# Adherence to antiretroviral therapy and associated factors among patients living with HIV/AIDS in Dessie Referral Hospital, Northern Ethiopia

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## Abstract

**Background:** Antiretroviral therapy has transformed the HIV infection into a chronic manageably disease. Optimal adherence ($\geq$ 95%) has required to achieve treatment success; however, still non-adherence remains major problem among patients receiving antiretroviral therapy (ART). The aim of this study was to determine adherences rate and evaluate factors affecting adherence among patients on ART in Dessie Referral Hospital (DRH).

**Materials and Methods:** A cross sectional study employing both qualitative and quantitative methods was used. A total of 130 people living with HIV/AIDS on ART were included. All patients who came to the hospital during study period were considered based on convenient sampling technique. Chi-Square test is used to examine the association of adherence with associated factors. Both data entry and analysis was done using SPSS version 16.

**Results:** Of 130 respondents, 58(44.6%) were males and 72(55.4%) were females and 107 (82.3%) had 100% adherences, 10(7.7%) had 95 -100% and the rest, 13(10%) had <95% adherences with overall adherence rate of 90% for last month prior to the study period. The main reasons for non-adherence were 12(37.5%) forgetfulness, 7(21.8%) being away from home and 4 (12.5%) being extremely ill. Use of other medications in addition to antiretroviral drugs (p=0.01), treatment fit into daily routines (p=0.01), family disclosure (p=0.01), active substance use (p=0.04) and living condition (p=0.00) were significantly associated with adherence to ART.

**Conclusion:** The self reported adherence rate to ART (90%) was found to be relatively higher which needs inclusion of other methods to ensure consistency of this value. Forgetfulness, being away from home and being extremely ill were the foremost reasons for non-adherence. The patients should be encouraged to maintain this high level of adherence.

**Keywords:** Adherence, Antiretroviral therapy, HIV/AIDS, Dessie Referral Hospital

## INTRODUCTION

In our era, HIV/AIDS is a great disaster creating tremendous challenges globally. The disease brutally has taken away the lives of many people knocking the doors of many more besides the direct victims. By 2005, total number of people living with HIV/AIDS was 40.3 million which was the highest figure ever recorded in the devastating history of the disease. Nearly 3.1 million people have died because of this pandemic. About 25.8 million people living with virus were residing in Sub-Saharan Africa signifying that Sub-Saharan Africa remains the severely affected region [1]. In the same year, in Ethiopia, it was estimated that a total of 1,320,000 people were living with HIV/AIDS. There were also 134,400 AIDS related deaths including 20,929 children 0-14 years and 83.6% under age of five. The number of PLWHA (People living with HIV/AIDS) in need of ART was 277,757 with 43,055 (15.5%) children aged 0-14 years [2].

HIV/AIDS has been fueling child morbidity and mortality and many children have been orphaned by it in Africa than anywhere else [3]. The tragic impact of HIV/AIDS in Ethiopia is still adversely affecting developments. Productivity costs and increased health care burdens to manage the disease have significant economic implications to the country [2].

The fact that HIV/AIDS is a disease of no cure; its impacts are multifaceted and disrupted the life of victims, their children and family as whole.  Later, entry of HAART in the continuum of medical care has brought hope

and tangible health outcomes. Despite the introduction of HAART has helped to reduce the incidences of opportunistic infections and improves survival and quality of life, patients are experiencing difficulty in adhering to the treatment as this long-term therapy which may be complex in terms of pill burden, dosing, specific dietary restriction [4].

HAART has thus improved the quality and quantity of lives of many PLWHA since its introduction; however, nearly a perfect adherence is crucial in order to attain the ART success. But adherence is a complex feature influenced by numerous factors. Studies revealed that the initial optimism regarding the efficacy of HAART has currently dissipated and there are fears that sub optimal adherences, allowing ongoing viral replication, facilitate the emergences of HIV-1 resistant variant and cutback the treatment options for the individual patients. Non-adherence has also implication for the broader public health since it might increase the risk of HIV transmission of resistant strains, which ultimately put patients out of alternatives to manage their disease [5], [6], [7].

