

Medication adherence and associated factors among patients on highly active antiretroviral therapy in Nekemte Hospital, Ethiopia

Etiyopya'daki Nekemte Hastanesi'nde yüksek oranda aktif antiretroviral tedavi alan hastalardaki tedaviye uyum ve ilişkili faktörler

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Abstract

Highly active antiretroviral therapy has reduced the number of deaths and increased survival time among HIV/AIDS patients. A major concern with scaling up of antiretroviral therapy in resource-limited settings is the emergence of drug resistant viral strains due to suboptimal adherence and the transmission of these resistant viral strains in the population. The objective of this study was to assess medication adherence and its determinants among HIV/AIDS patients on highly active antiretroviral therapy in Nekemte hospital, Western Ethiopia. A hospital based cross sectional study was conducted among HIV/AIDS patients on highly active antiretroviral therapy. Data was collected by using exit interview and also CD4 count, ARV regimen medication, WHO clinical stage, Existing opportunistic infection, length of treatment with ARV was obtained from the patient follow up record. Data was analyzed using SPSS 16.0. Patients' informed consent was obtained before data collection. Majority of the patients 211 (77.9%) had adherence rate of greater than or equal to ninety five ($\geq 95\%$) in the last one month period. About one third of the patients had missed one of the prescribed pills for HIV/AIDS in the last one month. The main reasons reported by the patients for missing the dose were side effects of the medication 32 (27.1%), forgetting 19 (16.1) and being busy 14 (11.9%) Educational status of the participants ($P=0.02$); concomitantly used medications ($P=0.002$); family and social support ($P<0.001$); belief in efficacy of HAART ($P=0.026$); following clinical appointment regularly ($P=0.001$); using reminding aid ($P<0.001$); having access to medical care regardless of place and time ($P<0.001$); improvement upon taking HAART ($P<0.001$); relationship with health professionals ($P=0.007$); history of substance use ($P=0.009$) and continuing to take the medication if the disease condition is worsened were associated with medication adherence rate of the patient which is explained by $P<0.05$. Majority of the study participants were adherent to their medication. According to the current study educational status of the participants; concomitantly used medication, family and social support, belief in efficacy of HAART, following clinical appointment regularly, using reminding aid, having access to medical care regardless of place and time, improvement upon taking HAART, relationship with health professionals, history of substance use and continuing to take the medication if the disease condition is worsened were associated with medication adherence of the patients which is explained by $P<0.05$.

Keywords: Highly active antiretroviral therapy; medication adherence; Nekemte Hospital

Özet

Yüksek oranda aktif antiretroviral tedavi HIV/AIDS hastalarının ölüm sayılarını azaltmış ve sağkalım süresini artırmıştır. Kısıtlı kaynakların olduğu durumlarda antiretroviral tedavinin artırılmasındaki temel kaygı ilaç tedavisine tam uyulmaması nedeni ile ilaca dirençli viral suşların ortaya çıkması ve bu dirençli suşların toplumda yayılmasıdır. Bu çalışmanın amacı Doğu Etiyopya'daki Nekemte Hastanesi'ndeki HIV/AIDS hastalarında tedaviye uyumun ve bunun belirteçlerinin yüksek oranda aktif antiretroviral tedaviye olan etkilerinin değerlendirilmesi idi. Yüksek oranda aktif antiretroviral tedavi alan HIV/AIDS hastalarında hastane temelli kesitsel bir çalışma gerçekleştirilmiştir. Veriler çıkış mülakatı ile ve ayrıca CD4 sayısı, ARV rejimi tedavisi, DSO klinik aşaması, var olan oportünistik enfeksiyon, ARV tedavi süresini içeren hasta kayıtlarından elde edilmiştir. Veriler SPSS 16.0 ile analiz edildi. Hastalardan veri toplanması öncesi onay alınmıştır. Hastaların çoğu olan 211(%77.9) tanesi son bir ay içerisinde %95 ve üzerinde tedaviye uyumu idi. Hastaların yaklaşık üçte biri son bir ay içerisinde HIV/AIDS için reçete edilen dozdan birini kaçırmışlardı. Hastalar doz kaçırmalarının ana nedenleri olarak tedavinin yan etkilerini 32(%27.1), unutmayı 19(%16.1) ve meşgul olmayı 14(%11.9) belirtmişlerdir. Katılımcıların eğitim durumları ($P=0.02$); peşpeşe ilaç kullanımı ($P=0.002$); aile ve sosyal destek ($P<0.001$); HAART'ın verimliliğine inanma ($P=0.026$); klinik muayeneye düzenli uyma ($P=0.001$); hatırlatma yardımı alma ($P<0.001$); yer ve zamandan bağımsız olarak tıbbi bakıma erişebilme ($P<0.001$); HAART sonrası ilerleme ($P<0.001$); sağlık çalışanları ile ilişki ($P=0.007$); madde kullanım geçmişi ($P=0.009$) ve hastalığın durumu kötüleşirse ilaç kullanmaya devam etme hastanın tedaviye uyma oranı ile ilişkili idi ve $P<0.05$ ile açıklandı. Çalışmaya katılanların çoğunluğu tedavilerine bağımlı idi. Mevcut çalışmaya göre katılımcıların eğitim durumları, peşpeşe ilaç kullanımı, aile ve sosyal destek, HAART'ın verimliliğine inanma, klinik muayeneye düzenli uyma, hatırlatma yardımı alma, yer ve zamandan bağımsız olarak tıbbi bakıma erişebilme, HAART sonrası ilerleme, sağlık çalışanları ile ilişki, madde kullanım geçmişi ve hastalığın durumu



