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Nutritional Status and associated factors among adults living with HIV/AIDS in Yekatit 12 Hospital, Addis Ababa, Ethiopia: A facility-based cross-sectional study

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Abstract

Background: Human Immunodeficiency Virus (HIV) and AIDS remained a significant health burden particularly in developing countries. It has been continued as one of a global health crisis with 1.5 million [1.0 million–2.0 million] new HIV infections and 680 000 [480 000–1 000 000] deaths from AIDS-related causes that occurred in 2020. Poor nutrition resulting in weight loss, muscle wasting, weakness, nutrient deficiencies leads to impaired immune system which could facilitate HIV disease progression or increase the risk of infection.

Objective: This study aimed to asses' nutritional status and associated factors among adults living with HIV/ AIDS at ART clinic of Yekatit12 Hospital Addis Ababa.

Methods: Facility based cross-sectional study was conducted among all adults attending ART follow up services at Yekatit 12 hospital from May 2024 to July 2024.

Results: A total of 393 participants were included in the study. The mean age of the participants was 33.74 (SD ±5.29) years. The prevalence of malnutrition with (BMI<18.5kg/m2) in this study was 37.15%. Opportunistic infections (AOR=3.12,95% CI: 1.77-5.46), Clinical stage four (AOR=6.39,95% CI: 1.73-23.65), Clinical stage three (AOR= 4.69, 95% CI: 1.02 -6.05), receiving nutritional support and care (AOR=0.53, 95% CI: 0.27-1.14), high meal frequency (AOR=0.36, 95% CI: 0.13-0.95), and, food insecure (AOR= 2.99, 95% CI:1.56-5.73) were significantly associated with under nutrition.

Conclusion: Malnutrition associated with advanced clinical stages of HIV diseases, opportunistic infection and food insecurity is significant problem among peoples living with HIV/AIDS.

Key words: BMI, PLHIV, Adult, Malnutrition

Background

Globally, between 1980 and 2015, about 78 million people were infected and half of them have died of AIDS (1, 2). According to the 2016 report of Global Burden of Diseases (GBD), worldwide 38.8 million people had HIV infection; 2.1 million people had been newly infected and 1.2 million died due to the HIV disease (3).

Human Immunodeficiency Virus (HIV) infection and AIDS remained a significant public health burden particularly in developing countries and remains as a global health crisis. In 2020 1.5 million [1.0 million–2.0 million] new HIV infections and 680 000 [480 000–1 000 000] AIDS-related deaths occurred globally (4). The vast majority of HIV infected are living in low- and middle-income countries, with the majority (68%) in sub-Saharan Africa (SSA) (5, 6)

According to the Ethiopian Demographic and Health Survey 2016 report, the national HIV prevalence is 0.9% with urban prevalence of 2.9%, which is seven times higher than that of the rural (0.4%). Furthermore, the 2018 spectrum HIV estimate indicated that the 2017 HIV prevalence in regions ranges from 0.16% to 4.34% (7)

The effects of under nutrition on the immune system are well known and include decreases in CD4 Tells suppression of delayed hypersensitivity and abnormal B-cell responses. The immune suppression caused by protein-energy malnutrition is similar in many ways to the effects of HIV infection (8).

A meta-analysis study in Ethiopia showed the pooled prevalence of under nutrition among adults receiving ART was 26%. Under nutrition among people living with HIV is associated with socio-demographic and clinical factors such as age, WHO clinical stage, CD4 count, duration of ART treatment, and food security (9, 10).

There are multiple factors that increase the risk of acquiring HIV infections, and the rate of new HIV infections is currently high. factors such as educational status, age, wealth status, media exposure, drug use, and consumption of alcohol are associated with HIV infections (11,12,13).

