

Adherence to Antiretroviral Treatment and Associated Factors among People Living with HIV/AIDS in Northwest Ethiopia

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Rec date: Feb 03, 2014, Acc date: Mar 18, 2014, Pub date: Mar 20, 2014

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Abstract

Introduction: Measurement of adherence to antiretroviral treatment is extremely important, especially for people living with HIV/AIDS in developing countries. The present study has determined the level of adherence to antiretroviral treatment and identified associated factors among people living with HIV/AIDS in South Gondar Zone, northwest Ethiopia.

Methods and Materials: Institution-based cross-sectional study was conducted at 6 health centers in South Gondar Zone from June to October 2013. Six hundred forty-seven HIV patients aged ≥ 18 years and were on antiretroviral treatment for more than one month was included in the study. Adherence was defined as taking 95% of the prescribed doses in the three days prior to the survey. Data were collected by using a pre-tested and structured interview questionnaire. Data were analyzed using SPSS for windows version 20. Multivariable analyses were employed to see the effect of explanatory variables on dependent variable.

Results: The level of adherence to antiretroviral treatment was 85.3%. Use of memory aid [AOR: 3.7, 95%CI: (1.3-10.7)], satisfaction with clinical change [AOR: 3.7, 95%CI: (1.4-9.8)], fitness of single drug regimen with daily routine [AOR: 2.4, 95%CI: (1.4-4.2)], and experience of drug side effects [AOR: 0.3, 95%CI: (0.2-0.5)] were factors significantly associated with adherence to antiretroviral treatment.

Conclusion: In this study a relatively higher adherence rate was reported compared to other studies in developing countries. Interventions to promote adherence should focus on areas, such as revising drug regimen and medication schedules, promoting use of different memory aids, like alarm watches and mobile bells, dealing with drug side effects, and patient counseling.

Keywords: Adherence; Antiretroviral treatment; People living with HIV/AIDS

Introduction

The Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) is one of the most destructive epidemics and a major threat to world population, affecting overall social, economic and political wellbeing as well as individual health [1-3]. There were an estimated 34 million people living with HIV/AIDS (PLWHA) in 2011 [1]. The majority, 97%, of them were from low and middle-income countries [2]. Sub-Saharan Africa is the most affected region contributing more than 69% of the total [1]. Currently, there are about 789,900 people living with HIV/AIDS in Ethiopia [3,4]. According to the 2011 Ministry of Health report, about 333,453 PLWHA were on antiretroviral treatment (ART) in Ethiopia [5].

Measurement of adherence to ART is extremely important, especially for PLWHA in developing countries [6-9]. Several studies have demonstrated that medication adherence is second only to CD4 count in accurately predicting progression to AIDS and death [10-12]. Non adherence to ART causes the worsening of the immunological and clinical state and leads to treatment failure, emergence of drug

resistant HIV strain, and increases AIDS-related morbidity, mortality and hospitalization [1,3,6]. Adherence to ART is the most complicated and dynamic issue influenced by internal and external factors, such as drug side effect, psychiatric problems, poor quality service delivery, lack of psychosocial support, pill burden, substance abuse, stigma, nondisclosure of HIV status, and hidden costs of care [6,7].

Most ART adherence studies were conducted in high-income countries [13-15]. Only a few studies assessed adherence rates or predictors in low and middle-income countries. This paper presented the findings of a study which investigated adherence to ART and associated factors among PLWHA receiving ART in six health centers in northwest Ethiopia, a low-income country in East Africa. The region was identified to be among the most HIV affected parts of the country [16,17]. The study will fill a critical gap in understanding ART adherence in Ethiopia and contributes to the growing adherence research in low-income countries. Such studies may also help in developing evidence-based interventions to improve patient adherence to ART, especially at the health center level in the country.

Methods and Materials

Study design, area and period

An institution-based cross-sectional study was conducted at 6 health centers providing ART services in South Gondar Zone, northwest Ethiopia, from June to October 2013. The zone had an estimated population of 2,278,555. Like the rest of the zones in the northern part of the country, the livelihood of the community largely depended on subsistence agriculture. During the investigation, there are about 4,988 ART users in the zone [18].