There have never been standard tools for measuring adherences with absolute precision and truthfulness in outpatient clinical settings. And the average rate of adherences varies with the method used to measure it; however, for most patients there is a common consensus that nearly perfect ($\geq$95%) adherence is necessary to achieve full and durable viral suppression, thereby full viral suppression allows for maximal reconstitution or maintenances of immune function, minimizes the emergences of drug resistant virus and thereby obtaining the intended therapeutic effect [8]. Hence, this study is aimed to assess the degree of adherence to ART and evaluate factors associated with adherence of HIV sero positive patients who were on ART in DRH.

## MATERIALS AND METHODS

### Study Area and Period

The study was conducted in Dessie Referral Hospital from January 15, January 30, 2007. Dessie Referral Hospital is the biggest service delivery referral hospital including ART in South Wollo Zone, Northeast Ethiopia at 401km away from Addis Ababa, capital city of Ethiopia. In terms of human resource, there were 12 specialist, 17 general practitioners, 37 nurses, 41 health officers, 1 pharmacist, 2 anesthesiologists, 8 pharmacy technicians, 2 medical laboratory technologists, 8 medical laboratory technicians and 4 X-ray technicians. There are about 4469 patients on ART in this hospital.

### Study Design

A cross-sectional study was conducted employing both quantitative and qualitative methods to collect data for assessment of adherence and associated factors.

The adherence rate for the past one month prior to the data collection period was calculated by considering number of doses taken divided by the number of doses prescribed multiplied by 100%. Eventually, aggregate mean adherence was calculated for the entire period. One drug is regarded as one dose and then adherence to regimen was approximated by the proportion of doses taken in a given period according to the following formula.

$$A = \frac{P - M}{P} \times 100$$

Where  P = N$\underline{o}$ of doses prescribed

M= N$\underline{o}$ of doses missed

A= Rate of adherences

### Sampling Procedure and Sample Size

All PLWHA taking ART and all health workers rendering health services in DRH constituted source population where as all PLWHA getting antiretroviral treatment services within the study period and the four health workers (one physician, one nurse, one pharmacist and one counselor) represented study population. The study covered all consecutive patients who attended ART pharmacy for refill over two weeks study period and hence, convenience sampling technique was used. As to the inclusion and exclusion criteria, study participants that were aged above 18 years, willing to give informed consent, patients who came for refill after Nevirapine loading dose and those that were on ART for more than 3 months were included in this study.

### Data Collection

Principal investigator was collecting both the qualitative and quantitative data. Data was collected PLWHA using closed ended questionnaire (patient self report method), data abstraction form to obtain patient information from the pharmacy refill data and key informant interview.

**Patient Self Report:** This involved that the patients were interviewed using closed-ended questionnaire to assess socio demographic characteristics, the number of doses missed in last month, reasons for missing, how to handle the missed doses, the adverse effects of drugs, active substances use, patients` involvements in decision making process to initiate ART and family disclosure.

**Patient Information Sheets**: The regimen, duration since ART initiated and co-administered drugs (other than ARV drugs) were reviewed and recorded.

**Key Informant Interview:** This involved the use of semi-structured, open-ended interview, which assessed the personal experiences and subjective perspective about ART. It also established the health workers perspective on the problem of non-adherence and assessing the quality of the health care that the patients were offered and other factors. The selection of the participants for key informant interview was made purposefully to reflect the diverse socio demographic characteristics of the informants and based on the possession of relevant information to subject of investigation. Accordingly, sampling 4 adults PLWHA (2 from rural and 2 from urban) and 4 health providers (one physician, one nurse, one pharmacist, and one counselor) were made.

**Data Quality Assurance**

In order to develop locally acceptable way of inquiring and maximizing the responses by respondents, Amharic which is a local language was conducted. Moreover, the questionnaire used for interview was translated from English to Amharic language and back to English to ensure its consistency.

**Data Entry and Analysis**

Data entry and analysis was carried out using SPSS version 16 after cleaning the data. Chi-square ($X^2$) test was used to assess association between variables [9].

Variables having p-value less than 0.05 were treated as showing a statistically significant association. In the analysis process, frequency distribution of variables was done and its presentation was in the form of tables and figures.

**Ethical Considerations**

At all levels, officials were contacted and permission was secured using letter from Jimma University Student Research Program. The necessary explanation regarding the purpose of the study and its procedure, assurance of confidentiality, the right to participate or not to participate in the study was done to the study participants. Participants were assured about confidentiality of the information obtained in the course of the study in that: no personal identifiers were used and data will be analyzed in aggregates.

