

Self-Reported Chronic Disease Co-morbidities among Patients on Antiretroviral Therapy: A facility based cross-sectional study in Jimma, Southwest Ethiopia

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Abstract

Background: People living with HIV who have access to antiretroviral therapy (ART) are living longer and healthier lives. The clinical management of such patients is evolving towards a new spectrum of comorbidities. People living with HIV are increasingly experiencing a range of multiple comorbidities conditions. Measurement of comorbidity has currently received more attention from medical researchers. Therefore, this study has assessed self-reported chronic disease comorbidities among patients on antiretroviral therapy in Jimma, Southwest Ethiopia. **Methods:** A facility based cross-sectional study design was employed among 351 ART clients visiting Jimma University Teaching Hospital in March 2014 that were identified by systematic random sampling. Data were collected by interviewer-administered questionnaires that mainly assessed socio-demographic data, disease-related care factors, community factors and treatment delivery-related factors. Descriptive analysis was performed. Bivariate and multivariate logistic regression analyses were used to identify associated factors by using SPSS version software. Association between the explanatory and dependent variables was assessed at the p-value of less than 0.05. The results were presented in a narrative form, tables and graphs. **Results:** Of the total respondents, 137 (39%) had comorbidities with different diseases. From this, the majority of them have tuberculosis 71 (51.82 %), followed by hypertensions 26 (19.0%), asthma 21 (15.3%), diabetes 11 (8.0 %) and heart diseases 8 (5.8%). Being current CD4 count < 250 cells/ml (AOR=2.715 [CI= 1.461, 5.1 poor level of general health conditions (AOR=5.894 [CI= 3.172, 10.951]), discontinuation opportunistic infection prophylaxes (AOR= 2.578 [CI = 1.371,4.845]), having any clinical symptoms for HIV/AIDS (AOR= 6.46 [CI= 3.428, 12.175]) and having substance use disorders (AOR= 4.925 [CI= 2.629, 9.225]) were factors that shown statistically significant associations with having comorbidities. **Conclusions:** The finding indicated that magnitudes of comorbidities were numerous. Different clinical and behavioral factors mentioned above lead the patients to the development of comorbidities. Therefore, we recommend the concerned organization to give greater emphasis on those identified factors as influential and due attention should be given to those factors curving the problems and burden of comorbidities among the HIV/AIDS patients.

Keywords: Antiretroviral therapy; Factors; Comorbidity; Ethiopia; Jimma; People living with HIV/AIDS.

1. Introduction

This world currently faced the quadruple burden of health and related problems like non-communicable, communicable diseases, injury (incidents) and including per-natal and maternal problems. Sub-Saharan Africa, including Ethiopia heavily carried high magnitude of this disease burden due to different socio-demographic and socio-economic factors for health and development have direct relationships [1-3].

HIV infection is a complex chronic disease that can result from immune compromise of patients, which leads to high susceptibility of those patients for different diseases. Due to this reason and markedly improved of the survival of HIV/AIDS patients (increased life expectancy) by the widespread use of combination antiretroviral therapy, observing comorbidity is common among HIV/AIDS patients [4-6].

With 36.7 million people living with HIV globally at the end of 2015, almost half of them (17 million (46%)) were estimated to be receiving ART. As a result, the deaths from the disease become decreased in high volume. This can result in rising life expectancies among people living with HIV, which leads to co-morbidity from chronic diseases [7, 8]. Various co-infections, comorbidities and other concomitant health conditions are common among people living with HIV and have implications for their treatment and care, including the timing and choice of ARV drugs.

Comorbidity is the occurrence of two or more diseases or disorders together with individual persons [9]. The health-related quality of life of HIV/AIDS patients is now under danger from certain chronic disease comorbidities like heart disease, hypertension, diabetes (endocrine disease), stroke, kidney(renal impairment) and liver disease, deep vein thrombosis, cancers and mental health problems which are increasingly prevalent [9-11].

