherence was in North America (53%), Europe (62%), and South America (63%) and, with higher levels in Africa (84%) and Asia (84%). In India, Achappa at al. [14] reported that 63.7% of the participants were adherent to ART and financial constraints, forgetting to take medication, lack of family care, depression, alcohol use, social stigma and side effects to ART were barriers for adherence.

Ketema and Weret [15], in Ethiopia revealed a 95.5% adherence among the study participants and having emotional or practical support positively encouraged ART adherence. Also, Reda and Biadgilign [16], against expectations, reported that sub-Saharan Africa patients have similar or higher adherence levels compared to those of developed countries. The challenges to ART adherence included factors related to patients and their families, socioeconomic factors, medication, and healthcare systems.

In Zambia, Katongo [17], Nsakanya [18] and Birbeck [19] reported 82%, 79.5% and 60% adherence among PLWHA on ART respectively. The adherence was related to stigma, information, education and communication, change in daily routine, social support and marital status.

The shift to the use of Highly Active Anti-retroviral Therapy (HAART) for treating HIV infection has led to increasingly complex drug regimens. This treatment presents significant challenges to both patients and health-care providers with respect to adherence. The poor adherence to ART, however, is common in all groups of treated individuals and thus client's adherence problems need to be effectively addressed [20].

We assessed adherence to ART and associated factors among PLWHA in Monze and Nyimba districts of Zambia. The findings of this study will contribute to improvement in adherence to ART and reduction in treatment failure leading to good treatment outcome of the patients.

Materials and methods

Design and sampling procedures

This cross-sectional study was carried out at Monze Mission and Nyimba District Hospitals among PLWHA. Monze Mission Hospital is a second level Hospital located in Southern Province 300 kilometres from Lusaka while Nyimba District Hospital is a first level Hospital located in Eastern Province 400 kilometres from Lusaka, the capital city of Zambia [21]. The patients attend the ART clinics at appointed times advised by the health care providers for continuous monitoring and consultation about their disease.

All the PLWHA on ART for at least six months and aged 18 years and above were include in the study. The participants who agreed to participate in the study were asked to give informed and written consent. However, the newly enrolled PLWHA for ART and those who were recruited in the previous month(s) were excluded from the study. A simple random sampling method was used and participants were selected consecutively from February to March 2013 to avoid sampling bias. The participants were selected based on the daily sampling frame. The sample size of 364 participants was calculated based on the prevalence formula.

Data Collection

A structured interview schedule was used to collect data on socio-demographic characteristics, adherence and associated factors. The same tool was used on all the patients to ensure reliability and validity. The data on socio-demographic characteristics, adherence and associated factors were obtained by interview and review of medical records of the patients.

Analyses

Statistical analyses were carried out using IBM® SPSS® Statistics for Windows Version 20.0 (IBM Corp. Armonk, NY, USA). The frequencies and descriptive statistics of the variables were calculated. The Chi-squared and Fisher's exact tests were used to select potential predictors of high or low adherence to ART. The Odds Ratio and 95% confidence interval were calculated using multivariate binary logistic regression to identify predictors of adherence to ART while adjusting for confounders. A p-value of < 0.05 was considered significant.

Ethics

This study was approved by the University of Zambia, School of Medicine Undergraduate Research Ethics Committee (Assurance No. FWA00000338, IRB00001131of IOR G0000774).

Results

Participants' distribution and characteristics

Of the 364 participants comprising the study, 216 (59.3%) were females and 172 (47.3%) were aged between 26 and 35 years. Most (229; 62.9%) of the participants were married and 222 (61.0%) were Christians. The majority (286; 73.6%) of the participants never or had primary education. Fewer than half (176; 48.4%) of the participant were formally employed and more than half (200; 54.9%) attended ART clinic at Nyimba District Hospital. Most (304; 83.5%) of the participants had high adherence while only a few (60; 16.5%) had low adherence to ART.

The majority (289; 79.4%) and (316; 86.8%) of the participants lived more than 15 km from the ART clinic and reported waiting time of more than 60 minutes respectively. The income of fewer than half (159; 43.7%) of the participants was moderate (ZMW 1,100 – 1,600) and most (312; 85.7%) of the participants had adequate knowledge about HIV and AIDS and ART adherence. Fairly over half

(209; 57.4%) of the participants reported good staff attitude to PLWHA. Most (318; 87.4%) of the participants had good health status and the majority (332; 91.2%) of the participants had good attitude towards their situation.