Participants and data collection

All adult PLWHA aged ≥ 18 years and were on ART follow up for more than one month were included in the study until the required sample size was obtained. Patients who were seriously ill and had overt psychiatric problems were excluded from the study. They were excluded from the study on the ground that they could not provide valid information during interviews. That means very different factors might affect their level of adherence to ART than factors which affected the participants included in this study. The explanation for this is beyond the scope of this paper. A pre-tested and structured interview questionnaire was used to collect the data. The questionnaire contained detailed information on socio-demographic, behavioral and clinical factors, reasons for missing antiretroviral drugs, drug side effects, and patient-provider relationships. In addition, with the intention to capture behavioral fluctuations in patient medication intake over time, patients on ART for more than one month were asked to recall their medication intake in terms of prescribed doses in the past three days prior to the interview. To ensure confidentiality, all participants were interviewed in a private room at the HIV/AIDS care unit by two trained interviewers.

Sample size calculation

A single population proportion formula was used to determine the sample size of the study. The total sample size was determined to be 648 by taking 95% confidence interval, 74.2% level of ART adherence [19], 5% margin of error, design effect of 2, 10% non-response rate, and 80% power.

Sampling procedure

The multistage sampling technique was used to select the study participants. In the first stage, 6 health centers were randomly selected by the lottery method from 12 health centers in South Gondar Zone. In the second stage, the total of 647 samples was proportionally allocated to each selected health centers. The participants were drawn from the PLWHA on ART list using simple random sampling.

Data quality assurance

The training of data collectors and supervisors emphasized issues such as data collection instrument, field methods, inclusion-exclusion criteria, and record keeping. The principal investigator and supervisors coordinated the interview process, spot-checked and reviewed the completed questionnaire on a daily basis to ensure the completeness and consistency of the data collected. The interview questionnaire was pre-tested on 20 respondents in order to identify potential problem areas, unanticipated interpretations, and cultural

objections to any of the questions. Based on the pre-test results, the questionnaire was adjusted contextually.

Data management and statistical analyses

Data entry and cleaning was carried out using the Epi Info version 3.5.2 statistical software, were analyzed on SPSS software package version 20. Frequency distribution, mean, standard deviation, and percentage, were employed for most variables. A forward stepwise binary logistic regression analysis was done to assess the relative importance of the explanatory variables on the dependent variable (adherence to ART). The Odds Ratio (OR) with a 95% Confidence Interval (CI) was used to test the statistical significance of variables.

Operational Definitions

Adherence to ART

Patients had adherence to ART when they had reportedly taken 95% or higher of their prescribed antiretroviral drugs in the three days prior to the interview [1,3,6].

Household income

In this study, income referred to monthly household income of the participants. Employed respondents were asked of their monthly salary, where-as farmers were asked of the annual amount of cereal harvested and livestock reared and changed to Birr and were then divided by the months of the year. For the analysis, we used Birr 500, which is the average urban and rural monthly total consumption expenditure set by the Federal Ministry of Finance and Economic Development of Ethiopia [20].

Ethical considerations

The study protocol was reviewed and approved by the Institutional Review Board of the University of Gondar via the Institute of Public Health. Permission was obtained from the respective health centers prior to data collection. Study participants were interviewed after informed written consent was obtained. They were also informed that their participation was voluntary and that they could withdraw from the interview at any time without consequences. The participants were assured that their responses would be treated confidentially through the use of strict coding measures. Finally, health education was given to patients who reported non adherence to ART.

Results

Socio-demographic characteristics

Out of the 647 patients 364(56.3%) were females and 283(43.7%) males. The mean age with a standard deviation of the patients was 36.6 ± 10.0 . Nearly three-fourths, 467(72.2%), of them belonged to the age group of 25-44 years. The majority, 340 (52.6%), of the patients were married. More than two-thirds, 419(64.8%), had no formal education. About 385(59.5%) had a monthly household income was less than or equal to Birr 500. The majority, 423(65.4%), were from urban settings. More than one-third, 230(35.6%), were farmers (Table 1).