Poor nutrition resulting in weight loss, muscle wasting, weakness, impaired immune system (poor ability to fight HIV and other infections, increased oxidative stress, which ultimately increases vulnerability to infections) (14). Hence, increased HIV replication, hastened disease progression that shortens the clinical latency period with chronic morbidity, On the other hand, adequate dietary intake enhances the therapeutic effect of medicines, boosts the immune system increases longevity, and promotes healthy living (14).Hence, data on nutrition status among peoples living with HIV/AIDS is important to understand the role of nutrition in HIV diseases progression as an input for public health programs to improve the HIV treatment care.

Methods and Materials

Study design, setting, period, and population

A facility based cross-sectional study was conducted in Addis Ababa at Yekatit 12 hospital from Jun 2024 to August 2024. Addis Ababa is the diplomatic capital of the African Union and capital city of Ethiopia. It has eleven sub-cities and 116 woredas. The city has an estimated population of 6.2 million of which 52.6% are females and 47.3% are males. The city covers about 540 km2 (15). According to the ministry of health report the city has 44 hospitals (33 governmental and 11 private), 94 Health Centers (88 government owned and 6 by NGOs) and more than 777 private health clinics (16)

The source populations are all adults coming for ART follow up services at Yekatit 12 hospital. Age of 18 years and above and receiving ART were the inclusion criteria's. A total of 393 participants were enrolled using a single population proportion formula, assuming 36.5% prevalence of under-nutrition among adults with HIV/AIDS (17), 95% confidence level and 5% margin of error and non-response rate of 10%

Data collection and tools

A structured data collection format was prepared to extract socio demography and nutrition related data. Clinical follow up data from HIV care and ART clinics were collected using case report formats (CRF). Three clinical nurses and one health officer working in the ART clinics have done the data collection and supervision respectively. The clinical nurse will do the data collection and the health officer will do the supervision BMI was calculated to assess the nutritional status of the study participants using participant's weight in Kg and height in m^2 as a parameter.

Study variables and operational definitions

Nutritional status (BMI) of PLWHA were the dependent variables, while the independent variables were Socio demographic characteristics patients' factors: eating problem, other chronic illness, infection, Depression WHO clinical staging and nutrition intervention.

- BMI<16.O= Severe malnutrition
- BMI≥ 16.0 and < 17.0 = moderate malnutrition
- BMI ≥ 17.0 and < 18.5= mild malnutrition
- BMI ≥ 18.5 and < 25.0 = normal weight
- BMI ≥ 25.0 and < 30.0 = over weight
- BMI ≥ 30.0 =obesity

Foods secure: If experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely

Food insecure: If the family experiences any of the conditions (uncertainty, insufficient quality and quantity of food) within the recall period. If the answer to any of the questions is "rarely," "sometimes," or "often" The only exception was among households in which the respondent's answer to question 1 was "rarely" but the response to all the other questions was "never")

Low dietary diversity is a score lower than four diversified food.

High dietary diversity is a score greater or equal to four diversified food.

Meal frequency is the number of reported daily eating occasions over the 24-hour period

Low meal frequency: refers to meal score less than four.

High meal frequency: refers to meal score greater than equal to four.

Wealth Index is a composite measure of the cumulative living standard of a household.

Social support: refers to getting money/food aid /home care.

Data management and analysis

To assure the quality of data, data collectors and supervisors were trained before the onset of data collection followed by continuous supportive supervision by the primary investigator. In addition, regular check-up for completeness and uniformity of the data on daily bases was conducted by the supervisor.

Pretest was conducted on 5% of the sample size in community to identify potential problems in data collection tools before the actual data collection. The filled questionnaires were checked for consistency and entered into Epi-data version 3.1, cleaned and imported to SPSS version 23 for analysis. Descriptive analysis was done for each variable in the study by running frequencies and presented using graphs. At 25% level of significance, bivariate analysis was done to screen out the potentially significant independent variables. The independent variables associated with the outcome variable in bivariate analysis are included in the multiple logistic regression analysis to depict the association between independent variables and dependent variable.