Measurement of comorbidity has currently received more attention from medical researchers. Comorbidities among HIV-positive individuals may increase the potential for poly-pharmacy causing drug-to-drug interaction. Several factors associated with comorbidity HIV infection and knowing those predictor variables are very important for care and treatment of HIV patients [12, 13]. A few reports exist on comorbidities among HIV infected patients across the country. Hence, this study was assessed the prevalence as well as predisposing factors of chronic disease co-morbidities among patients on antiretroviral therapy in Jimma, Southwest Ethiopia.

2. Methods

2.1. Study design and setting

The facility-based cross-sectional study was conducted in Jimma University Teaching Hospital ART Clinic from March 1 to 30, 2014. Jimma University Teaching Hospital (JUTH) is one the oldest public hospital in the country. It was established in 1937 by Italian invaders for the service of their soldiers. Geographically, it is located in Jimma City that is located at 357 km from Addis Ababa [14]. JUTH is the teaching and referral hospital that have around 450 beds and more than 750 staffs of both supportive and professionals. It provides services for approximately 9,000 inpatients and 80,000 outpatient attendances a year. JUTH ART Clinic pioneered the use of antiretroviral drugs in Ethiopia in 2002. The clinic currently gives to follow up service for about 6260 HIV/AIDS patients. On average, 50 - 100 patients were visiting the clinic on a day. The appointments follow up given to for patients in every one to two months. The clinic staffed with internist, the senior health officer and nurses who were trained in specific HIV/AIDS disease patient cares [15].

2.2. Population, Sample Size Determinations, and Sampling Techniques

The total HIV/AIDS patients, following ART Drugs at Jimma University Teaching hospital's ART Clinic and aged ≥ 18 years were considered as source population. From this, those come to Clinic at the time of data collection were studied population. Due to ethical issues and to get real information from the patients, those under 18 years ages not involved in the sample while data collection.

The sample was determined using single population proportion formula using EPI Info 7.1.0.6 version was applied with an assumption of a level of confidence of the study, 95%, sampling error tolerated 5%, and Proportion of comorbidity was 29 % [16]. Finally, 358 sample size was obtained.

By using a systematic random sampling technique, from the total number of populations served in one-two months, which were 6220, data were collected by every 18th PLWHA on ART who were eligible to participate in ART care.

2.3. Data Collection Instruments and Methods

The questioners were adapted from related kinds of literature [7, 9-13, 16-20]. The questioners mainly assessed socio-demographic data, disease-related care factors, community factors and treatment delivery-related factors. Five BSc nurses working in JUTHART Clinic who could speak both Amharic and Afan Oromo were collected the data by face-to-face interview. One BSc Nurse Supervisor was assigned at the time of data collections. The patient was interviewed after they had got the service they required for the ART Clinic.

2.4. Data Quality Assurance

The questionnaires were pre-tested on 5% of the sample in Jimma Town, Shanan Gibe Hospital before the actual data collections and amendments were made accordingly. Language experts translated the questioners into two local languages (Amharic and Afan Oromo) and then back to English to make sure the consistency of the questionnaires, then correction was done accordingly. The data collectors and supervisors were trained on data collection tools and procedures for one day. On top of this, supervisors have followed data collectors, and the investigators were also checked for the collected data clear and completeness every day of the period of data collections.

2.5. Data Processing and Analysis

Before data entry, questionnaires were checked for completeness. Data were entered into Epidata version 3.0 and then exported to SPSS version 20.0 for further analysis. Descriptive analysis such as percentage, frequency and mean were calculated. Bivariate logistic regression analysis was used to identify associations between variables. The possible effects of confounders were controlled through multivariate logistic regression analysis to identify the predictor of the study variables. Those predictor variables that had p -value ≤ 0.25 in binary logistic regressions were entered into multiple logistic regression models. The association between the explanatory and dependent variables were being assessed at the p -value of 0.05 and the variables that show p -value < 0.05 were considered as statistically significant. The degree of association between independent and dependent variables was assessed using adjusted odds ratio with 95% confidence interval. The findings were presented in the form of narratives, cross-tabulations, tables, pie charts, and graphs.