kötülejšire ilaç kullanmaya devam etme hastanın tedaviye uyma oranı ile ilişki idi ve $P < 0.05$ ile açıklandı.

Anahtar kelimeler: Yüksek oranda aktif antiretroviral tedavi; tedaviye uyum; Nekemte Hastanesi

Introduction

Human Immunodeficiency Virus (HIV), the pathogen that causes Acquired Immune Syndrome (AIDS) has been the most significant emerging infectious agent in the last century and continually threatens to create health, social and developmental problems in this millennium (1). Medical knowledge around HIV/AIDS has increased significantly over the years and good progress has been made in the treatment of HIV as a manageable life-threatening chronic condition using antiretroviral therapy (ART) (2). ART has also remained the only available option that offers the possibility of dramatically reducing HIV/AIDS-related morbidity and mortality (3). In sub-Saharan Africa, the part of the world most impacted by HIV; the number of people dying of AIDS-related causes has declined by 32% between 2005 and 2011(4).

In Ethiopia, several policies and guidelines are in place to support the implementation and scale-up of the national response, including the National HIV/AIDS Policy, the National Strategic Framework on the Prevention and Control of HIV/AIDS, the Supply and Use of ARV Drugs policy. Based on these documents, and on the recommendations of the United Nations General Assembly Special Session on HIV/AIDS (UNGASS), the Government of Ethiopia launched its fee-based ART initiative in 2003 and free ART initiative in 2005 (5). After 2005, HIV care and ART services were further decentralized in Ethiopia. Private hospitals and health centers started delivering ART and HIV care in June 2006 (6).

A major concern with scaling up of antiretroviral therapy (ART) in resource-limited settings is the emergence of drug resistant viral strains due to suboptimal adherence and the transmission of these resistant viral strains in the population (7). Adherence is defined as the patient's ability to follow treatment plan by taking the correct dose of medications, at prescribed time and frequencies (on schedule), and following dietary instructions (8). Very high levels of adherence (> 95%) are required for ART to be effective long term and to prevent the emergence of resistant viral strains (7). On aggregate, non-adherence to ART is estimated at between 50-80% in different social and cultural settings (9).

In resource-scarce settings, where second and third line ART regimens and viral load monitoring are limited, routine assessment of and interventions for patients' adherence have become one of the biggest priorities in delivering ART services (10). Although

adherence is one of the modifiable factors in ART, monitoring it is difficult among patients, since no standard method exists to monitor adherence in ART, and therefore, multiple approaches are often used. Some of the commonest methods are self-report, electronic device monitoring, pills count, pharmacy refill tracking, biological markers, provider estimation and therapeutic drug monitoring (2).