To check the adequacy of the final model Hosmer-Lemeshow goodness of fit test was checked and multi-collinearity using variance inflation factor (VIF). Adjusted odds ratio with 95% confidence interval was computed. Variables with p-value ≤ 0.05 were considered as statistically significant to the dependent variable.

Results

Socio demographic characteristics

Among the 393 adult patients on ART, 390 participated in the study with response rate of 99.2%.The mean age of the respondents was 33.74 (SD ±5.29) years. One hundred and thirty-nine (35.3%) of the respondents were between 31-39 years of age and half of the respondents 198 (50.3%) were married. one fourth 102 (25.9%) of the participants attended primary school and greater than one third, 143 (36.6%) were self-employed. One hundred sixteen of the respondents' (40.7%) had average monthly income of ≤1500ETB (Table 1).

Participants' clinical profile

Hundred sixty-five (42%) of participants had GI symptoms in the last 2 weeks before the survey. Furthermore, 158 (40%) of the participants were diagnosed with opportunistic infection in the past 6 months before the survey. Including oral candidiasis 93(23.6%), chronic diarrhea 71 (18 %) and Tuberculosis 37(9.4%), sixty-five (16.6%) respondents suffered from side effect of ART, 17(4.3%) were at WHO clinical stage four and one hundred fifty-eight (40.2%) were at WHO clinical stage two during the survey (Table 3). Larger proportion (85.2%) of respondents had good adherence to ART during the past one month before the survey (Table 2).

Table 1: Socio-demographic characteristics of peoples living with HIV/AIDS, 2024 (n=390).

Variables	Response category	Frequency	Percentage (%)
Sex	1-5 years	53	61.6
	6-10years	28	32.6
	11-16 years	5	5.8
Age	20-30	77	19.5
	31-39	139	35.3
	40-49	97	24.6
	50-59	59	15.0
	>60	21	5.0
Marital status	Married	198	50.3
	single	101	25.6
	Divorced	39	9.9
	Widowed	55	13.9
Education	No formal education	58	14.7
	Primary school (1-8th)	102	25.9
	Secondary school (9-12th)	87	22.1
	Certificate or diploma	95	24.1
	First degree and diploma	51	12.9
Occupation	Unemployed	107	27.2
	Self employed	143	36.3
	Government employed	111	28.2
	Student	10	2.5
	Others	22	5.5
Income	≤1500ETB	160	40.7
	1501-3000ETB	87	22.1
	>3001ETB	146	37.1

Table 2: Health care related characteristics of peoples living with HIV/AIDS, 2024 (n=390)

Variables	Response category	Frequency	Percentage (%)
Gastro intestinal symptom	Yes	165	42.0
	No	228	57.8
Opportunistic infection	Yes	158	40.3
	No	234	59.7
Tuberculosis	Yes	37	9.4
	No	356	90.6
Oral candidiasis	Yes	93	23.6
	No	300	76.4
Chronic diarrhea	Yes	71	18.2
	No	322	81.8
Side effect of ART	Yes	65	16.6
	No	328	83.4
Adherence to ART	Good	335	85.2
	Fair	41	10.4
	Poor	17	4.3
Clinical staging	I	97	24.7
	II	158	40.2
	III	121	30.8
	IV	17	4.3

Dietary characteristics of respondents

Majority of respondents, 317(80.66%) didn't get nutritional support and 258(65.64%) of them were counseled about dietary feeding (Table 3). Out of 390 participants, larger proportion of the respondents (63.6%) had inadequate diversified food and (73%) had low meal frequency score with in the 24 hour dietary recall period (Table 3). Out of 390 participants, 267 (68.4%) were food insecure

Table 3: Dietary characteristics of peoples living with HIV/AIDS, 2024 (n=390)

Variables	Response category	Frequency	Percentage (%)
Nutritional support	Yes	76	19.3
	No	317	80.7
Dietary counseling	Yes	258	65.6
	No	135	34.4
Meal frequency	Low	287	73.0
	High	106	27.0
Dietary diversity score	Inadequate	250	63.6
	Adequate	143	36.4

