ADHERENCE TO ANTIRETROVIRAL THERAPY AND ASSOCIATED FACTORS AMONG HIV POSITIVE ADULTS ATTENDING TREATMENT AT NEKEMTE REFERRAL HOSPITAL, WEST ETHIOPIA, 2019

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Research article

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Abstract

BACK GROUND Antiretroviral therapy has a remarkable clinical effect in decreasing the viral replication, reducing the progress of AIDS and deaths related to AIDS. The clinical outcome of ART depends on the strict adherence to antiretroviral medication. However; only a few studies have been done on the adherence status of ART and its determinant factors in Ethiopia and this study could provide an opportunity to identify obstacles to taking medication. Therefore, the purpose of this study was to assess adherence status and associated factors among HIV infected patients on ART attending Nekemte referral hospital, West Ethiopia. **METHODS** Institutional based cross-sectional study was conducted on 311 HIV/AIDS patients, from March 01 to March 30, 2019. The study participants were selected by simple random sampling method and were interviewed using structured questionnaires. The data were coded, checked, cleaned and entered into Epi data version 3.1 and then exported to SPSS window version 20.0 for analysis. Multivariable logistic regression was used to find the independent variables which best predict adherence. Association and statistical significance were measured using odds ratio at 95% confidence interval and p-value less than 0.05. **RESULTS** A total of 305 HIV/AIDS patients were included in this study. Out of this, 73.1% were adhered to their medication. Respondent's knowledge about HIV and its treatment (AOR=8.13, 95% CI: 3.06, 21.61), family/social support (AOR=7.36, 95% CI: 2.07, 26.10), adverse effects of ARV medications (AOR=5.62, 95% CI: 2.11, 14.93), co-morbidity of other chronic illness (AOR=5.46, 95% CI: 1.86, 16.02), and family disclosure status (AOR= 5.27, 95% CI: 2.20, 12.62) were significantly associated with adherence to medication among HIV/AIDS patients. **CONCLUSION** In this study, the level of adherence to antiretroviral therapy was found low compared to the WHO standard. The clinician should emphasize adverse drug reaction, early detect and treat co-morbidities, improve knowledge through health education, and encourage HIV/AIDS patient to disclose their HIV status.

Introduction

Human immune deficiency virus is one of a chronic disease which affects human immune systems and increases vulnerability of individuals to infections [1]. Globally, 36.7 million people were living with HIV/AIDS at the end of 2015 with approximately 70% (25.7 million) residing in Sub-Saharan Africa [2]. In Ethiopia, the Federal HIV/AIDS Prevention and Control Office (EFHAPCO) indicates that there are over 718,550 people (> 1.18%) living with HIV [3].

Antiretroviral therapy has a remarkable clinical effect in decreasing the viral replication and viral load, reduces the progress of AIDS, and reduces deaths related to AIDS [4]. The availability of ART has essentially improved the survival rates of HIV patients, reduction of the new number of HIV infection and prevention of HIV related comorbidities [5]. The availability of this ART drugs changed the disease course to chronicity which arise the issue of adherence. However, the clinical outcome of ART depends on the strict adherence of HIV patients to antiretroviral medication. Strict adherence to antiretroviral therapy is important to decrease the multiplication of the virus and improve disease outcomes [6 & 7].

Several studies indicate that > 95% adherence to therapeutic regimen is required for HIV infected patient to reach full viral suppression [8 – 11]. Maintaining over 95% adherence level is a crucial to maintain viral suppression, to minimize HIV related morbidity and mortality. In Ethiopia, the rate of adherence to ART is 88.2%, which is low compared to WHO Standard [12]. Poor adherence to antiretroviral therapy reduces the effectiveness of ART and hastens viral distribution and drug resistance [13 & 14]. Poor adherence is linked to higher mortality rates, higher rates of decrease in CD4 cell count, lower therapeutic success and increased hospital days [15]. Studies have shown that adherence to ART medication among people living with HIV/AIDS is affected by factors related to the patient, therapeutic regimen, psychosocial environment and health care related factors. Hence, factors such as socio-demographic and socio-cultural factors, side effects of ARVs, ART regimes, duration on ART, and psychosocial factors such as stress, depression and anxiety have also been associated with ART adherence [16 & 17]. It is essential to assess the number of people living with HIV/AIDS drop out of treatment programmes and factors affecting adherence to ART. Since most of the Ethiopian setting is resource limited, there are no routine assessments for ART adherence among PLHIV in Ethiopia. In addition, only a few studies have been done on the adherence status of ART and its determinant factors in Ethiopia and this study could provide an opportunity to identify obstacles to taking ART medication which may help to prevent development of drug resistance and treatment failure. Therefore, this study was aimed to assess adherence status and associated factors among HIV infected patients.