2.6. Ethical Considerations

Before the data collection, ethical clearance and approval to conduct this research was obtained from the Ethical Review Committee of Institute of Health, Jimma University. Permission was obtained from the Jimma University Teaching Hospital to implement the study. Prior to administering the questionnaires; the objectives of the study clearly explained to the participants and informed consent was obtained. After they showed willingness orally the questionnaires were administered to them. Confidentiality was ensured throughout the execution of the study, as participants didn't require disclosing personal information on the questionnaire and number was used instead of their names. Participants have been informed that their participation was voluntary and that they can withdraw from the study at any time if they wish to do so.

3. Results

3.1. Socio-Demographic Characteristics

About 351 sampled study participants have responded to study with response rate 98 %. For all participants, 228 (65%) of them were females. Most of the participants aged less than 40 years 237 (67.5%) with the mean age of 34.9 (SD \pm 8.68) (min 19 years old and max 67 years old). Concerning their marital status, never married accounts 152 (43.3%) followed by married 99 (28.2%). The majority of the study participants were primary 143 (40.7%) and 104 (30.5%) attended secondary school education. Oromo accounts 42.7% and Muslims accounts 29% based on ethnicity and religion respectively. About 247 (70.4%) of them were currently employed [table 1].

Table-1. Socio demographic characteristics of PLWHA on follow up in Jimma University Teaching Hospital in ART Clinic, Southwest Ethiopia, 2014 (N=351)

Variables	Alternatives	Frequency	Percentage (%)
Age of the respondent	1. \leq 39 years	237	67.5
	2. \geq 40 years	114	32.5
Sex of respondents	1. Male	123	35
	2. Female	228	65
Marital status	1. Single	152	43.3
	2. Married	99	28.2
	3. Widowed	31	8.8
	4. Divorce	69	19.7
Educational level	1. No formal education	70	19.9
	2. Grade: 1-8	143	40.7
	3. Grade: 9-10	104	30.5
	4. 10+, certificate and above	31	8.8
Ethnicity	1. Oromo	153	43.6
	2. Amhara	96	27.4
	3. Tigre	18	5.1
	4. Dawuro	34	9.7
	5. Yem	36	10.3
	6. Others*	14	4
Religion	1. Muslim	102	29.1
	2. Orthodox	181	51.6
	3. Protestant	68	19.3
	4. Others**	13	3.6
Occupation	1. Currently Employed	247	70.4
	2. Currently not employed	104	29.6
Income of respondents	1. \leq 500 ETB [\leq 18 USD]	253	72.1
	2. 501 - 1000 ETB [19-36 USD]	48	13.7
	3. \geq 1001 ETB [\geq 37 USD]	50	14.2

* Gumuz and Gurage ** Wakefata and Catholic

3.2. Clinical conditions of Participants

The majority of the respondents, 248 (70.7 %) had CD4 count less than $<$ 250 cells/ml when they started ART follow up services. During the data collection time, 278 (79.2 %) of the respondents had \geq 250 cells/ml CD4 count level. Three-fourth, 283 (80.6%) of the participants were at stages I-II of WHO classification during the data collection time. Regarding opportunistic infections prophylaxes; 233 (66.4%) of them was taking prophylaxes. Moreover, 247 (70.4%) of respondents felt good general health conditions at the time of data collections. Compared to last year, 273 (77.8 %) of them were better now than a year regarding their health status progress [table 2].

Table-2. Clinical conditions of PLWHA on follow up in Jimma University Teaching Hospital in ART Clinic, southwest Ethiopia, 2014(N= 351)