## RESULTS

A total of the 130 PLWHA were involved in this study, of these, 58(44.6%) were males and 72 (55.4%) were females. More than three quarters of the respondents, 103(79.2%) were in the age of 25 -45 years, followed by 15 (11.6%) 18 -24 years old and only 12 (9.2%) were above 45 years old. As to the religion, 68 (52.3%) of the respondents were Muslims, 58 (44.6%) were Orthodox Christians and 4(3.1%) were Protestants. Educationally, 39 (30%) were in the range of grade 7 -11, 35 (26.9%) grade 1 - 6, 22 (16.9%) were 12th completed and above and 34 (26.2%) were illiterate. With regard to the monthly income, 111 (85.4) have a monthly income less than 250birr, 8 (6.2%) 250 -500 birr, 7 (5.4%) 500 -1000 and only 4 (3%) claimed to have a monthly income greater than 1000 birr (Table 1).

Table 1.  Distribution of socio-demographic characteristics of HIV positive patients in Dessie Referral Hospital

| Variables | N (%) |
|---|---|
| **Gender** | |
| Male | 58(44.6) |
| Female | 72(55.4) |
| | |
| **Age in year** | 15(11.6) |
| 18 -24 | 103(79.2) |
| 25-45 | 12(9.2) |
| >45 | |
| | |
| **Address** | |
| Urban | 84(64.6) |
| Rural | 46(35.4) |
| **Religion** | |
| Muslim | 68(52.3) |
| Orthodox | 58(44.6) |
| Protestant | 4(3.1) |
| | |
| **Living  condition** | |
| Living  alone | 31(23.8) |
| Living  with other | 99(78.2) |
| | |
| **Marital status** | |
| Married | 35(27) |
| Widowed | 43(33) |
| Single | 32(24.6) |
| Divorced | 20(15.4) |
| **Educational levels** | |
| Illiterate | 34(26) |
| 1 -6 | 35(27) |
| 7 -11 | 39(30) |
| 12& 12$^+$ | 22(17) |
| | |
| **Monthly income** | |
| <250 | 111(85.4) |
| 250 -500 | 8(6.2) |
| 500 -1000 | 7(5.4) |
| >1000 | 4(3) |
| **Family disclosure** | |
| Yes | 110(84.6) |
| No | 20(15.4) |

## Clinical Characteristics of HIV Positive patients

Near to 92% of the respondents were not active substances users (i.e khat chewers, cigarettes smokers and alcohol drinkers). Of the study participants, only 19 (14.6%) of them were involved in decision making to initiate ART while others, 111 (85.4%) were not taking part in decision making. With regard to treatment fit into daily routine activity, 16 (12.3%) respondents mentioned facing difficulty of fitting their ART into their daily routine activities. As to the treatment durations, 59(45.4%) of patients were on ART for 7 -12 months, 37 (28.5%) for 3 -6 months, 18 (13.8%) for 12 -24 months and 16 (12.3%) for more than 24 months. Ninety percent of patients were received instructions like "use cooked foods" or "use boiled milk" on how to use their ARV drugs in relation to use of foods where as 13 (10%) of them had not given any instructions. Sixty one, 46.9% of the participants somehow sure about the benefits of ART while 15(11.5%) of them weren't sure about the benefits of ART. (Table 2).

Table 2: Distribution of clinical characteristics of HIV positive patients

| Variables | | N (%) |
|---|---|---|
| Involvement in decision making to initiate ART | Yes | 9(14.6) |
| | No | 111(85.4) |
| ART schedule fitness to daily routines | yes | 114(87.7) |
| | No | 16(12.3) |
| Duration on ART | 3 -6 months | 37(28.5) |
| | 7 -12 months | 59(45.4) |
| | 12 -24 months | 18(13.8) |
| | >24 months | 16(12.3) |
| Active substance use* | Yes | 11(8.5) |
| | No | 119(91.5) |
| Counseling patients as to selection of foods | Yes | 117(90) |
| | No | 13(10) |
| Believe in ART benefits | Not sure | 15(11.5) |
| | Somewhat sure | 61(46.9) |
| | Very sure | 33(25.4) |
| | Extremely sure | 21(16.2) |

*(Chat, cigarette and alcohol)