Methods And Materials

STUDY SETTING AND POPULATION

This study was conducted in Nekemte referral hospital from March 01 to March 30, 2019. Nekemte referral hospital is found in Nekemte town which is one of the largest towns found in western part of Ethiopia at about 325 kilometers from a capital city Addis Ababa. The institutional based cross-sectional study design was employed. All ART patients on treatment follow up at Nekemte referral hospital was the source population and the sampled ART patients who had treatment follow up during the study period was the study population. Patients whose ages are 18 years and above were included in this study. Patients who are eligible but not willing to take part in the study were excluded.

SAMPLE SIZE DETERMINATION AND SAMPLING TECHNIQUES

The sample size of the study was calculated using the formula for estimation of a single population proportion with the assumptions of 95 % Confidence Level (CL), marginal error (d) of 0.05. Adherence level of 0.74 (74.0 %) was taken from previous study done in Addis Ababa [18], and by adding a non-response rate of 5%, a total of 311 ART patients were enrolled in the study. Simple random sampling method was used to select the study participants.

DATA COLLECTION TOOL AND PROCEDURES

Data was collected using a structured questionnaire and face-to-face interview was used for data collection. The dependent variable of the study was adherence to ART and the independent variables were socio-demographic, psychosocial and medication related characteristics. Adherence status was assessed based on the number of pills reported to have been taken one month prior to the data collection period divided by the number of prescribed pills multiplied by 100%. Patients who reported an intake of $\geq 95\%$ of the prescribed medication were considered adherent; those with a reported intake of $< 95\%$ were classified as non-adherent [19]. Socio-demographic factors, psychosocial and medication related characteristics were measured as explanatory variables. Data was collected by three trained BSc nurses and one supervisor for duration of approximately one month.

DATA PROCESSING AND ANALYSIS

The data were coded, checked, cleaned and entered into Epi data version 3.1 and then exported to SPSS window version 20.0 for analysis. Bivariate analysis was done to find association between each independent variable with adherence. Finally, multivariable logistic regression was used to find out the independent variables which best predict adherence. Association and statistical significance were measured using odds ratio at 95% confidence interval and p-value less than 0.05.

DATA QUALITY CONTROL

The questionnaire was translated to the local language and then translated back to English by expertise for consistency. Five percent (5 %) of the questionnaire was pre-tested on ART patients having treatment follow up at Gimbi general hospital which is found about 87-kilometer distance from Nekemte referral hospital. One-day training was also given for data collectors and supervisor.

Results

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Out of the total of 311 study participants sampled, 305 were participated; making a response rate of 98.07 %. From the total of 305 participants, 140 (45.9 %) were male, and 165 (54.1 %) were females. One hundred six, (34.8 %) of the study participants lie in the age group between 29-38 years, and the mean age was 32.6 years with ± 11.45 standard deviation. Concerning marital status, 126 (41.3 %) of the study participants were single followed by married, 101 (33.1 %). Majority of the study participants were Oromo 184 (60.3 %), followed by Amhara 81 (26.6 %). Concerning educational status, 123 (40.3 %) were completed grade 9-12, and 110 (36.1 %) were completed grade 1-8. Regarding monthly income, 81 (26.6 %) gets monthly income 1501-2000 Ethiopian birrs followed by monthly income 1001-1500 Ethiopian birr which accounts 73 (23.9 %). Regarding occupation, 96 (31.5 %) were private employee followed by farmer, 83 (27.2 %). Majority of the study participants, 202 (66.2 %) had living companion. (Table 1).

CLINICAL AND BEHAVIORAL CHARACTERISTICS OF PARTICIPANTS

Majority of the study participants, 212 (69.5 %) had no co-morbidity of other chronic diseases. Two hundred-one (65.9 %) had knowledge about HIV and its treatment. Majority of the study participants, 207 (67.9 %) had disclosed their HIV status to their family. One hundred forty (45.9 %) had CD4 count between 200-500 cells and 111 (36.4 %) had CD4 count between 501-800 cells. Regarding the stage of HIV, 116 (38.0 %) were on stage II and 98 (32.1 %) were on stage I. One hundred sixty-seven (54.8 %) of the study participants had poor social support and the remaining 138 (45.2 %) had good social support. Majority of the study participants, 180 (59.0 %) don't experienced social stigma and the remaining 125 (41.0 %) had experienced social stigma. One hundred ninety-four (63.6 %) of the study participants had no history of current substance use. Concerning the disease duration, 115 (37.7 %) had duration of 6-10 years, followed by 104 (34.1 %) which was 1-5 years. Regarding the duration of treatment, 116 (38.0 %) had been on the treatment for 1-5 years followed by 112 (36.7 %) which was 6-10 years. Majority of the study participants, 191 (62.6 %) had no adverse drug reaction, and the remaining 114 (37.4 %) had experienced an adverse drug reaction. (Table 2).

