

ORIGINAL ARTICLE**Adherence to Antiretroviral Therapy and Associated Factors among People Living with HIV/AIDS in Hara Town and Its Surroundings, North-Eastern Ethiopia: A Cross-Sectional Study**Tesfaye Aychew Legesse¹, Melese Abate Reta^{2*}**OPEN ACCESS**

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ABSTRACT

BACKGROUND: Adherence is the most important factor in determining Antiretroviral Therapy (ART) treatment success and long-term viral suppression. Nonadherence to ART led to the human Immunodeficiency Virus (HIV) related morbidity and mortality. Moreover, it intensifies the risk of the emerging drug resistant HIV strains. This study aimed to assess the level of ART adherence and to identify its predictive associated factors among people living with HIV/AIDS in Hara Town and its surroundings, North-Eastern Ethiopia.

METHODS: An institutional facility based cross-sectional study was conducted from April-May 2017. A total of 454 individuals were on ART follow-up in the selected ART-clinic, and only 418 patients were recruited. Bivariate and multivariate logistic regression analyses were carried out to identify associated factors. Odds ratio and 95% Confidence Interval (CI) were calculated to determine the level of significance.

RESULTS: The level of ART adherence in the study setting was 300 (71.8%). Participants who had not disclosed their HIV status to their families were 88% less likely to adhere to their ART medication than those who had disclosed their HIV status ((Odds ratio (OR): 0.12, 95%CI:0.05-0.58; $p<0.001$). On the other hand, participants who had not encountered drug side effects were 2.69 times more likely to adhere to their ART medication than those who had ever encountered drug side effects (OR: 2.69, 95%CI:1.27-5.05; $p<0.001$).

CONCLUSION: A very low level of ART adherence was shown in the study population. It was below the recommended good adherence standard. Therefore, patients should get adequate and comprehensive ART adherence counselling before initiation ART treatment and during the follow-up time.

KEYWORDS: Adherence, ART, HIV/AIDS, Associated factors, Hara Town, Ethiopia

INTRODUCTION

HIV/AIDS has continued as a leading public health problem globally. Particularly, low income countries such as sub-Saharan African countries are challenged with a widespread of the virus and socio-economic crises due to the disease (1, 2). Globally, in the previous era, many efforts had been made to fight against the worldwide HIV epidemic (3, 4). Accessibility of the ART treatment program had scaled-up (3). Hence, almost 10 million people had received the treatment by the end of 2012 (5). Accordingly, the rate of new infections and HIV/AIDS related morbidity and mortality declined significantly (3, 4). The scaled-up accessibility of ART treatment saved around 2.5 million lives from HIV-related deaths in developing countries, since 1995 (2).

ART treatment can suppress the viral replication, enhance immunological status, can reduce HIV transmission to uninfected people, and increase patients' life expectancy (6). With the availability of free ART treatment, the cost of ART, and related care is no longer adequate for treatment success and HIV-related mortality reduction (7, 8). Although efforts such as improving patients' awareness to seek treatment and when to initiate therapy, supporting continuity care, promoting and ensuring high ART adherence rate are vitally important (9).

The level of adherence to ART can vary based on population context, and moreover, it is affected by individual, service, and therapy-related factors such as substance abuse, psychiatric problems, inability to disclose HIV status, lack of psychosocial support, stigma, drug side effect, pill burden, poor quality service delivery, and unexplained treatment cost (10, 11).

In Ethiopia, HIV epidemic is continuing to be a threat to the lives of many productive age groups (12). In 2007, it was estimated that 977,394 people lived with the virus, and this would result in a total of 71,902 HIV-related deaths. In the same year, the prevalence of HIV in Ethiopia was estimated to be 2.1% (12). However, the national HIV prevalence in 2014 was 1.14% (13). The advent of ART treatment in Ethiopia improved the quality of life for HIV-positive people and

increased their life expectancy. Since Ethiopia's ART program began in 2003, a total number of 210,637 people started treatment in 481 facilities throughout the country. ART service expansion was recent and fast from only four facilities in 2003 to 481 in 2009 (14).