Variables	Alternatives	Frequency	Percentage
CD4 count when ART started	1. < 250 cells/ml	248	70.7
	2. ≥ 250 cells/ml	103	29.3
CD4 count currently	1. < 250 cells/ml	73	20.8
	2. ≥ 250 cells/ml	278	79.2
WHO stage at start	1. Stages I - II	286	81.5
	2. Stages III - V	65	18.5
Current WHO stage of HIV	1. Stages I - II	283	80.6
	2. Stages III- V	68	19.4
Vests clinic for health seeking	1. Yes	285	81.2
	2. No	66	18.8
Discontinuation of OI prophylaxes	1. Yes	233	66.4
	2. No	118	33.6
How long they stayed on treatment	1. < 2 years	143	40.7
	2. ≥ 2 years	208	59.3
General health condition	1. Good	247	70.4
	2. Poor	104	29.6
Faced body pain in last 4 weeks	1. Not faced	217	61.8
	2. mild pain	103	29.3
	3. severe pain	31	8.8
Healthy as any body	1. Yes	223	63.5
	2. No	128	36.5
Compared to last year how they rate their health status	1. better now than a year	273	77.8
	2. worse now than a year	78	22.2
Can perform any physical exercise	1. yes	215	61.3
	2. No	136	38.7
Have attended health education	1. Yes	287	81.8
	2. No	64	18.2

Magnitude and type of comorbidity among patients with HIV Of the total, 137 (39%) of respondents had comorbidities with other chronic diseases [figure 1]. From those participants that had comorbidities; the majority of them have tuberculosis 71 (51.82 %) followed by hypertension 26 (19.0%), asthma 21 (15.3%), diabetes 11(8.0 %) and heart diseases 8 (5.8%) [figure 2].

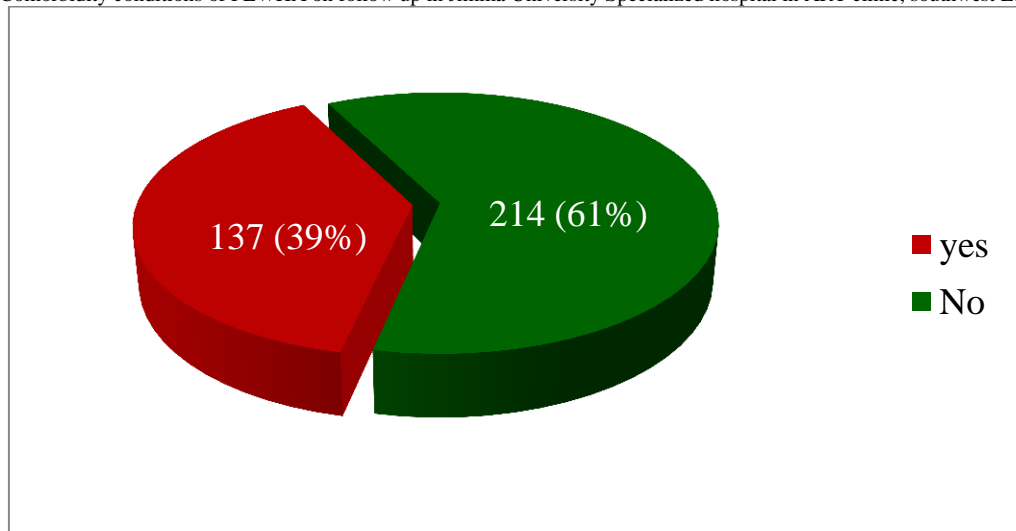
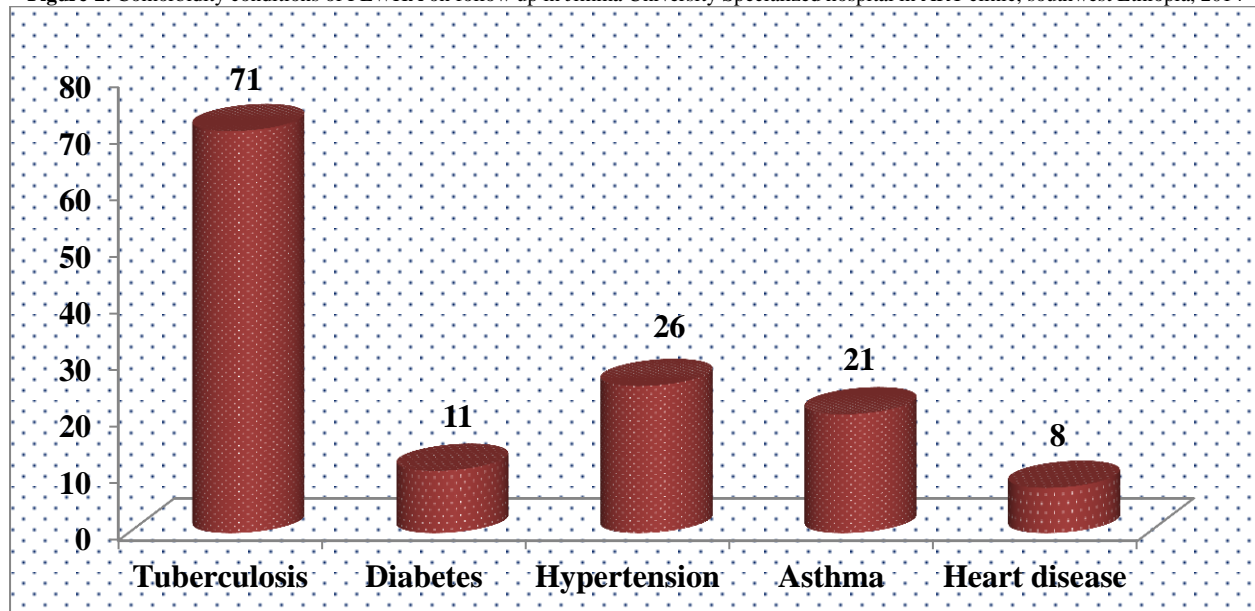
Figure-1. Comorbidity conditions of PLWHA on follow up in Jimma University Specialized hospital in ART clinic, southwest Ethiopia, 2014