Adherence to medication is a dynamic behavior affected by factors related to treatment regimen complexity, patient-related variables, patient-healthcare provider relationships and the quality of healthcare services (11). A range of studies have investigated determinants of ART adherence, particularly in adult populations. In one literature review of twenty studies-primarily using data from North American and European patients-determinants most consistently associated with non-adherence included: symptoms and adverse drug side effects, psychological distress, lack of social or family support, complex HAART regimens, low patient self-efficacy, and inconvenience of treatment (12). A Tanzanian study conducted in 2009, demonstrated that adherence was related to the level of trust between the patient and the health care provider, however this relationship was not considered to be a major factor affecting adherence in other studies (13). A qualitative study of HIV-infected patients in Uganda, Tanzania, and Botswana found that the main obstacles to optimal adherence were treatment-related costs (transportation, a lost day of work, registration fees at health facilities), long wait times at health facilities, stigma, and hunger and side effects during the initial stage of treatment. This exemplifies the wide range of factors associated with adherence and how they may differ according to context (12). Another study done in rural China by Wang and Wu, showed that a total of 181 patients participated in the study and 81.8% of them reported $\geq 95\%$ adherence on the previous three days. The most frequently reported reasons for missing doses were forgetfulness, being busy and anti retro viral drug side effects (14).

Achievement of optimal medication adherence and management of antiretroviral toxicity pose great challenges among Ethiopian patients with HIV/AIDS (11). In order to maximize the benefits of treatment, immense personal discipline and commitment are required from the patient. Possible barriers to adherence should be discussed with the patient before patients start on the treatment. As ARV therapy is a life time commitment; it is vital that patients in the earlier stages of HIV be educated on wellness management and encouraged to keep themselves healthy for as long as possible so that

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their CD4 counts remain high and referring the need to commence ARV therapy (15). It is good also to take previous drug administration history of the patients (1). Thus, this study aimed at assessing adherence level and associated factors among HIV/AIDS patients taking HAART in Nekemte hospital, Western Ethiopia.

Method and Participants

The study was conducted in Nekemte hospital, ART clinic, which is found in Nekemte town, Oromia region, Western Ethiopia. Nekemte is located about 331 km west of Addis Ababa with a population of around 300 000 people. Presently there are about 1963 people are started on HAART in Nekemte Hospital. The study was conducted from January 28 to February 12, 2013.

Hospital based cross sectional study was conducted among HIV/AIDS patients taking HAART for at least last two months. Data collection structured questionnaire contains information about socio-demographic characteristic, ART medication, patient-provider relationships, alcohol consumption practice and disease condition of the patient. Data was collected by exit-interview of the patients and reviewing their respective follow up record. Patients were included into the study conveniently. From the patient record/ chart; CD4 count, ARV regimen medication other than ARV, WHO clinical stage, Existing opportunistic infection, length of treatment with ARV was reviewed.

All patients using HAART from Nekemte Hospital and who have regular follow up and age ≥ 15 years were included in the study but those with hearing problem, mentally unstable and who are not volunteers to participate in the study were excluded from the study.

In order to assure the quality of data the following measures were undertaken: Pre-test was done before 3 days of the research conducted and accordingly modifications were made. The data collectors were trained for 1 day on the data collection format and techniques of data retrieval. The principal investigators strictly monitored data collectors daily to assure the completeness of filled formats. During entry into the computer, data cleaning were performed.

Data were coded and then checked for its completeness and consistency. Then entered and analyzed using SPSS for windows version 16.0 statistical software program. A descriptive analysis was conducted to check for outliers, consistencies and to identify missed values for each variables. The data was then analyzed by using SPSS 16.0 version and presented using tables. $P < 0.05$ was considered as statistically significant. Ethical clearance to carry out this study was obtained from Jimma University. Subsequent permission was also obtained from

Nekemte Hospital administration. Informed consent was obtained before exit-interview of the patients. Confidentiality was secured during the data collection, thus name and address of the patient was not recorded in the data collection format.

Investigators operationally defined the following terms as: **Adherence**: is the extent to which patients' behavior coincides with the prescribed regimen as agreed up on through a shared decision making process between the patient and the health care providers. When patients took greater than or equal to 95% of their prescribed medication, we call it adherent; unless non-adherent. **Adherence rate**: Number of dose taken (number of doses prescribed minus number of dose missed) divided by number of doses prescribed multiplied by 100. **Highly active antiretroviral therapy/HAART**: The treatment regimens recommended to aggressively suppressing viral replication and progress of HIV disease. The usual highly active antiretroviral therapy regimen combines three or more different drugs. **Side effects**: The action or effect of a drug other than those desired.

