Adherence to Antiretroviral Medications Among People Living With HIV in the Era of COVID-19 in Central Ethiopia and Perceived Impact of the Pandemic

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Abstract

Aim: This study assessed the level of adherence to antiretroviral drugs and the associated factors among clients who have a follow-up at public health facilities in central Ethiopia.

Method: A multi-site cross-sectional study was conducted from August 1–30, 2020 at seven public health institutions. A systematic random sampling method was used to recruit 385 participants. Data was collected using a structured interviewer-administered questionnaire. Analysis was done using descriptive statistics, and binary logistic regression model. The OR with its 95% C.I was employed to present analytic outputs. Statistical significance for the multivariable model was considered at $p \leq 0.05$.

Results: Of the 371 participants, the majority were females (233, 62.8%), attended health centers (215, 58.0%), and were married (173, 46.6%). Eighty-nine (89, 24.0%) of the participants have at least one comorbidity. About 72 (19.0%) and 50 (13.5%) of the respondents stated that the COVID-19 has posed challenges on their follow-ups and availability of medications respectively. Nearly a half of the people living with HIV and comorbid T2DM or hypertension (29, 48.0%) reported that they had encountered an increase in the price of medications compared to the pre-COVID-19 times. About half of the respondents in the study setting have perfect adherence to antiretroviral therapy (ART) (200, 54.0%). Basic education (aOR = 3.02: 95% CI: 1.57–5.80), marriage (aOR = 2.27: 95% CI: 1.24–4.15), attendance to a health center (aOR = 0.59: 95% CI: 0.36–0.98) and sleep disturbance (aOR = 0.47: 95% CI: 0.26–0.84) showed a statistically significant association with adherence to ART.

Conclusion: About half of the respondents in the study settings have perfect adherence to their ART medications. As multiple factors interplay in the success rate of adherence to ART, stakeholders should place and strengthen practices, such as active follow-up and tracing of cases, ensuring medication affordability (access and low pricing), and psycho-social support to patients.

Keywords

Addis Ababa, adherence, antiretroviral therapy, Ethiopia, people living with human immunodeficiency virus

Background

The human immunodeficiency virus (HIV) has remained a public health challenge in Ethiopia with 0.9% prevalence among the adult population.[1] As per the Ethiopian public health institute (EPHI) estimate for 2020, about 745,719 people live with the virus, of which 94.5% were estimated to be adults.[2] With 132,524 total cases, Addis Ababa accounts for the second-highest prevalence of HIV burden (3.4%) next only to Gambella region (4.8%).[1]

Antiretroviral therapy (ART) consisting of at least three classes of drugs is the mainstay of management for people with HIV-1.[3] Poor adherence to a prescribed ART regimen leads to devastating consequences, both, for individual patients and public health.[4] The World Health Organization

(WHO) recommends that patients on ART sustain a high level of adherence in order to achieve viral suppression, improved immunological and clinical outcomes, decrease potential drug resistance, and minimize the risks of transmitting the

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virus.[5] Estimates from a longitudinal cohort[6] showed that patients with 80% to 84% adherence level attained over 80% HIV ribonucleic acid (RNA) suppression (<50% copies/ml) while ≥95% adherence revealed an estimated 85.1% suppression to viral RNA replication.

Studies on adherence to ART medications have been conducted across Ethiopia at different times. Proper adherence rate (≥95%) to ART ranged from 81.2% in 2006[7] to 73.3% reported in 2012,[8] both obtained from patients visiting health facilities in Addis Ababa. Correlates of adherence included having regular follow-up, not being depressed, having no side effects, a regimen that fitted the daily routine, and satisfaction with the relationship with doctors.[7] High figures of overall adherence were reported in Northwest Ethiopia (88.2%).[9] The study also showed that people having no comorbidity were less likely to adhere to their ART. According to a finding in Southern Ethiopia, medication adherence among ART patients visiting a single hospital was 68%.[10] A 2018 study conducted in two health centers of Addis Ababa showed that the adherence rate to ART was about 87%.[11]

A rationale for initiating the present study was the fact that the COVID-19 pandemic might have posed a considerable influence on patients' adherence to chronic care medications and follow-up appointments.[12,13] Its effect on vulnerable populations, such as people living with HIV (PLHIV), becomes highly sensitive as treatment success, in this group, mainly relies on a substantial adherence to ART. This study, therefore, aimed to assess the level of adherence to medication and the associated factors among people on either first or second-line ART medications and who visited public health facilities in Addis Ababa.

