Full Length Research Paper

Undernutrition and its predictors among people living with HIV/AIDS attending antiretroviral therapy clinic in Jimma University Specialized Hospital

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HIV is one of the most serious health and development challenge of the globally with approximately 36.9 million people currently living with HIV and tens of millions of people having already died since the emergence of the pandemic. Food insecurity and poor nutritional status could enhance the progression to AIDS-related illnesses and compromise adherence and response to antiretroviral therapy. However, factors associated with nutritional status of HIV positive people is not well documented in Ethiopia in general and in the study area in particular. The aim of this study was to determine the prevalence of undernutrition and associated factors among adult people living with HIV/AIDS. An institution-based cross-sectional study was conducted on among a total of 305 people living with HIV/AIDS attending Antiretroviral therapy in Jimma University Specialized Hospital from January to March 2014/2015. A systematic sampling technique was used to select study participants. Semi-structured and pre-tested questionnaire was used to collect socio-demographic data, while beam balance and stadiometer were used to measure weight and height of the study participants, respectively. Body mass index was calculated by dividing weight of subjects in k.g by their height in meters squared. Bivariate and multivariable logistic regression analyses were used to identify independent predictors of undernutrition as measured by body mass index < 18.5 kg/m^2. P value <0.05 was considered for statistical significance. The prevalence of undernutrition was 27.2% (95% CI 22.2–32.2). Multivariable logistic regression analysis revealed that alcohol consumption (AOR=0.13[95%CI: 0.05-0.32]), WHO clinical stage I (AOR=0.2[95%CI:0.07-0.52]), WHO clinical stage II(AOR=0.25[95%CI:0.085-0.75]) and DDS(AOR=3.67[95%CI:1.72-7.817]) were significantly associated with undernutrition. Compared to cases with an advanced WHO stage of the disease (stage V), case with the stages I to II were less likely to have undernutrition (P<0.05). Similarly, compared to those with lower dietary diversity, subjects with high dietary diversity were less likely to have undernutrition (AOR=3.67[95%CI: 1.72-7.817, P=0.001]). Likewise, those not consuming alcohol were less likely to be undernourished compared to the ones who consume alcohol (AOR=0.13[95%CI: 0.05-0.32, P=0.001]). The prevalence of undernutrition among HIV/AIDS patients in Jimma University Specialized Hospital was high. Alcohol consumption, WHO clinical stage and DDS were significant independent predictors of undernutrition among People living with HIV/AIDS. Concerted efforts should be made to create awareness through behavior change communication for all patients about no or optimal alcohol consumption and dietary diversification.

Key words: Undernutrition, HIV/AIDS, Adult.

INTRODUCTION

Undernutrition is defined as the condition in which nutrient intake is continuously below a minimum requirement for maintaining healthy life. According to the global conceptual framework, the causes of undernutrition are multiple and interrelated requiring intricate series of approaches, multifaceted, and multi-sectoral interventions to address it (University of The Western Cape (UWC), 2002; Sirotin et al., 2012; United States Agency for International Development (USAID), 2014).

Human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) has become one of the daunting challenges to socio-economic development in the world. The first cases were reported in 1981 and at the moment, nearly 36.9 million people are living with HIV and many had died of AIDS and associated morbidity since the start of the pandemic. Although, new cases are being reported in all regions of the world, almost 70% are in sub-Saharan Africa AIDS (Chipeta et al., 2009; Ile-Ife, 2004; Henry, 2014).

It has been reported that having low body mass index (BMI<18.5 kg/m^2) strongly associated with mortality in HIV-infected individuals (Sharma et al., 2015).

In Ethiopia, the prevalence of HIV infection among adults and number of deaths due to AIDS and related problems was estimated to be 1.1% and 26,489 in 2015 (Ethiopian Health Nutrition Research Institute (EHNRI), 2012). The overall death toll in 2013 was estimated to be 793,700 out of which 200,300 were children (Federal HIV/AIDS Prevention and Control Office (FHAPCO), 2014).

HIV/AIDS and undernutrition are interrelated and exacerbate one another in a vicious cycle. HIV could affect nutritional status through several pathways including increasing energy requirements, reducing food intake, and adversely affecting nutrient absorption and metabolism. Asymptomatic and symptomatic adults have energy requirements by 10 and 30%, respectively to maintain body weight and physical activity (USAID, 2000; Raiten et al., 2005).

