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RESEARCH ARTICLE

Factors Influencing Adherence to Antiretroviral Therapy among HIV Infected Patients in Nyamagana-Mwanza, Northern Tanzania: A Cross Sectional Study

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Abstract

Background: High level of Antiretroviral Therapy adherence among HIV infected patients contributes to better treatments outcome and has additional importance in preventing the development of drug resistance. It also improves the quality of life and makes the patient live longer and healthier. The objective of the study was to determine level of adherence as well as factors influencing adherence to antiretroviral therapy among HIV infected patients in Nyamagana district, Mwanza, Tanzania.

Methods: A cross sectional study was conducted in Nyamagana district, Mwanza among HIV infected patients aged 15 years and above who attended Care and treatment Clinics. Systematic sampling method was employed to obtain a total of 206 patients. Face to face interviews were conducted using structured questionnaire.

Results: The overall adherence was 54.9% (113) while 98.1% (202) had good knowledge score on antiretroviral therapy adherence. Participants who had primary level of education had 66% lesser odds of reporting poor adherence to antiretroviral therapy when compared with those who had secondary education [Adj OR 0.44 (95% CI 0.22-0.91)]. Participants who reported to have experienced stigma or those who did not disclose their HIV status had a 2.16 times higher odds of adhering poorly to antiretroviral therapy than their counterparts; who did not report being stigmatized and those reporting to have disclosed their HIV status [Ad.j OR 2.16 (95% CI 1.17-4.01)].

Conclusion: Antiretroviral Therapy adherence was low among clients attending Care and Treatment despite participants having high knowledge on antiretroviral therapy. Adherence counseling and education should be provided to all patients before initiation of antiretroviral therapy in order to enhance adherence to Antiretroviral Therapy. Strategies to increase disclosure of HIV status to treatment supporters, who in turn supports clients to adhere to antiretroviral therapy are recommended. Interventions to reduce stigma to people living with HIV/AIDS are of importance in increasing adherence to antiretroviral therapy, both at community level and among people living with HIV/AIDS.

Keywords

Antiretroviral therapy, HIV, Adherence, Tanzania

Background

Human immunodeficiency virus (HIV) remains important public health problem of poverty related in most sub-Saharan African countries, where it accounts for 70% of HIV incidence worldwide [1]. Tanzania like other African countries reported decline of prevalence of HIV infection from 7% to 5% [2]. Successful Antiretroviral therapy (ART) depends on sustaining high levels of adherence and this is achieved through maintaining optimal adherence of at least 95% [3]. Adherence to ART

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among HIV patients is important because it reduces mortality among those who remain in treatment and adhere to therapy [4], therefore, prevents the virus from developing resistance to drugs [5]. ART improves the quality of life of HIV infected patients by reducing a wide range of HIV related morbidity and mortality hence makes the patient live longer and healthier [6,7]. ART prevents HIV from multiplying and destroying the body's immune system, prevents HIV progression to AIDS [7], prevention of mother to child transmission (MTCT). Failure to adhere to ART can results into sub-therapeutic drug level and consequent viral drug resistance [5,8]. Several factors have been reported which may leads to poor adherence and retention to ART. The contribution factors include fear, alcohol and substance abuse which makes the patient forget to take medication as scheduled [6,9-11]. Also missing scheduled clinic visit and age of the patients, health care and system related changes [8,9,11] Stigma [12] distance from clinic as well as drugs side effects [9,12,13]. In Tanzania, the main barrier to adherence and retention reported was poverty [14] while in other settings intimate partner violence is also found to affect ART adherence though reported to have more impact on women than in men [15]. The initial or baseline assessment of adherence is therefore needed in order to understand the level of adherence before intervention and hence to prevent the future threat of widespread treatment resistant strains of HIV strains.

A study conducted in Kilimanjaro Tanzania at Kilimanjaro christian medical centre (KCMC) referral Hospital reported that 84% of HIV infected patients adhere to or/and do not missing any doses of ART from the start of treatment [16]. In Mwanza region the prevalence of HIV is 4.2% [2], but information on level and factors for adherence is limited. Therefore, the present study was conducted to determine level and the factors influencing adherence to ART in HIV infected patients in Nyamagana district, Mwanza region.