The majority of patients, 59 (45.4%) were on the regimen $D_4T/$ 3TC/ NVP followed by 34(26.2%) on $D_4T/3TC/EFV$, 28(22%) on AZT/3TC/NVP and 9(7%) on AZT/3TC/EFV (Fig1).
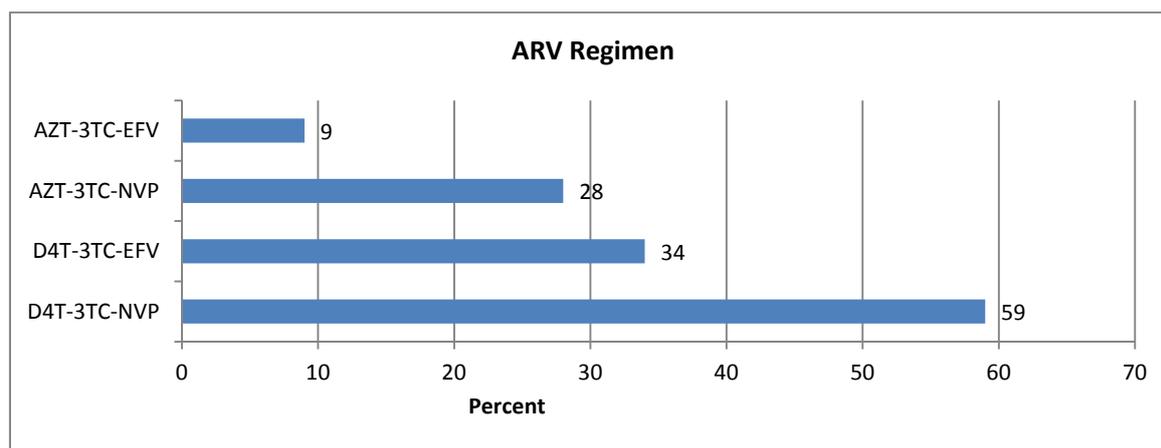


Fig 1: Distribution of HIV positive patients by ARV regimen in Dessie Referral Hospital

About three-quarter of patients responded that they did not encounter any adverse effects of ARV drugs in the previous one month prior to data collection date whereas 42 (32.3%) of them reported as they experienced adverse effects. The common adverse effects were nausea and vomiting 39(31.7%), skin rash 31(25.2%) and peripheral neuropathy 27(21.9%) (Table3).

Table 3. The common adverse effects faced by HIV positive patients in Dessie Referral Hospital

| Variables | | N (%) |
|---|---|---|
| Adverse effects | Yes | 88(67.7) |
| | No | 42(32.3) |
| Adverse effects | Nausea & vomiting | 39(31.7) |
| | Skin rash | 31(25.2) |
| | Pain and numbness | 27(21.9) |
| | Headache | 7(5.7) |
| | Fatigue | 5(4.1) |
| | Depression | 5(4.1) |
| | Abdominal pain | 5(4.1) |
| | Others | 4(3.2) |

Of 130 respondents, 107 (82.3%) reported that they have not ever missed any dose in the previous one month (100% adherences). But only 13(17.7%) of them reported to have missed one or more doses in the previous 30 days. The range of missed doses is 16 (Fig2).
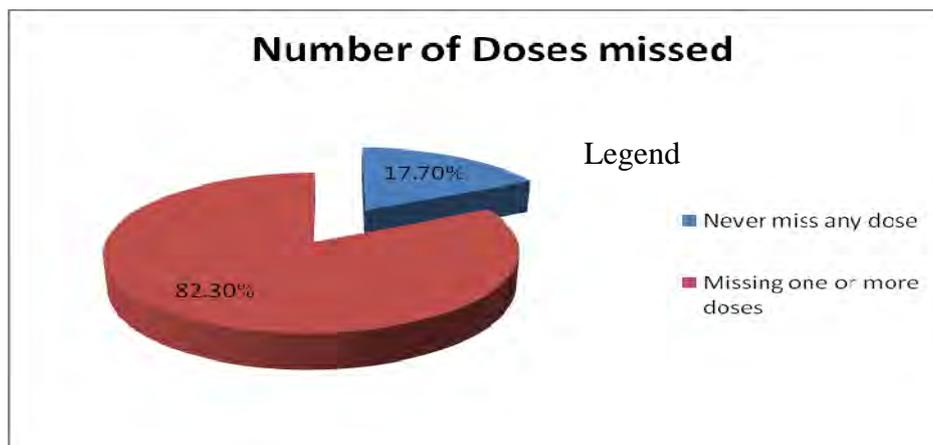


Fig 2. The number and percentage of HIV positive patients missing doses for past one month in Dessie Referral Hospital

The main reasons for skipping the doses were 12 (37.5%) forgetfulness, 7 (21.8%) being away from home and 4 (12.5%) being extremely ill (Table 5). Other reasons included sleeping and being with friends (Table 4).