Results

Socio-demographic characteristics

A total of 271 HIV infected patients on antiretroviral regimen were included in this study from Nekemte hospital, ART Clinic. Of which, 148 (54.6%) were females and 123 (45.4%) were male, and the largest number of the respondents belonged to 31-45 age groups. Patients distribution with marital status was shown that 174 (64.2%) were married, 72 (26.6%) were single, 13 (4.8%) were widowed and the rest of the respondents 12 (4.4%) were divorced. About 245 (90.4%) patients were living with family or friends and 26 (9.6%) patients were living alone. In this study half of the patients 136 (50.2%) were having an educational status of primary school (1-8 grade) followed by secondary school (9-12 grade) 68 (25.1%). About 116 (42.8%) study respondents were Protestants followed by Orthodox Christians 96 (35.4%). Regarding the occupational status of the patients 56 (20.6%) were not working because of the disease, 52 (19.2%) patients were merchant and 51 (18.8%) were employed. Data on monthly income (in birr) showed that, 117 (43.2%) of the respondents had a monthly income of between 501 to 1000 birr, followed by 151-500 birr. Concerning ethnicity, majority 216 (79.7%) of the patients were Oromo (Table 1).

Patient related variables

Among the total of 271 study participants, 250 (92.3%) had disclosure of HAART using status to their family members or friends. Of this, 211 (84.4%) participants were helped by their family members or friends in remembering to take their medications. Among those participants disclosed their HAART using status, 175 (70%) participants were very satisfied with the overall support and advice they got

Table 1. Socio-demographic characteristics of the respondents on HAART in Nekemte Hospital ART Clinic, West Ethiopia, January 28 to February 12, 2013.

Socio-demographic characteristics		Frequency	Percentage
Age (in year)	31-45	117	43.2
	15-30	89	32.8
	46-60	58	21.4
	>61	7	2.6
Sex	Female	148	54.6
	Male	123	45.4
Ethnicity	Oromo	216	79.7
	Amhara	34	12.5
	Gurage	13	4.8
	Tigrie	8	3
Living condition	Living with family or friends	245	90.4
	Living alone	26	9.6
Religion	Protestant	116	42.8
	Orthodox	96	35.4
	Muslim	49	18.1
	Catholic	9	3.1
Educational level	Waqefata	1	0.4
	1-8 grade	136	50.2
	9-12 grade	68	25.1
	Illiterate	43	15.9
	College and above	24	8.8
Marital status	Married	174	64.2
	Single	72	26.6
	Widowed	13	4.8
	Divorced	12	4.4
Monthly income (in birr)	501-1000	117	43.2
	151-500	101	37.3
	1000+	44	16.2
	<150	9	3.3
Occupational status	Not working because of disease	56	20.6
	Merchant	52	19.2
	Employed	51	18.8
	Unemployed	43	15.9
	Students	23	8.5
	Daily laborer	20	7.4
	Farmer	14	5.3
	House wife	13	4.8

from their family members or friends. Out of total 271 participants, 174 (64.2%) used memory aid to take their medication on time. Regarding following clinical appointments regularly, 256 (94.5%) of the study participants followed clinical appointment regularly. The main reason for not following clinical appointment regularly was; 6 (40%) forgetting and 5 (33.4%) transportation problem respectively. Regarding social drugs used by the participants, 246 (90.8%) had no exposure to social drugs since initiation of HAART. Of the participants, 193 (71.2%) participants followed specific medication time schedule closely always. Regarding the length of duration of therapy, 145 (53.5%) of the participants thought that longer duration of therapy had no negative impact on treatment. The rest thought that longer duration of therapy had negative impact on treatment. Regarding medication sharing, majority 265 (97.8%) of the participants did not share the medications with their friends (Table 2).

Medication related variables

Out of the total 271 study participants, most 167 (61.7%) of participants took anti-retroviral drugs for more than 1years and the minimum 19 (7%) of participants took the HAART between 2 to 3months. Regarding the medications other than ARV, 161 (59.4%) participants took medication other than ARV

drugs in the past 8 months. While, 110 (40.6%) of the study participants did not take medication other than ARV drugs. Among other medications in addition to ARV drugs, cotrimoxazole 157 (69.5%) was the highest one. Regarding the side effect the patients' faced, 153 (56.4%) of the participants faced side effect from HAART. Of which, 61 (25.2%) of the participants developed fatigue or loss of energy followed by 48 (19.8%) headache. Concerning ARV regimen, 101 (37.3%) of the participants were started on D4T/3TC/ NVP regimen during the initiation of the anti-retroviral treatment, 69 (25.5%) were started on ZDV/3TC/NVP and the rest were started on other regimen as shown below (Table 3). Regarding current ARV regimen, 122 (45%) of the participants were currently on TDF/3TC/ EFV regimen followed by 73 (26.9%) ZDV/3TC/NVP regimen and the rest were currently on other regimen as shown below (Table 3).