Methods

Study design and Area

This was a cross sectional study, conducted in Care and Treatment centers (CTC) in Nyamagana district Mwanza, from March to June 2016. Nyamagana District is one of the seven districts of the Mwanza Region of Tanzania. This district is located in the Mwanza municipality, dominantly within the booming commercial activities in the municipal. Nyamagana district is bordered to the north by Ilemela District, to the east by Magu District, to the south by Misungwi District and to the west by the Mwanza Bay of Lake Victoria. The total number of CTCs involved in this study was seven (7); four CTCs from four hospitals (Bugando, Mwananchi, Nyamagana, and Mababitini) and three CTCs from located in three dispensaries (Nyakahoja, Makongo and Butimba).

Study population and Sampling procedure

This study included HIV infected patients receiving ART, aged 15 years and above, and attending the CTCs included in the research. Patients who were on started ARV in less than three months were excluded. We employed systematic sampling method and individuals presenting at the health facilities were informed about full nature of the study and were asked to participate on a voluntarily basis. Face to face interviews were conducted in a room at a facility where privacy was assured and using structured questionnaire.

Study questionnaire

We used a simplified medication adherence questionnaire previously validated and used in a large cohort of HIV-infected patients [17], which has also been used in Tanzania [16]. The questionnaire contained open and closed ended questions divided in four sections. The first section recorded the respondents' socio-economic-demographic characteristics such as age, sex, marital status, educational level, occupation, residence, religion, Income, bus fare and distance from the clinic. Part two assessed ART knowledge using eight questions: ART reduces HIV related morbidity? ART reduces HIV related mortality? HIV is controlled by ART? does patient trusts the doctor? do you knows how to deal with side effects? do you stops taking ART on side effects without doctors consultation, do you knows the effectiveness of ART? and not abiding to ART leads to drug resistance?. Part three assessed ART adherence based on patients' self report and contained several questions; duration of ART treatment, dosage frequency. Do you sometimes finds difficult to take medicine? when you feels better do you sometimes take a break from your medication? when you feels worse do you take medication? or do you stop taking it? for the past last two weeks, how often have you not taken your medicine? did you take any of your medicine over the past weekend? and over the past three months, how many days you did not take any medicine?. And also questions on pill identification test-the participants were asked to provide the names of the drug they take and the correct dosage frequency per day, the correct time for taking medicine and if the participant knows extra information about ART, then the health care provider checked for correctness.

The ART knowledge score was calculated as a continuous variable by summing the participant's number of correct responses to 8 statements. One point was awarded for each correct response (Yes or No for correct statement), and zero for each wrong response, with a maximum obtainable correct score of 8 for each respondent. The knowledge score was categorized into two levels indicated by poor (0-4) and good (5-8).

ART adherence was classified as Good adherence (95% and above) for the patients who scored all the four questions and poor adherence (less than 95%) for participants who missed at least one question.

Data processing and Analysis

Data were collected and analyzed using Statistical package for social sciences (SPSS) Statistics for Windows, Version 22.0 (IBM Corp, Armonk, NY, USA). To determine the association between a number of socio-economic-demographic characteristics and other factors to ART adherence, crude odds ratio (OR) with 95% confidence intervals (CI) were calculated by bivariate logistic regression. Factors which were significant in the bivariate logistic regression analysis were later included in a multivariate logistic regression to obtain the adjusted odds ratio with 95% CI. A p-value < 0.05 was considered the measure of statistical significance.

Ethical consideration

The approval to conduct this study was granted by Catholic university of health and Allied science (CUHAS) ethical committee and an ethical clearance certificate (Number 146/2016) was issued. Permission to conduct the study was obtained from the Nyamagana District Executive Director. Written informed consent was obtained from every participant before being enrolled in this study.

Table 1: Characteristics of the study population (N = 206).