WHO recommends that adults with HIV should get 10 to 30% higher energy than a healthy adult without HIV, and children with HIV 50 to 100% higher than their normal counterparts to meet their requirement. Food availability and good nutrition are thus essential to keep people with HIV healthy and enable them resist opportunistic infections such as tuberculosis for longer (Regional Centre for Quality of Health Care-Food and Nutrition Technical Assistance (RCQHC-FANTA) Project, 2000; Federal Democratic Republic of Ethiopia Ministry of Health (FMOH), 2008; World Health Organization (WHO), 2003).

The interaction of HIV/AIDS with nutritional status has been a distinctive characteristic of the disease course since the earliest days of the epidemic, when the term "slim disease" was often used in endemic areas such as sub-Saharan Africa to indicate the wasting syndrome typically connected with HIV/AIDS and related diseases (Quinn, 2001).

Both HIV and undernutrition can lead to progressive deterioration of the immune system and increased up to 50% of PLWHA have undernutrition, especially in sub-Saharan Africa (USAID, 2000; WHO, 2005).

Optimal nutrition could be achieved through consumption of a balanced healthy diet from locally available foods and fortified foods and/or micronutrient supplements when appropriate and this is vital for wellbeing and survival of all individuals regardless of HIV status (United Nations Programme on HIV/AIDS (UNAIDS), 2009).

Nutritional assessment and counseling should be an integral part of all HIV treatment programs. Improved attention to diet and nutrition may augment ART acceptability and effectiveness, helps prevent metabolic complications, and improves adherence and response to antiretroviral therapy (UNAIDS, 2009; Sunguya et al., 2014; World Food Programme (WFP), WHO, UNAIDS, 2006).

HIV could lead to weight loss and wasting through the pathways of low food intake and increased energy requirement. Once a patient is on antiretroviral therapy (ART), progressive wasting and consequent morbidity can often be reversed and nutritional requirements may revert to normal, although metabolic changes might continue to be evident (UNAIDS, 2009; Sunguya et al., 2014; WFP, WHO, UNAIDS, 2006; Heikens and Manary, 2009).

According to the World Health Organization (WHO), nutritional support is an integral part of a comprehensive response to HIV/AIDS and receiving appropriate nutrition can help improve the health and quality of life of HIV-infected individuals (Heikens and Manary, 2005; Republic of Rwanda Ministry of Health, 2005).

In resource-limited countries across the world including Ethiopia, low quality monotonous diets are common but food insufficiency and low dietary diversity are known contributors to poor health. Despite advancements in the treatment modality, the effects of the overlap between undernutrition and HIV infection are not well understood (Woldemariam et al., 2005; UNAIDS, 2012). There is

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also little evidence in Ethiopian context in general and in the study area in particular regarding to the nutritional status of PLWHA whether they are in pre-ART or ART care. Therefore, this study aimed to assess the nutritional status and associated factors for undernutrition among adult HIV/AIDS clients on ART care in Jimma University Specialized Hospital.

METHODOLOGY

The study was conducted in Jimma University Specialized Hospital located in Jimma Town, Southwest Ethiopia. The hospital serves as a teaching and referral hospital with a catchment of 15 million people. It has three medical wards with 85 admission beds and chronic care and training centre for HIV/AIDS and TB patients. The study was an institution based cross-sectional study conducted.

All adult PLWHA who enrolled for regular ART follow-up in JUSH were used as a source population; while adults PLWHA that enrolled for regular ART follow up in JUSH were randomly selected as the study population.

The sample size was determined using single population proportion formula taking prevalence of malnutrition among adults with HIV/AIDS on ART of 25% (Daniel et al., 2013) with 5% margin of error and 95% confidence level and 5% non response rate. The final sample size was estimated to be 302. A systematic sampling technique was used to identify the study subjects until the desired sample size was obtained. Seriously ill patients were excluded from the study and referred to the respective hospital.

Measurements

The data were collected from December 2014 to March 2015 using semi structured questionnaire. Socio-demographic characteristics including age, sex, monthly income, household properties, educational and marital status, and dietary quality were assessed by using 24 h dietary recall method which was developed by FANTA in 2008 (Food and Nutrition Technical Assistance, 2000). Patients were asked to describe the foods (meals and snacks) that they ate or drank yesterday during the day and night, whether at home or outside the home. They were also asked to start with the first food or drink of the morning and clinical characteristics of the patients were collected from patients log books. Four data collectors (one nurse, one health officer, and two laboratory technicians) were recruited and two days of training were given. The data collection process was followed by the principal investigator daily.