The ART adherence is now well understood as the most important determinant (15), and it is the 'Achilles heel' of ART treatment success (16, 17). Poor adherence can lead to preventable HIV-related deaths. Moreover, it increases the risk of the emerging-drug resistant HIV strains (16, 18). Hence, educating and sustaining ART treatment adherence to the HIV positive individual is the important component which needs public health efforts (19). Due to many factors, a high number of HIV positive individuals are still dropping out from their treatment follow-up (5, 20).

A recent study has shown that the emergence of drug-resistant HIV strains in 'ART-naive people' is increasing (21). According to a World Health Organization (WHO) survey study in 12 developing countries in 2012, the HIV drug resistance rate among people starting ART ranged from 4.8% in 2007 to 6.8% in 2010 (22). Hence, "attention to and strengthening of adherence throughout the entire course of ART comprises an essential part of any successful treatment programme and should be built into the country-specific program" (20). Although the magnitude of HIV at the study area was not known, the number of people who were registered to get HIV care and treatment was increasing, and there is limited information about the ART adherence level of people living with HIV/AIDS. Moreover, most peoples living in the study are pastoral and agro-pastorals. Hence, many factors might hinder them to adhere to their ART medications. Currently, the prevalence of HIV is increasing in the rural community. However, regional and the national HIV/AIDS prevention and control programme is unable to reach to investigate the magnitude of the disease, health service quality, individuals' ART adherence level, and their social and behavioural factors that hinder their ART treatment seeking behaviour. Many kinds of research are conducted in well-established towns

where most aware individuals about HIV/AIDS live. Therefore, this study was aimed to assess the level of adherence to ART treatment and its associated factors in Hara Town and its surroundings, North-Eastern Ethiopia.

METHODS AND MATERIALS

Settings: The study was done in the ART Unit of Hara Health Center. Hara is in the eastern part of the Amhara Region in North Wollo Zone. It is located at 383km from the regional capital city, Bahir Dar, and 543km from Addis Ababa. The town had a total population of 28,096, (14188 males and 13,908 females). There was one ART clinic, 7 health posts, and 5 private clinics in the town. During this study piloted, there were a total of 454 HIV positive people who were on ART treatment follow-up. Four hundred eighteen patients were enrolled in this study.

Study design and period: An institutional facility based cross-sectional study was conducted from April to May 2017 to assess the level of adherence to ART and its associated factors among HIV positive individual in Hara Town and its surroundings, North-Eastern Ethiopia.

Study population and eligibility criteria: All HIV positive adults (≥ 18 years old) who were currently on Highly Active Antiretroviral Therapy (HAART) follow-up at least for 3 months and had no difficulty to communicate were enrolled in this study. However, those patients who were seriously ill during data collection, and those who were under 18 years of age were excluded.

Sample size: Single population proportion formula was used to calculate the sample size. We considered the proportion (P) of good adherence from a previous study 85.3% (10), the margin of error 5% at 95% confidence interval. Therefore, the final sample size was 193. However, there were a total of 454 adults who were on ART treatment follow-up in the study setting (ART-clinic); hence, all eligible study subjects were included.

Data collection procedures: A structured questionnaire was used as a data collection tool. We adapted the questionnaire partly from the AIDS Clinical Trial Group (ACTG) (23), adherence baseline and follow-up questionnaires. Pilot study was conducted on 5% of the total

sample size at Kobo Health Center to check the validity of the questionnaire. The questionnaire includes information on socio-demographics, individual characteristics, and health and economic status of the respondents. The English version of the questionnaire was translated into local language (Amharic) for ease of understanding and it was translated back into the English language to check content validity. Two diploma nurses performed the interview and the data collection using the face-to-face interview method. Training was given to data collectors about the objectives of the study, and how they could approach the patients to obtain their confidentiality. Written and verbal consent was obtained from the study participants after the objectives of the study were explained. Patients' clinical data such as WHO clinical stage and the CD4 counts were retrieved from their medical record registration book at the ART clinic. An antiretroviral therapy adherence level was calculated based on the patients' report of seven days recall of missed doses before the interview date.