Variables		Frequency % (n)
Sex	Male	41.3 (85)
	Female	58.7 (121)
Age (in years)	15-25	9.2 (19)
	26-35	36.9 (76)
	36-45	30.1 (62)
	46-55	18.0 (37)
	≥ 56	5.8 (12)
Education level	No formal education	11.2 (23)
	Primary education	65.5 (135)
	Secondary and higher	23.3 (48)
Occupation	Peasant	36.9 (76)
	Employed[1]	22.3 (46)
	Business	40.8 (84)
Marital status	Married	48.1 (99)
	Single	5.8 (12)
	Divorced	13.6 (28)
	Widow	19.9 (41)
	Cohabiting	12.6 (26)
Religion	Christian	68.0 (140)
	Muslim	24.8 (51)
	No religion	7.2 (15)
Current alcohol use	Yes	8.3 (17)
	No	91.7 (189)
Stigma	Yes	47.9 (97)
	No	52.9 (109)
Monthly income (in TZs)[2]	0-200,000	82 (169)
	200,001-1,000,000	18 (37)
Bus fare (in TZs)[2]	≤ to 2000	57.8 (119)
	2000 to 10000	12.6 (26)
	By foot/Private Car	29.6 (61)
Distance from the clinic (Most convenient transport)	Less than 1 hour	84 (173)
	More than 1 hour	16 (33)

[1]Employed was defined as those who are employed by organization or self-employed; [2]TZs: Tanzanian shilling (1USD = 2276 TZS).

Results

Characteristics of the Study population

A total of 206 participants were included in this study where the majority were females 58.7% (121) (Table 1). The mean age (± SD) of participants was 37.59 ± 10.7 years. More than one third of all participants were in the age group between 26 and 35 years (36.9%) followed by those aged 36 to 45 years (30.1%) and those from 46 to 55 years (18.0%). Regarding marital status, almost half of all participants were married (48.1%) followed by widowed (19.9%), divorced (13.6%) and cohabiting (12.6%). Most participants had primary education 65.5% (135) followed by secondary education and higher were 23.3% (48) and remaining proportion did not attend school. Seven in every ten participants were Christians (68%).

Overall prevalence of ART adherence

Out of 206 participants studied, the overall adherence prevalence in this study was 54.9% (113) (defined as taking at least 95% of their pills during the previous two months). The reported good adherence was of at least 95% and above on both patients' self report and pill identification test while the remaining proportion of participants adhered poorly on ART.

Knowledge and perception of the participants on ART adherence

Out of 206 participants, 98.1% (202) had good knowledge score on ART adherence (Table 2). Results on knowledge and perception on ART shows that 98.5% (203) participants agreed that ART reduces HIV related morbidity and the rest did not agree. Majority of the participants 94.2% (194) reported to agree that ART reduces HIV related mortality and more nearly two thirds of the participants 63.6% (131) agreed that HIV can be controlled by ART while the remaining proportion were in view that HIV can never be controlled by ART. On the other hand, 99.5% (205) of participants had faith on their health care providers while 90.8% (187) participants had been well informed by their health care providers (doctors) how to deal with ART's side effects, that is, they knew how to deal with side effects once they appeared. Two hundred and two (98.1%) participants said once they experience ART's side effects and took appropriate action including consulting their health care providers for advice. Majority of the participants, 95.6% (197) knew that Art were very effectiveness in controlling the progression of HIV/AIDS while the remaining smaller proportion did not know that fact. Lastly, 98.1% (202) participants knew that failure to abide on ART leads to HIV drug resistance.

Table 2: Knowledge and perception of antiretroviral ART among participants in Nyamagana district (N = 206).

Variables	Frequency % (n)
ART reduces HIV related morbidity	
Agree	98.5 (203)
Disagree	1.5 (3)
ART reduces HIV related mortality	
Agree	94.2 (194)
Disagree	5.8 (12)
HIV is controlled by ART	
Agree	63.6 (131)
Disagree	36.4 (75)
The patient trusts the doctor	
Yes	99.5 (205)
No	0.5 (1)
Knows how to deal with side effects	
Yes	90.8 (187)
No	9.2 (19)
Stops taking ART on side effects without doctors consultation	
Yes	1.9 (4)
No	98.1 (202)
Knows the effectiveness of ART	
Yes	95.6 (197)
No	4.4 (9)
Not abiding to ART leads to drug resistance	
Yes	98.1 (202)
No	1.9 (4)
Average knowledge	
Good	98.1 (202)
Poor	1.9 (4)

ART: Antirectroviral therapy.