Table 4. The reasons claimed by HIV positive patients for missing doses in Dessie Referral Hospital

| Reasons For Missing ART Doses | N (%) |
|---|---|
| Forgetfulness | 12(37.5) |
| Being away from home | 7(21.8) |
| Being extremely ill | 4(12.5) |
| Being busy | 3(9.4) |
| Ran out of drugs | 2(6.3) |
| Due to adverse drug reactions | 2(6.3) |
| Others | 2(6.3) |

In this study, the overall adherence rate for study subjects was 90 % with 107 (82.3%) of the respondents had 100% adherence, 10 (7.7%) had 95 -100% adherence and 13(10%) had <95% adherence. Socio-demographic characteristics such as gender, age, address, religion, marital status, educational levels, occupation, monthly income treatment related variables like duration on ART, side effects of drugs were not significantly associated with adherence whereas variables like other mediation in addition to ARV drugs, treatment fit into daily routine activities, family disclosure, active substance use and living condition were significantly associated with adherence (Table 5).

Table 5. Association of different level of adherence rates to the different variables in Dessie Referral Hospital

| Variables | | Adherence levels | | | $X^2$ and P-value |
|---|---|---|---|---|---|
| | | 100% | ≥95% | <95% | |
| Gender | Male | 49 | 4 | 5 | $X^2$= 0.346, P= 0.841 |
| | Female | 58 | 6 | 8 | |
| Age | 18 -24 | 10 | 2 | 3 | |
| | 25 -45 | 89 | 7 | 7 | X2 = 7.005, P= 0.136 |
| | >45 | 8 | 1 | 3 | |
| Address | Urban | 68 | 7 | 9 | $X^2$ = 0.301,P= 0.860 |
| | Rural | 39 | 3 | 4 | |
| Religion | Muslim | 57 | 4 | 7 | |
| | Orthodox | 47 | 5 | 6 | $X^2$=2.381, P= 0.666 |
| | Protestant | 3 | 1 | 0 | |
| Living Condition | Living alone | 15 | 6 | 10 | $X^2$ = 33.056,P = 7e-8 |
| | Living with others | 92 | 4 | 3 | |
| Marital status | Married | 29 | 2 | 4 | |
| | Widowed | 36 | 3 | 4 | $X^2$ = 0.597, P = 0.996 |
| | Single | 26 | 3 | 3 | |
| | Divorced | 16 | 2 | 2 | |
| Educational levels | Illiterate | 28 | 3 | 3 | |
| | 1 -6 | 29 | 2 | 4 | |
| | 7 -11 | 32 | 3 | 4 | $X^2$ = 0.432, P = 0.999 |
| | 12 and 12$^+$ | 18 | 2 | 2 | |
| Monthly income | <250 | 95 | 6 | 10 | |
| | 250 -500 | 5 | 2 | 1 | |
| | 500 -1000 | 5 | 1 | 1 | $X^2$ = 8.145, P = 0.228 |
| | 1000$^+$ | 2 | 1 | 1 | |
| Family Disclosure | Yes | 95 | 7 | 8 | |
| | No | 12 | 3 | 5 | $X^2$ = 8.388, P = 0.015 |
| Active substance Use | Yes | 6 | 2 | 3 | |
| | No | 101 | 8 | 10 | $X^2$ = 6.429, P = 0.040 |
| Duration on ART | 3 -6 Months | | | | |
| | 7 -12 Months | 30 | 3 | 4 | |
| | 12 -24 Months | 50 | 4 | 5 | $X^2$ = 0.769, P = 0.993 |
| | > 24 Months | 14 | 2 | 2 | |
| | | 13 | 1 | 2 | |
| Side effects | Yes | 72 | 7 | 9 | |
| | No | 35 | 3 | 4 | $X^2$=0.046, P= 0.977 |
| Other medications in addition to ARV | | | | | |
| | Yes | 70 | 10 | 12 | |
| | No | 37 | 0 | 1 | $X^2$ = 8.526, P = 0.014 |
| Treatment fit into daily routines | | | | | |
| | Yes | 98 | 7 | 9 | |
| | No | 9 | 3 | 4 | $X^2$ =8.511, P = 0.014 |

**Key Informant Interview**

**The pattern of non-adherence in Dessie Referral Hospital**

Key informants believed that not all people might not strictly adhered to the regimen rather some interrupted taking the drug to various extents due to numerous reasons like forgetfulness, economic insufficiency, stigma, being away from home and religious influences. Participants irrespectively of their religion were agreed that some traditions in the religious practice negatively affect the adherence. They were also explained that being busy and with friends are among the factors affecting adherence level.