Data analysis: All the collected data were entered into EPI-Data 3.1 statistical software to code and edit errors, and then transferred into SPSS version 20.0 for analysis. The data were calculated and presented using descriptive statistics. Multivariate logistic regression analysis was performed to identify and check the associated risk factors to adherence. Odds ratio with 95%CI was calculated, and independent variables with *p*-values of less than 0.05 in multivariate logistic regression analysis were considered significantly associated with adherence.

Definition of operational term

Adherence: Adherence is defined as **good** if it is $\geq 95\%$ (< 2 doses of 30 doses or < 30 doses of 60 doses is missed) as documented by ART healthcare provider. It is **poor** if it is between 85-94% (3-5 doses of 30 doses or 3-9 doses of 60 doses is missed) as documented by the ART healthcare provider.

Ethical consideration: Ethical approval letter was obtained from the institutional Research Review Committee of Health Sciences Faculty, Woldia University (No: 18/FHS/RERC/2017). Official permission letter was obtained from North Wollo

Zone Health Department and Hara Health Center. The objective of the study was explained to all study subjects to obtain their verbal or written consent before the interview. Participants were informed that they had the full right to discontinue participating in the study if they felt discomfort. They were also assured that all the data provided by them would be kept confidential. In addition, no personal identifiers were used.

RESULTS

Socio-demographic characteristics: Out of a total of 454 study participants, 418 people living

with HIV and currently on ART follow-up were enrolled in the analysis. The response rate was 92.1%. Thirty-six cases were excluded because they were less than 18 years old. Of the total 418 participants, 246 (58.9%) were females. The mean age of the study participants was 38.17 years while 36.6% of them were between the ages of 25-34 years. Of the total, 35.9% were married. The majority, (69.4%) of the study participants were illiterate. Two hundred twenty-seven (54.3%) of them were farmers. The majority, 332 (79.4%) did not get support from their family members to take their medication timely (Table 1).

Table 1: Socio-demographic characteristics of the study participants in Hara Town and its surroundings, April to May 2017 (n = 418)

	Attributes	N	%
Sex	Male	172	41.1
	Female	246	58.9
Age (year)	18-24	22	5.3
	25-34	153	36.6
	35-44	140	33.5
	≥45	103	24.6
Marital status	Married	150	35.9
	Divorced/ separated	185	44.3
	Single	67	16
	Widowed	16	3.8
Educational status	Illiterate	290	69.4
	Can read and write	54	12.9
	Elementary	61	14.6
	Secondary school & above	13	3.1
Residence	Urban	278	66.5
	Rural	140	33.5
Religion	Orthodox	58	13.9
	Muslim	360	86.1
Occupation	Merchant	38	9.1
	Housewife	99	23.7
	Farmer	227	54.3
	Government employ	16	3.8
	Other*	38	9.1
Distance from the health facility	<10km	268	64.1
	≥10km	150	35.9
Monthly income[#]	≤500	287	68.7
	501-999	96	22.9
	≥1000	35	8.4
Getting support	Yes	86	20.6
	No	332	79.4

Exchange rate 1USD = 27.22 Ethiopian Birr; * students, daily laborer

Clinical and Behavioural Characteristics of the respondents:

Two hundred (47.8%) of the participants were at WHO clinical stage III. Two hundred thirty-six (56.5%) of them had a baseline CD4 count between 200-499cells/mm³ while 61.7% had a CD4 count between 200-499 during the antiretroviral treatment initiation time, and 55% had the CD4 count of ≥ 500 cells/mm³ during

the interview. Three hundred ninety-two (93.8%) of the respondents reported that they experienced drug side effect to ARV (antiretroviral) drugs; while, 93 (22.2%) had histories of opportunistic infections. Of the total respondents, 361 (86.4%) did not disclose their HIV status to their relatives (Table 2).