LEVEL OF ADHERENCE TO MEDICATION AMONG THE STUDY PARTICIPANTS

Adherence status was assessed based on the number of pills reported to have been taken one month prior to the data collection period divided by the number of prescribed pills multiplied by 100%. Patients who reported an intake of $\geq 95\%$ of the prescribed medication were considered adherent; those with a reported intake of $< 95\%$ were classified as non-adherent. Accordingly, out of the total of 305 study participants, 223 (73.1 %) were adhered to their medication and 82 (26.9 %) were not adhered to their medication (Figure 1).

BIVARIATE LOGISTIC REGRESSION ANALYSIS

In bivariate analysis, socio-demographic characteristics such as sex, age, marital status, educational status, occupation, income and living companion showed significant association with adherence at P-value less than 0.25. Clinical variables such as HIV stage, side effects of ARV medication, treatment duration, knowledge about HIV and its treatment and comorbidity of other chronic diseases showed significant association with adherence to medication at P-value less than 0.25. Behavioral variables such as family/social support, substance use, family disclosure status and perceived social stigma showed significant association with adherence at P-value less than 0.25. (Table 3).

MULTIVARIATE LOGISTIC REGRESSION ANALYSIS

In the final model of logistic regression, social/family support, adverse drug reaction, Knowledge about HIV and its treatment, family disclosure status and comorbidity of other chronic diseases were significantly associated with adherence to medication. Study participants who had good family/social support were 7.36 times more likely to adhere to their medication than those who had poor family/social support (AOR=7.36, 95% CI: 2.07, 26.10). Study participants who had knowledge about HIV and its treatment were 8.13 times more likely to adhere to their medication than those who had no knowledge about HIV and its treatments (AOR=8.13, 95% CI: 3.06, 21.61). Respondents who didn't develop adverse

drug reactions were 5.62 times more likely to adhere to their medication than those who develop adverse drug reaction (AOR=5.62, 95% CI: 2.11, 14.93). Study participants who hadn't other comorbid chronic diseases were 5.46 more likely to adhere to their medication than those who had other comorbid chronic illness (AOR=5.46, 95% CI: 1.86, 16.02).

Study participants who disclosed their HIV status to their family were 5.27 times more likely to adhere to their medication than those who don't disclosed their HIV status to their family (AOR=5.27, 95% CI: 2.20, 12.62). (Table 4).

Discussion

This study examined the level of adherence to ART and associated factors among HIV/AIDS patients in Nekemte referral hospital, West Ethiopia. The overall level of adherence to medication among peoples living with HIV/AIDS in this study is 73.1 %. This level of adherence is slightly consistent with study done in Southern Ethiopia (68.0%) [20], Northern Tanzania (71.0%) [21] and South Africa (69.0 %) [27]. However; it is lower than a study done in China (85.5%) [22], Eastern Ethiopia (85.0 %) [23], North-West Ethiopia (88.2 %) [12], Nepal (87.4 %) [28], Myanmar (84.0 %) [29] and Togo (78.4 %) [30]. On the other hand, the level of adherence to ARV medication among HIV/AIDS patients in this study is higher than study done in Ghana (62.2 %) [24] and Northern Tanzania (54.9 %) [25]. The difference might be due to variation in sample size, study design and study participant's variation. The level of adherence in this study is lower than world health organization requirement level which is > 95 % [19].

In this study, factors such as social/family support, adverse drug reaction, Knowledge about HIV and its treatment, family disclosure status and comorbidity of other chronic diseases were significantly associated with adherence to ARV medication. Respondents who had no family/social support were found to be non-adherent to medication than those who have family/social support. Support from family and friends have immediate and long-term positive influences on their adherence. This finding is consistent with study done in Ghana [24] and Eastern Ethiopia [23]. However; study done in China [22], Southern Ethiopia [20], South Africa [27], Nepal [28], Myanmar [29], Togo [30] and North West Ethiopia [12] didn't show significant association between family/social support and adherence to antiretroviral medication.

Respondents who developed adverse drug reaction were less adherent to their medication than those who didn't develop adverse drug reaction. Adherence to antiretroviral therapy was negatively affected in HIV/AIDS patients who experienced side effects. This might be due to the fact that study participants might skip their medication to avoid drug side effects. This finding is consistent with a study done in Ghana [24], Nepal [28], South Africa [27] and Cameroon [26]. However; this result is not supported with study done in China [22], Eastern Ethiopia [23], Togo [30], Myanmar [29] and North West Ethiopia [12].