**A 33 Years old female patient said:**

<<In home, my husband was died 1 year ago and it is me who cares for the family and the main means of generating income is through trading at small scale while I am over loaded with variety of activities, I usually forget taking drugs especially the morning doses>>

Patients were also discussed that stigma and fear of disclosing the HIV status could affect patients' adherence to ART. They added that there were even some people who came from distant areas to get the service in this hospital given that there is ART clinic in their localities, just only for fear of being exposed to the public. Due to stigma, some of the patients didn't regularly come to collect their drugs instead they sent others on their behalf because they fear that their HIV status would be exposed. Others weren't also comfortable to be seen by people while collecting drugs over the counter owing to fear of disclosure to the public as a result they didn't absorb all instructions and counseling standing near the dispensing sites rather they simply hurried for collecting the drugs and going away from that area.

**A 26 years old female staff said:**

<<There are cases I know, who are on ARV therapy, they collect ARV drugs by removing the packaging materials on which the dispensers wrote doses and frequency of drugs administration in their local language because there is no transparency about the use of ARV drugs in the family.>>

**Factors associated with better adherence to ART**

The participants agreed that assistance from other people is so important that it would help the patients morally and in reminding schedule of taking drugs.

One of the patients witnessed: "We, patients have to be open and transparent to those people who could help us when in need. This will enable the victim to derive support from others morally, financially and so on."

The improvements that patients obtained from the treatment have stimulated them to adhere and conform to any counseling decisions. A 58 years old female key informants shared us her experiences like this: In the first instant of contact, she teared prior to responding to the interview since being HIV positive and moment of acquiring the infection at this age irritated her. She strongly encouraged the uses of ARV drugs for she has got good health improvements. Furthermore, she underscored that << It is this drug, which lifts me from bed and prolongs my life. If I were not taking the drugs, you would not see me here at this time. >>

## DISCUSSION

ART has changed the clinical course of HIV infection and making it a chronic manageable disease but strict adherence is a priority consideration to get hold of the intended treatment outcomes. In this study, 130 PLWHA, who were on ART for at least 3 months prior to data collection period, were included. The level of adherence to ART in the hospital was relatively higher (90%), which was in agreement with optimal adherence level ($\geq$95%).However, 17.7% of the patients reported to have ever missed one or more doses in the previous 30 days prior to the interview date, which was lower than 75% non-adherence in Nigeria [9], 30.9% in Italy [10] and 25.8% in South Ethiopia [11]. This finding is consistent with study done in Tanzania where 18.4% of the respondents reported to have missed at least one dose [12]. However, finding in developed countries showed that 33% of the respondents reported missing at least one dose within the past month [13].

So long as there were missed doses, it would be sound to expect reasons for the missing. The main reasons cited in connection with skipping doses were forgetfulness, being away from home and being extremely ill in order of importance, among many others which were similar with findings in Tanzania [14]. This study thus found out that forgetfulness was the most frequently claimed reason for missing doses, which is comparable with study findings conducted in Addis Ababa (33.9%) [15].

Participants in the key informant interview also added that economic insufficiency, stigma, fear of disclosure, being away from home, pill burden and religious factors seriously affect treatment adherence. Near to three-fourth of the respondents were using other drugs such as cotrimoxazole and anti-TB drugs in addition to ARV drugs. This explicitly indicates that there is high level of pill burden that could impair the adherence to ART. From the very essence, ART is lifelong treatment demanding lifelong adherence and uninterrupted effort to manage HIV/AIDS and associated opportunistic infections. Patients would feel exhaustion and lose motivations to comply for treatments, at least for sometime in the entire course of treatment. Key informants essentially

believed that pill burden was predictive of poor adherence which is then supported with findings in most studies [16], [17]. However, it is inconsistent with results reported by Edward L Machtingn and D.R. Bangs berg and Adriana et al [18].