Table 2: Clinical and behavioural characteristics of the study participants in Hara Town and its surroundings, April to May 2017 (n = 418)

Attributes	N	%	
WHO clinical stage at the start of ART	Stage I	51	12.2
	Stage II	108	25.8
	Stage III	200	47.8
	Stage IV	59	14.1
Baseline CD4 count	<200	74	17.7
	200-499	236	56.5
	≥ 500	108	25.8
CD4 count at the start of treatment	<200	73	17.5
	200-499	258	61.7
	≥ 500	87	20.8
Current CD4 count	<500	188	45
	≥ 500	230	55
Encountered drug side effect in relation to ART	Yes	392	93.8
	No	26	6.2
History of opportunistic infections (OIs)	Yes	93	22.2
	No	325	77.8
Using memory aids as time reminder to take medication timely	Yes	153	36.6
	No	265	63.4
History of using an active substance like alcohol	Yes	29	6.9
	No	389	93.1
Disclose HIV status for families	Yes	57	13.6
	No	361	86.4

The adherence measurement was calculated based on the respondents' self-report. In this study, of the total participants, only 71.8% (95% CI: 70.8%-74.4%) reported to have an adherence level of $\geq 95\%$ in seven days before the interview.

The adherence level of ART in the previous three days prior to the data collection date was 82.5%. The majority of the respondents with poor adherence, 63 (53.4%) had reported that they forget to take their medication timely (Table 3).

Table 3: Study participants' adherence to ARV drugs at Hara Town and its surroundings, Ethiopia, April to May 2017 (n=418)

<i>Attributes</i>		N	%
Taking other medication in addition to ARV drugs	Yes	29	6.9
	No	389	93.1
How did you take ARV drug doses in the last 7 days?	Missed	118	28.2
	Not missed	300	71.8
Number of ARV drug doses missed in the last 7 days	≤ 2 doses	64	54.2
	≥ 3 doses	54	45.8
Number of ARV drugs doses missed in the last 3 days	≤2 doses	41	56.2
	≥ 3 doses	32	43.8
Reasons for nonadherence to ART	Illness	13	11.0
	Transportation	26	22.0
	Refusal to take the drugs	16	13.6
	Forgetfulness	63	53.4

Factors associated with adherence to ART:

Different socio-demographic and adherence related variables were entered in stepwise regression. Crude analysis showed that residence, distance from the health facility, disclosure of HIV status to families, encounter of drug side effect, having history of opportunistic infections, and current CD4 count were negatively associated with adherence to ARV drugs ($p < 0.05$). In multivariate logistic regression analysis, only disclosure HIV status to families (AOR: 0.12, 95% CI: 0.05-0.58; $P < 0.001$) and encounter of drug side effect (AOR: 2.69, 95% CI: 1.27-5.05; $p < 0.001$) were factors that negatively affected the respondents' adherence to ARV drugs (Table 4).

DISCUSSION

This study assessed patients' ART adherence level and the factors associated with their ART adherence in Hara Town and its surroundings, North-Eastern Ethiopia. The adherence rate was found to be 71.8% in the past seven days of

respondents' recall of missed doses. Our result was below the recommended level of good adherence. It must be ($\geq 95\%$) to suppress the viral load for a long time (8), to bring the patients' clinical improvement and increased patient's CD4 count (24, 25)