Figure-2. Comorbidity conditions of PLWHA on follow up in Jimma University Specialized hospital in ART clinic, southwest Ethiopia, 2014



3.3. Comorbidities and Factors Associated with it among HIV Positive Patients

From candidate variable; age, current CD4 count level, current WHO stage, general health conditions, discontinuation of opportunistic infection prophylaxes, ART treatment duration, having any clinical symptoms of HIV, social domains of quality of life and substance abuse were shown association with having comorbidities in binary logistic regressions analysis. .

In multiple logistic regression model; income, current CD4 count level, discontinuation of opportunistic infection prophylaxes, general health conditions, having any clinical symptoms of HIV and substance abuse behaviors of the respondents have statistically significant association with having comorbidities or co-infections with other diseases. By further elaborations, patients that have current CD4 count < 250 cells/ml were around three times more likely to have comorbidities than their counterparts (AOR = 2.715 [95% CI = 1.461,5.1]). The participants that were present at poor level by their general health conditions were around six times more to have comorbidities (AOR=5.894 [95% CI = 3.172,10.951]). Moreover, the respondents that discontinued the opportunistic infection prophylaxes also 2.5 times more than their complements to face comorbidities or co-infections with other chronic diseases (AOR= 2.578 [95% CI = 1.371,4.845]). In addition, respondents those who had any clinical symptoms of HIV/AIDS were around six times more to develop co-infections or comorbidities than those who haven't any HIV related clinical symptoms (AOR= 6.46 [95% CI= 3.428, 12.175]). Finally, the study participants that have substance abusing behaviors were 5 times extra to have comorbidity conditions with chronic disease than those not have substance abuse habits (AOR= 4.925 [95% CI= 2.629, 9.225]) [table 3].

Table-3. An association of Socio demographic, Clinical and behavioral factors with Comorbidity conditions of PLWHA on follow up in Jimma University Teaching Hospital in ART Clinic, Southwest Ethiopia, 2014 (N= 351)