Interviewees in KII and patients themselves witnessed that few patients were user of psychoactive substances like khat, cigarettes and alcohol beverages especially local drink, "Areki" while they were on HAART. "Areki" is a locally made beverage with 78% alcohol composition. The respondents said that when they felt empty and lost hope in their life, they suggested that pleasure could be restored by chewing, smoking and drinking. Since patients were informed to avoid use of these substances while on treatment, they might use the drugs and the active substances alternatively which directly leads to non-adherence or the other way round, patients might use simultaneously giving rise to possible interactions and consequent lowering of therapeutic doses, then treatment failure and development of resistance. Furthermore, the psychoactive substances would distort their life style and sleeping pattern, hence it could be more likely to skip the doses especially when they take "Areki".

Another barrier to ART adherence is fear of disclosing HIV sero status and stigma. Results revealed that significant number of patients didn't disclose their HIV status while it is clear that openness and disclosing the HIV status is crucial to gain support from other persons. It could be explained that stigma directed to patients could degrade their confidence, self-esteem and interfered with their efforts to incorporate pill taking schedules to their daily routines. It would be possible to intellectually guess that patients could fear to disclose their HIV status due to trepidation of stigma following the disclosure. In sharp contrast, patients could be advantages if they disclose their status at least for their family members so that they might enhance adherence through encouragement and reminding the time of the schedule for pill taking. This result is consistent with study done in Uganda [18], [19].

Correlates of adherence were assessed. Accordingly, the socio demographic variables such as gender, age, address, occupations and monthly income were not significantly associated with adherence. These results were agreed with several studies [8], [20] and variables like duration of treatments and side effects were not significantly associated with adherence. But results in other study showed that side effects were significantly associated with adherences [21]. The possible reasons for the non-association of side effects with adherence might be the fact that patients were early counselled about possible side effects at the commencement of treatments. Hence, patients could take the prescribed drugs even if they were experiencing the side effects.

As to the association, use of other medications in addition to ARV drugs (leads to pill burden), ART fit into daily routine activities, active substances uses, family disclosure and living conditions were found to be significantly associated with adherence. Similarly, this study also revealed that non-disclosure of sero status to family and living alone were significantly association with poor adherence. The study done in France and Uganda showed that HIV status disclosure was related with level of adherence [18], [22], [23].

Having the strength of addressing adherence and associated factors using qualitative and quantitative approaches simultaneously, this study had its own limitations. The cross-sectional nature of study couldn't be able to address the temporal and cause-effect relationships between various factors and adherence. Moreover, adherence is a dynamic process which couldn't be predicted at a single point in time but the study measured snapshot pictures of adherence and factors affecting adherence. There would also be social desirability bias. Self- reported adherence is thus likely to overstate true adherence than other methods of measuring adherence [24] ; although, some authors have suggested that self-report method is one of the most accurate measures of behavioral adherence because only the patient can report actual behaviors [25],[26],[27]. This in fact necessitates the inclusion of other methods of measuring adherence to support consistency of reported rate.

## CONCLUSION

The level of adherence to ART using self-reported method among PLWHA in Dessie Referral Hospital was relatively higher. The major reasons for missing dose (s) in order were simple forget, being away from home and being extremely ill. These reasons for missing the doses and other barriers, which were reported by key informants, were the important points of focus for efforts to improve treatment adherences. The study also revealed a significant association between rate of adherence with living conditions, family disclosure, other mediations in addition to ARV drugs, treatment schedule that fits with daily routine and active substances use.

## ACKNOWLEDGMENTS

## DISCLOSURE

The authors declare that there is no conflict of interests regarding the publication of this paper.

## REFERENCES

[1] UNAIDS/WHO. AIDS epidemic update, 2005. Geneva

[2] Federal Ministry of Health/National HIV/AIDS Prevention and Control Office. AIDS in Ethiopia 6th Report, 2006. Available at http://www.etharc.org/aidsineth/publications/aidsineth6th.htm accessed on 5/4/2007

[3] UNAIDS/WHO. AIDS epidemic update, 2006. Geneva

[4] D.J. Back, S.H. Khoo, S.E.Gibbons, C.Merry. The role of therapeutic drug monitoring in treatment of HIV infection. Br J Clin Pharmacol., 2000, 51:301-308.

[5] Bartlett, John A. Addressing the Challenge of Adherence. JAIDS., 2002 , 29: 2-10.