Health professionals related variables

Among 271 the study participants, 254 (93.7%) of the participants believed that interaction with care givers improves the outcome of treatment. Of all study participants, 259 (95.6%) followed instructions given by health professionals to take the medications along with foods and other agents. Majority 264 (97.4%) of the participants had access to medical care at any time and place.

Table 2. Patient related variables affecting participants' adherence, January 28-February 12, 2013.

Patient related variables		n	Percent
Disclosure to family or friends about HAART using status	Yes	250	92.3
	No	21	7.7
Family members or friends help in remembering to take the medication	Most of the times	211	84.4
	Sometimes	31	12.4
	Never	8	3.2
Satisfaction with overall support and advice from the family members or friends and health professional	Very satisfied	175	70
	Somewhat satisfied	48	19.2
	Never satisfied	17	6.8
	Very dissatisfied	10	4
Belief in efficacy of HAART	Yes	239	88.2
	No	32	11.8
Closely following specific medication time schedule	All of the times	193	71.2
	Most of the times	62	22.9
	Some times	13	4.8
	Half of the times	3	1.1
	Never	0	0
Following instruction given by health professional	Yes	259	95.6
	No	12	4.4
Storing the medications according to information given by health professionals	Yes	235	86.7
	No	36	13.3
Medication schedule fit daily routine activity	Yes	206	76
	No	65	24
Sharing the medications	Yes	6	2.2
	No	265	97.8
Thinking longer duration of therapy has negative impact on treatment	Yes	145	53.5
	No	126	46.5
Knowing monitoring parameters of the medications	Yes	227	83.8
	No	44	16.2
Following clinical appointment regularly	Yes	256	94.5
	No	15	5.5
Reasons for not following clinical appointment regularly	Forgetting	6	40
	Transportation	5	33.4
	Being busy	2	13.3
	Felt sleeping	2	13.3
Having history of social drugs	Yes	246	90.8
	No	25	9.2
Types of social drugs used	Khat	11	37.9
	Alcohol	11	37.9
	Cigarette	6	20.7
	Shisha	1	3.5
Knowing the cautions and precautions of the medications	Yes	229	84.5
	No	42	15.5
Using reminding aid	Yes	174	64.2
	No	97	35.8

Regarding health professionals' patients relationship, 239 (88.2%) of the study participants had good relationship with their health professionals (Table 4).

Disease related variables

Of the whole study participants, 232 participants reported to have good improvements or prognosis of their disease up on starting of HAART; which can be explained by CD4 cell count level of the patients as 252 (93%) patients had a current CD4 count of greater than 200 cells/mm³. Concerning WHO

clinical stage, 136 (50.2%) of the patients were at WHO clinical stage III at the initiation of treatment while 11 (4%) were at stage IV and currently majority of the patients were at WHO clinical stage II and I respectively. The most frequent opportunistic infections was, 40 (18.5%) oral candidiasis, 33 (15.3%) PCP, 29 (13.4%) diarrhea and 28 (13%) TB, respectively (Table 5).

Adherence to ART

Among the total of 271 HIV/AIDS infected respondents on anti-retroviral regimen, 193 (71.2%) patients had taken all prescribed pills a month before the study period and 78 (28.8%) patients had missed some of the prescribed pills a month before the study period. Each patient was asked a number of doses missed within a month before the study period and number of doses must be taken within a month. Then adherence rate of the patients a month before the study period was calculated by the formula:

$$\text{Adherence rate} = (\text{Number of doses supposed to be taken} - \text{Number of doses missed}) / \text{Number of doses supposed to be taken} \times 100$$

Based on above formula; the adherence rate of each patient was calculated and average adherence rate was obtained by adding adherence rate of each patient and dividing this value for the total respondents (271). Majority of the patients 211 (77.9%) had adherence rate of greater than or equal to ninety five (≥ 95) and the rest 60 (22.1%) had adherence rate of less than ninety five (< 95). In this study, adherence was measured using self-report and the average adherence to antiretroviral therapy was 96.9% of all prescribed doses (Table 6).

According to the current study educational status of the participants; concomitantly used medication; family and social support; belief in efficacy of HAART; following clinical appointment regularly; using reminding aid; having access to medical care regardless of place and time; improvement upon taking HAART; relationship with health professionals; history of active substance use and continuing to take the medication if the disease condition is worsened were associated with medication adherence of the patient which is explained by $P < 0.05$ (Table 7); the rest variables were not.