The finding of this study also showed that study participants who had knowledge about HIV and its treatment were more adhered to their medication than those who had no knowledge about HIV and its treatment. This is due to the fact that knowledge on HIV and its treatment might increase their awareness

and access to HIV therapy which might further increase adherence to medication. This finding is consistent with study done in Gonder, North West Ethiopia [12], but not supported with many other studies [20, 22, 23, 24, 27, 28 and 29].

In this study, study participants who disclosed their HIV status to their families were more adhered to their medication than who didn't disclosed their HIV status. This is similar with study done in China [22], Tanzania [25], Eastern Ethiopia [23], North West Ethiopia [12], South Africa [27], Myanmar [29] and Togo [30]. When there is no self-disclosure about HIV status, the persons may fear to take their treatments and miss the medication. Participants who did not disclose their HIV status put more pressure on themselves in terms of taking regular medication and might skip their medication. On the other hand, non-disclosure might impede the participants from obtaining social support and patients with lower social support might show poor adherence to their medication.

Respondents who had comorbidity of other chronic illness were less adherent to their medication than those who had no comorbidity of other chronic illness. The possible reason might be that when patients had co-morbidities, they might have pill burden. When a number of pills increases, the patient might experience more adverse effects from the medications which potentially lead them to skip their treatment. This finding is supported with study done in China [22], Cameroon [26], Eastern Ethiopia [23], Southern Ethiopia [20], and North West Ethiopia [12]. However, this finding is not supported with study done in Ghana [24] and Northern Tanzania [21]. Unlike to other studies done in different parts of the world, age, monthly income, marital status, waiting time, number of pills and substance use didn't show significant association with adherence to medication in this study.

LIMITATION OF THE STUDY

Causality cannot be confirmed since the research design was cross-sectional. Adherence was assessed based on data taken during the previous one month. So, the participants might be subjected to recall bias.

Conclusions

In this study, the level of adherence to antiretroviral therapy was found low compared to the WHO standard. Social/family support, adverse drug reaction, knowledge about HIV and its treatment, disclosure status and comorbidity of other chronic diseases were significantly associated with adherence. The clinician should emphasize adverse drug reaction, early detect and treat co-morbidities, improve knowledge through health education, and encourage HIV/AIDS patient to disclose their HIV status to improve medication adherence.

Abbreviations

AIDS: Acquired immunodeficiency syndrome, AOR: Adjusted odd ratio, ART: Anti-retroviral therapy, ARV: Anti-retroviral, CI: Confidence interval, EFHAPCO: Ethiopian Federal HIV/AIDS Prevention and Control

Declarations

Ethical approval and consent to participate

The study was reviewed and approved by the Institutional Review Boards of Wollega University Ethical review board. The purpose of the study was explained to medical director and staffs of the hospital and permission was obtained. All participants of the study were provided written consent, clearly stating the objectives of the study and their right to refuse. Filled out questionnaires were carefully handled and all access to results was kept strictly within the author.

Consent for publication

Not applicable

Availability of data and materials

The data used during this study are available on request.

Competing Interests

I declare that I have no competing interests.

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No funding was received for this research work.

Authors' Contributions

Overall activities of this study (conceptualization of the study, designing, result writing, analyzing the finding and writing and approving the manuscript) were carried out by the author MA.

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Tables

Table 1: Distribution of study participants by socio-demographic characteristics among HIV/AIDS patients at Nekemte referral hospital, West Ethiopia, 2019 (n= 305)

Variables		Frequency	Percentage
Sex	Male	140	45.9
	Female	165	54.1
	Total	305	100
Ethnicity	Oromo	184	60.3
	Amhara	81	26.6
	Tigre	18	5.9
	Gurage	12	3.9
	Others	10	3.3
	Total	305	100
Age	18-28	104	34.1
	29-38	106	34.8
	39-48	46	15.1
	>=48	49	16.1
	Total	305	100
Marital status	Married	101	33.1
	Single	126	41.3
	Divorced	40	13.1
	Widowed	38	12.5
Educational status	Total	305	100
	No formal education	20	6.6
	Primary school (1-8)	110	36.1
	Secondary (9-12)	123	40.3
	Degree and above	52	17.0
Occupational status	Total	305	100
	Gov't employee	35	11.5
	Private employee	96	31.5
	Farmer	83	27.2
	Merchant	81	26.6
	Others	10	3.3
	Total	305	100
Monthly income	<500	62	20.3
	500-1000	56	18.4
	1001-1500	73	23.9
	1501-2000	81	26.6
	>200	33	10.8
Living companion	Total	305	100
	Yes	202	66.2
	No	103	33.8
	Total	305	100

Table 2: Distribution of study participants by clinical and behavioral variables among HIV/AIDS patients at Nekemte referral hospital, West Ethiopia, 2019 (n= 305)

