



BMJ Open Experience of fatigue and associated factors among adult people living with HIV attending ART clinic: a hospital-based cross-sectional study in Ethiopia

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To cite: Baye M, Fisseha B, Bayisa M, *et al.* Experience of fatigue and associated factors among adult people living with HIV attending ART clinic: a hospital-based cross-sectional study in Ethiopia. *BMJ Open* 2020;**10**:e042029. doi:10.1136/bmjopen-2020-042029

► Prepublication history and additional material for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2020-042029>).

Received 23 June 2020
Revised 22 August 2020
Accepted 24 August 2020



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ABSTRACT

Objective This study aimed to determine the prevalence of fatigue and the factors associated among adult people living with HIV attending antiretroviral therapy clinic in Gondar town, Ethiopia.

Design Cross-sectional.

Setting Governmental health facility that provides HIV care in Gondar town.

Outcome measure Fatigue is defined by nine items version Fatigue Severity Scale.

Participants Adult (aged 18 and above) people living with HIV in Gondar town (n=392).

Result A total of 408 HIV seropositive adults were approached for consent, among which 392 participants consented to participate in this study, with a response rate of 96.1%. The mean age of the participants was 40.5±8.5 years. The prevalence of HIV-related fatigue was 53.3% and about 66% of women living with HIV experienced fatigue. The factors associated with fatigue experience were; female gender (adjusted OR (AOR): 2.61, 95% CI 1.01 to 5.3), being married (AOR: 0.18, 95% CI 0.10 to 0.9), low income (AOR: 7.1, 95% CI 4.6 to 22.15), unemployed (AOR: 2.79, 95% CI 1.19 to 9.84), parity (AOR: 4.87, 95% CI 2.18 to 17.9), being anaemic (AOR: 12.45, 95% CI 5.6 to 41.01), depression (AOR: 4.51, 95% CI 1.91 to 11.20), mild weight loss (AOR: 4.2 95% CI 2.56 to 13.9) and moderate weight loss (AOR: 5.1, 95% CI 1.85 to 16.12), respectively.

Conclusion The findings of this study revealed that experiencing fatigue is quite common among adult people living with HIV. It is important for the healthcare professionals and people living with HIV to understand; the possible causes of fatigue, remedies and ways to reclaim energy. The predisposing factors and complications that cause fatigue should be aggressively diagnosed and treated by the clinicians. Further qualitative studies exploring the reasons for experiencing HIV-related fatigue might help designing interventions.

INTRODUCTION

Globally by the end of 2018, about 37.9 million people were reported to live with HIV and the highest-burden of it is carried by sub-Saharan Africa (SSA) with an estimated 71% of the global tally.¹ SSA remains a hotspot of the pandemic and nearly one in every 25

Strengths and limitations of this study

- The cross-sectional nature of this study is not sufficient to infer the causality of HIV-related fatigue.
- The wider CI for the OR of some variables suggests replication of the study using a larger sample size.
- The strengths of this study are: this study has provided a well-powered insight into the prevalence of fatigue and factors associated among the people living with HIV using a representative sample of the clinical population and a valid outcome tool. This should enhance the external validity of the findings.

adults living (3.9%) with HIV. A 2018 report estimated that 722 248 Ethiopian adults live with HIV and the distribution is skewed with the high cluster in the urban areas. Further, the prevalence of HIV in urban areas of the Amhara regional state was 4% in 2017 and the study area (North Gondar Zone) is a hotspot cluster and also mapped as a geospatial prioritised zone. The HIV/AIDS Prevention and Control Office of Ethiopia in 2019 reported that the reduction in HIV-related mortality and morbidity is being challenged due to complacency.²⁻⁵

Fatigue is a perceived phenomenon and often self-reported, which is defined as a subjective sensation of weariness, increased sense of effort, effort-performance mismatch or exhaustion.⁶ 'Fatigue does not kill but it is a common, very disabling and debilitating symptom'.^{7,8} Fatigue is one of the common disabling symptoms among many chronic diseases including HIV infection.^{9,10} Highly active antiretroviral therapy (HAART) introduction has faded the HIV-related mortality.^{11,12} Nonetheless, the chronicity of HIV infection post-HAART era and side effects has imposed an additional burden of HIV-related symptoms. Several studies report an estimated prevalence of fatigue ranging

from 33% to 88%^{8 13–15} and the fatigue is the highest reported among the other entire HIV-related and ART-related symptoms in HIV positive patients.¹⁶