Discussion

Currently, there is no cure or vaccine for HIV/AIDS, but it is no longer the death sentence it once was (16). According to a statistical model, the life expectancy of people living with HIV/AIDS (PHAs) would only be eight years shorter than that of individuals in the general population if they adhered to their medication regimens and received HIV care in line with guidelines (17). In fact, in excess of 95% adherence to HAART is required to achieve the full

Table 3. Medication related variables affecting the study participants' adherence to HAART in Nekemte Hospital, ART Clinic, West Ethiopia, January 28 to February 12, 2013

Medication related variables		Frequency	Percentage	
Duration of treatment with ARV	>1 years	167	61.7	
	6-12 months	49	18	
	3-6 months	36	13.3	
	<3 months	19	7	
Taking other medication in addition to ARV	Yes	161	59.4	
	No	110	40.6	
Number of other tablets per day	1	105	65.2	
	2-4	50	31.1	
	>4	6	3.7	
Medication other than ARV drugs	Cotrimoxazole	157	69.5	
	Anti-TB	31	13.7	
	Fluconazole	26	11.5	
	Acyclovir	12	5.3	
Faced side effects	Yes	153	56.4	
	No	118	43.6	
The medication is convenience to take	Yes	198	73.1	
	No	73	26.9	
Commonly reported side effects	Fatigue/loss of energy	61	25.2	
	Headache	48	19.8	
	Rash	29	12	
	Nausea and vomiting	22	9.1	
	Peripheral neuropathy	22	9.1	
	Diarrhea	21	8.7	
	Insomnia	21	8.7	
	Depression	18	7.4	
Measures taken against side effects	Take until the date of appointment	94	61.4	
	Immediately reported professionals	45	29.4	
	Immediately stopped until appointment	14	9.2	
ARV regimen	Initial	D4T/3TC/NVP	101	37.3
		ZDV/3TC/NVP	69	25.5
		TDF/3TC/EFV	63	23.2
		D4T/3TC/EFV	18	6.6
		TDF/3TC/NVP	16	5.9
		ZDV/3TC/EFV	4	1.5
	Current	TDF/3TC/EFV	122	45
		ZDV/3TC/NVP	73	29.6
		TDF/3TC/NVP	42	15.5
		D4T/3TC/NVP	24	8.9
		ZDV/3TC/EFV	7	2.6
		D4T/3TC/EFV	3	1.1

effectiveness of HAART treatments while minimizing virologic failure and resistance to ART (18,19). Factors related to patient characteristics, social environment, treatment type, the disease itself, and the health care team can influence degree of treatment adherence (20). Present study is also meant to identify different variables (patient related, medication related, health professionals' related, disease related) and their association with adherence rate with HAART in the study site.

According to our study, most of the study participants took all prescribed pills as per the instruction while some of them missed it. The main

reason for missed doses were side effect of the medication and the rest were forgetting, being busy, felt sleeping, being depressed, pill burden, being extremely ill, running out of medication, problem with transportation and getting better from the illness. This study is consistent with study done in rural China and Kenya (14,21).

The average adherence rate on a month before the study to antiretroviral medication was 96.9% of all prescribed doses. This finding is consistent with the study done in rural China by Wang and Wu; where 81.8% of the patients reported $\geq 95\%$ adherence on the previous 7 days of the study (14). However, the

Table 4. Health professionals related variables affecting adherence of study participants to HAART in Nekemte Hospital, ART Clinic, West Ethiopia, January 28 to February 12, 2013.

Health professionals related variables		Frequency	Percentage
Care giver telling about the problems of low adherence	Yes	248	91.5
	No	23	8.5
Thinking interaction with care giver improves the outcome of treatment	Yes	254	93.5
	No	17	6.3
Having access to medical care	Yes	264	97.4
	No	7	2.6
Thinking dispensing time was enough to get all information	Yes	226	83.4
	No	45	16.6
Health-professionals-patients relationship	Good	239	88.2
	Poor	32	11.8

Table 5. Disease related variables of the study participants on ART in Nekemte Hospital, ART Clinic, Nekemte, West Ethiopia, January 28 to February 12, 2013.

