Factors influencing Adherence to Antiretroviral Therapy among People Living with HIV in an Urban and Rural Setting, Tanzania

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Adherence is one of the most crucial determinants of treatment response to antiretroviral therapy (ART). An analytical cross-sectional study was conducted in 24 Care and Treatment Centres (CTC) in Dar es Salaam and Iringa regions in Tanzania. Data was collected using questionnaire and appointments records. A total of 943 patients attending at the care and treatment sites in Dar es Salaam and Iringa were recruited. Adherence based on keeping appointments and on four days recall was 65% and 70%, respectively. Adherence based on taking ART more than 95% of the time in one month was 83%. Satisfaction with health services, having treatment support, having knowledge on the use of ART, early presentation to CTC, and being on ART for more than one year, were associated with good adherence. Being in the urban region, using traditional medicine, medicine side effects and alcohol consumption problems negatively associated with adherence to ART.

Keywords: Adherence barriers, antiretroviral therapy, HIV, Tanzania, rural, urban

INTRODUCTION

HIV is a chronic lifelong illness with no known cure, and, therefore people living with HIV and AIDS (PLWHA) have to be followed up medically for the rest of their lives [1]. The core component of the treatment and care of PLWHA is the provision of antiretroviral therapy (ART). In 2003, HIV was declared a global health emergency, and so governments, international agencies and funding bodies began to implement plans to increase ART uptake and coverage in developing countries. By 2008, about 4 million of the 9.5 million people in need of ART in low and middle-income countries were receiving treatment [2]. Starting treatment in patients with very low CD4 count imposes unnecessary morbidity and mortality [3] while starting ART early, when opportunistic infections are still absent, gives a good prognosis [4]. An alarmingly high proportion of HIV-infected individuals present late for care in developing countries like Sub-Saharan Africa, South-East Asia, and South America due to limited health care access and health [5, 6]. Despite the use of ART, numerous reports worldwide indicate failure of therapy due to lack of potency of combinations, insufficient drug adherence and transmission of drug resistant virus [7-9]. Drug resistance is a significant cause of therapy failure [10] and may be a consequence of the other factors such as poor adherence [11].

Tanzania is among the countries highly affected by HIV and is experiencing a mature, generalized HIV epidemic. The country is estimated to have an overall HIV national prevalence of 5.1%, being slightly higher among females (6.2%) than males (3.8%) (Tanzania Health Indicator Survey 2011-12). In Tanzania,

provision of free ART to eligible patients with CD4 count $\leq$ 200 cells/µl, started in 2004, at which time the government of Tanzania launched its public sector ART programme [12]. The main focus of the programme was a rapid scaling up of ART, aimed at having more than 400,000 patients on ART by 2008, as well as tracking disease progression in the 1.2 million HIV-positive persons who were not eligible for ART [12].

Care and Treatment Centres (CTCs) are being established in Tanzania to support HIV patients, enabling them to live a healthy life through health education, treatment and prevention of opportunistic infections and provision of ART to eligible patients. The success of any ART programme depends on early testing and presentation at CTCs as well as adherence to ART [13]. In 2007 Tanzania, HIV testing was scaled up during the Presidential National Testing Campaign and Provider Initiated Testing and Counselling (PITC) in 2009. However, the potential for testing services to act as a gateway to HIV treatment will be met, when individuals tested, receive results and those who are HIV positive are subsequently linked to a CTC on time.

PLWHA are known to interrupt ART due to poverty, stigmatization, inadequate access to medicines, occasional stock-outs and traditional beliefs which make patients seek alternative treatment from unregistered herbalists and traditional healers. In one study of ART adherence in Tanzania, 79% of the 207 patients interviewed were taking less than the critical 95% of the dosage recommended by the World Health Organization [14].