This finding revealed a very low adherence level as compared to similar studies in Ethiopia: Gondar (85.3%) (10), Addis Ababa (73.3%) (26), Harar and Dire Dawa (85%) (27), Debre Berhan (95.5%) (28), Gondar (82.7%) (29), Jimma (94.3%) (30), and Jimma (95%) (31). The possible reason for this might be due to the difference in socio-demographic characteristics of participants, and the service quality discrepancy. This result is also lower than other studies conducted in some African countries: Uganda (97%), Namibia (86.1%), and Cameroon (76.7% males vs 90.84% females) (24). However, this figure was higher than the study conducted in Ghana, 62.2% (32), rural Zambia (59.9%) (33), Nigeria (70.8%) (17), and Botswana (54%) (34). The low adherence rate

reported from the above studies might be due to different population characteristics, health service

quality, study settings, and the adherence level measurements used.

Table 4: Bivariate and multivariate analysis showing factors associated with adherence to ARV drugs in Hara Town and its surroundings, April to May 2017 (n = 418)

Variables	Adherence to ARV drugs				
	Missed (n=118) n (%)	Not missed (n=300) n (%)	COR (95% CI)	AOR (95% CI)	
	Disclose HIV status for families	Yes	38(32.2)	19(6.3)	1
	No	80(67.8)	281(93.7)	0.12(0.04-0.37)*	0.12(0.05-0.58)**
Residence of respondents	Rural	57(48.3)	83(27.7)	1	
	Urban	61(51.7)	217(72.3)	3.58 (2.15-5.95) *	
Distance from the health facility	<10Km	57(48.3)	211 (70.3)	1	
	≥10Km	61(51.7)	89(29.7)	3.67(2.18-6.18)*	
Encountered drug side effects in relation to ARV	Yes	102(86.4)	290(96.7)	1	1
	No	16(13.6)	10(3.3)	2.78 (1.86-4.17) *	2.69(1.27-5.05)**
History of opportunistic infections (OIs)	Yes	26(22.0)	67 (22.3)	1	
	No	92(78.0)	233(77.7)	3.29 (2.09-5.198) *	
Current CD4 count	<500	38(32.2)	150(50.0)	1	
	≥500	80(67.8)	150(50.0)	3.60(1.51-8.58) *	

* $P < 0.05$; ** $P < 0.001$; $I = \text{constant}$

In our study, the majority, 63(53.4%) of the respondents reported that forgetfulness was the reason for their nonadherence followed by the transportation problem to the ART-clinic 26 (22%). From predicted associated factors, only respondents who did not disclose their HIV status to their families were 88% less likely to adhere as compared to those who had disclosed their HIV status (AOR: 0.12, 95% CI: 0.05-0.58). A similar findings were reported from Harar and Dire Dawa, Ethiopia, showing that patients who did not disclose their HIV status to their families were 55% less likely to adhere to their medication than those who disclosed their HIV status (AOR: 0.45; 95% CI: 0.21–0.97) (35). This implies that there was still fear of stigma and discrimination to disclose their HIV status to their families.

In this finding, drug side effect was another factor which was associated with participants'

adherence to their ART medication. Respondents who had not encountered drug side effect were 2.69 times more likely to adhere to their ART medication than those who had experienced drug side effect (AOR: 2.69, 95%CI: 1.27-5.05). Incomparable to this, another study conducted in Gondar, Ethiopia, reported that respondents with drug side effect were 70% less likely to adhere to ARV therapy than those who did not encounter drug side effect (AOR: 0.3, 95%CI: 0.2-0.5) (10). Another study which was done in the Kathmandu District, Nepal, reported that the odds of adherence among those who did not experience drug side effects were 4.88 times higher than those who reported experiencing drug side effects (36). The severity of drug side effects varies from mild to life threatening condition. Therefore, instead of dropping out their medication, it is recommended to get a consultation with the

healthcare providers to manage the adverse consequence of the ARV drugs.

In this study, a very low ART adherence level was reported. Intervention measures to promote ART adherence in the study area should get attention. These include revising counseling policy to investigate patients' drug side effect and health education programs to enable HIV positive individuals to disclose their HIV status to their families and to deal with drug side effects.

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