[6] A.Amberbir , K.Woldemichael, S. Getachew ,B. Girma, K.Deribe. Predictors of adherence to antiretroviral therapy among HIV-infected persons: a prospective study in Southwest Ethiopia. BMC Public Health., 2008,8,265.

[7] M.A. Chesneya, M.Morin, L.Sherr. Adherence to HIV combination therapy. Social Science & Medicine., 2000: 1599-1605.

[8] E. L. Machtingn, D. R. BangsBerg. Adherence to ART in HIV in site knowledge base chapter, 2005.

[9] B.S.C. Uzochukwu, O.E.Onwujekwe, A.C.Onoka, et al. Determinants of non-adherence to subsidized anti-retroviral treatment in Southeast Nigeria. Health Policy and Planning.,2009,24:189–196.

[10] R.Murri, A.Ammassari, M.P.Trotta, et al. Patient-reported and Physician-estimated Adherence to HAART. J Gen Intern Med, 2004.,19:1104–1110.

[11] E.Markos, A.Worku, G.Davey. Adherence to ART in PLWHA at Yirgalem Hospital, South Ethiopia. Ethiop.J.Health Dev., 2008, 22 ,2:174-179.

[12] Nyadanga P.O. et al Factor associated with ART non-adherence in Deres Salaam. Abstract of 3rd LAS conference, 2005.

[13] D.W. Robert and B.David: Adherence to HAART: A compendium of HAART adherence Research Nov.1997-1999.

[14] F.Mugusi, S. Mugusi, M. Bakari, et al.. Enhancing adherence to antiretroviral therapy at the HIV clinic in resource constrained countries; the Tanzanian experience. Tropical Medicine and International Health. 2009, 14, 10:1226–1232.

[15] OW. Fong, CF. Ho, LY. Fung, et al. Determinants of adherence to highly active antiretroviral therapy (HAART) in Chinese HIV/AIDS Patients. HIV Medicine, 2003,4:133-138.

[16] DL. Ptereson S. Swindelis, J. Mohr, M. Brester, EN.Vergis, C Squier, et al. Adherence to Protease Inhibitor Therapy and Outcomes In patients with HIV Infections Ann Intern Med., 133,1:21-30.

[17] MA. Chesney, M Morin, L Sherr. Adherence to HIV combination therapy. Soc Sci Med. 2000, 50,11:1599-605.

[18] Enzana. Determining barriers and predictors to adherence in child with HIV/AIDS in Uganda. Abstract of 3rd LAS conference, 2005.

[19] M.Roura, J.Busza, A.Wringe, et al. Barriers to Sustaining Antiretroviral Treatment in Kisesa, Tanzania: AIDS Patient Care STDS., 2009,23,3,203–210.

[20] CF. Ho, QW. Fong, KH. Wong Patients Report as a Marker of Adherence to Antiretroviral Therapy. Clin Infect Dis; 2002, 34, 11:1534-1535.

[21] T Yonas. ART adherence and its correlates among PLWHA on HAART in Addis Ababa Ethiopia; Ethiopian public health association; Annual public health Oct. 2005.

[22] U.Bodasing, A. Coovadia A. Mosam. Adherence to HAART for management of HIV+ and Kaposi Sarcoma in South Africa. 15th International AIDS Conference. Bangkok, Thailand , 2004.

[23] DR. Bangsberg, S.Singh, B. Rachlis, et al. Adherence to HAART: A systematic review of developed and developing nation patient-reported barriers and facilitators. PLoS Med., 2006,3,11.

[24] J.H. Arnsten, P.A.Demas, H.Farzadegan, et al. Antiretroviral Therapy Adherence and Viral Suppression in HIV-Infected Drug Users: Comparison of Self-Report and Electronic Monitoring. Clinical Infectious Diseases, 2001, 33,1417–1423.

[25] WHO. Adherence to long term therapy: Evidence for action, 2003. Available at: http://www.who.int/chp/knowledge/publications/adherence_report/en/ accessed on 6/5/2006.

[26] AL. Gifford, JE. Bormann, MJ Shively et al. Predictors of self reported adherence and plasma HIV concentrations in patient on multidrug antiretroviral regimens. JAIDS., 2000, 23,386-395.

[27] A.K.Wutoh, O. Elekwachi, V.C.Tasker. Assessment and Predictors of Antiretroviral Adherence in Older HIV Infected patients. JAIDS., 2003,33:106-114.