A previous study from a different region in Ethiopia reported the prevalence of fatigue among adults living with HIV to be 51.7%.¹⁷ The prevalence of fatigue among patients with HIV and predictors vary widely across countries and regions in the country. Several studies have reported that fatigue can negatively impact the patient's activities of daily living, quality of life, sociability, job desire, productivity, level of physical activity, psychological well-being, health-seeking behaviour and adherence to the HAART regimen.^{15 16 18–21} The cause of fatigue among people living with HIV is probably multifactorial. Most of the studies focused on the physiological and/or psychological factors.^{20 22 23} Further, evidence suggests that+ fatigue is associated with age, gender, malnutrition, insomnia, unemployment, poor income, family burden, depression, social support system, several disease-related factors such as the stage of the disease, anaemia, the use of ART and certain laboratory parameters, as well as with the sociodemographic and psychological factors.^{8 9 13 14}

The attention in HIV care is now shifting towards symptom control and improving the quality of life of HIV infected patients elsewhere.²⁴ SSA is the hotspot of the HIV/AIDS pandemic and a large number of people living with HIV reside in Ethiopia.^{25 26} Yet, there is a dearth of research in Ethiopia focusing on HIV-related fatigue as a primary outcome of interest and the study area is a challenging geographical terrain where fatigue can be very disabling. The objective of this study was to determine the prevalence of fatigue defined by the Fatigue Severity Scale (FSS) and the factors associated among adults living with HIV attending ART at the public health facility of Gondar city, Amhara, Northwest Ethiopia.

METHODS

Study design, setting and population

An institutional-based cross-sectional design study was conducted from March to May 2019 at the ART clinic, University of Gondar Specialized Comprehensive Hospital (UOGSCH). The hospital is found in Gondar town at 748 km far from Addis Ababa, a capital city of Ethiopia, to the northwest, at an altitude of 2706 m above sea level. UOGSCH is a 550 bedded multidisciplinary specialised governmental teaching hospital. Presently, it provides healthcare services to more than 5 million urban and rural inhabitants in its catchment area.^{19 20} The HIV care unit and ART clinic started in 2003. As of 2018, this institution has served about 11 277 people living with HIV, on average 90–130 patients every working day. This hospital provides cost-free HIV testing, CD4 count monitoring regularly, medical consultations, counselling and ART medications. Each participant signed the written consent before participation. Adult HIV seropositive outpatients diagnosed by the infectious disease physicians and registered in ART clinic, both genders aged 18 and above,

lived in the sampled region for 6 months, conscious and able to speak Amharic (local language) and attending UOGSCH ART clinic were eligible for inclusion. Pregnant women, individuals with cognitive impairment and hospitalised HIV-positive patients were excluded from participation. During the sample enrolment interval (1 March 2019 to 31 May 2019), 3526 HIV-seropositive individuals registered in the ART (ART) clinic, UOGSCH.

Patient and public involvement

This study was conducted without patient or public involvement.

Sampling and data collection

The sample required for this study was estimated using a single population proportion formula.²⁷ Since there were no similar regional studies, the following assumptions were made: 50% proportion, with a 95% CI ($Z_{\alpha/2}=1.96$), and a marginal error of 5%. Since the population is <10 000 (finite population) a correction formula was used.

$$N = \left(\frac{Z_{\alpha}}{2} \right)^2 \times p P(1 - P) / d^2$$

The derived power calculated sample was n=371. Accordingly, the final sample size with added 10% contingency was found to be 408. From the registered list of people living with HIV attending the HIV care/ART clinic each day during the study period, Kth patient was selected and the 1st participant between 1 and Kth was randomly selected, then taking every Kth number thereafter. Data were collected by two trained physiotherapists who were randomly recruited from the registered list of data collectors and were paid per diem. Interview method, measurements and a structured questionnaire were used for data collection. Sociodemographic and clinical information (comorbid, duration of illness, stage, CD4 count, viral loads, prophylaxis history, haematological values) were extracted from the patients' medical records, ART logbook and follow-up cards. FSS for measuring fatigue, Patient's Questionnaire-9 for measuring depression and Insomnia Severity Scale were also used.

Variable definitions

Fatigue is defined using the 9-item FSS.²⁸ Each item in FSS is scored on a 7-point Likert scale ranging from 1 ('strongly disagree') to 7 (strongly agree) on how much fatigue affects the activities and lifestyle of a person.^{29 30} The minimum score is '1' and the maximum score is '63', another way of scoring is by calculating the mean of all the scores with '1' and '7' being the minimum and maximum scores, respectively. A cut-off score of 4 or more was considered indicative of problematic fatigue.²⁹ A patient was considered physically active if the participant reported activity ≥ 150 min per week.³¹ The Patient Health Questionnaire-9 (PHQ-9) was used to measure the depression level (case cut-off ≥ 5) of the participants.³² A participant who scored > 7 on the Insomnia Severity Scale was defined as an insomnia case. Anaemia was defined according to

WHO criteria. For men, anaemia was defined as haemoglobin concentration (Hb) less than 13 g/dL, while for women; the cut-off is less than 12 g/dL.³³ Adults living with HIV suffering profound weight loss or wasting were recognised using a set of rules/criteria developed by the expert physicians in the HIV care clinic, UOGSCH and investigators of this study (online supplemental file 1). The criteria to define weight loss included (1) previously diagnosed conditions related to weight loss (six conditions), (2) intake of medications prescribed for weight gain (nine medications), (3) prescribed nutritional therapy or high calorie supplements. Categorisation of the HIV associated weight loss was based on; presence of one of the criteria in the past year as mild weight loss, two criteria in the past year as moderate criteria and more than two criteria in the past year as severe weight loss.