Assessment of adherence can be done by using microelectronic monitor bottles, self-reports, pill counts, patients' appointments and the pharmacy's refill schedule. While the wide use of electronic monitoring is hampered by its high cost, self-report is widely used in adherence studies thanks to low cost, including the CTC in Tanzania. However, self-report can be subject to inaccurate recalls and inaccurate reporting. On the other hand, pharmacy refill schedule, particularly computerized records, can be very

useful in validating adherence determined by self-reports [15] but are not routinely used in Tanzania. So far, no gold standard method has been decided to study non-adherence to ART in the clinical setting [16] especially not in resource-limited countries. This study investigated factors affecting adherence to antiretroviral (ARV) in both urban and rural setting in Tanzania.

EXPERIMENTAL

Design and sampling

For this cross-sectional analytical study, rapid appraisal techniques were used to collect quantitative data from patients' records. A standardized questionnaire was used to obtain social demographic information, basic knowledge of the current ARV used, side effects, and implications on non-adherence. The study was conducted at CTCs at Ilala, Temeke and Kinondoni municipalities in Dar es Salaam region and Iringa Municipal, Makambako District and Njombe District in Iringa region. The selection of locations was based on the high HIV prevalence and the need to compare between urban and rural settings.

HIV positive consenting patients aged 18 years and above who had been taking ARV for more than 3 months were recruited. A random sampling method was utilized to select 4 health facilities in each municipality and patients who met the inclusion criteria for a total of three months. Patients having AIDS associated symptoms, along with patients having CD4 less than 200 cells/µl of blood and eligible to start ART at the first CTC visit were classified as late presenters; all the others were categorized as early presenters [17].

Ethical clearance

Ethical clearance and approval for this study were sought and granted by the National Institute for Medical Research-IRB and from the respective health facility authorities. All patients were requested to sign the consent form after being thoroughly explained about the project, before enrolment. For confidentiality purposes,

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names of the patients and other personal data were not revealed.

Treatment failure

Immunological failure at 3 months was defined as 30% drop in CD4+ count from peak value or a return to pre-ART baseline or lower. Clinical failure was defined as development of new or recurrent (after being resolved) opportunistic infections or malignancy occurring 3 months or more after initiation of ART. No data were available to assess virological failure.

Assessment of patient adherence to ART

Patient's adherence was assessed on the one hand by quantifying the keeping of appointments and on the other hand by using a self-report method.

At the CTC, appointments were issued based on the period that the dispensed ARV-stock would last, which usually amounts to a one month interval. A patient visiting on the scheduled appointment was scored 100% appointment adherent, while an appointment skipped entirely resulted in 0% adherence. For a delayed appointment, the proportions of days late (in % with respect to the total number of days between the two visits) were subtracted from 100. Adherence was considered good if the percentage was more than 95, calculated based on the appointment of and the one preceding the interview [14] those with ≤95% adherence were considered non-adherent.

The overall doses taken over the past one month were assessed with a visual analogue scale (VAS) ranging from 0 to 100% [16]. Good adherence was defined as indicating more than 95% on VAS [11]. Moreover, the questionnaire also addressed the frequency of doses missed yesterday, the day before and three days before yesterday [18] as used by the Adult AIDS Clinical Trials Group (AACTG). Re 2porting missing at least one ARV dose in 4 days was scored non-adherent by the AACTG. Finally, the questionnaire that was used probed for patients' reasons for non-adherence as well.

Data analysis

The obtained data were coded and entered into the computer for analysis. Data were analysed using Epi Info version 3.5.1. Descriptive analysis was done to obtain the basic demographic and clinical characteristics of patients. The Chi-squared test or Fisher's exact test was used in the bivariate analysis for comparison of proportions. To control for confounders, logistic regression was used in the analysis of the factors associated with adherence, this multivariate analysis was performed on all significant variables. The significance level was set at $P<0.05$.