Methods

Study Area

The study was conducted in Addis Ababa, Ethiopia. The city headquarters the African Union Commission (AUC), and has a total population over 3.9 million.[14] There are 32 hospitals, 22 health centers providing outpatient and inpatient service in Addis Ababa.[15] Ethiopia follows a three-tier healthcare system (primary, secondary, and tertiary) in which hospitals are expected to deliver services to a catchment population of 1 to 5 million whereas; health centers cover up to 40,000 people.[16] All public and some private health facilities in the country[17] provide ART services to PLHIV. In the present study, seven public health facilities namely; Saint Paul's Hospital Millennium Medical College (SPHMMC), Ras Desta Damtew Memorial Hospital (RDDMH), Arada, Lideta, Nifas Silk Lafto wereda 9, Akaki Kality, and Bulbula health centers providing active ART services were included purposively. The selection of health facilities was informed by the socioeconomic diversity of clients, types of medical

services provided, and potential for the COVID-19 pandemic perceived risk.

Study Design and Duration

A multi-site cross-sectional study was carried out to assess the level of adherence to ART medication, and the perceived impact of COVID-19 pandemic among PLHIV. The study was conducted from 1st to 30th of August 2020.

Study Population

The source population was all PLHIV who already had been initiated with ART at least 6 months earlier to the study period at the selected health facilities in Addis Ababa. On the other hand, PLHIV who were on ART and fulfilled the inclusion criteria were the study population.

Inclusion and Exclusion Criteria

Inclusion criteria were: adult PLHIV and who have started with either first or second-line ART 6 months earlier to the study period, those who had appointments during the study period, either visited the selected health facilities themselves, or those who were approached by health professionals for medication refill. A client would be excluded if he/she were admitted to the inpatient department, has any debilitating psychiatric problem (s), or not consented to take part in the study.

Sample Size and Sampling Method

The sample size was determined based on a recent report on the level of proper adherence to ART (87%) in the study area.[11] The single population proportion formula with its 95% confidence level, a 5% level of error margin, and a design effect of 2 were taken for the estimation. Adding 10% for non-response, the final required sample size was 385. Health facilities were selected purposively for inclusion. The number of required participants per facility was determined using a proportion to size allocation. A systematic random sampling method was applied to recruit the participants. The ART registration logbook was used as a sampling frame. Participants who had appointments during the study period but were unable to attend health facilities, either due to fear of the COVID-19 or the facility's arrangements, were contacted at their residence.

Data Collection Instrument, Quality Control, and Procedures

A validated Amharic version data collection instrument was used for data collection. Data on the sociodemographic, clinical profiles, perception, and adherence level of clients

were collected using a structured interviewer-administered questionnaire. Adherence level to ART medication was assessed using the Morisky Medication Adherence Scale (MMAS).[18] The tool has 8 items with "yes" or "no" responses for questions 1 to 7. These are; forgetting to take medications, days when clients had not taken medications in the past 2 weeks to the interview date, whether clients had stopped taking medications either because they felt worse or well, the experience of missing medications during long travel, the status of medication intake in the past day to the interview date, and clients' feeling of being hassled about taking medications every day. The 8th Likert-scaled item inquires information on how often clients faced difficulties taking all medications.