Prevalence of malnutrition among adults living with HIV

Overall, the prevalence of malnutrition with (BMI<18.5kg/m2) in this study was (37.15%). Out of 146 malnourished individuals, 8(5.47%) were severely malnourished, 26(17.8%) were moderately malnourished, and 112 (76.7%) were mildly malnourished (Figure 2). Female were most affected my malnutrition (59.45%)

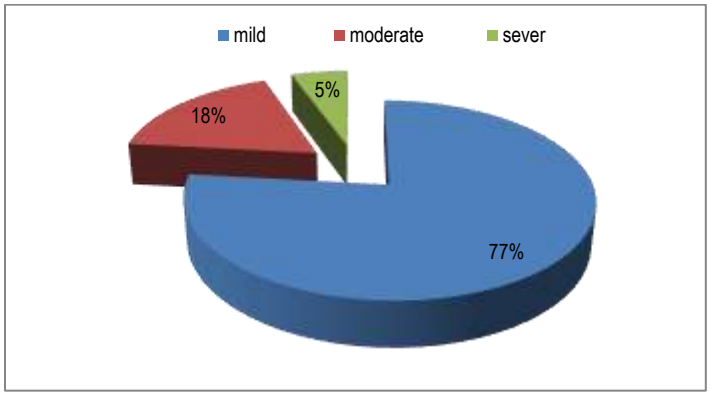

Figure 1: Degree of malnutrition among adults living with HIV on HAART at Yekatit 12 Hospital, Addis Ababa, Ethiopia.

Factors associated with malnutrition among adults living with HIV

In bivariate analysis, GI symptoms, Opportunistic infections (OIS), Tuberculosis, Candidiasis, Diarrhea, WHO clinical staging, Food security, Meal frequency score, Dietary diversity score, Nutritional support were significantly associated with nutritional status of adult living with HIV (Table 4). However, in multivariable binary logistic regression analysis only OIS, WHO clinical staging and, food security was significantly associated with nutritional status of adult living with HIV (Table 4).

Discussion

The overall prevalence of malnutrition in this study was (37.15%). The result was lower than the study done in Ethiopia, 43% (44); but consistent with the study done in Uganda, 37%, North Shoa Oromia, 36.5%, and Vietnam (37, 51, 52).

Table 4: Factors associated with malnutrition among individuals living with HIV,**2024 (n=390)**

Variables	Malnutrition		COR (95% CI)	AOR (95% CI)
	Yes (N, %)	No (N, %)		
OIS				
No	45 (36.9)	189 (30.0)	1.00	1.00
Yes	77 (63.1)	81 (30.0)	4.8 (2.91,0.63)	3.1 (1.77-5.46)
Clinical staging				
I	9 (7.4)	74 (27.3)	1.00	1.00
II	43 (35.2)	120 (44.3)	3.3 (1.43,7.52)	2.5 (1.02-6.05)
III	61 (50.0)	66 (24.4)	6.2 (3.76,19.75)	4.7 (1.88-11.67)
IV	9 (7.4)	11 (4.0)	8.4 (2.56,28.06)	6.4 (1.73-23.65)
Food security				
Food secure	21 (17.2)	102 (37.8)	1.00	1.00
Food insecure	101 (82.8)	168 (62.2)	3.4 (1.93,6.10)	3.0 (1.56-5.73)

The finding of this study is also higher than the study done in Tanzania, meta-analysis done in Ethiopia and Jima medical center, 27.7%, 26%, and 34%, respectively (9, 10, 21). This high rate of undernutrition in this study could be due to the high prevalence of household food insecurity (68.4%), leading to a lack of access to adequate, safe, and nutritious food resulting in undernutrition and it led to weaken the immune system, make people more vulnerable to opportunistic infection. Our data also indicated that 63.6% the participants are taking inadequate dietary diversified food, which might be associated with low micronutrient intake. This may contribute to the pathogenesis of HIV through increasing oxidative stress and compromised immunity and indirectly resulting in undernutrition. The difference in prevalence of malnutrition might be due to differences in socio-economic and other factors that may predispose the community to problems, such as food habits and culture.