RESULTS

A total of 415 patients in Dar es Salaam and 528 patients in Iringa attending care and treatment sites were recruited, of whom, 156 (38%) were from Temeke Municipal, 143 (34%) from Ilala Municipal, 116 (28%) from Kinondoni Municipal which are urban settings, and 154 (29%) from Iringa Municipal, 183 (35%) from Makambako and 191 (36%) from Njombe Municipal which are rural settings. Hospital facilities from the three Municipals in each region provided a proportional number of patients.

There was no significant difference between Dar es Salaam and Iringa, with respect [odds ratio (OR) and confidence interval (CI)] to gender [OR (CI)=0.9 (0.7-1.2); P=0.4] and duration on ART treatment [OR (CI)=1.1 (0.8-1.5); P=0.5] (Table 1). Fewer patients from Dar es Salaam than Iringa were likely to be married [OR (CI)=0.2 (0.1-0.3); P<0.01], had friends and family to remind them to take ARV [(OR (CI)=0.6 (0.4-0.8); P<0.01), were diagnosed within the past five years [OR (CI)=0.05 (0.03-0.08); P<0.01], received pre-ART counselling [OR (CI)=0.5 (0.3-0.7); P<0.01], were on first-line ARV [OR (CI)=0.3 (0.2-0.4); P<0.01], had income less than 150 USD [OR (CI)=0.1 (0.05-0.2); P<0.01], were less educated [OR (CI)=0.2 (0.1-0.4); P<0.01], were experiencing side effects [OR (CI)=0.6 (0.5-0.8); P<0.01], were satisfied with the services at CTC [OR (CI)=0.3

(0.2-0.4); P<0.01] and consumed alcohol [OR (CI)=0.09 (0.07-0.13; P<0.01] (Table 1).

On the other hand, more patients in Dar es Salaam than Iringa paid less than Tsh 500 for transport to the clinic [OR (CI)=3.7 (2.8-4.9); P<0.01], delayed to register to CTC [OR (CI)=5.6 (4.2-7.5); P<0.01] and were taking other medications for opportunistic infections [OR (CI)=2.1 (1.6-2.7); P<0.01] (Table 1).

Table 1. Comparison of socio-demographic and adherence parameters between Dar-es-Salaam (Urban) and Iringa (Rural) settings

Variable	Dar-es-Salaam N=415 (%)	Iringa N=528 (%)	OR (CI)	P-Value
Female Gender	279 (67%)	369 (70%)	0.9 (0.7-1.2)	0.4
Being married	218 (57%)	462 (88%)	0.2 (0.1-0.3)	<0.01
Income less < 150 USD	317 (76%)	514 (97%)	0.1 (0.05-0.2)	< 0.01
Primary school education	347 (85%)	510 (97%)	0.2 (0.1-0.4)	<0.01
Having family support	231 (56%)	360 (68%)	0.6 (0.4-0.8)	<0.01
Pay less than 500 TZS transport cost to CTC	262 (65%)	166 (32%)	3.7 (2.8-4.9)	<0.01
< 5 years of illness since diagnosis	264 (74%)	514 (97%)	0.05 (0.03-0.08)	<0.01
No care before starting ARV	302 (73%)	170 (32%)	5.6 (4.2-7.5)	<0.01
Being on treatment for more than 12 months	316 (76%)	391 (74%)	1.1 (0.8-1.5)	0.5
Using first line treatment	319 (77%)	490 (93%)	0.3 (0.2-0.4)	<0.01
Taking other medications for opportunistic infections	240 (58%)	320 (39%)	2.1 (1.6-2.7)	<0.01
Number of adherent patients based on of keeping appointments (>95%)	318 (77%)	293 (55%)	2.6 (2.0-3.5)	<0.01
Number of adherent patients based on self-reported adherence >95% of the time for 1 month based on the visual analogue scale (VAS)	234 (56%)	428 (81%)	0.3 (0.2-0.4)	<0.01
Number of adherent patients based on 4 days recall	362 (87%)	423 (80%)	1.7 (1.2-2.4)	<0.01
Received Pre-ART counselling	337 (81%)	475 (90%)	0.5 (0.3-0.7)	<0.01
Experiencing side effects	252 (61%)	379 (72%)	0.6 (0.5-0.8)	<0.01
Satisfied with the services at CTC	233 (56%)	428 (81%)	0.3 (0.2-0.4)	<0.01
Consume alcohol	71 (17%)	359 (68%)	0.09 (0.07-0.13)	<0.01