Variables		Frequency	Percentage
CD4 cell count	<200	42	13.8
	200-500	140	45.9
	501-800	111	36.4
	>800	12	3.9
	Total	305	100
Stage of HIV	Stage I	98	32.1
	Stage II	116	38.0
	Stage III	48	15.7
	Stage IV	43	14.1
	Total	305	100
Social support	Good	138	45.2
	Poor	167	54.8
	Total	305	100
Perceived social stigma	Yes	125	41.0
	No	180	59.0
	Total	305	100
Current substance use	Yes	111	36.4
	No	194	63.6
	Total	305	100
Duration of disease	<1 year	47	15.4
	1-5 years	104	34.1
	5-10 years	115	37.7
	>10 years	39	12.8
	Total	305	100
Adverse drug reaction	Yes	114	37.4
	No	191	62.6
	Total	305	100
Waiting time	<30 minutes	186	61.0
	>/= 30 minutes	119	39.0
	Total	305	100
Family disclosure status	Yes	207	67.9
	No	98	32.1
Comorbidity of other chronic diseases	Total	305	100
	Yes	93	30.5
Knowledge about HIV and its treatment	No	212	69.5
	Total	305	100
	Yes	201	65.9
	No	104	34.1
	Total	305	100

Table 3: Bivariate logistic regression analysis of factors associated with adherence among HIV/AIDS patients at Nekemte referral hospital, West Ethiopia, 2019 (n= 305)

Variables	Adherence		COR (95%) CI	P value
	Adhered (%)	Not adhered (%)		
Sex				
Male	97 (69.3 %)	43 (30.7 %)	1	
Female	126 (76.4 %)	39 (23.6 %)	0.69 (0.42, 1.16)	0.16*
Age (years)				
18-28	69 (66.3 %)	35 (33.7 %)	2.25 (0.98, 5.16)	0.05*
29-38	78 (73.6 %)	28 (26.4 %)	1.59 (0.68, 3.70)	0.27
39-48	36 (78.3 %)	10 (21.7 %)	1.23 (0.45, 3.37)	0.68
>48	40 (81.6 %)	9 (18.4 %)	1	
Marital status				
Married	81 (80.2 %)	20 (19.8 %)	1	
Single	92 (73.0 %)	34 (27.0 %)	1.49 (0.79, 2.80)	0.20*
Divorced	26 (65.0 %)	14 (35.0 %)	2.18 (0.96, 4.91)	0.06*
Widowed	24 (63.2 %)	14 (36.8 %)	2.36 (1.04, 5.36)	0.04*
Ethnicity				
Oromo	134 (72.8 %)	50 (27.2 %)	1	
Amhara	61 (75.3 %)	20 (24.7 %)	0.87 (0.48, 1.60)	0.67
Tigre	13 (72.2 %)	5 (27.8 %)	1.03 (0.35, 3.03)	0.95
Gurage	9 (75.0 %)	3 (25.0 %)	0.89 (0.23, 3.43)	0.87
Others	6 (60.0 %)	4 (40.0 %)	1.78 (0.48, 6.59)	0.38
Educational status				
No formal education	11 (55.0 %)	9 (45.0 %)	2.45 (0.83, 7.24)	0.10*
Primary school (1-8)	73 (66.4%)	37 (33.6 %)	1.52 (0.72, 3.19)	0.26
Secondary school (9-12)	100 (81.3 %)	23 (18.7 %)	0.69 (0.31, 1.49)	0.34
College and above	39 (75.0 %)	13 (25.0 %)	1	
Residence				
Urban	62 (68.9 %)	28 (31.1 %)	1.34 (0.78, 2.31)	0.28
Rural	161 (74.9 %)	54 (25.1 %)	1	
Occupation				
Government employee	28 (80.0 %)	7 (20.0 %)	1	
Private employee	72 (75.0 %)	24 (25.0 %)	1.33 (0.51, 3.44)	0.55
Farmer	56 (67.5 %)	27 (32.5 %)	1.92 (0.74, 4.97)	0.17*
Merchant	58 (71.6 %)	23 (28.4 %)	1.58 (0.60, 4.13)	0.34
Others	9 (90.0 %)	1 (10.0 %)	0.44 (0.04, 4.11)	0.47
Income				
<500 EB	35 (56.5 %)	27 (43.5 %)	4.32 (1.47, 12.66)	0.008*
500-1000 EB	41 (73.2 %)	15 (26.8 %)	2.04 (0.66, 6.26)	0.21*
1001-1500 EB	51 (69.9 %)	22 (30.1 %)	2.41 (0.82, 7.07)	0.10*
1501-2000 EB	68 (84.0 %)	13 (16.0 %)	1.07 (0.34, 3.28)	0.90
>2000 EB	28 (84.8 %)	5 (15.2 %)	1	
Number of pills taken in a day				
2 tablets	114 (75.5 %)	37 (24.5 %)	1	
3 tablets	52 (72.2 %)	20 (27.8 %)	1.18 (0.62, 2.23)	0.60
4 tablets	43 (69.4 %)	19 (30.6 %)	1.36 (0.70, 2.62)	0.35