Variables	Number (N=647)	Percent
Sex		
Male	283	43.7
Female	364	56.3
Age (in years)		
18-24	47	7.3
25-34	228	35.2
35-44	239	37
≥45	133	20.5
Marital status		
Single	101	15.6
Married	340	52.6
Divorced	139	21.5
Widowed	67	10.4
Educational		
Had no formal education	419	64.8
Primary	135	20.9
Secondary and above	93	14.3
Income (in birr)		
≤500	385	59.5
501-1000	166	25.7
>1000	96	14.8
Residence		
Rural	224	34.6
Urban	423	65.4
Occupation		
Government employee	95	14.7
Merchant	135	20.9
Farmer	230	35.6
Daily labourer	113	17.4
Others	74	11.4

Table 1: Socio-demographic characteristics of adult ART users in South Gondar Zone, northwest Ethiopia from June to October 2013

Clinical characteristics

A total of 171(26.4%) patients reported that they developed drug side effects during the treatment. Out of these 69(40.3%) stopped taking their drugs while 102(59.7%) continued to do so correctly. Out of 381(58.9%) patients who developed multiple signs and symptoms, 100(26.3%) had headaches, 80(21.0%) nausea, 77(20.2%) vomiting, 27(7.1%) anemia, 50(13.1%) diarrhea, and 47(12.3%) skin rash.

Behavioral characteristics

Of 492(76.0%) patients who used memory aids, 322(49.8%) employed alarm watches, and 155(24.0%) some active substance. Of the patients who used active substance 103(66.6%) used to drink alcohol, and 274(42.3%) reported that they felt uncomfortable when taking drugs in public (Table 2).

Variable	Number (N=647)	Percent
Used memory aid		
Yes	492	76.0
No	155	24.0
Type of memory aid used		
Pill box	51	7.9
Written schedule	40	6.2
Alarm watch	322	49.8
Mobile bell	74	11.4
Used more than one aids	35	5.4
Used active substance(s)		
Yes	155	24.0
No	492	76.0
Type of active substance used (N=155)		
Khat	13	8.3
Cigarette	19	12.2
Alcohol	103	66.6
Others	20	12.9
Feeling discomfort when taking drugs in front of others		
Yes	274	42.3
No	373	57.7

Table 2: Behavioral characteristics of adult ART users in South Gondar Zone, northwest Ethiopia from June to October 2013

Patient-provider relationships

Nearly all, 628(97.1%) of the patients were satisfied with the services provided at the ART clinics and believed that care providers were fully capable of supporting and treating their illnesses. The same patients reported that they had open communication with their care providers. The majority, 612(94.6%), of the patients were satisfied with the health education they received from their care providers. Five hundred ninety-three (91.7%) of the patients were satisfied with their health improvements (clinical changes) after they started ART. The majority, 580(89.6%), were satisfied with the confidentiality maintained by their care providers.

Adherence to ART

Out of the 647 ART users 552(85.3%) had reportedly taken 95% or higher of their prescribed antiretroviral drugs in the month before the interview; 313(56.7%) of these were females and 239(43.3%) males.

Reasons for missing antiretroviral drugs

Ninety five (14.7%) patients reported that they missed some doses of the antiretroviral drugs at least once in the month before the interview. The common reason for missing drug doses for 29(30.5%) was being away from home, for 25(26.3%) forgetting, and for 23(24.2%) lack of supporter (Figure 1).