Adherence

The prevalence of patients with good adherence based on timeliness of visit attendance (>95% appointment adherence) was significantly higher among patients in Dar es Salaam, 318 (77%) than patients in Iringa 293 (55%) [OR (CI)=2.6 (2.0-3.5); P<0.01]. There was no significant association between good adherence and immunological [OR (CI)=0.8 (0.6-1.2); P= 0.2] or clinical [OR (CI)=1.1 (0.7-1.5); P=0.7] response to ART in both Dar es Salaam and Iringa. We had no access to virological response to ART, even though it is the more relevant variable to test therapy response. The main reasons for missing appointments were forgetting the appointment dates 103 (11%) and having travelled away from home 86 (9%).

In univariate analysis, all socio-demographic variables mentioned in Table 1 were tested, and also the clinical site itself or whether the site was rural or urban was tested. Satisfaction with Health services, Education and employment status, early presentation to CTC, duration of using ART, having treatment support, knowledge on ARV, pre-ART counselling, transportation to the health facilities, attending CTC in urban facilities, developing side effects, status disclosure and gender were positively associated with good (>95%) appointment adherence. On the contrary, the use of traditional medicine and alcohol abuse were negatively associated with good (>95%) appointment adherence.

According to the multivariate analysis (Table 2),

the following variables were found to be associated with keeping appointments (>95%) in the joint analysis for both settings: satisfaction with health services, early presentation to CTC, and being on ART for more than one year. Also attending clinic in the urban setting was significantly associated with appointment adherence. In addition, being employed, developing side effects and taking alcohol were significantly associated with non-adherence just in Dar-Es-Salaam, while paying less than 500 TZS for bus fare to the clinic and using traditional medicines were negatively associated with keeping appointments just in Iringa.

Table 2: Independent predictors of adherence as measured in Dar-es-Salaam and Iringa 2012, keeping appointment adherence

Exposure Variable	OR (95% CI) Dar es Salaam	P-Value Dar es Salaam	OR (95% CI) Iringa	P-Value Iringa	AOR (95% CI) Joint analysis	P-value Joint analysis
Adherence based on keeping appointment (>95%)						
Satisfaction with Health services	3.9 (1.8-8.6)	<0.01	2.4 (1.3-3.2)	0.04	2.3 (1.7-7.2)	0.01
Unemployment	2.3 (1.1-4.6)	0.02	1.4 (0.6-2.5)	0.13	1.08 (0.5-2.5)	0.85
Early presentation to CTC	2.3 (1.1-4.6)	0.02	2.04 (1.6-4.8)	0.05	0.40 (0.2-0.9)	0.01
Being on ART >1year	1.88 (1.1-3.1)	0.01	2.7 (1.5-4.1)	0.01	10.7 (4.4-21.1)	<0.01
Paying > 500 Tshs fare to the clinic	0.9 (0.5-1.4)	0.5	2.1 (1.6-3.2)	0.03	1.9 (1.4-5.2)	0.05
Developing side effects	2.2 (1.3-3.6)	<0.01	1.01 (0.9-2.1)	0.2	1.9 (1.3-2.9)	0.05
Taking Traditional Medicine	1.3 (1.2-1.4)	0.6	0.5 (0.2-0.9)	0.04	0.8 (0.2-0.9)	0.05
Taking alcohol	0.3 (0.2-0.5)	0.01	1.0 (0.7-1.5)	0.9	0.7 (0.5-0.8)	0.05
Urban setting (vs. rural setting)	NA	NA	NA	NA	2.63 (1.96-3.53)	< 0.01

NA= not applicable

Fewer patients in Dar es Salaam (56%) than Iringa (81%) took their ARV medication more than 95% of the time during the previous one month [OR (CI)=0.3 (0.2-0.4); P<0.01]. In both Dar es Salaam and Iringa, good adherence based on one-month recall was not significantly associated with immunological response [OR (CI)=1.2 (0.8-1.8); P= 0.5] and clinical response to ART [OR (CI)=1.2 (0.8-1.9); P=0.4].