Disease related variables		Frequency	Percentage
Improvement since initiation of ART	Yes	232	85.6
	No	39	14.4
Continuing to take medication, if the disease condition would worsened or other opportunistic conditions faced	Yes	88	32.5
	No	183	67.5
Baseline	< 200	184	67.9
	≥200	87	32.1
Current	≥200	252	93
	<200	9	3.3
CD4 Cell count	Not recorded	10	3.7
	Stage-III	136	50.2
Baseline	Stage-II	82	30.3
	Stage-I	42	15.5
WHO Clinical stage	Stage-IV	11	4
	Stage-II	140	51.7
Current	Stage-I	92	33.9
	Stage-III	38	14
Opportunistic infections	Stage-IV	1	0.4
	Oral candidiasis	40	18.5
Diarrhea	PCP	33	15.3
	TB	29	13.4
Herpes simplex	Herpes zoster	28	13
	Others	18	8.3
Herpes zoster		16	7.4
		52	24

Others: STI, UTI, bacterial pneumonia, Toxoplasmosis

average adherence in this study is higher than study done in Nepal; in which adherence is 85.5% (22) and study done at Taksin Hospital with reported adherence rate of 70% (23). The probable reason for this difference may be difference in assessment methods. Current study used only self-reports which might overestimate the measure of adherence. But multi- method adherence assessment consisting of self- report, the visual analogue scale, and the pill identification test and pill count was used in other studies.

Majority 211 (77.9%) of the patients were adherent based on the adherence rate calculation. The figure is greater than the study done in Jimma University specialized hospital 72.4% (24); where the rate of self-reported adherence was based on the combined indicator of the dose time and food adherence measurement and study done at Yirgalem Hospital 74.2% (25). The probable reason for this difference may be the adherence in this study was only regarding adherence to dose taken.

There was statistically significant difference among those participants who wants to continue their medication if their disease condition is worsened or other opportunistic or co-morbid condition is faced in the future in comparison with those patients who do not want to continue their medication if their disease condition is worsened or other comorbid or opportunist condition faced in future. This may show that the participants fail to adhere to HAART if there was no good prognosis from the disease.

In this study, 153 (56.4%) participants faced side effect from their HAART, which might contributed a significant amount to medication non-adherence. Among the side effects, fatigue or loss of energy 61 (25.2%) and headache 48 (19.8%) took the upper hand. This may be due to zidovodine based ARV regimen and cotrimoxazole, since; majority 157 (69.5%) of participants took cotrimoxazole in addition to ARV. Among the total participants who were under the support of their families or friends, 175 (70%) participants were very satisfied with the overall support and advice they got from their

Table 6. Distribution of adherence rate and reasons for non-adherence of study participants on HAART in Nekemte Hospital, ART Clinic, West Ethiopia, January 28 to February 12, 2013.

Variables		Frequency	Percentage
Missing a dose a month before the study period	Yes	78	28.8
	No	193	71.2
Reason for non-adherence	Side effects	32	27.1
	Forgetting	19	16.1
	Being busy	14	11.9
	Felt sleeping	11	9.3
	Being away from the home	11	9.3
	Being depressed	8	6.8
	Pill burden	8	6.8
	Being extremely ill	8	6.8
	Running out of medication	3	2.5
	Problem with transportation	2	1.7
	Getting better	2	1.7
Adherence rate	≥95%	211	77.9
	<95%	60	22.1

Table 7. Association of independent variables with adherence rate in Nekemte Hospital, ART Clinic, West Ethiopia, June 2013.