>4 tablets	14 (70.0 %)	6 (30.0 %)	1.32 (0.47, 3.68)	0.59

Living companion				
Yes	178 (88.1 %)	24 (11.9 %)	1	
No	45 (43.7 %)	58 (56.3 %)	9.55 (5.36, 17.0)	0.000 *
CD4 cell				
<200	31 (73.8 %)	11 (26.2 %)	0.71 (0.17, 2.83)	0.62
200-500	100 (71.4 %)	40 (28.6 %)	0.80 (0.22, 2.80)	0.72
501-800	84 (75.7 %)	27 (24.3 %)	0.64 (0.17, 2.3)	0.49
>800	8 (66.7 %)	4 (33.3 %)	1	
HIV stage				
Stage I	73 (74.5 %)	25 (25.5 %)	1	
Stage II	88 (75.9 %)	28 (24.1 %)	0.92 (0.49, 1.73)	0.81
Stage III	31 (64.6 %)	17 (35.4 %)	1.60 (0.76, 3.37)	0.21 *
Stage IV	31 (72.1 %)	12 (27.9 %)	1.13 (0.50, 2.53)	0.76
Side effect of ARV drugs				
Yes	44 (38.6 %)	70 (61.4 %)	23.7 (11.83, 47.57)	0.000 *
No	179 (93.7 %)	12 (6.3 %)	1	
Family/social support				
Good	134 (97.1 %)	4 (2.9 %)	1	
Poor	89 (53.3 %)	78 (46.7 %)	19.36 (10.37, 33.05)	0.000 *
Perceived stigma				
Yes	59 (47.2 %)	66 (52.8 %)	11.46 (6.15, 21.35)	0.000 *
No	164 (91.1 %)	16 (8.9 %)	1	
Substance use				
Yes	46 (41.4 %)	65 (58.6 %)	14.71 (7.87, 27.47)	0.000 *
No	177 (91.2 %)	17 (8.8 %)	1	
Disease duration				
<1 year	35 (74.5 %)	12 (25.5 %)	1.14 (0.42, 3.08)	0.79
1-5 years	76 (73.1 %)	28 (26.9 %)	1.22 (0.51, 2.90)	0.64
6-10 years	82 (71.3 %)	33 (28.7 %)	1.34 (0.57, 3.13)	0.49
>10 years	30 (76.9 %)	9 (23.1 %)	1	
Treatment duration				
<1 year	38 (79.2 %)	10 (20.8 %)	1	
1-5 years	85 (73.3 %)	31 (26.7 %)	1.38 (0.61, 3.11)	0.42
6-10 years	78 (69.6 %)	34 (30.4 %)	1.65 (0.74, 3.70)	0.21 *
>10 years	22 (75.9 %)	7 (24.1 %)	1.20 (0.40, 3.63)	0.73
Knowledge about HIV and its treatment				
Knowledgeable	181 (90.0 %)	20 (10.0 %)	1	
Not knowledgeable	42 (40.4 %)	62 (59.6 %)	13.36 (7.29, 24.47)	0.000 *
Waiting time				
<30 minutes	140 (75.3 %)	46 (24.7 %)	1	
>/=30 minutes	83 (69.7 %)	36 (30.3 %)	1.32 (0.79, 2.20)	0.28
comorbidity of other chronic illness				
Yes	35 (37.6 %)	58 (62.4 %)	12.98 (7.14, 23.58)	0.000 *
No	188 (88.7 %)	24 (11.3 %)	1	
Family disclosure status				
Yes	184 (88.9 %)	23 (11.1 %)	1	
No	39 (39.8 %)	59 (60.2 %)	12.10 (6.68, 21.89)	0.000 *

Notes * shows significant at P-value <0.25

Table 4: Multivariate logistic regression analysis of factors associated with adherence among HIV/AIDS patients at Nekemte referral hospital, West Ethiopia, 2019 (n= 305).