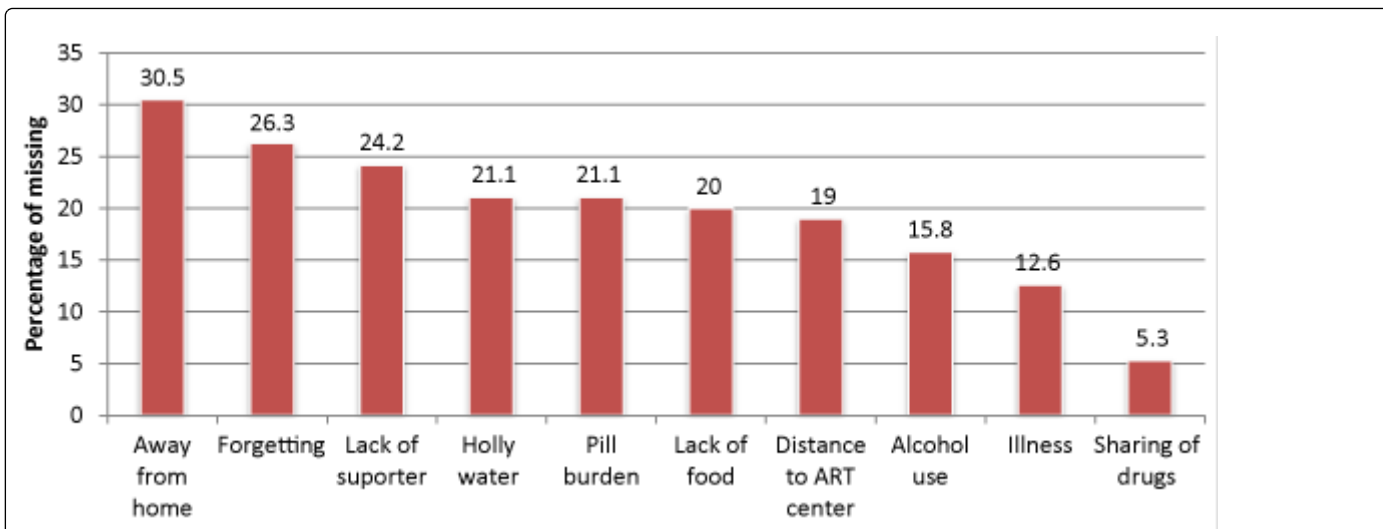


Figure 1: Reasons for missing antiretroviral drugs

Factors associated with adherence to ART

Table 3 presents factors which remained statistically significant in the bivariate and multivariate logistic regression analyses. In this study, the independent predictors of adherence to ART on the multivariate analysis include use of memory aid [AOR: 3.7, 95%CI:

(1.3-10.7)], satisfaction with clinical change [AOR: 3.7, 95%CI: (1.4-9.8)], fitness of single drug regimen with daily routine [AOR: 2.4, 95%CI: (1.4-4.2)], and experience of drug side effects [AOR: 0.3, 95%CI: (0.2-0.5)] (Table 3).

Variables	Adherence to ART		Crude OR(95% CI)	Adjusted OR(95%CI)
	Yes	No		
Use of memory aid				
Yes	430	62	1.9(1.2-3.0)	3.7(1.3-10.7)
No	122	33	1.0	1.0
Satisfaction in clinical change				
Yes	513	80	2.5(1.4-3.9)	3.7(1.4-9.8)
No	39	15	1.0	1.0
Fitness of single drug to daily routine				
Yes	332	74	0.4(0.2-0.5)	2.4(1.3-4.2)
No	220	21	1.0	1.0
Experience of drug side effect				
Yes	123	48	0.3(0.2-0.4)	0.3(0.2-0.5)
No	429	47	1.0	1.0

Table 3: Factors associated with adherence to ART among PLWHA in South Gondar Zone, northwest Ethiopia from June to October 2013

Discussion

World Health Organization (WHO) recommends at least 95% of adherence to ART to avoid the emergence of resistant strains of HIV [21,22]. 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. However, many of the reported adherence rates are below what is recommended. Typical adherence rates for medications prescribed over long periods of time are approximately 50-75% [23-28]. The average rate of adherence varies by the method used to

assess it and the groups studied but appear to be approximately 70%. In the early days of ART expansion, there was a common perception among scholars that poor adherence to ART in resource-poor countries would accelerate widespread antiretroviral resistance if treatment was initiated without first establishing comprehensive adherence programs [29-32]. Contrary to these prior thoughts, several studies corroborated that developing countries showed comparable or better levels of individual adherence than what was seen among North American and European populations [33-35]. In this study, 85.3% of

the patients had self-reported adherence of $\geq 95\%$ of the prescribed doses in the three days prior to the interview. This was in the range of studies from Ethiopia (81.2-88.3%) [35-38] and Africa (54-92.9%) [34,35,39-41]. But it was higher than reports from Asia (47-84%) [42-46] and the world's average adherence rate of 70% [27,28]. The improvement might be due to continuous efforts to strengthen the health system infrastructure, increase public awareness, involve community health extension workers, build staff capacity, and step up the number of sectoral collaborations to prevent and control HIV/AIDS epidemic.