Factors associated with ART adherence

Regarding the factors associated with adherence to ART, the bivariate analysis presented in Table 3 indicated that marital status, level of education, stigma and disclosure of HIV status were significantly associated with adherence to ART and therefore qualified for multivariate analysis. In the multivariate analysis, participants who had primary level of education had 66% lesser odds of reporting poor adherence to ART when compared with those who had secondary education and the difference was significant [Adj OR 0.44 (95% CI 0.22-0.91)]. On the other hand, participants who reported to have experienced stigma or those who did not disclose their HIV status had a 2.16 times higher odds of poor adherence to ART than their counterparts; who did not report being stigmatized and those reporting to have disclosed their HIV status [Adj OR 2.16 (95% CI 1.17-4.01)].

Discussion

The present study assessed factors influencing ART adherence among participants in Nyamagana district. Our findings have revealed that, the overall prevalence of ART adherence was 54.9%. This prevalence is very low and is inconsistent with a previous study done at KCMC Consultant Hospital in northern Tanzania which showed adherence of 84% [16]. Furthermore, other studies done elsewhere have shown a higher prevalence rate. In Kenya for example, one study reported that the prevalence of adherence was 82% [18]. Similarly higher prevalence of ART adherence of 73% and 78.4% have been reported in Togo [19], and India [3] respectively. This disparity of adherence rates across studies may depend on the context where the study is done, the way adherence was measured and study design, which may vary from a study to another. For example, the present study examined three main parameters to ultimately assign adherence status - the participant use of medication, correct frequency of use and physical verification of pill count. This methodology differentiates the present study from other studies highlighted earlier that mostly used one parameter of participant reports of use of medication to assign adherence status. It may also vary with age distribution as well as if the study was conducted in rural or urban setting, community, home-based care or hospital/health facility based [20].

The overall knowledge of the participants in this study was significantly higher as 98.1% of the participants had good knowledge concerning ART. Other studies which have been done elsewhere documented similar findings of higher level of knowledge on ART among participants attending Care and Treatment Services in health care facilities. A study done in Nigeria by Kasumu and Balogun indicated that the overall knowledge of the participants was 83.1% [21]. Knowledge levels has been reported in Togo to be 88.7% [19] and in India 97% [22]. Of 206 participants, 98.5% (203) agreed that ART reduces HIV related morbidity, consistent with the study conducted in Nigeria in which 92.5% of the participants agreed that ART reduces HIV related morbidity [21]. In the present study, majority (94.2%) of the participants said that adhering to ART could probably reduce HIV related mortality, the findings correlating with a previous study conducted in Ghana where 89.3% of the participants agreed that ART reduces HIV related mortality [23]. Furthermore, in this study 63.6% of the participants agreed that HIV virus can be controlled by ART while the remaining third of participants said the virus cannot be controlled by ART. This is contrary to earlier findings which showed that 95.6% of the participants knew the effectiveness of ART and that, not adhering to treatment would lead to HIV drug resistance [24].

Formal education obviously plays a major role in understanding and communicating information related to health care. In the current study we found that most participants had primary education 65.5% (135) and 23.3% (48) did not attend school (illiterate) this makes a sum of about 89% (183) participants with a lower formal education. Findings show that those with secondary education and higher in this study had poor ART adherence compared to those with primary education. Participants who were younger (≤ 25-years-old) were more likely to report poor adherence. This is contrary to what Bello laments from a study conducted in Ilorin Nigeria which

Table 3: Factors associated with ART adherence in Nyamagana district (n = 206).