Factors associated with adherence to ART

The Chi-square and Fisher's exact tests were run to select the variables to include into the binary logistic regression model. The distribution of adherence to ART among the participants by the socio-demographic and adherence factors are shown in Tables 1 and 2. There was an association between adherence to ART and knowledge, staff attitude, and ART site. However, age, sex, marital status, religion, education, employment, monthly income, distance, waiting time, health status, and client attitude, were not associated with adherence to ART (Tables 1 and 2).

The multivariate binary logistic regression model was tested for multicollinearity, Hosmer and Lemeshow test of model fitness for data, omnibus test of model coefficients and classification accuracy. The dependent variable was adherence to ART: High (1), Low (0). The results of the multivariate binary logistic regression analysis to predict whether three variable factors, namely staff attitude, knowledge, and ART site were associated with adherence to ART revealed that only knowledge was statistically significantly associated with adherence to ART (Table 3).

The patients who had adequate knowledge on HIV and AIDS and ART were 73% (OR 0.27, 95% CI: 0.14 – 0.54) less likely to achieve high adherence to ART compared to those who had inadequate knowledge. In addition, the patients who visit Nyimba ART site were 2.34 times (OR 2.34, 95% CI: 1.24 – 4.49) more likely to achieve high adherence compared to those who visit Monze ART site (Table 3).

Discussion

In the past years, the global fund (GF) emerged to fight HIV infection and to finance the scaling up of resources to promote adherence [22]. The poor adherence to ART is a worldwide problem of striking magnitude (WHO, 2011) The WHO recommends at least 95% of adherence to ART among PLWHA to avoid the emergence of the resistant strains of the virus [23]. Based on these facts, the importance of adhering to ART has been widely publicized and accepted as a critical element in the success of ART.

Without adequate adherence, ARV drugs are not maintained at sufficient concentrations to suppress HIV replication in infected individuals to lower the plasma viral load of HIV [24]. Additionally, poor adherence to ARV drugs accelerates development of drug-resistant HIV. The resulting virologic failure diminishes the potential risk for long-term clinical success. Drug-resistant strains of HIV can be transmitted to uninfected patients, resulting in fewer treatment options [25]. Non-adherence may eventually undermine the improvements in HIV-related health success already seen over the last years.

The current study revealed that 83.5% of the participants had high adherence to ART according to the WHO [10] cut-off point of >95% adherence to ART. Similarly, the high adherence was reported in other studies [12,13,15,26,17,18,27]. Having emotional or practical support positively encouraged ART adherence, included factors related to patients and their families, socioeconomic factors, medication, and healthcare systems, stigma, information, education and communication, change in daily routine, social support and marital status among other things.

Also, high adherence and viral suppression were achieved for a significant proportion of HIV-infected patients taking ART in a resource-limited area [28]. The strategies to maximize adherence in this setting should emphasize ready access to affordable and simple ART regimens, as well as HIV education programs to help increase awareness and decrease disease stigmatization [29]. Against the expectations, sub-Saharan Africa patients have similar or higher adherence levels compared to those of developed countries [16,30]. Despite good adherence and program-related findings, ART is challenged by a range of hierarchical and interrelated factors. The challenges to ART adherence include factors related to patients and their families, socioeconomic factors, medication, and

healthcare systems [31]. However, there is substantial room for improvement of ART programs in sub-Sahara African countries.

Conversely, low adherence to ART among PLWHA was reported by Kim et al. [13] and Achapa et al. [14]. The challenges to ART adherence were financial constraints, forgetting to take medication, lack of family care, depression, alcohol use, social stigma and side effects to ART [13,28,32], substance and alcohol abuse [26]. Thus, health care providers must identify possible barriers to adherence at the earliest possible time and provide appropriate solutions. Medication adherence leads to improved quality of life which is the key determinant of the patient's response to ART and measuring it helps to guide strategies [33].

In this study, the two variables that predicted adherence to ART were knowledge and ART clinic site. This study showed that the participants who had adequate knowledge on HIV and AIDS and ART were 73% less likely to achieve high adherence to ART compared to those who had inadequate knowledge.