Statistics

Data were coded and entered into EPI Info V.7.0 and exported to IBM Statistical Package for Social Sciences (SPSS) V.24 for Windows. The representativeness of the study sample to the research setting population during the study period was examined using formulas proposed by Cochrane to calculate the normal approximation frequency.³⁴ Sample characteristics were described with the frequency, mean and χ^2 /t-test. Collinearity diagnostics were performed for each of the variables in the full model. All variance inflation factors were <10, and the condition inflation factors were <30, indicating that multicollinearity was not a problem for this model. With fatigue (categorised: yes vs no) as the dependent variable, univariate and multivariable logistic regression analyses (backward stepwise) were carried out to examine the association with different independent variables. Variables were entered into the model using forced entry and categories were used as covariates for detailed analyses. Model fit was assessed by the Hosmer and Lemeshow's goodness of fit test³⁵ and results were considered statistically significant when 95% CIs not containing unity (equal to p value <0.05). χ^2 test or Fisher's exact test was used to determine the prevalence distribution of fatigue and estimate its association with different predictor variables. Predictor variables that were found to be associated with HIV-related fatigue (categorised; yes or no) in univariate model were gender, marital status, income, educational status, occupation, having children, anaemia, weight loss, total duration since HIV confirmed, comorbid condition (hypertension, diabetes mellitus, respiratory conditions, cardiac conditions, arthritis), WHO classification clinical stage of HIV/AIDS and CD4 counts and the same were included in the multivariable analysis. Interaction terms were used to examine the potential association between predictor variables and fatigue. When a clear sub-group seemed present in the data set, significance testing (Pearson χ^2) and, if appropriately sized subgroups per category remained, the same was exported to the logistic model. This study is reported as per the Strengthening

the Reporting of Observational Studies in Epidemiology reporting guidelines (online supplemental file 2).

RESULTS

Sociodemographic characteristics

A total of 408 HIV positive adults were approached for consent, among which 392 participants consented to participate in this study, with a response rate of 96.1% and this is more than 100% of the power calculated sample size (n=371). Those 16 patients who did not consent or agree to participate in the study reasoned lack of interest and time constrain.

The mean age of the participants was 40.5 (\pm 8.5) years and majority of the participants 259 (66.1%) were women. Only 7.9% of them reported to be from rural, majority of the participants were underweight (52.8%), above one-fourth did not have formal education. About 47% reported to be jobless and 43% answered to have a low income (<1500 Ethiopian birr). The majority of the participants 77.3% reported a lack of family support. Most of the subjects (94.1% and 86.9%) self-reported no previous or current smoking and alcohol habits, respectively (table 1).

Clinical characteristics

Among the total participants, 94.6% were on ART during the study period. About 40% of the participants had been diagnosed with HIV infection for >60 months as of May 2019. The recent CD4 cell count of 251 (n=251, 64%) participants was below 350 cell/mm³, and about 3/4th of the participants were diagnosed to be in clinical stage I and II. Majority of the participants (93%) were diagnosed with weight loss, nearly half of them (48.7%) had anaemia, and only 4.6% and 9.4% had been diagnosed to have diabetes mellitus and hypertension, respectively. According to the PHQ-9 score of depression, about 3/4th of the people living with HIV were found suffering from depression, of those, almost half of them had severe depression. About one in four reported to suffer insomnia 23.2% and 29.8% were physically active (table 2).

Fatigue among people living with HIV and distribution

Among 392 participants, 209 (n=209, 53.3%; 95% CI 48.5 to 58.5) reported to have the experience of fatigue. A statistically significant difference was observed in the prevalence of fatigue between the genders (men 27.1 vs women 66.8%; χ^2 (1, n=392)=55.7, p<0.0001, phi=0.37). The majority of widowed participants reported fatigue 78.3% followed by married 55% and single 48%. The experience of fatigue was higher among anaemic participants 180 (94.2%), unemployed 157 (84.4%) and those who reported a low income 147 (86.5%). Depression was significantly associated with the experience of fatigue (depression 72.1% vs no depression 27.9%; χ^2 (1, n=392)=144.8, p<0.0001, phi=0.61). The frequency distribution of fatigue symptoms for the 9-item FSS reported by the respondents was almost even and the majority of