Specific questions on perceived impacts of the COVID-19 pandemic were also included in the tool (please see variables and working definitions). Five trained data collectors, comprising two general practitioners and three public health officers, were deployed, and pretesting was done before the actual data collection. The reliability of the instrument was checked using the Cronbach's alpha reliability test (Alpha = 0.86). Content validity of the tool in relation to the study objectives was ensured by the study team. The authors followed the steps recommended by Lynn[19] in developing the items for assessing the perceived impacts of COVID-19. Considering inputs from the literature[12,13] and experience, items were first developed by (TS) in the dimensions of follow-up attendance, medication availability, medication pricing, substance use, and social support and its implication in adherence to ART. Next, an evaluation by the remaining team was held to assess the relevance, clarity, meaningfulness, and comprehensiveness of items in the tool. Supervision of the data collection process was also carried out by the study team on a continuous basis. All possible precaution measures, such as consistent use of face masks, hand sanitizers, and adequate spacing during interviews have been implemented to prevent the risk of COVID-19 on, both, the study participants and data collectors.

Variables and Working Definitions

Dependent Variables

Adherence to ART: was defined based on clients' self-reported score of MMAS. A score sum of 16, which is the maximum score computed from all 'yes' positive items and 'no' labels of negative items, was considered as 'perfect adherence'. A score summation of 15 points or below was assumed poor.

Perceived impact of the COVID-19 pandemic: were assessed using three specific questions, namely; "do you believe that COVID-19 has negatively affected meeting your follow-up appointments? (yes/no), do you think that the COVID-19 has influenced availability of your chronic care medications? (yes/no), and do you perceive that the COVID-19 has reduced the affordability/increased the price of anti-diabetic or anti-hypertensive medications? (yes/no)".

Independent Variables

Sociodemographic variables: included age (a continuous measure), sex (male or female), marital status (married, unmarried, separated, divorced, widowed) income level (continuous measure), number of families in the household (alone, two, three or more), and occupation (merchant, government employee, private employee, student, housewife, jobless).

Current history of substance use: was defined as a patient reporting to have used either one or any combination of alcohol, Khat, or cigarettes in the past 3 months (yes/no).

The presence of social support: was computed from the following Likert scale items, namely; "how money people are you so close to that you can count on them if you have a great personal problem? (None to 5 or more), how much interest and concern do people show in what you do? (None to a lot), and how easy is it to get practical help from others if you should need it? (very difficult to very easy)". The score was dichotomized as yes (at or above the mean) and no (below the mean).

Education level: was classified as no formal education, basic, and tertiary education. By no formal education, we meant people acquired the knowledge to do so through their own effort, religious or a community based adolescent informal education, but have not been enrolled in any modern education schools. Basic education refers to a person to have completed either primary (grades 1–8) or secondary (grades 9–12) education levels. Tertiary, also, refers to either a college or university level education a participant has achieved.

Other variables included: type of health facility (health center, hospital); clinical variables: presence of sleep disturbance problem (a self-reported patient experience as either yes or no), presence of comorbid condition (yes, no), time since HIV diagnosis (continuous measure), and duration on ART medication (continuous measure). The selection and inclusion of these variables was informed by literature,[7-13,20,21] prior knowledge, and the socioeconomic context of the study area.

Ethical Consideration

Ethical approval for conducting this study was sought from Saint Paul's Hospital Millennium Medical College institutional review board (Ref. No. PM23/15) and Addis Ababa regional health bureau (AARHB) (Ref. No. AAHB/329/227). A support letter was also obtained from both institutions and written to the respective study sites. Informed written consent was obtained from all participants. Participation in the study was, fully, on a voluntary basis. Confidentiality of the data collected was maintained during and after the study period.

Table 1. Profiles of ART Clients Visiting Public Health Facilities in Addis Ababa, Ethiopia.

Characteristics	Category	Frequency	Percent
Sex			
	Male	138	37.2
	Female	233	62.8
Health facility level			
	Health center	215	58.0
	Hospital	156	42.0
Education			
	No formal education	87	23.5
	Basic education	225	60.6
	Tertiary education	59	15.9
Occupation			
	Merchant	17	4.6
	Government employee	52	14.0
	Private employee	134	36.1
	Student	17	4.6
	Housewife	48	12.9
	Jobless	71	19.1
	Other	32	8.6
Marital status			
	Unmarried	89	24.0
	Married	173	46.6
	Separated	26	7.0
	Divorced	33	8.9
	Widowed	50	13.5
Number of families			
	Alone	59	15.9
	Two	49	13.2
	Three or more	263	70.9
Presence of sleep disturbance			
	Yes	78	21.0
	No	293	79.0
Current history of any substance use[a]			
	No	343	92.5
	Yes	28	7.5
Presence of social support			
	No	144	38.8
	Yes	227	61.2

[a]Includes either of alcohol, khat, tobacco or any combination consumed in the past 3 months.