	Good % (n)	Poor % (n)	Crude OR (95% CI)	Adjusted OR[1]
Sex				
Male	54.1 (46)	45.9 (39)	1.05 (0.60-1.83)	
Female	55.4 (67)	44.6 (54)	1	
Age (years)				
15-25	21.1 (4)	78.9 (15)	3.75 (0.77-18.2)	
26-35	53.9 (41)	46.1 (35)	0.85 (0.25-2.88)	
36-45	61.3 (38)	38.7 (24)	0.63 (0.18-2.18)	
46-55	64.9 (24)	35.1 (13)	0.54 (0.14-2.02)	
≥ 56	50 (6)	50 (6)	1	
Religion				
Christians	57.9 (81)	42.1 (59)	0.48 (0.16-1.43)	
Muslims	51 (26)	49 (25)	0.64 (0.19-2.06)	
No religion	40 (6)	60 (9)	1	
Marital status				
Married	54.5 (54)	45.5 (45)	1.33 (0.55-3.22)	1.42 (0.56-3.55)
Single	50 (6)	50 (6)	1.60 (0.40-6.36)	1.70 (0.41-7.07)
Divorced	32.1 (9)	67.9 (19)	3.37 (1.10-10.3)	2.75 (0.85-8.84)
Widow	68.3 (28)	31.7 (13)	0.74 (0.26-2.07)	0.31 (0.28-2.65)
Cohabiting	61.5 (16)	38.5 (10)	1	-
Level of Education				
No formal education	43.5 (10)	56.5 (13)	0.78 (0.28-2.14)	1.00 (0.35-2.87)
Primary	63.0 (85)	37.0 (50)	0.35 (0.17-0.69)	0.44 (0.22-0.91)
Secondary and higher	37.5 (18)	62.5 (30)	1	-
Occupation				
Peasant	57.9 (44)	42.1 (32)	0.88 (0.47-1.64)	
Employed[2]	51.1 (23)	48.9 (22)	1.15 (0.56-2.39)	
Businessman/woman	54.8 (46)	45.2 (38)	1	
Monthly income[3] (TZs)				
0-240,000	55.6 (94)	44.4 (75)	0.84 (0.41-1.71)	
240,001-1,000,000	51.4 (19)	48.6 (18)	1	
Distance from clinic (Most convenient transport)				
< 1 hour	53.8 (93)	46.2 (80)	1.32 (0.61-2.82)	
> 1 hour	60.6 (20)	39.4 (13)	1	
Bus fare[3] (TZs)				
< 2000	53.8 (64)	46.2 (55)	1.08 (0.58-2.01)	
2001-10,000	57.7 (15)	42.3 (11)	0.92 (0.36-2.33)	
Foot/private transport	55.7 (34)	44.3 (27)	1	
Stigma				
Yes	42.3 (41)	57.7 (56)	2.65 (1.51-4.67)	2.16 (1.17-4.01)
No	66.1 (72)	33.9 (37)	1	
Alcohol use				
Yes	47.1 (8)	52.9 (9)	1.40 (0.52-3.80)	
No	55.6 (105)	44.4 (84)	1	
Disclosure of HIV status				
No	42.3 (41)	57.7 (56)	2.65 (1.51-4.67)	2.16 (1.17-4.01)
Yes	66.1 (72)	33.9 (37)	1	-
Average knowledge				
Poor	50.0 (2)	50.0 (2)	1.22 (0.16-8.83)	
Good	55.0 (111)	45.0 (91)	-	

[1]Factors included in the adjusted analysis are marital status, level of Education, stigma and disclosure of HIV status; [2]Employed was defined as those who are employed by organization or self-employed; [3]TZs: Tanzanian shilling (1USD = 2276 TZs); ART: Antiretroviral therapy; OR: Odds Ratio.

indicated that the higher the level of education, the better the understanding of the disease state and the comprehension of instructions given on drug usage [24]. Educated people may show better adherence to ART due to their ability to follow the instructions related to the treatment given by the health providers. Bello proposed that education could invariably enhance adherence [24] which is in support of a study conducted by Gupta, et al.