Laboratory data

Data on WHO clinical stages of disease, drug adherence, drug regimen and duration in the care were collected from patient charts and ART follow-up log books using a data abstraction prepared for the purpose. CD4+ T cell count was measured with BD FACS machine (US) and categorized according to its clinical significance.

Anthropometric data

Anthropometric measurements were taken at the end of the interview. Weight of the participants was measured using a beam balance to the nearest 0.1 kg; each participant was asked to remove heavy clothes and the scale was calibrated to zero before and after each measurement. Height was measured using a portable Stadiometer (Seca 213, Germany) and recorded to the nearest 0.1 cm. During height measurement, shoes, pins and braids from the hair that could affect the measurement were removed. Height was measured with the head of participants at the Frankfurt plane, knees straight and the heels, buttocks, calves and the shoulders blades touching the vertical stand of the stadiometer. Height was measured three times and the average was taken; BMI was calculated by dividing the weight of the study participants in kg by their heights in meters squared.

Operational definitions

Undernutrition was defined as the body mass index less than 18.5 kg/m^2. Dietary diversity is a qualitative measure of food consumption that reflects household access to a variety of foods and is also a proxy for nutrient adequacy of the diet of individuals. In the current study, a DDS of 4 or above is considered as high DDS, while a DDS of less than 4 is low. Alcohol consumption in the current study classified individual as alcohol consumer if he/she consumes at least one standard alcohol unit using local conventional measures at least once per week. For khat consumption, khat chewers were considered as if they had been chewing khat for more than 6 months and chew khat within the last 30 days preceding the study. For cigarette smoking, cigarette smokers were considered as if they had been smoking cigarette for more than 6 months and smoke minimum of one stick of cigarette per week.

Statistical analysis

The questionnaire was adapted and modified into the study area's context from previous literature. It was prepared first in English, translated into the local Amharic and Oromifa languages, and then retranslated back to English by an expert to maintain its consistency. Training was given for data collectors and supervisors. Pre-testing of the questionnaire was made on 20 patients receiving ART in the nearby health center 3 weeks prior to the actual survey. Data collection process was strictly followed day to day by the supervisor and principal investigator.

Data were checked for completeness, coded, and first entered into Epi Data version 3.1; then, it was rechecked and transferred to Statistical Package for Social Science (SPSS) version 20 for analysis. Bivariate and multivariable logistic regression analyses were used to assess the effect of the various factors on undernutrition and to control possible confounders. The absence of multi-co-linearity was checked using variance inflation factor. The model adequacy was checked by using Hosmer and Lemeshow goodness of fit test. P value ≤0.05 at 95% CI was considered statistically significant.

Ethical approval was obtained from the ethical review committee of the College of Health Sciences, Jimma University, prior to data collection. Permission was taken from JUSH administrators. Written informed consent was obtained from each individual after the purpose of the study was explained. Participants were told that they had full right to participate or not, and they were also informed that all the data obtained from them would be kept confidential using codes instead of any personal identifiers.

RESULTS

The total sample was 302 making the response rate of 98.6%. Most of the households were residents of the urban area (90.9%), while 9.1% reside in rural areas.

Table 1. Soci-demographic characteristics of people living with HIV/AIDS in Jimma University Specialized Hospital.

Variable		Frequency	Percent
Sex	Male	84	28.2
	Female	214	71.8
Residence	Urban	271	90.9
	Rural	27	9.1
Religion	Orthodox	156	52.3
	Muslim	88	29.5
	Protestant	54	18.1
Ethnicity	Oromo	132	44.3
	Amhara	97	32.6
	Keffa	43	14.4
	Tigre	26	8.7
Educational status	Formal education	231	77.5
	No formal education	67	22.5
Employment	Self employed	140	47
	Unemployed	85	28.5
	Government employed	73	24.5
Marital status	Single	46	15.4
	Married	126	42.3
	Divorced	72	24.2
	Widowed	54	18.1

Majority were orthodox (52.3%) and the rest Muslims (29.5%). Most (44.3%) of the respondents were Oromo ethnic groups, while Amharic accounts for 32.6%. Regarding marital status, 42.3% of respondents were married and most (77.5%) of the respondents attended formal education. The result indicated that 47% of respondents were self employed while 28.5% of respondents were unemployed. The mean age of the respondents was 36 years with standard deviation (SD) ±9.5 (Table 1). The study found that around 27% of respondents were undernourished (BMI<18.5 kg/m^2); the mean BMI score was 20.6 kg/m^2 with SD ±3.6 (Figure 1). Two third of the respondents were found in WHO clinical stage III, while stages I, II and IV accounted for 32.2, 18.5 and 14.1%, respectively (Figure 2). The study found that almost all respondents did not smoke, while alcohol consumption and khat chewing accounted for 15.4 and 15.8%, respectively. In the current study, high proportion (63.8) of respondents consume a diet with low dietary quality (DDS≤3) and the mean DDS score was 3.6 with SD ±1.1 (Figure 3).