No personal identifiers were included in the instrument, and analysis was done in aggregate.

Data Analysis

The data were cleaned and coded manually before entry into the statistical package for social sciences (SPSS) (Armonk, NY, IBM corp.) for analysis. Re-coding and transformation of all items have been done to obtain values for the final outcome variable (where 'yes' for positive and 'no' for negative items was coded as '2' while the reverse was assigned a code of '1'). Descriptive statistics using frequency, percentages, mean and median were used to present
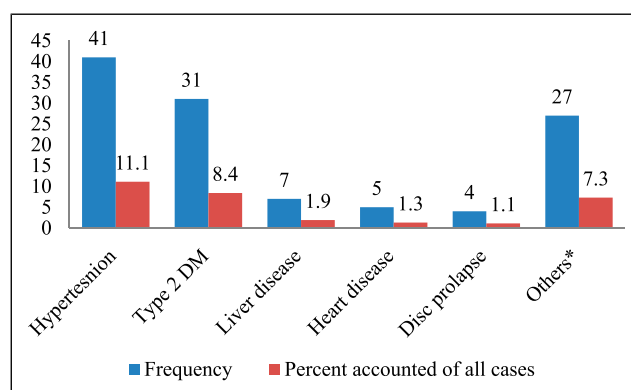
Figure 1. Comorbidities reported by ART clients at public health facilities in Addis Ababa, Ethiopia. *Include chronic asthma, epilepsy, gout, hypercholesterolemia, thyroid disorder, cataract, clotting disorder, nerve dysfunction and insomnia accounted by less than 1% of all cases.

data in tables and figures. Adherence level was dichotomized as perfect and poor based on the aggregated MMAS scores. Bivariate and multivariable logistic regressions were used to test potential factors associated with the outcome variable. A 95% level of confidence with $p \leq 0.2$ for the crude and $p \leq 0.05$ for the adjusted analyses were used. The model coefficient's significance ($X^2(18) = 51.6$, $p \leq 0.0001$) suggested that the fitted model revealed a significant improvement over the null model whereas, the Hosmer and Lemeshow statistics also revealed the model to adequately fitting the data ($X^2(8) = 8.94$, $p = 0.348$). About 17.4% of the variance in adherence to ART was explained by the independent variables considered (Nagelkerke $R^2 = 0.174$).

Results

Profile of Respondents

Of the total 385 eligible participants considered, 371 (96.4%) supplied a complete response which, then, was included in the analysis. The mean age was 43.2 (±12.4) ranging from 16 to 77 years. The majority were females (233, 62.8%), visiting health centers (215, 58.0%), attended either primary or secondary education (225, 60.6%), private employees (134, 36.1%), married (173, 46.6%), have three or more families in the household (263, 70.9%), have no sleep disturbance problem (293, 79.0%), have no current history of any substance use (343, 92.5%), have a social support (227, 61.2%) (Table 1). The mean duration of disease was 9.2 (± 5.7) ranging from 1 to 30 years. The mean duration clients were on ART was 8 (± 4.5) ranging from 1 to 25 years. Average monthly income of the respondents ranged from 0 to 1400USD with a median of 51 and mean of 72 (± 100) based on the average currency exchange rate in August 2020.

Table 2. Perceived Impacts of the COVID-19 Pandemic Among ART Clients at Public Health Facilities in Addis Ababa, Ethiopia.