Variables		Adherence rate		P value
		≥95% (Adherent) Frequency (%)	<95% (non-adherent) Frequency (%)	
Sex	Male	95(35.1)	28(10.3)	0.822
	Female	116(42.8)	32(11.8)	
Age	15-30	68(25.1)	21(7.7)	0.893
	31-45	91(33.6)	26(9.6)	
	46-60	47(17.4)	11(4.1)	
	≥61	5(1.8)	2(0.7)	
Educational status	Illiterate	26(9.6)	17(6.3)	0.020
	1-8 grade	108(39.9)	28(10.3)	
	9-12 grade	56(20.7)	12(4.4)	
	College and +	21(7.7)	3(1.1)	
Other medication in addition to ARV	Yes	115(42.4)	46(17)	0.002
	No	96(35.4)	14(5.2)	
Family and social support	Very satisfied	165(66)	9(3.6)	<0.001
	Somewhat satisfied	25(10)	23(9.2)	
	Never satisfied	2(0.8)	16(6.4)	
	Very dissatisfied	2(0.8)	8(3.2)	
Duration of treatment	<3 months	15(5.5)	4(1.5)	0.999
	3-6 Months	28(10.3)	8(2.9)	
	6-12 months	38(14)	11(4)	
	>1 years	130(48)	37(13.7)	
Belief in efficacy of ART Medication	Yes	191(70.5)	48(13.7)	0.026
	No	20(7.4)	12(4.4)	
Medications schedule fit daily routine activity	Yes	161(54.4)	45(16.6)	0.835
	No	50(18.5)	15(5.5)	
Following clinical appointment regularly	Yes	205(75.6)	52(19.2)	0.001
	No	6(2.2)	8(3)	
Continuing to take the medication if the disease condition is worsened	Yes	82(30.3)	6(2.2)	<0.001
	No	129(47.6)	54(19.9)	
Having access to medical care	Yes	210(77.5)	54(19.9)	<0.001
	No	1(0.4)	6(2.2)	
Improvement upon taking ART	Yes	206(76)	26(9.6)	<0.001
	No	5(1.8)	34(12.6)	
Relationship with health professionals	Good	192(70.9)	47(17.3)	0.007
	Poor	9(7)	13(4.8)	
History of active substance abuse	Yes	195(72.3)	49(18.1)	0.009
	No	15(5.5)	11(4.1)	
Using reminding aid	Yes	158(58.3)	16(5.9)	<0.001
	No	53(19.6)	44(16.2)	

families or friends. There was statistically significant difference among the patients who were very satisfied with the overall support and advice they got from their families or friends and who were somewhat satisfied, never satisfied and very dissatisfied. This shows that getting much support and advice from the families or friends might favor good adherence. This is consistent with the study done in Jimma university specialized hospital, where patients who get family support were 2 times more

likely adherent than those who did not get family support as an independent predictors of overall adherence (24).

Education status, belief in efficacy, reminding aids and exposure to social drugs were found to be associated with adherence. There was statistically significant difference in college and above, secondary and primary education level in comparison with illiterate. This study is consistent with study done in

Nepal, where being illiterate was one of the reasons for failing to adhere to HAART (26). There was also statistically significant difference among the patients who believed in efficacy of HAART and who did not believe in efficacy of HAART based on adherence rate. Regarding social drug use, participants who use social drugs were non-adherent when compared to those participants who do not use the social drugs. This study is consistent with the done in Nepal (2) and Vietnam (27) where drinking alcohol was among the reasons for failure to adhere to HAART. There was also statistically significant difference in using reminding aids in comparison with those not using, showing that using reminding aid was associated with increased adherence rate.

There was statistically significant difference among the participants who kept clinical appointment and who missed the clinical appointment. The main reasons for missing clinical appointment in this study was forgetting, transportation problem, and being busy. This is consistent with study done in Kenya, where the most common reasons for poor adherence to clinical appointments were being away from the home, forgetting and being too busy (26).

In this study, 161 (59.4%) of the participants took other medication in addition to ARV drugs continuously for the past 8 months. Among other medications concomitantly taken in addition to ARVs, cotrimoxazole 157 (69.5%) constitute the largest part. There was statistically significant difference among participants who took other medications in addition to ARV in past 8 months and who did not take other medication.

Regarding improvement from HIV/AIDS and other opportunistic infections since initiation of HAART, majority 232 (85.6%) of the participants reported that they had good prognosis or improvement since initiation of HAART. There was statistically significant difference among the patients who had good improvement upon starting HAART and those who had no improvement since initiation of ART based on adherence rate. This shows that participants who had good improvement from the disease was adherent when compared with those participants who had no improvement since initiation of HAART.

In the conclusion, majority of the study participants were adherent to their medication. The main reasons for missed dose were side effect of the medication followed by forgetting and being busy. According to the current study educational status of the participant, concomitantly used medication, family and social support, belief in efficacy of HAART, following clinical appointment regularly, using reminding aid, having access to medical care regardless of place and time, improvement upon taking HAART, relationship with health professionals, history of substance use and

continuing to take the medication if the disease condition is worsened were associated with medication adherence of the patients.

Further study with advanced statistical test and longitudinal design should be performed.

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How to cite:

Ejigu SH, Rike WA, Angamo MT. Medication adherence and associated factors among patients on highly active antiretroviral therapy in Nekemte Hospital, Ethiopia. *Gaziantep Med J* 2014;23(3):199-208.