Although the findings of this study have shown that the participants who had adequate knowledge on HIV and AIDS and ART were 73% less likely to achieve high adherence to ART compared to those who had inadequate knowledge, other studies [14,16] have reported contrary to our findings. Katongo [17] and Potchoo et al. [34] reported that, adherence to ART was related to stigma, information, education and communication, missing at least once a dose intake, travel, and side effects of the ARV drugs which are all influenced by knowledge.

In addition, Demessie et al. [35] reported low adherence to ART among PLWHA who had inadequate knowledge on the ART plan and regimen. Consequently, adequate knowledge on HIV and AIDS and ART regimen influences adherence to ART among PLWHA. Also, older age, use of memory aids, treatment satisfaction, and not having co-medications and regimen switch improves adherence to ART [35]. This calls for enhanced IEC both in terms of adequate dosing and improved adherence, to achieve better outcomes of the PLWHA.

Knowledge enables clients to have a better understanding of HIV and AIDS and the adherence to ARV drugs regimen [36]. Also, Vervoort et al. [37] suggested that knowledge has a positive influence on adherence to ART. Lack of knowledge on the mode of action of ARV drugs would lead to poor adherence especially if the client is not experiencing any symptom and leading a normal and healthy life [34]. The patient could therefore develop a notion that they are healed hence they can even start missing doses or even discontinue ART. Therefore clients should be able to understand that the absence of symptoms is simply because the virus has been suppressed by ART and rendered inactive.

As recently as 2010, it was estimated that 64% of 15-24 year olds in Zambia had no knowledge about the truth of HIV and AIDS [10], showing that our peer education initiatives to combat myths and misconceptions surrounding the HIV infection and its management are still vitally needed.

This study also revealed that, the participants who attend ART clinic at Nyimba ART clinic site were 2.34 times more likely to adhere to ART compared to those at Monze ART clinic site. However, among the studies reviewed, the researchers did not come across studies that ascertained the association between ART clinic site and adherence to ART. Although, ART clinic site is one of the variables, this study was not designed to compare adherence to ART and associated factors between the two ART sites.

Thus, we may only speculate that the differences in adherence could be because the population of the PLWHA on ART visiting Nyimba ART site is larger (4005) than that of Monze ART site (3251) [38,39]. This suggests that more (200, 55%) participants from Nyimba ART clinic site were included into the study compared to (164, 45%) from Monze ART clinic site. However, considering the fact that both ART clinic site are rural [2] we did not expect to see much difference in terms of adherence to ART among the PLWHA from both ART clinic sites. This will be our focus in future studies.

Several studies have shown that adherence to ART is associated with various factors. The factors which were statistically significant in other studies were not significant in this study. Thus identifying

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the other factors influencing adherence to ART among PLWHA can improve the management of their condition.

Limitations of the study

It is possible that our findings could have been affected by many confounding factors. The possible confounding factors, such as those related to patients and their families, socioeconomic factors, medication, and healthcare systems were not adequately considered but will be the next focus in our future studies.

In addition, since this was a cross-sectional study, it is difficult to establish a "causal" relation between adherence to ART and associated factors. The other limitation was the inadequate time and cost to meet the study logistics. Also, the study was carried out on a limited study population and only the participants who visited the ART clinics during the period of data collection were considered in this study.

Conclusion

The majority of the participants in this study had high adherence to ART that was associated by knowledge and ART clinic site. This raises the concerns on the adequacy of the IEC on HIV and AIDS and ART adherence that is provided to PLWHA at Nyimba District and Monze Mission Hospitals. Considering that HIV and AIDS like most other chronic diseases is progressive, the findings suggest that if the factors influencing adherence to ART are not adequately addressed, opportunistic infections will emerge and ART regimen of the PLWHA becomes much more complex with time.

The study will enable health care providers to review their IEC and care given to PLWHA to ensure high adherence to ART. In order to achieve this, it is suggested that further research should be conducted to evaluate the type of IEC that is given to the PLWHA and to compare adherence to ART among different ART sites.

Acknowledgements

Competing interests

The authors declare that they have no competing interests in the study.