In univariate analysis, satisfaction with health services, education and employment status, early presentation to CTC, duration of using ART, having treatment support, knowledge on ARV, pre-ART counselling, transportation to the health facilities, developing side effects, status disclosure and gender were significantly associated with the adherence to ART, while use of traditional medicine and alcohol abuse, attending CTC in the urban setting were negatively associated with taking ARV in one month recall.

In the multivariate analysis, the following variables remained positively associated with adherence to ART in both settings: being on ART for more than one year, going to a CTC for more than one year, having treatment support, having knowledge on the importance of taking ARV as directed; while females were more adherent only in Dar-Es-Salaam; and developing side effects, using traditional medicine and alcohol consumption were found to be negatively associated with adherence to ART only in Iringa (Table 2 and 3). Also attending an urban clinic was negatively associated with taking ARVs in one month recall adherence [OR 0.30 (0.22-0.41); P-Value < 0.01].

Good adherence based on four days recall was higher in Dar es Salaam (88%) than in Iringa 80%) (Table 1), and was not associated with immunological [OR (CI)=0.9 (0.4-2.1); P= 0.6] or clinical [OR (CI)=0.9 (0.4-2.0); P=0.5]

response to ART in both Dar es Salaam and Iringa. In univariate analysis, satisfaction with health services, education and employment status, duration of using ART, having treatment support, knowledge on ARV, pre-ART counselling, status disclosure and attending an urban clinic were significantly associated with adherence to ART based on 4 days recall. In the multivariate analysis, the following variables remained positively associated with the last 4 days recall self-reported adherence in both settings (Table 3): being on ART for more than one year, having treatment support, having knowledge on the importance of taking ARV as directed. Attending an urban clinic was significantly associated with adherence (4 days recall).

Table 3: Independent predictors of adherence as measured in Dar-es-Salaam and Iringa 2012, self-reported adherence

Exposure Variable	OR (95% CI) Dar es Salaam	P-Value Dar es Salaam	OR (95% CI) Iringa	P-Value Iringa	AOR (95% CI) Joint analysis	P-value Joint analysis
Adherence based on self-reported adherence measure by the Visual Analogue Scale (VAS)						
Being on ART >1 year	10.7 (4.4-21.1)	<0.01	3.0 (1.8-7.1)	0.01	5.2 (3.2-16.3)	<0.01
Being on CTC for more than 1 year	9 (6.4-11.2)	<0.01	6.1 (2.0-1.4)	0.02	9 (6.4-11.2)	0.009
Female Gender	2.24 (1.03-4.9)	0.03	0.9 (0.5-1.4)	0.7	2.3 (1.03-4.9)	0.04
Having treatment support	5.96 (2.7-13.4)	<0.01	1.7 (1.1-2.7)	0.02	3.96 (2.1-7.9)	<0.01
Having knowledge on ARV	7.2 (2.7-19.1)	0.01	4.2 (2.5-9.9)	0.01	5.2 (2.5-19.2)	0.01
Developing side effects	1.3 (0.6-2.9)	0.5	0.4 (0.2-0.9)	0.02	0.6 (0.4-0.9)	0.05
Using traditional medicine	1.3 (0.6-2.9)	0.5	0.6 (0.1-0.8)	0.02	0.8 (0.5-0.9)	0.05
Alcohol Consumption	0.8 (0.3-2.0)	0.6	0.5 (0.3-0.8)	<0.01	0.6 (0.2-0.8)	0.04
Urban setting (vs. rural setting)	NA	NA	NA	NA	0.30 (0.22-0.41)	< 0.01
Self-reported adherence based on (four days recall)						
ART for more than one year	3.4 (2.1-4.5)	P<0.01	2.2 (1.6-4.2)	P=0.04	2.4 (1.7-4.5)	P<0.01)
Having treatment support	1.9 (1.2-3.4)	P=0.05	2.8 (1.4-4.2)	P<0.01	1.4 (1.1-2.4)	P=0.05
Having knowledge on the importance of taking ARV as directed	4.1 (2.2-6.2	P<0.01	3.4 (2.2-5.7)	P<0.01	3.1 (1.9-5.2)	P=0.04
Attending an urban clinic	NA	NA	NA	NA	1.70 (1.2-2.5)	P< 0.01