Independent Variables	Alternatives	Comorbidity conditions		p-values		COR [95% C.I]	AOR [95% C.I]
		Yes	No	COR	AOR		
Age of respondents	≤ 39 years	104	133			1.00	1.00
	≥ 40 years	33	81	.008	.321	0.521(0.323- 0.841)	0.697(0.342-1.421)
Sex of respondents	Male	40	83	.067	.292	0.651(0.411-1.1)	0.71(0.369-1.35)
	Female	97	131			1.00	1.00
Marital Status	Single	59	93			1.00	
	Married	42	57	.569		0.861(0.514-1.441)	
	Divorce	27	42	.965		0.987(0.551-1.768)	
	Widowed	9	22	.307		1.551(0.669-3.597)	
Educational level of respondents	No formal education	28	42			1.00	1.00
	Grade 1-8	54	90	.724	.977	1.111(0.619-1.995)	0.988(0.447-2.184)
	Grade 9-10	47	60	.605	.901	0.851(0.462-1.569)	1.1(0.457-2.434)
	10+, certificate and above	8	22	.206	.692	1.833(0.716-4.693)	1.31(0.347-4.932)
Occupation of respondents	Currently employed	97	150	.887		1.1(0.646-1.656)	
	Currently not employed	40	64			1.00	
Average monthly income	≤ 500ETB	102	151	.173	.614	0.634(.33-1.221)	1.238(.541-2.834)
	501- 1000ETB	20	28	.230	.034	0.6 (.261-1.381)	2.426(1.1-5.491)
	≥ 1001ETB	15	35			1.00	1.00
CD4 count when ART started	< 250 cells/ml	64	109	.441		0.845(0.55-1.298)	
	≥ 250 cells/ml	73	105			1.00	
CD4 count currently	< 250 cells/ml	56	17	.000	.002	2.676 (1.668-4.293)	2.715(1.461-5.1)
	≥ 250 cells/ml	82	196			1.00	1.00

WHO stage at start	Stages I-II	109	177	.459		0.814 (0.471-1.41)	
	Stages III-IV	28	37			1.00	
Current WHO stage of HIV	Stages I-II	96	189			1.00	
	Stages III-IV	41	25	.000		3.229(1.854-5.623)	
General health condition	Good	61	184				1.00
	Poor	76	30	.000	.000	3.1(1.876-4.832)	5.894(3.172-10.951)
Discontinuation of OI prophylaxes	No	110	123	.000	.003	3.1(1.827-4.973)	2.578(1.371-4.845)
	Yes	27	91			1.00	1.00
Compared to last year how they rate your health	Better now than a year	109	164	.520		1.187(0.71-2.0)	
	Worse now than a year	28	50			1.00	
How long they stayed on treatment	< 2 years	38	105			1.00	1.00
	≥ 2 years	99	109	.000	.056	2.51 (1.584-3.976)	1.812(0.984-3.339)
Have any Clinical symptoms for HIV	Yes	113	94	.000	.000	6.1(3.585-10.1)	6.46 (3.428-12.175)
	No	24	120			1.00	1.00
Social domain of quality of life	Low	98	125	.013	.063	1.789(1.129-2.834)	1.801(.969-3.345)
	High	39	89			1.00	1.00
Physical domain of quality of life	Low	49	87	.359		0.813(0.522-1.266)	
	High	88	127			1.00	
Psychological domain	Low	91	147	.657		0.9 (0.571-1.425)	
	High	46	67			1.00	
Substance abusing	Yes	107	100	.000	.000	4.1(2.5-6.61)	4.925(2.629-9.225)
	No	30	114			1.00	1.00
Self-care status	Low	96	139	.32		1.263(0.797-2.1)	
	High	41	75			1.00	
Quality of life of HIV/AIDS patients	Low	5	8			0.928(.598-1.442)	
		2	5	741			
	High	5	8	29	1	1.00	

4. Discussions

This study had investigated the magnitude and predictors of chronic disease comorbidities among people living with HIV/AIDS following antiretroviral therapy Clinic in Jimma University Teaching Hospital, Southwest Ethiopia. Accordingly, from this respondents, 137 (39%) had comorbidities with other chronic diseases. Of this majority of them have tuberculosis 77 (56.2 %) followed by hypertension 26 (19.0%), asthma 21 (15.3%), diabetes 11(8.0 %) and heart diseases 8 (5.8%).