**Table 1** Sociodemographic characteristics of people living with HIV/AIDS attending antiretroviral therapy clinic, in the University of Gondar Hospital, University of Gondar, Northwest Ethiopia, 2019 (n=392)

Variables	Sample total n (%)	Fatigue n (%)		χ^2	P value
		Yes	No		
Sex					
Female	259 (66.1)	173 (66.8)	86 (33.2)	55.7	0.000
Male	133 (33.9)	36 (27.1)	97 (72.9)		
Age group (years)					
<25	16 (4.1)	04 (25)	12 (75)	5.7	0.06
25–44	255 (65.1)	141 (55.3)	114 (44.7)		
≥45	121 (30.9)	64 (52.9)	57 (47.1)		
Religion					
Orthodox	310 (79.1)	164 (52.9)	146 (47.1)	0.19	0.91
Muslim	48 (12.2)	18 (52.8)	16 (47.2)		
Protestant	34 (8.7)	27 (56.2)	21 (43.8)		
Marital status					
Single	91 (23.2)	44 (48.4)	47 (51.6)	18.3	0.04
Married	203 (51.8)	112 (55.2)	91 (44.8)		
Divorced	75 (19.1)	35 (46.7)	40 (53.3)		
Widowed	23 (5.9)	18 (78.3)	05 (21.7)		
Level of education					
No formal schooling	114 (29.1)	68 (59.6)	46 (40.4)	7.1	0.044
Grade 1–6	82 (20.9)	38 (46.3)	44 (53.7)		
Grade 7–8	53 (13.5)	30 (56.6)	23 (43.4)		
Grade 9–10	53 (13.5)	32 (60.4)	21 (39.6)		
Grade 11–12	44 (11.2)	19 (43.2)	25 (56.8)		
Diploma and above	46 (11.7)	22 (47.8)	24 (52.2)		
Residence					
Urban	361 (92.1)	197 (54.6)	164 (45.4)	2.88	0.81
Rural	31 (7.9)	12 (38.7)	19 (61.3)		
BMI (kg/m²)					
Underweight (<18.5)	207 (52.8)	26 (12.6)	181 (87.4)	292.1	0.000
Normal weight (18.5–24.9)	172 (43.9)	170 (98.8)	02 (1.2)		
Overweight (25–29.9)	10 (2.6)	09 (90)	01 (10)		
Obese (>29.9)	03 (0.7)	02 (66.7)	01 (33.3)		
Employment status					
Unemployed	186 (47.4)	157 (84.4)	29 (15.6)	137.4	0.000
Employed	206 (52.6)	52 (25.2)	154 (74.8)		
Income/wealth index					
Low income	170 (43.4)	147 (86.5)	23 (13.5)	202.5	0.000
Medium income	91 (23.2)	56 (61.5)	35 (38.5)		
High income	131 (33.4)	06 (4.6)	125 (95.4)		
Having children					
Yes	243 (62.0)	182 (74.9)	61 (25.1)	119.6	0.000
No	149 (38.0)	27 (18.1)	122 (81.9)		
Family support					
Yes	89 (22.7)	38 (42.7)	51 (57.3)	4.3	0.91

Continued

Table 1 Continued

Variables	Sample total n (%)	Fatigue n (%)		χ^2	P value
		Yes	No		
No	303 (77.3)	171 (56.4)	132 (43.6)		
Smoking					
Current smokers	16 (4.1)	11 (68.7)	5 (31.3)	7.8	0.2
Previous smoker	07 (1.8)	4 (57.1)	3 (42.9)		
Never smoked	369 (94.1)	194 (52.6)	175 (47.4)		
Alcohol					
Never	341 (86.9)	175 (51.3)	166 (48.7)	5.4	0.34
Current	46 (11.8)	31 (67.4)	15 (32.6)		
Past	05 (1.3)	03 (60)	02 (40)		

BMI, body mass index.

them reported that ‘exercise brings on my fatigue’ 57.4% (225/392), and ‘I am easily fatigued’ 55.9% (219/392) (see figure 1).

Regression analysis

Prior to analysis, 14 variables that are potentially related to the experience of fatigue were identified for regression analysis: gender, age, marital status, education level, employment status, income index, parity, duration of HIV, HIV/AIDS clinical-stage, weight loss, anaemia, comorbid conditions, depression and physical activity. Of those, age, duration of HIV and physical activity were found not significantly associated in univariate analyses. The remaining 11 variables independently contributed to the regression model as predictors or confounders and entered into the multivariable model. In multivariable analyses when adjusted for other independent variables; gender, marital status, income level, employment status, parity, anaemia, depression and weight loss were found to be significant predictors.