Questions	Yes (%)	No (%)
Do you believe that COVID-19 has negatively affected meeting your follow-up appointments? (n = 371)	72 (19.0)	299 (81.0)
Do you think that the COVID-19 has influenced availability of your chronic care medications? (n = 371)	50 (13.5)	321(86.5)
Do you perceive that the COVID-19 has reduced the affordability/increased the price of anti-diabetic or anti-hypertensive medications? (n = 60)	29 (48.0)	31(52.0)

Common Comorbidities

Overall, 89 (24.0%) of the clients have at least one co-morbidity while the rest 282 (76.0%) do not have any. Hypertension and T2DM accounted for the top comorbidities with an overall magnitude of 41(11.1%) and 31(8.4%) respectively (Figure 1). Others included chronic asthma, epilepsy, gout, hypercholesterolemia, thyroid disorder, cataract, clotting disorder, nerve dysfunction, and insomnia accounted for less than 1.0% of all cases.

Perceived Influence of the COVID-19 Pandemic

Seventy-two (19.0%) of them witnessed that the pandemic has negatively affected their follow-up appointments. Similarly, 50 (13.5%) of the respondents believed that it has influenced the availability of medications for their chronic non-communicable illnesses. Among the participants with comorbid T2DM or hypertension (n = 60), 29 (48.0%) stated that they had encountered an increase in the price of medications compared to the pre-COVID-19 times (Table 2).

Adherence to ART

Only 200 (54%) of the respondents were found to have "perfect adherence" as defined by this study (perfect score of 16 on the MMAS).

Factors Associated With Adherence

A bivariate and multivariable binomial logistic regression was performed to identify potential association of education level, facility type, marital status, number of families in the household, disease and ART duration, comorbid status, and presence of sleep disturbance with the likelihood of perfect adherence to ART. Respondents with basic education had increased odds of 3 to have perfect adherence to their ART medication compared to those with tertiary education (aOR = 3.02: 95% CI: 1.57–5.80). Married people had increased odds of 2.3 a perfect adherence compared to the unmarried group (aOR = 2.27: 95% CI: 1.24–4.15). Participants attending health centers (aOR = 0.59:95% C.I: 0.36–0.98) had reduced odds of perfect adherence compared to those visiting hospitals. Likely, the patients with sleep disturbance problems (aOR = 0.47: 95% CI: 0.26–0.84) experienced a poor level of adherence to ART compared to those with no sleep disturbance problem (Table 3).

Discussion

The effect of COVID-19 on clients with chronic illnesses is multidimensional.[22,23] One such peculiar inquiry a reader might also ask would be the degree and specific circle of influence the pandemic has caused. Notably, the negative correlation of clients' adherence to treatment protocols and a daily surge of COVID-19 related cases and deaths accounted for a significant implication,[24,25] especially among people living with HIV/AIDS.[26] Even though measuring the direct impact of the pandemic on clients' adherence to their ART medications is not within the main scope of this study, a perceived belief of respondents on its potential influence has also been assessed in the interim. Accordingly, 72 (19.0%) of the respondents believed that the pandemic had affected their follow-up appointments. This figure, however, may reflect the apparent negative implication it posed on clients' follow-up, and may not reveal the actual instances of missed follow-up schedules. There has been an encouraging effort undertaken by the city government health bureau to arrange community-based services for selected ART clients. Most of the ART clients from health centers were contacted at their homes based on their refill dates. Lost to follow-up and cases with known predisposing risk factors were contacted on a regular basis, and this was intensified during this outbreak.

Yet, poor availability of medications profoundly militate efforts to achieve high adherence to ART. In this study, 50 (13.5%) of the clients reported that the COVID-19 pandemic has influenced the availability of medications to their chronic illnesses. This is in agreement with a report (13%) from South Africa.[27] Though medications are provided free of charge, the availability of ART medications in low-income settings can also be affected due to extra costs, such as registration, laboratory, and transportation.[28] A mathematical model-based projection for Sub-Saharan Africa showed that 6-months of COVID-19 related disruption of ART supply would lead to a 63% increase (ranging from 39% to 87% increase) in HIV-related deaths compared to non-disruptions over a one-year period.[29]

It is worthwhile to assess the situation among a specific group with comorbid conditions, in particular, with T2DM and hypertension. Nearly a quarter of the respondents have reported having any chronic comorbidity along with HIV in

Table 3. Factors Associated With Perfect Adherence to ART Medication Among Clients at Public Health Facilities in Addis Ababa, Ethiopia.