In contrary to this study, the trend analysis study done in USA on 36 298 HIV-infected patients covered by commercial payers, 26 246 covered by Medicaid payers, and 1854 covered by Medicare payers were identified between 2003 and 2013 shown that hypertension (31.4%, 39.3%, and 76.2%, respectively), hyperlipidemia (29.2%, 22.1%, and 49.6%), and endocrine disease (21.8%, 27.2%, and 54.0%) were the most common comorbidities [21](16). Their difference might be related to study type and study population (developed and developing). Because as the life expectancy increase, the chance to have different disease increase. That is the point why this study comorbidity prevalence lowers than that of USA. In addition to that this study is cross-sectional design and that of USA is trend analysis 10 years (starting from 2003-2013).

Similarly the other study done in Nigeria shown that 119 (24.3%) respondents had multiple comorbidities and the identified comorbidities were hypertension: 53 (44.5%), arthritis: 44 (37%) and diabetes mellitus: 9 (7.9%) [22](17). Likewise, the study done in Brent, London, UK were also different with this study findings that about 29% of people living with HIV/AIDS (PLWHA) in Brent have at least one comorbidity [16](18). The difference might be related to socio demographic and socio- economic differences of the study population. Likewise; the other study has shown that diabetes mellitus comorbidity was common in HIV patients [23, 24](19, 20).

The predictor variables such as current CD4 count level, discontinuations of opportunistic infection prophylaxes, general health conditions, having any clinical symptoms for HIV and substance use disorder of the respondents have the statistically significant association with having comorbidities or co-infections with other chronic diseases.

This study finding was agreed also with the review study done that alcohol-related behaviors had a direct association with developing comorbidity [20](21). Similarly, the study done in Nigeria revealed that the age of the patients has a significant association with co-morbidities that as age increase the probability of developing comorbidities were increased [22](17). Moreover, being at age ≥ 40 years, being male in sex and CD4 cell count become ≤ 200cells/IL had statistically significant associations with developing comorbidities [16, 18](18, 22).

Likewise, the other study shown substance use behaviors like alcohol consumptions have a contribution to the development of comorbidity [19, 25](23, 24). CD4 count ≤ 200 cells/mm³, advanced WHO clinical stages and not using prophylaxis for opportunistic infections were found to be predictors for developing comorbidities [20, 26](25, 26).

Moreover, a study done in South Brazilian shown that duration of HIV infection and time on treatment in years were associated with greater comorbidity in HIV-positive persons, which is the same finding with this study 27.

4.1. Strengths and limitations

This study data was collected by their (HIV/AIDS) caregivers, and no discomforts were resulted related to their information secret, which can decrease the social desirability bias and fear of the participants for their security. Since it's done only in one hospital, these findings cannot be generalized to entire populations as the regions. But these findings can be generalized to this Hospital HIV/AIDS patient that not included as a sample. Since the data were collected only by quantitative methods, it doesn't address the information that possible to address only by qualitative methods. Therefore, both qualitative and quantitative methods of data collections should be considered while conduction of investigation of the similar study in the future to come up with best all-inclusive findings.

5. Conclusions

The findings of this study indicated that the magnitudes of comorbidities or co-infections were high among the study participants. Different clinical and behavioral related variables such as current CD4 count level, discontinuations of opportunistic infection prophylaxes, felt general health condition, having any clinical symptoms of HIV and substance abuse behaviors of the respondents have the statistically significant association in this study that these predictor variables lead the patients to the development of comorbidities with other chronic disease.

Abbreviations

JUTH_ Jimma University Teaching Hospital
 HIV_ Human Immune Deficiency Virus
 ART_ Antiretroviral therapy
 AIDS _ Acquired Immunodeficiency Syndrome
 PLWHA _ People Living with HIV/AIDS
 AOR _ Adjusted Odds Ratio
 COR _ Crude Odds Ratio
 CI _ Confidence interval
 WHO _ World Health Organization

Competing Interests

None of the authors have any competing interests.

Consent for Publication

It is not applicable.

Availability of Data and Materials

The datasets that used in this study for analysis and other information are available currently in the hands of the corresponding author and principal investigator. Therefore, they can provide it if requested.

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Authors' contributions

TT is the principal investigator. TT, TB, and AA conceived and designed the study. JD assisted the design of the study. TT and JD analyzed the data and interpreted the results. TT and JD prepared and critically reviewed the manuscript. All authors have read and approved the manuscript.

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