In this study, both bivariate and multivariable logistic regression analysis were computed. Out of 7 selected variables that showed significant association with malnutrition in the bivariate model, only three variables (Alcohol consumption, WHO clinical staging and DDS) were significantly associated with malnutrition. When data were computed with multivariable logistic regression analysis, four variables that showed association on the bivariate model (sex, residence, marital status and khat chewing) were not statistically associated with malnutrition in the multivariate model (Table 2).

In addition, being nonalcoholic was significantly associated with malnutrition (P = 0.01). Patients found in WHO clinical stage I had 80% less chance of being undernourished as compared to patients in WHO clinical stage IV [AOR= 0.2 (0.07-0.52)], dietary diversity score was associated with nutritional status, respondents who had low dietary diversity score were 3.6 times more likely to be undernourished than their counter parts [AOR 3.67 (1.72-7.817)] (Table 3).

DISCUSSION

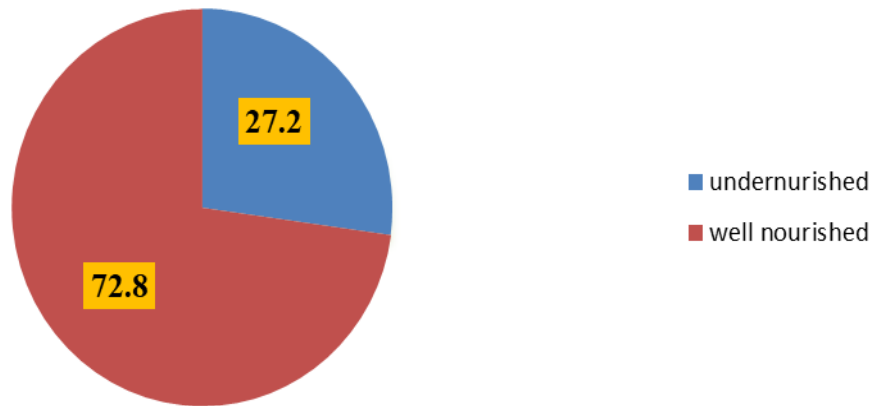HIV infection has long been associated with wasting

Figure 1. Nutritional status of people living with HIV/AIDS attending ART clinic in Jimma University Specialized Hospital.

Table 2. Personal habit of people living with HIV/AIDS attending ART clinic in Jimma University Specialized Hospital.

Variable		Frequency	Percent
Smoking	Yes	4	1.3
	No	294	98.7
Alcohol consumption	Yes	46	15.4
	No	252	84.6
khat chewing	Yes	47	15.8
	No	251	84.2

syndrome and underweight in HIV patient is a strong risk factor even in people receiving ART (Normén et al., 2005).

This study found that the prevalence of undernutrition among people living with HIV/AIDS is 27.2% (95% CI: 22.2-32.2) which is comparable with another study done in other parts of Ethiopia: Nekemte, Bahir Dar and Gondar referral hospital (Mitiku et al., 2016; Alemayehu et al., 2015; Hailemariam et al., 2013), but it is comparatively higher than the study done in Dilla and Nepal (Hailemariam et al., 2013; Thapa et al., 2015). The difference in magnitude can be explained in the current study that around half of the patients were in WHO clinical stages III and IV of the diseases during data collection. It is known that as the patient moves from the lowest to the highest clinical stage of the disease, it is expected that they will be more vulnerable to different opportunistic infection which will have a direct and indirect effect on the person nutritional status.