Note: NA= not applicable

DISCUSSION

We found in this study that the prevalence of good adherence based on keeping appointments was 77% among Dar es Salaam patients and 55% among Iringa patients, based on one month recall it was 56% among Dar es Salaam patients and 81% among Iringa patients, while based on the 4 days recall measure it was 87% among Dar es Salaam patients and 80% among Iringa patients. Good adherence in this study was lower compared to the findings from another study conducted in Tanzania [14] where good adherence was found to be 90%. However, a similar study conducted in Moshi Tanzania by found that 84% of the subjects reported not to have missed any dose of ART from the start of treatment. A meta-analysis of adherence rates found that 77% of adults achieved good adherence in sub-Saharan Africa [19].

Access to a CTC seemed to affect adherence differently in an urban vs. a rural setting. This difference was most obvious for keeping

appointments, where more urban patients could keep hospital appointments than rural patients. This could be attributed to the fact that patients from the rural areas were paying more for transportation fare to the clinics as compared to patients in urban areas, it is therefore not surprising that the effect of travel cost to the clinic affects more adherence in the rural population than the urban population, where a reasonably good infrastructure exists, thus having CTC close to patients' homes. However, in urban populations, more often, having a job results into in missing appointments, broader access to CTCs may also be needed in urban settings. The findings are similar to other studies which found that People Living with HIV from the rural areas face barriers to care that are related to the rural environment, including travel burdens and limited availability of HIV care providers. But the fact that having a job interferes with keeping appointments in the urban setting is new and worrying.

Early presentation to CTC and attending CTC for more than 1 year were essential factors towards achieving good adherence in both regions, Dar es Salaam and Iringa. Even though Dar es Salaam patients are in close proximity to CTCs, significantly more patients were not attending CTC before initiation of ARV as compared to patients in Iringa. This may be related to the fact that in Dar-es-Salaam being employed was affecting attendance to the clinic, perhaps more people in the urban setting have difficulties attending a CTC because of their job. This may explain the fact that more patients in Iringa were adherent to their ART in 1 month recall adherence measure compared to patients in Dar es Salaam. For the success of the ARV program, regular attendance to CTC and adherence to ART are necessary for improving treatment outcome. This is similar to the findings of another study in which early initiation of ART was found to be advantageous when opportunistic infections were absent [4], a condition that could reduce virologic failure [20]. This is because more patients with advanced HIV are likely to stop ART due to related toxicity [21].
Given that the majority of those interviewed

were on treatment for more than 12 months, the low proportion of those who were on the second line regimen is an indication of good adherence, especially in Iringa. The percentage of those on the second line regimen was higher compared to the National AIDS Control Programme (NACP) report that indicated that 1.5% of patients are on second line ARV in Tanzania [22]. However, more patients from Iringa were experiencing side effects but were still on first line treatment. The higher frequency of ARV change among patients in Dar es Salaam compared to patients in Iringa could be due to better access to CTC while on treatment, thus it may have been easier for them to report side effects and subsequently change therapy. Experiencing side effects affected adherence in both settings, however, the effect was significant on attending appointments only in Iringa, while it affected taking ARV only in Dar-es-Salaam. These findings are consistent with those observed from a larger study carried out in 2010 by the NACP on the progress of implementation of National Care and Treatment Plans by analysing data from CTCs countrywide.