One important finding of this study was the identification of effective and feasible strategies used to support adherence to ART. In this study, patients who used memory aids were about four times more likely to be adherent than those who did not. This is true according to several other studies [47-50]. Besides, memory aids would be more helpful to ensure treatment adherence when weighted against single-pill regimens and reduced number of side effects in this study. The possible explanation for this could be that memory aids were particularly important given that patients quoted forgetting and being away from home as the primary reasons for missing doses. Thus, automated alarms on mobile phones and hand watches, or other electronic items could help remind patients. These devices have been widely used throughout Ethiopia and have become integral devices almost never left at home.

In this and other studies, patient satisfaction in clinical change during their treatment has had a significant association with adherence to ART [46]. The reason behind this may be that those who are satisfied with their treatment outcome may gain a positive reinforcement and have strong belief that continuing the treatment improves their health status. Therefore, care providers had better explain the clinical change as a result of treatment to patients during their appointment of follow up visits.

The convenience of medication schedule and single drug regimen with daily routine was found significantly associated with improved adherence in this study. Clinical trials and cohort studies suggest that an ART regimen composed of a single pill per day may significantly improve adherence, patient satisfaction, and virological outcomes [51-55]. In prospective studies of patients switching to single-pill treatments, adherence to an ART regimen has been estimated to be up to 98% [51-53]. Furthermore, among homeless or marginally housed patients, those receiving an ART regimen composed of a single pill per day had better virologic outcomes and a 26% increase in adherence, compared with patients receiving other multi-pill per day regimens [54]. Cognizant of this fact, identifying and resolving the conflict between daily routine and schedule of medication is very important before starting ART in order to avoid adherence problems.

In this study, patients who experienced drug side effects were less likely to adhere to ART than those who did not. This is true according to several other studies [56-60]. The possible explanation for this could be that there might be a social cost to ART side effects in addition to the physical and psychological ones. Compromised social functioning induced by ART side effects may further render HIV patients living in multicultural societies like Ethiopia to lose faith in their regimens and to seek help from complementary and alternative medicine [60,61]. It is thus imperative that clinicians clearly understand drug side effects, readily recognize them in patients, and manage them effectively. In addition to this, identifying risk factors for the occurrence of adverse drug reactions is of crucial importance to optimize the initial choice of ART regimen before initiating therapy [56]. Moreover, interventions

aiming to facilitate patient self-management of side effects of ART could help to maintain or improve adherence levels.

The findings of this study must be interpreted in the light of its limitations. There is no gold standard for measuring adherence, and our measurement of adherence is based on PLWHA self-reports of missed doses which may be subject to social desirability and recall biases. The literature, for example, suggests that PLWHA tend to overestimate adherence [62]. However, many other studies document that well collected self-reported data clearly correlate with virologic changes and are more practical in most settings [63-66]. Further, in the present study, adherence information was collected by non-clinical research staff, so there was less reason for participants to over-report adherence. And we also explained clearly to the patients the purposes of the study prior to interviewing them. Moreover, we asked patients to report their medication intake in only the past three days with the aim to reduce the recall bias to be introduced. Another limitation of this study is that we were unable to relate the obtained adherence rate to CD4 cell count due to financial and logistic barriers which prevented frequent laboratory monitoring. Finally, the focus of this research was on individual patient factors affecting adherence. Additional research is needed to better understand health care system determinants of treatment adherence.

Conclusion

In this study a relatively higher adherence rate was reported compared to other studies in developing countries. Interventions to promote adherence should focus on areas, such as revising drug regimen and medication schedules, promoting use of different memory aids, like alarm watches and mobile bells, dealing with drug side effects, and patient counseling.

Competing Interests

The authors declare that they have no competing interest.

Acknowledgments

The authors wish to thank the south Gondar zone health office for logistic and administrative support, and data collectors for their support in making this study possible. They also extend their deepest gratitude to the study participants.

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