Characteristics	Unit	Adherence status		p-value	COR (95% C.I)	AOR (95% C.I)
		Poor n(%)	Perfect n(%)			
Education						
	No formal education	51 (29.8)	36(18.0)	0.251	1.03(0.53–2.02)	1.57(0.73–3.40)
	Basic education	85 (49.7)	140 (70.0)	0.01	2.40 (1.34–4.31)	3.02 (1.57–5.80)[a]
	Tertiary education	35 (20.5)	24 (12.0)		1	1
Level of facility						
	Health center	113 (66.1)	102 (51.0)	0.40	0.53 (0.35–0.81)	0.59 (0.36–0.98)[a]
	Hospital	58 (33.9)	98 (49.0)		1	1
Marital status						
	Unmarried	47 (27.5)	42 (21.0)		1	1
	Married	66 (38.6)	107 (53.5)	0.008	1.84 (1.08–3.04)	2.27 (1.24–4.15)[a]
	Separated	16 (9.4)	10 (5.0)	0.427	0.70 (0.29–1.71)	0.68 (0.26–1.77)
	Divorced	17 (9.9)	16 (8.0)	0.361	1.05 (0.47–2.34)	1.51 (0.63–3.63)
	Widowed	25 (14.6)	25 (12.5)	0.625	1.12 (0.56–2.24)	1.21 (0.56–2.60)
Number of family						
	Alone	33 (19.3)	26 (13.0)	0.821	0.58 (0.33–1.02)	0.93 (0.47–1.81)
	Two	27 (15.8)	22 (11.0)	0.560	0.60 (0.32–1.10)	0.81 (0.40–1.63)
	Three or more	111 (64.9)	152 (76.0)		1	1
Years since first diagnosis	Mean (SD)=9.2 (5.7)	N.A	N.A	0.294	1.1 (1.02–1.10)	1.04 (0.96–1.13)
Years since ART initiation	Mean (SD)=8.0 (4.5)	N.A	N.A	0.775	1.1 (1.02–1.12)	1.01 (0.92–1.12)
Comorbidity						
	No	124 (72.5)	158 (79.0)	0.079	1.43 (0.88–2.30)	1.65 (0.94–2.89)
	Yes	47 (27.5)	42 (21.0)		1	1
Sleep disturbance						
	Yes	48 (28.1)	30 (15.0)	0.01	0.45 (0.27–0.75)	0.47 (0.26–0.84)[a]
	No	123 (71.9)	170 (85.0)		1	1

[a]indicates statistically significant association.

which hypertension and T2DM accounted for the top two comorbidities in the sample. Studies suggested that PLHIV and other chronic illnesses suffer from a multitude of problems, such as multi-morbidity-related complications,[30] impaired quality of life,[31] and increased costs.[32] Close to a half of the respondents with comorbid T2DM or hypertension (29, 48%) also stated that COVID-19 caused either an unaffordable or increased price. Whilst the scope was limited to challenges linked with medications for chronic illness, the number would have gotten higher had the present study considered medicines for opportunistic infections (OIs) and other chronic care medications. Given that ART medication is provided free of charge to all clients in Ethiopia, the subgroup with additional health conditions would face intricate challenges, particularly during the pandemic, which might worsen the risks of poor adherence among people on ART.

The level of perfect adherence to ART among clients in the current study area is considerably low. The figure obtained (200, 54.0%) is significantly lower compared to earlier reports across the country.[7-11] The observed variation could be attributed to some reasons. One plausible source of variation could be ascribed to the methods of assessing adherence and degree of flexibility, such as accepting to miss 1 or 2 items in the measurement scale[10] among the local studies.