Women living with HIV were 2.6 times more likely to experience fatigue than their counterparts (adjusted OR (AOR) 2.61, 95% CI 1.01 to 5.32), patients who were married and living with their spouse were 82% less likely to experience fatigue than those who were not with their spouse. Those who were unemployed and had low income were about three times (AOR 2.79, 95% CI 1.19 to 9.84) and sevenfolds (AOR 7.1, 95% CI 4.6 to 22.15) more likely to suffer from fatigue. Participants those who have children were nearly five times more likely to have fatigue compared with those who did not have children (AOR 4.87, 95% CI 2.18 to 17.9). Those diagnosed with anaemia and depression were 12 times (AOR 12.45, 95% CI 5.6 to 41.01) and 4.5 times (AOR 4.51, 95% CI 1.91 to 11.2), respectively. Those who had mild and moderate weight loss were about five times more likely to develop fatigue as compared with those with no weight loss (AOR 4.2, 95% CI 2.56 to 13.94) and (AOR 5.1, 95% CI 1.85 to 16.12), respectively (table 3). The interaction effect of

unemployment, low income, gender, having children and depression was not significantly associated with fatigue.

DISCUSSION

The findings of this study showed that the overall prevalence of fatigue using the 9-item FSS among people living with HIV attending the ART clinic at the UOGSCH in Gondar city, Ethiopia was 53.3% (95% CI 48.5 to 58.4). This is to some extent at the higher end of the prevalence range (33%–88%) reported previously in the literature.^{8 13–15} This finding is harmonised with the regional study conducted in Tigray, Ethiopia 51.7%, studies in USA 54%, South Africa 55% and Canada 54%.^{17 29 36 37} Larger sample size, similar patient characteristics and inclusion criteria in these studies could explain the consistent findings.

Most of the Ethiopian adults are involved in intense activity, domestic working, home care, children care and caring for the elderly. Negative life events such as disease, debilitating symptoms, unemployment and separation from life partners would often trigger the illness.^{38 39} The differing health beliefs in Ethiopian culture might have influenced the cut-off of where and how fatigue and depression are perceived. Further, the FSS used in this study was translated and adapted based on the pilot study but the high level of illiteracy among the participants in this study could have influenced the prevalence rate in this study.

Surprisingly, in this study, there is no association between advanced HIV disease marked by CD4 count, duration of HIV, ART regimen, clinical stage of HIV and the experience of fatigue when adjusted for the other independent variables in the regression model. Although drugs like zidovudine and didanosine are frequently reported to have fatigue as side effects.⁴⁰ Antiretroviral agents might help the control of viral replication and slower disease progression, which could mitigate the risk of fatigue associated with ART. Further, the distinct

**Table 2** Clinical characteristics of people living with HIV/AIDS attending antiretroviral therapy clinic at University of Gondar Hospital, University of Gondar, Northwest Ethiopia, 2019 (n=392)

Variables	Sample total n (%)	Fatigue n (%)		χ^2	P value
		Yes	No		
Type of HAART regimen					
AZT+3TC+NVP	155 (39.5)	74 (47.7)	81 (52.3)	1.3	0.7
AZT+3TC+EFV	16 (4.1)	7 (43.8)	9 (56.2)		
TDF+3TC+EFV	118 (30.1)	76 (64.4)	62 (35.6)		
TDF+3TC+NVP	63 (16.1)	27 (42.9)	36 (57.1)		
ABC+DDI+LPV/R	19 (4.8)	14 (73.7)	05 (26.3)		
Pre-HAART	21 (5.4)	11 (52.4)	10 (47.6)		
CD4 counts					
<200 cells/mm ³	23 (5.8)	07 (30.4)	16 (69.6)	4.5	0.23
200–350 cells/mm ³	228 (58.2)	128 (56.1)	100 (43.9)		
>350 cells/mm ³	141 (36.0)	73 (51.8)	68 (48.2)		
Duration of HIV infection					
<60 months	232 (59.2)	176 (75.9)	56 (24.1)	119.7	0.000
60–100 months	87 (22.2)	24 (27.6)	63 (72.4)		
>100 months	73 (18.6)	09 (12.3)	64 (87.7)		
WHO HIV/AIDS clinical stage					
Stage I	230 (58.7)	99 (43)	131 (57)	25.1	0.00
Stage II	80 (20.4)	51 (63.8)	29 (36.2)		
Stage III	81 (20.7)	58 (71.6)	23 (28.4)		
Stage IV	1 (0.3)	01 (100)	0 (0)		
Weight loss					
No weight loss	26 (6.6)	24 (92.3)	02 (7.7)	31.9	0.01
Mild weight loss	148 (37.8)	102 (68.9)	46 (31.1)		
Moderate weight loss	122 (31.1)	63 (51.6)	59 (48.4)		
Severe weight loss	96 (24.5)	20 (20.8)	76 (79.2)		
Anaemic					
Yes	191 (48.7)	180 (94.2)	11 (5.8)	111.2	0.000
No	201 (51.3)	29 (14.4)	172 (85.6)		
Diabetes mellitus					
Yes	18 (4.6)	15 (83.3)	03 (16.7)	13.6	0.001
No	374 (95.4)	194 (51.9)	180 (48.1)		
Hypertension					
Yes	11 (9.4)	10 (90.8)	01 (9.1)	9.2	0.002
No	381 (89.6)	198 (52)	183 (48)		
Other comorbid conditions					
Yes	37 (9.4)	23 (62.2)	14 (37.8)	15.3	0.000
No	355 (90.6)	186 (52.4)	169 (47.6)		
Depression					
Yes	283	204 (72.1)	79 (27.9)	144.8	0.000
No	109 (28.1)	21 (19.3)	88 (80.7)		
Insomnia					
Yes	91 (23.2)	43 (47.3)	48 (52.7)	1.66	0.68
No	30 (76.8)	166 (55.1)	135 (44.9)		