Female were most affected by malnutrition (59.45%). this might be due to the fact that HIV is common in women than man. This is comparable with an earlier similar study conducted in Jimma medical center (21), higher than the study in Butajira hospital (32). Similar study done in Bahir-Dar showed proportion of malnourished females were 46% less likely to be malnourished than males, AOR = 0.54, 95%CL (0.52 - 0.95) which is opposite to this study (46). This may be due to females do not give attention for themselves. In order to sustain their children and husband's life they give attention for their family. As we can see above, to become male is protective to be malnourished as it is shown by logistic regression analysis.

It was found that an opportunistic infection was an independent risk factor for under nutrition. Similar other studies support the findings that OI is associated with under nutrition (15, 32, 47, 48). This exemplifies the importance of managing patients with OIs promptly.

The advanced WHO clinical staging of the patient was also significantly associated with under nutrition among the study participants. The odds of developing under nutrition were 4 and 6 times higher among adults PLWHIV who were in WHO clinical staging of III and IV. This finding was supported by studies conducted in Ethiopia as well as by a study conducted in Nepal and Jimma Medical Center (47, 48, 21). This might be because patients with advanced disease stages are more susceptible to developing comorbid opportunistic infections. Thus, additional treatment for opportunistic infections and the regular first-line ART might worsen the side effects like loss of appetite and poor nutritional status of the patients and compromise their resistance to the disease (49)

In this study, food insecurity was significantly associated with under nutrition. HIV patients with food insecurity had 3 times increased odds of developing undernourished as compared to their counterparts. This finding was consistent with studies done in East Hararge Zone hospitals of Ethiopia, Senegal, and systematic reviews in sub-Saharan Africa (20, 22, 29) that found that patients with household food deficiency had higher risks of undernourishment. This may be due to the shortage of food to satisfy nutritional requirements for productive and healthy living, contributing to macro- and micronutrient deficiencies.

This study has some inherent limitations mostly recall bias and non-probability sampling that might limit the generalizability of the finding.

Conclusion

The prevalence of overall malnutrition was high among adult people on ART in Yekatit 12 Hospital. Predictors of malnutrition were food insecurity, clinical disease stage four and three, and opportunistic infection. To address under nutrition, targeted nutritional interventions should focus on PLHIV with these characteristics.

Abbreviations

AARHB: Addis Ababa Regional Health bureau; AIDS: Acquired Immune Deficiency Syndrome; ART: Anti Retro Viral Therapy; BMI: Body Mass Index; BWL: Body Weight Loss; CCC: Comprehensive Care Center; EDHS: Ethiopian Demographic and Health Survey; HAART: Highly Active Anti Retro Viral Therapy; HIV: Human Immune Deficiency Virus; OIs: Opportunistic Infections; PLHIV: People Living with Human

Immune Deficiency Virus; USA: United States of America; WHO: World Health Organization

Declarations

Consent for publication

Participants consented for unanimous sharing of compiled data as approved by the IRB

Ethical declaration

The Addis Ababa Medical and business university college institutional review committee has given its approval for the ethical use of the data. All-study methods, and protocols, were carried out in accordance with Participant, Ethiopian national and regional regulations and Guidelines. This is not experimental study and stating experiments on humans and/or the use of human tissue samples is not applicable to this study. Written consent from participants were obtained after explaining the objectives, risk and benefit of the study for the participants

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Authors' contributions

Henok Ketema conceptualized the research problem, designed the study, conducted fieldwork collected and data analyzed, and drafted the manuscript. Aregash Mekonnenwas involved in conceptualization, preparing the research proposal, and revising the final manuscript. All authors of the manuscript have read and agreed to its content.

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Competing interest

No competing interest

Availability of data and materials

The data sets used in the current study and data collection tool are available with the corresponding author

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