in India whereby 56% of the educated participants said that HIV could probably be controlled by ART [5]. Other literatures support that ART adherence rate was higher among participants who had a high level of formal education [19,25]. Our findings are inconsistent with that reported by Kalichman in United States of America, who had earlier identified low educational status as a major factor of poor adherence to ART [26]. Lower education was found to have associations with barriers to receiving HIV related health care, including ART. Other studies have been previously reported from African settings where the level of education has adversely affected adherence [19,27] similarly with what has been reported in the current study that those with secondary education and higher in this study had poor ART adherence compared to those with primary education. Educated participants are more likely to be employed and their time at work influencing negatively with the consistent use of medication. This is especially affecting the update of medicine per required frequency and medications are sometimes left at home. Even in the present study, we document the higher odds of adhering poorly to ART among the employed when compared to those engaging in their private business however the difference was not significant due to lower number of participants in the category. In this regard, occupational policies in place work need to be available so as to guide those with chronic diseases like HIV/AIDS to adhere to their treatment. These policies should be friendly and supportive to clients to allow them follow their pre-planned treatment schedules and allow them to timely visit health facilities for refill of ART. We also found that participants who were younger (≤ 25-years-old) were more likely to report poor adherence however the difference was not significant due to lower number of participants in the category. Likewise young age has been associated with poor adherence in other studies in Tanzania [16,20]. The finding that younger people were less likely to adhere poorly to ART use was possibly related to younger people having less stable social and economic situations and having less experience interacting with health care system than their older counterparts [25,26].

Finally, participants who did not disclose their HIV sero-status to their sexual partner and their families had poor adherence to ART. Several studies have shown that HIV sero-status disclosure is a known predictor of increased adherence to ART. In fact, HIV disclosure could be the first stage of creating a supportive relationship with the sexual partner and with the family, and that would facilitate the acceptance and the continuation of ART. In a study conducted in Ibadan, Nigeria [28] and in China [12], reported that, the participants who were not ready to disclose their HIV infection status, were more likely to have poor adherence to ART. The results of this study have important implication in the current program of Care and Treatment for HIV infected clients of reinforcing the role of treatment supporters. Treatment supporters are individuals who are close to the client and who knows the status of the client after being disclose to them. They have important role of following the client's adherence to ART. Clients who fail to disclose their status lack treatment supporters, resulting to low adherence rates. Stigma plays an important role in influencing disclosure of HIV status. In the present study, clients who reported to have experienced stigma events were less likely to disclose their HIV status. Therefore, interventions to reduce stigma are of importance in increasing adherence to ART, both at community level and among people living with HIV/AIDS. Treatment support groups, which have been helpful in some parts of Tanzania to support clients share challenges to ART use and solutions to overcome setbacks, will only be possible in event where stigma is reduced. In these support groups, clients do encourage one another in adhering to treatment, and such open sharing of individual experiences is possible when stigma is reduced.

The findings of this study should be interpreted in view of some limitations. This study was conducted among participants who were attending different CTC clinics in Nyamagana district who were on ART for at least three months. Therefore, the sample may not be representative of the whole country. Since the study was of cross sectional design, the variation of adherence of the participants to ART that can occur over time may not have been captured.

Conclusion

ART adherence in the present study sample was low despite participants having high knowledge on ART. Participants who did not disclose their HIV sero-status to their sexual partner and/or their families had poor adherence to ART. Also, clients who reported to have experienced stigma events were less likely to adhere to ART. It is of importance that adherence counseling and education should be provided to all patients before initiation of ART in order to enhance adherence to ART. Strategies to increase disclosure of HIV status of the clients to treatment supporters, who in turn supports clients to adhere to ART are recommended. Interventions to reduce stigma are of importance in increasing adherence to ART, both at community level and among people living with HIV/AIDS. This may include having ART treatment support groups composed of people living with HIV to support each other through joint sharing of experiences in overcoming challenges of ART adherence. Individuals who have overcomed stigma and with experience in ART adherence, alternatively called expert patients, may be motivated to share with other clients their success stories in adhering to ART and spark energy among those challenged in adhering to ART. We have seen that those educated and likely to be on employment were less likely to adhere to ART. We recommend further research on how work related environment can influence use of ART. However, other factors associated

with poor adherence reported earlier of low disclosure and stigma may apply at work, influencing negatively adherence to ART among employees living with HIV/AIDS. Operationalization or reinforcing of work related HIV/AIDS policies that create conducive environment in favour of those living with HIV/AIDS is recommended.

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Authors' Contributions

SEK and DCK designed the study, conducted analysis and interpretation of the results.

MRM translated the interview questionnaires from Swahili to English and reviewed the manuscript. GNS developed manuscript and reviewed the manuscript and provided critical comments. BE reviewed the manuscript and provided critical comments. All authors have read and approved the final manuscript.

Competing Interests

The authors declare that they have no competing interests.

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