Continued

Table 2 Continued

Variables	Sample total n (%)	Fatigue n (%)		χ^2	P value
		Yes	No		
Physical activity					
Yes	117 (29.8)	41 (35.1)	76 (64.9)	5.49	0.014
No	275 (70.2)	178 (64.7)	97 (35.3)		
Physical disability					
Yes	12 (3.1)	10 (83.3)	02 (16.7)	2.48	0.59
No	380 (96.9)	199 (52.4)	181 (47.8)		

HAART, highly active antiretroviral therapy.

difference between the perception of fatigue and performance fatigue, level of fatigue and energy demand of the respondents could have influenced the findings.⁴¹ Then again, the finding of this result was lower than the findings reported in other studies done in a rural district in South-west Uganda 61%,⁴² South Africa 66.7%,³⁷ Rochester, USA 64%,⁴³ China 86.8%⁴⁴ and the UK 65.1%.⁴⁵ This discrepancy might be due to the reasons that the Ugandan and the USA included lesser samples 212 and 128, respectively. Moreover, the Ugandan study used Memorial Symptom Assessment Scale-Short Form, the UK used a self-administered questionnaire with Chalder Fatigue Scale to measure fatigue, though the study from the USA used similar outcome measure (FSS) the cut-off was lower, the study in South Africa used convenient sampling to report multiple self-reported symptoms with fatigue being one among those. The Chinese study was

based on the secondary source data (case-report form) using a retrospective design. Overall, the variations in the sampling method, study design, outcome tools, data collection method and clinical characteristics of the patients could explain these discrepancies.

In this study, the key predictors that were significantly associated with fatigue among adult people living with HIV were clinically diagnosed anaemia, low income, parity, weight loss, depression and living without a spouse. Likewise, studies done in the USA and China reported an association between fatigue and anaemia.^{44 46 47} Fatigue is the cardinal symptom of anaemia, a prognostic marker of disease progression, and frequently reported as a predictor of morbidity and mortality among people living with HIV. The negative effects of HIV infection and cART on the haematopoiesis contribute to low haemoglobin concentration leading to impaired oxygen transport to