Patients' satisfaction with health services was one of the significant factors to their keeping monthly appointment, irrespective of the setting. In our study, even though, more patients in Iringa were satisfied with the health services, they were less likely to keep their monthly appointments. Some other infrastructural problems as observed by Nsimba et al [14], and Hardon *et al* [23], such as lack of confidentiality and work overload, resulting in long waiting hours were not significantly observed in this study. There was self-reported difference in taking ARV medication between males and females in Dar es Salaam, a finding which is different from other studies in Tanzania [11, 14] who found no difference, which is more in accordance with what we observed among patients in Iringa. The most common reason for missing pills was simply forgetting to take them. This may be attributed to adopting different intervention strategies for reminding patients to take their ARV, such as telephone-based alarms and home visits as demonstrated by Unge and colleagues [24].

On perception of the effectiveness of ART in improving the health of PLWHA, most patients in Iringa and Dar es Salaam indicated that treatment had improved their health, which was higher compared to a study in which a noticeable proportion of respondents (nearly one-third) indicated that treatment did not improve their health [25]. The perceived effectiveness of treatment is an important encouragement to patients to continue with their medication and keep their CTC attendance appointments.

It was observed that patients taking other medications were more likely to adherent to ART compared to those taking ARV alone, and this was contrary to a study done in Kenya [26] However, the proportion of patients who reported to have been taking other medicines was low, especially in Iringa, contrary to expectations that they would also be taking other medicines as prophylaxis for opportunistic infections, as recommended by the National Guidelines for the Management of HIVAIDS [27].

Pre-ART counselling seems to be an essential requirement for successful ART adherence. At the initiation of ART, the majority of the patients in the study received intensive counselling. More patients in Iringa than Dar es Salaam received pre-ART counselling and this could explain good ARV uptake. This has also been shown by [19] who found that individual adherence counselling at ART initiation reduced the risk of poor adherence and virological failure. However, once they were on treatment, less counselling was conducted unless there was a problem. This has also been shown in a study by Horne [28], which revealed that adherence declines over time due to lack of continuous counselling while on ART In this study, despite the lack of constant counselling over time, the patients who had been on treatment for more than one year and had been attending CTC early before initiation of ART were more likely to be adherent to ART indicating a sufficient pre-ART counselling.

Lacking family support and non-disclosure were other significant factors for non-adherence,

consistent with findings demonstrated by Unge et al [24].The use of alcohol and traditional medicine were among the factors affecting adherence to ART, more among Iringa patients than Dar es Salaam patients. However, those who reported consuming alcoholic drinks in Dar es Salaam did so occasionally, a behaviour that reinforces adherence similar to findings of a study conducted in Botswana [21, 29].

CONCLUSION

We found that provision of adequate education on the importance of strict adherence to the prescribed doses of ARVs during regular attendance to CTCs is an essential factor towards achieving good adherence to ART. PLWHA encounter many barriers to access and adherence to treatment. HIV health care providers should provide on-going adherence counselling emphasizing on adhering to ART, helping patients and families recognize and overcome HIV-associated stigma, alcohol abuse, as well as insisting on early testing so as to start ART early during the course of illness. Differential attention in rural compared to urban settings may be needed to some factors influencing adherence: rural areas may benefit more from a better transport system and access to a CTC, seeking in traditional medical practitioners allies (rather than enemies) for better ARV treatment support; while urban areas may benefit more from access to a CTC outside of working hours. In both settings, side effects were affecting adherence, but in a differently. A more extensive study to investigate more patients on ARV is needed to understand the gender difference in taking ARV medication, and how it affects HIV disease progression after diagnosis, clinically and virologically.

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