Author's contributions

RK, JZ and DPS conceived the study. RK, JZ, DPS and EMM designed and conducted the study. RK and EMM analysed the data and wrote the manuscript. EMM, supervised the whole study process. All the authors read and approved the final manuscript.

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Table 1: Adherence to ART by socio-demographic factors of participants

	Adherence to ART		
	High (n = 304, >95% adherence)	Low (n = 60, <95% adherence)	
Characteristic	No (%)	No (%)	*P*-value*
Age			

18-25 years	73 (88.0)	10 (12.0)	
26-35 years	147 (85.5)	25 (14.5)	0.173[a]
36-45 years	55 (77.5)	16 (22.5)	
< 46 years	29 (76.3)	9 (23.7)	
Sex			
Male	125 (84.5)	23 (15.5)	
Female	179 (82.9)	37 (17.1)	0.688[a]
Marital status			
Single	197 (86.0)	32 (13.9)	
Married	107 (79.3)	28 (20.7)	0.209[b]
Religion			
Christian	184 (82.9)	38 (17.1)	
Non-Christian	120 (84.5)	22 (15.5)	0.760[a]
Education			
Never/Primary	223 (83.2)	45 (16.8)	
Secondary	51 (86.4)	8 (13.6)	
College/University	30 (81.1)	7 (18.9)	0.516[a]
Employment			
Formal	148 (84.1)	28 (15.9)	
Self employed	99 (81.1)	23 (18.9)	0.785[a]
Unemployed	56 (84.8)	10 (15.2)	
ART site			
Nyimba	158 (79.0)	42 (21.0)	
Monze	146 (89.0)	18 (11.0)	**0.010[a]**

*$P < 0.05$. [a]Pearson's Chi-squared test, [b]Fisher's exact test

Table 2: Adherence to ART by factors of the participants

	Adherence to ART		
	High (n = 304, >95% adherence)	**Low (n = 60, <95% adherence)**	
Characteristic	**No (%)**	**No (%)**	**P-value***
Monthly income			
<US$ 97	136 (82.4)	29 (17.6)	
US$ 97 – 155	135 (84.9)	24 (15.1)	0.635[a]
>US$ 165	33 (82.5)	7 (17.5)	
Distance			
<5 km	24 (91.3)	2 (8.7)	
5 – 15 km	48 (92.3)	4 (7.7)	0.100[b]
>15 km	235 (81.3)	54 (18.7)	
Waiting time			
<30 minutes	8 (66.7)	4 (33.3)	
30 – 60 minutes	31 (86.1)	5 (13.9)	0.255[b]
>60 minutes	265 (83.9)	51 (16.1)	
Knowledge			

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Adequate	269 (86.2)	43 (13.8)	
Inadequate	35 (67.3)	17 (32.7)	0.001[a]
Health status			
Good	264 (83.0)	54 (17.0)	
Poor	40 (87.0)	6 (13.0)	0.501[a]
Staff attitude			
Good	167 (79.7)	42 (20.1)	
Poor	137 (88.4)	18 (11.6)	0.033[a]
Client attitude			
Good	276 (83.1)	56 (16.9)	
Poor	28 (87.5)	4 (12.5)	0.626[a]

$*P < 0.05$. [a]Pearson's Chi-Squared Test, [b]Fisher's Exact Test

Table 3: Multivariate binary logistic regression model-determining factors associated with adherence to ART

	Adherence to ART			
	High (n = 304, >95% adherence)	Low (n = 60, >95% adherence)		
Predictor variable	No (%)	No (%)	AOR (95% CI)[a]	P-value*
Staff attitude				
Good	167 (79.7)	42 (20.1)	1.78 (0.96-3.30)	0.069
Poor	137 (88.4)	18 (11.6)	Ref (1.00)	
Knowledge				
Adequate	269 (86.2)	43 (13.8)	0.27 (0.14-0.54)	**0.000**
Inadequate	35 (67.3)	17 (32.7)	Ref (1.00)	
ART site				
Nyimba	158 (79.0)	42 (21.0)	2.34 (1.25-4.40)	**0.033**
Monze	146 (89.0)	18 (11.0)	Ref (1.00)	

*Indicates significant p-value at $p < 0.05$. [a]AOR=adjusted odds ratio when other predictor variables were controlled for.