Nonetheless, even a lower figure (49%) has been reported in the Northeast part of the country by considering a mean score classification of the same scale.[33] Perhaps, a more conservative self-reported indirect measurement, adopted from Morskiy,[18] was used in this study to help reveal the actual level of adherence at least in the short term. The application of such an "all or none" approach may, therefore, pose an extensive stringency which is an integral recommendation of adherence to ART (that patients should have at least 95% level of adherence to their ART medication in a month to achieve a maximal viral suppression (undetectable viral RNA in at least 85% of the cases))[6,34] unlike other studies that classified MMAS scores differently.[35,36] The last plausible explanation of differences could be the era of COVID-19. People on ART are among the population faced with a high degree of psychosocial distress,[37,38] coupled with economic and clinical service disruptions.[27] The fact that the majority of the clients (134, 36.1%) were private employees has an indisputable link with lockdowns and social distancing rules. In addition, an increased fear especially among the elderly, a doubled transportation costs in the first 6 months of the pandemic, and poor screening practices of suspected cases in the health facilities might have led to the poor adherence to ART during this time.

Various predictors may correlate with adherence to ART medications. Respondents with primary or secondary education and married people had increased odds of perfect adherence compared to their counterparts in the present study. On the contrary, participants attending health centers and those with sleep disturbance problems experienced poor adherence to ART medications. Though it is apparent that literacy and education affect ART adherence favorably,[39,40] there were no significant difference between those with no education and tertiary education attended clients in this population, but higher odds of perfect adherence was noted in the group with basic education. In fact, it is reported elsewhere[41] that HIV/AIDS-related education might be a rather important predictor. Married people might have an extra prospect to recall medication intake and appointment times, share knowledge or experiences, and gain resilience from economic as well as psychosocial disorders following both HIV/AIDS and the COVID-19. Sleep disturbance may be related to depression which is also common among people with HIV[42,43] which the latter has a negative correlation with an optimal adherence.[44,45] Similarly, the negative association of a health center's service with perfect adherence might be attributed to fear of stigma in nearby health facilities, as well as unavailability of COVID-19 screening and management services at such settings.

Limitation of the Study

A fundamental limitation to this study could be the temporality of relationships between outcome and independent variables. The observed effect size might not, therefore, support the actual relationship in the real-world. The fact that adherence was measured as "all or none" to the MMAS items could potentially underestimate the level of actual adherence, hence also affecting comparisons with other reports. Nonetheless, it could be rational to expect patients' adherence to ART at or beyond 95% to achieve the desired level of viral suppression, immunologic, and clinical outcomes. Validation of some items in the instrument was merely based on a face-value, and not supported by a statistical quantification which, in turn, might affect the scope of generalizability.

Conclusion

Overall, this study suggests that only about half of the respondents have perfect adherence and among those with chronic diseases, nearly half faced increases in medication costs. As adherence to any medication is important and, to ART is much more important, this study has presented a timely update on the status of this relevant question during the difficult time. A particular attention should be given to increase adherence among ART clients, especially at the health center level. This could be done by ensuring the availability of medications at all times and presenting a safe health care facility that will attract clients for routine adherence interventions. Efforts on the use of alternative methods, such as active follow-up and psychosocial support might also assist to strengthen adherence and reduce fear, particularly, of the COVID-19. Studies with prospective designs and qualitative approaches are recommended to explore extra challenges to ART adherence, and the actual impacts of the pandemic on this population.

Abbreviations

AARHB, Addis Ababa Regional Health Bureau; AIDS, Acquired Immune Deficiency Syndrome; ART, Antiretroviral Therapy; COVID-19, Coronavirus Disease-2019; HIV, Human Immune Deficiency Virus; MMAS, Morskiy Medication Adherence Scale; OIs, Opportunistic Infections; OR, Odds Ratio; PLHIV, People Living with HIV; RDDMH, Ras Desta Damtew Memorial Hospital; RNA, Ribonucleic Acid; SPHMMC, Saint Paul's Hospital Millennium Medical College; T2DM, Type 2 Diabetes Mellitus; WHO, World Health Organization.

Data Availability

Findings of this study were generated from the data collected and analyzed on the basis of stated methods and materials. Hence, all data were already available in the manuscript.

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