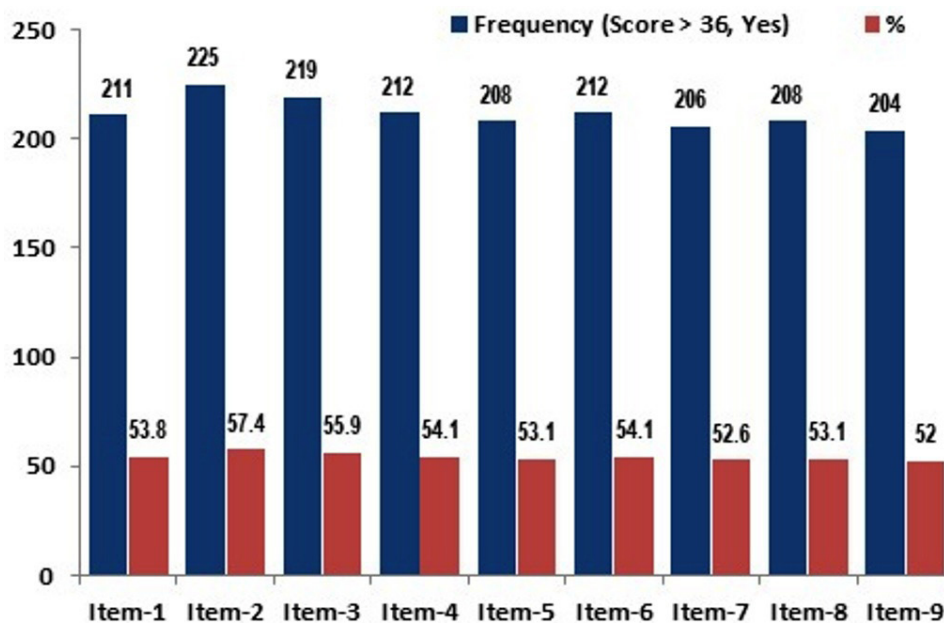


Figure 1 Frequency distribution of fatigue characteristics based on 9-item Fatigue Severity Scale (FSS) of HIV infected attending antiretroviral therapy (ART) clinics in the University of Gondar Specialized Comprehensive Hospital, Northwest Ethiopia, 2019 (n=392). 9-items FSS: Item-1, my motivation is lower when I am fatigued; Item-2, exercise brings on my fatigue; Item-3, I am easily fatigued; Item-4, fatigue interferes with my physical functioning; Item-5, fatigue causes frequent problems for me; Item-6, my fatigue prevents sustained physical functioning; Item-7, fatigue interferes with carrying out certain duties; Item-8, fatigue is among my three most disabling symptoms; Item-9, fatigue interferes with my work, family or social life.

**Table 3** Univariate and multivariable analysis for the associated and predicting sociodemographic and clinical characteristics to HIV-related fatigue, 2019 (n=392), Ethiopia

Variables	Fatigue		Univariate	Multivariable
	Yes	No	COR (95% CI)	AOR (95% CI)
Sex				
Women	173	86	5.42 (3.45 to 8.6)*	2.61 (1.01 to 5.32)*
Men	36	97	1 (ref)	1 (ref)
Marital status				
Single	44	47	1 (ref)	1 (ref)
Married	112	91	1.32 (0.80 to 2.16)*	0.18 (0.10 to 0.9)*
Divorced	35	40	0.94 (0.51 to 1.72)*	0.24 (0.07 to 2.2)
Widowed	18	5	3.85 (1.32 to 11.24)*	0.77 (0.14 to 3.1)
Income				
Low income	147	23	133.15 (52.56 to 337.3) *	7.1 (4.6 to 22.15)*
Medium income	56	35	33.33 (13.26 to 83.78)	2.51 (1.60 to 18.76)
High income	6	125	1 (ref)	1 (ref)
Educational status				
Illiterate	68	46	1.6 (0.81 to 3.21)*	0.54 (0.12 to 1.99)
Grade 1–6	38	44	0.94 (0.46 to 1.94)	0.86 (0.52 to 2.01)
Grade 7–8	30	23	1.42 (0.64 to 3.15)	0.13 (0.09,1.00)
Grade 9–10	32	21	1.66 (0.75 to 3.7)	0.21 (0.14 to 1.42)
Grade 11–12	19	25	0.83 (0.36 to 1.9)	0.73 (0.31 to 3.6)
Diploma and above	22	24	1 (ref)	1 (ref)
Occupation status				
Employed	52	154	1 (ref)	1 (ref)
Unemployed	157	29	16.033(9.67 to 26.59)*	2.79 (1.19 to 9.84)*
Having children				
Yes	182	61	13.48(8.11 to 22.40)*	4.87 (2.18 to 17.95)*
No	27	122	1 (ref)	1 (ref)
Anaemia				
Yes	180	11	17.05 (7.01 to 28.3)*	12.45 (5.61 to 41.01)*
No	29	172	1 (ref)	1 (ref)
Depression				
Yes	204	79	5.61 (2.03 to 19.1)*	4.51 (1.91 to 11.20)*
No	21	88	1 ref	1 ref
Weight loss				
No weight loss	6	20	1 (ref)	1 (ref)
Mild weight loss	109	39	12.3 (3.24 to 24.22)*	4.2 (2.56 to 13.94)*
Moderate weight loss	99	23	13.9 (2.89 to 27.5)*	5.1 (1.85 to 16.12)*
Severe weight loss	45	51	7.8 (1.01 to 15.2)*	1.85 (0.79 to 7.63)
Comorbid condition				
Yes	37	9	4.16 (1.95 to 8.88)*	4.71 (1.10 to 18.21)
No	172	174	1 (ref)	1 (ref)

*Level of significance p < 0.05

*Significant association of the characteristics with HIV-related fatigue in the multivariable model.

AOR, adjusted OR; COR, Crude Odds Ratio.

the vital organs and musculoskeletal system resulting in fatigue. The resolution of HIV-related anaemia has been shown to improve fatigue among individuals living with HIV.⁴⁸

Depression is significantly associated with fatigue, low energy or tiredness itself is a depressive symptom. Similar to this study, many studies and a systematic review of 42 studies reported that inadequate income, unemployment and depression are stronger predictors and uniformly associated with HIV-related fatigue.^{13 36 49 50} Less energy, lack of work capacity, an inclination to work and reduced motivation may eventually result in unemployment and inadequate income. Importantly, fatigue that precedes depression or results from depression is a distinct health outcome among people living with HIV and the interaction can sometimes become a vicious cycle. Further, the negative cognitions about side effects, medical sequelae of HIV, opportunistic infections and fear of impending mortality could increase the likelihood of depression-related symptoms. The present study also found that female patients were more likely to perceive fatigue than men. This finding is similar to the studies conducted in South Africa,³⁷ France,⁵¹ and a systematic review.¹³ The mean age of women in this was lower than men, the majority of those who were diagnosed with anaemia and weight loss were women. Besides, a higher representation of women in this study could have favoured this association. Furthermore, studies had reported that depression and fatigue to be highly prevalent among people living with HIV than the HIV-negative population.^{52 53} Fatigue and depression among people living with HIV might be clinically diverse from the same primary symptoms among HIV negative population, thus requiring a different management approach.