Variables	Adherence		COR (95%) CI	P value	AOR (95%) CI	P value
	Adhered (%)	Not adhered (%)				
Sex						
Male	97 (69.3 %)	43 (30.7 %)	1		1	
Female	126 (76.4 %)	39 (23.6 %)	0.69 (0.42, 1.16)	0.16	0.53 (0.22, 1.29)	0.17
Age (years)						
18-28	69 (66.3 %)	35 (33.7 %)	2.25 (0.98, 5.16)	0.05	2.65 (0.32, 21.4)	0.36
29-38	78 (73.6 %)	28 (26.4 %)	1.59 (0.68, 3.70)	0.27	1.63 (0.19, 13.4)	0.64
39-48	36 (78.3 %)	10 (21.7 %)	1.23 (0.45, 3.37)	0.68	2.38 (0.14, 29.6)	0.54
>48	40 (81.6 %)	9 (18.4 %)	1		1	
Marital status						
Married	81 (80.2 %)	20 (19.8 %)	1		1	
Single	92 (73.0 %)	34 (27.0 %)	1.49 (0.79, 2.80)	0.20	2.29 (0.72, 7.26)	0.15
Divorced	26 (65.0 %)	14 (35.0 %)	2.18 (0.96, 4.91)	0.06	4.87 (0.96, 24.62)	0.06
Widowed	24 (63.2 %)	14 (36.8 %)	2.36 (1.04, 5.36)	0.04	2.35 (0.47, 11.63)	0.29
Ethnicity						
Oromo	134 (72.8 %)	50 (27.2 %)	1		1	
Amhara	61 (75.3 %)	20 (24.7 %)	0.87 (0.48, 1.60)	0.67	0.28 (0.09, 0.83)	0.22
Tigre	13 (72.2 %)	5 (27.8 %)	1.03 (0.35, 3.03)	0.95	1.08 (0.12, 9.64)	0.94
Gurage	9 (75.0 %)	3 (25.0 %)	0.89 (0.23, 3.43)	0.87	0.69 (0.09, 5.29)	0.72
Others	6 (60.0 %)	4 (40.0 %)	1.78 (0.48, 6.59)	0.38	0.88 (0.10, 7.35)	0.91
Educational status						
No formal education	11 (55.0 %)	9 (45.0 %)	2.45 (0.83, 7.24)	0.10	4.74 (0.54, 41.32)	0.15
Primary school (1-8)	73 (66.4%)	37 (33.6 %)	1.52 (0.72, 3.19)	0.26	1.72 (0.45, 6.57)	0.42
Secondary school (9-12)	100 (81.3 %)	23 (18.7 %)	0.69 (0.31, 1.49)	0.34	0.88 (0.23, 3.30)	0.86
College and above	39 (75.0 %)	13 (25.0 %)	1		1	
Residence						
Urban	62 (68.9 %)	28 (31.1 %)	1.34 (0.78, 2.31)	0.28	1.42 (0.50, 4.02)	0.50
Rural	161 (74.9 %)	54 (25.1 %)	1		1	
Occupation						
Government employee	28 (80.0 %)	7 (20.0 %)	1		1	
Private employee	72 (75.0 %)	24 (25.0 %)	1.33 (0.51, 3.44)	0.55	0.80 (0.12, 5.16)	0.82

Farmer	56 (67.5 %)	27 (32.5 %)	1.92 (0.74, 4.97)	0.17	2.96 (0.43, 20.35)	0.26
Merchant	58 (71.6 %)	23 (28.4 %)	1.58 (0.60, 4.13)	0.34	2.14 (0.35, 12.8)	0.40
Others	9 (90.0 %)	1 (10.0 %)	0.44 (0.04, 4.11)	0.47	0.03 (0.001, 3.14)	0.62
Income						
<500 EB	35 (56.5 %)	27 (43.5 %)	4.32 (1.47, 12.66)	0.008	1.98 (0.19, 20.8)	0.56
500-1000 EB	41 (73.2 %)	15 (26.8 %)	2.04 (0.66, 6.26)	0.21	0.69 (0.06, 7.48)	0.76
1001-1500 EB	51 (69.9 %)	22 (30.1 %)	2.41 (0.82, 7.07)	0.10	1.72 (0.17, 16.8)	0.64
1501-2000 EB	68 (84.0 %)	13 (16.0 %)	1.07 (0.34, 3.28)	0.90	1.18 (0.09, 15.31)	0.89
>2000 EB	28 (84.8 %)	5 (15.2 %)	1		1	
Number of pills taken in a day						
2 tablets	114 (75.5 %)	37 (24.5 %)	1		1	
3 tablets	52 (72.2 %)	20 (27.8 %)	1.18 (0.62, 2.23)	0.60	2.19 (0.71, 6.71)	0.16
4 tablets	43 (69.4 %)	19 (30.6 %)	1.36 (0.70, 2.62)	0.35	3.24 (0.94, 11.1)	0.61
>4 tablets	14 (70.0 %)	6 (30.0 %)	1.32 (0.47, 3.68)	0.59	0.91 (0.10, 8.26)	0.93