In this study, having children was associated with the experience of fatigue. A similar association was reported by studies in the USA, France and South Africa.^{36 50 54} The findings might be attributed to additional responsibility and workload in terms of the physical, social and financial burden that are associated with having children. However, participants who were married and living with their spouse was a protective factor for fatigue than those who lived without a spouse. Emotional stress, grief, loneliness and depression attributed to the loss of spouse, separation and lack of support could be the possible explanation for likely risk of fatigue among those living alone. Moreover, people living with HIV are likely to be widowed, divorced and/or singled compared with HIV negative patients leading to bereavement and diminished support.⁵²

The current study also found that mild and moderate weight loss was significantly associated with fatigue. This was similar to the studies done in Eastern Cape, Bellville, South Africa³⁷ and Southwest Uganda.⁴² Although the association between fatigue and severe weight loss is non-significant, the coefficient above 1 in the regression model explains the risk of fatigue. Malnourishment, wasting, loss of appetite, side-effects of drugs, illness

related to coinfections and HIV-related complications are blamed for unexplained weight loss among people living with HIV. Each of these factors can cause loss of energy and/or tiredness and are predictors or risk factors for developing fatigue. Another important finding in this study is that there was a high rate of unemployment and low income among the people living with HIV in agreement with several studies and similarly these populations are more likely to experience fatigue. Further, unemployment has been known to compound fatigue and depression.^{19 52 55}

While the high prevalence of self-reported fatigue in this study compared with the western studies and association with anaemia, weight loss, depression, low income and having children has implications for the clinical management and policy management of fatigue in HIV-infected patients. First, health-related attitudes, culture, beliefs and high altitude of the study area might describe the higher reporting of fatigue. Second, the symptom of fatigue should prompt not only a search for clinical causes, but also detailed questioning about socio-economic, cultural and psychological causes. Given the high prevalence, and seemingly negative consequences of HIV-related fatigue on the quality of life and functional capacity in these individuals, there is a need for preventive measures, patient education, interventions and further evaluation of the clinical, psycho-social and cultural factors in the Ethiopian adults living with HIV.

CONCLUSION

The prevalence of fatigue was found to be high in people living with HIV/AIDS. From all the sociodemographic factors and HIV/AIDS-related medical factors that were studied, being women, being married, low income, unemployed, having children, severe weight loss and anaemia were found statistically associated with fatigue. Hence, early detection of the HIV-related fatigue and its underlying treatable causes permits patient education, controlling risk factors and treat these conditions when they are present or predisposed.

Acknowledgements First, we would like to express our deepest gratitude to the University of Gondar for ethical approval and fully funding this project. Our gratitude and appreciation go to data collectors, adults living with HIV attending HIV care clinic who participated in this study. We are also grateful to all the hospital authorities and HIV care clinic staff for their cooperation.

Contributors MBaye brought the original idea and was involved in the proposal writing, designed the study and participated in all the implementation stages of the project. MBaye and BJ analysed the data and wrote the manuscript. BF, BJ, SMA and MBayisa participated in the conception of the original idea and were involved in the proposal writing, finalised the write-up of the manuscript and critically revised the manuscript for important intellectual content. BJ, MBaye, SMA, MBayisa and BF were responsible for critically revising the research proposal and the manuscript, and participated in its design and interpretation. BJ and MBayisa were involved in the design of the work and approved the version to be published. All the authors read and approved the final version of the manuscript.

Funding This study was funded by the University of Gondar (Grant ref no: 08792017). The views presented in the article are the authors and do not necessarily express the views of the funding organisation. University of Gondar did not involve in the design of the study, data collection, analysis and interpretation.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval The study was conducted after submitting the study protocol followed by ethical approval from the Institutional Review Board (IRB), CMHS, University of Gondar (Ref no; SOM/087/9/2017). Permissions were obtained from the regional public health institute and the authorities of the study site before the study. Written consent was obtained from each participant after explaining the study, its objective, benefits, and its importance. Information's were recorded anonymously and confidentiality and beneficence were assured throughout the study period.

Provenance and peer review Not commissioned; externally peer reviewed.

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