Living companion						
Yes	178 (88.1 %)	24 (11.9 %)	1		1	
No	45 (43.7 %)	58 (56.3 %)	9.55 (5.36, 17.0)	0.000	0.48 (0.04, 5.16)	0.54
CD4 cell						
<200	31 (73.8 %)	11 (26.2 %)	0.71 (0.17, 2.83)	0.62	2.38 (0.22, 25.15)	0.46
200-500	100 (71.4 %)	40 (28.6 %)	0.80 (0.22, 2.80)	0.72	1.05 (0.12, 8.7)	0.95
501-800	84 (75.7 %)	27 (24.3 %)	0.64 (0.17, 2.3)	0.49	0.98 (0.11, 8.32)	0.98
>800	8 (66.7 %)	4 (33.3 %)	1		1	
HIV stage						
Stage I	73 (74.5 %)	25 (25.5 %)	1		1	
Stage II	88 (75.9 %)	28 (24.1 %)	0.92 (0.49, 1.73)	0.81	2.36 (0.63, 8.80)	0.19
Stage III	31 (64.6 %)	17 (35.4 %)	1.60 (0.76, 3.37)	0.21	1.11 (0.17, 6.88)	0.91
Stage IV	31 (72.1 %)	12 (27.9 %)	1.13 (0.50, 2.53)	0.76	1.32 (0.22, 7.86)	0.75
Family/social support						
Good	134 (97.1 %)	4 (2.9 %)	1		1	
Poor	89 (53.3 %)	78 (46.7 %)	19.36 (10.37, 33.05)	0.000	7.36 (2.07, 26.10)	0.002*
Perceived stigma						
Yes	59 (47.2 %)	66 (52.8 %)	11.46 (6.15, 21.35)	0.000	1.50 (0.36, 6.15)	0.57
No	164 (91.1 %)	16 (8.9 %)	1		1	
Substance use						
Yes	46 (41.4 %)	65 (58.6 %)	14.71 (7.87, 27.47)	0.000	2.54 (0.49, 13.12)	0.26
No	177 (91.2 %)	17 (8.8 %)	1		1	
Disease duration						
<1 year	35 (74.5 %)	12 (25.5 %)	1.14 (0.42, 3.08)	0.79	0.81 (0.12, 5.18)	0.83
1-5 years	76 (73.1 %)	28 (26.9 %)	1.22 (0.51, 2.90)	0.64	0.63 (0.12, 3.33)	0.59
6-10 years	82 (71.3 %)	33 (28.7 %)	1.34 (0.57, 3.13)	0.49	0.41 (0.07, 2.15)	0.29
>10 years	30 (76.9 %)	9 (23.1 %)	1		1	
Treatment duration						
<1 year	38 (79.2 %)	10 (20.8 %)	1		1	

	%)	%)				
1-5 years	85 (73.3 %)	31 (26.7 %)	1.38 (0.61, 3.11)	0.42	2.22 (0.13, 38.0)	0.58
6-10 years	78 (69.6 %)	34 (30.4 %)	1.65 (0.74, 3.70)	0.21	0.70 (0.04, 12.36)	0.81
>10 years	22 (75.9 %)	7 (24.1 %)	1.20 (0.40, 3.63)	0.73	0.52 (0.03, 9.22)	0.65
Knowledge about HIV and its treatment						
Knowledgeable	181 (90.0 %)	20 (10.0 %)	1		1	
Not knowledgeable	42 (40.4 %)	62 (59.6 %)	13.36 (7.29, 24.47)	0.000	8.13 (3.06, 21.61)	0.000*
Side effect of ARV drugs						
Yes	44 (38.6 %)	70 (61.4 %)	23.7 (11.83, 47.57)	0.000	5.62 (2.11, 14.93)	0.001*
No	179 (93.7 %)	12 (6.3 %)	1		1	
comorbidity of other chronic illness						
Yes	35 (37.6 %)	58 (62.4 %)	12.98 (7.14, 23.58)	0.000	5.46 (1.86, 16.02)	0.002*
No	188 (88.7 %)	24 (11.3 %)	1		1	
Waiting time						
<30 minutes	140 (75.3 %)	46 (24.7 %)	1		1	
>/=30 minutes	83 (69.7 %)	36 (30.3 %)	1.32 (0.79, 2.20)	0.28	0.67 (0.24, 1.87)	0.45
Family disclosure status						
Yes	184 (88.9 %)	23 (11.1 %)	1		1	
No	39 (39.8 %)	59 (60.2 %)	12.10 (6.68, 21.89)	0.000	5.27 (2.20, 12.62)	0.000*

Notes * shows significant at P-value <0.05

Figures

Figure 1

Bar graph showing the level of adherence to antiretroviral medication among HIV/AIDS patients at Nekemte referral hospital, West Ethiopia, 2019