Alcohol abuse occurs frequently among HIV patients, researches demonstrated that moderate consumption of alcohol, particularly of alcoholic beverages containing antioxidants may protect immune cells from damage

(Romo-Avil et al., 2016). In the current study, patients who consumed alcohol were more likely to be undernourished than their counterparts which are consistent with a study done in Rwanda that showed alcohol use was associated with higher rates of food insufficiency (Sharma et al., 2015). This might be due to the fact that alcohol consumption is linked to poor response to HIV treatment and more rapid progression of HIV. Another pathway for such a link could be an adverse drug interactions between alcohol and antiretroviral medications (Braithwaite and Bryant, 2010; Lum and Rainey, 2013). Furthermore, alcohol consumption is causally linked to non-adherence to antiretroviral treatment, which in turn causes an increase in HIV/AIDS mortality (Schneider et al., 2012; Hendershot et al., 2010).

WHO clinical staging characterizes the patient clinically into one of the four WHO HIV stages (Baveewo et al., 2011); the current study showed that WHO clinical stage is one of the independent predictor of undernutrition, patients who were in WHO clinical stage I are less likely to develop undernutrition than a patient in stage IV. This finding is supported by a study done in Nepal and Dilla
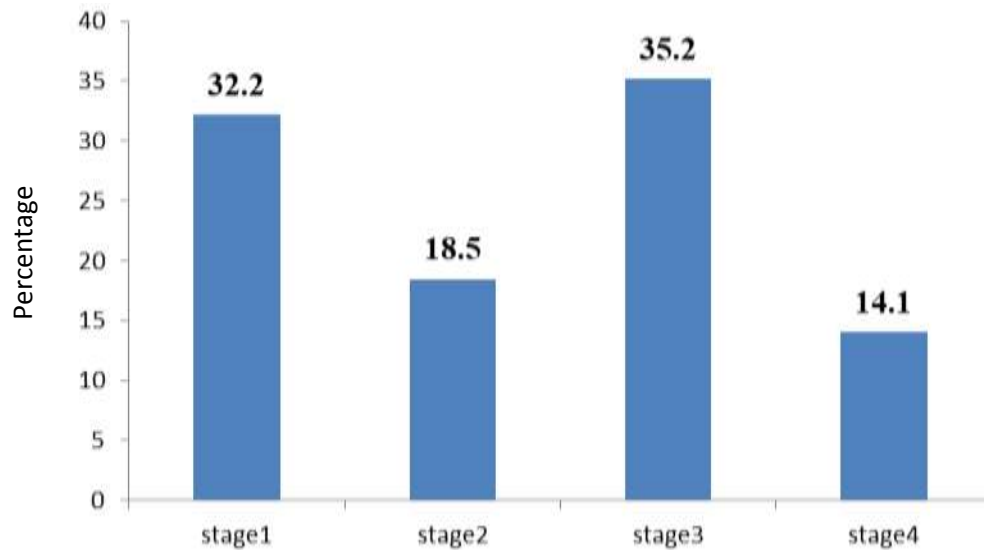
Figure 2. WHO clinical stage of people living with HIV/AIDS attending ART clinic in Jimma University Specialized Hospital.
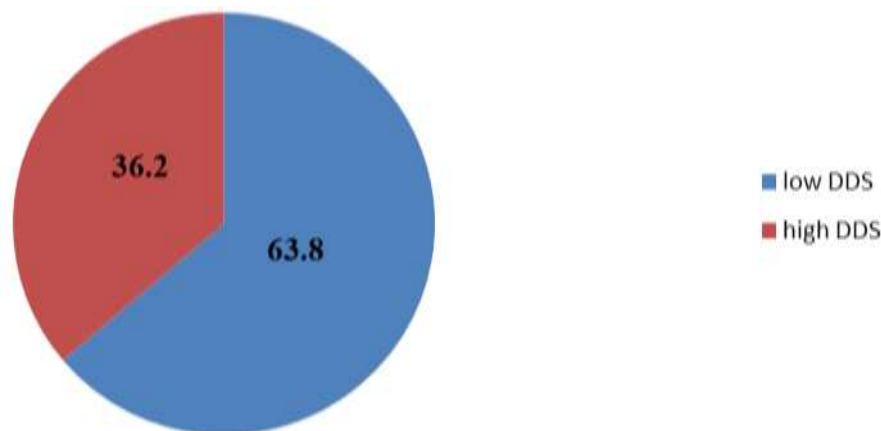

Figure 3. Dietary diversity score of people living with HIV/AIDS attending ART clinic in Jimma University Specialized Hospital.

referral hospitals (Hailemariam et al., 2013; Thapa et al., 2015). Basically, individuals at all stages of HIV disease are at risk of nutritional deficiency but clinical stages show the severity of the disease from primary HIV infection to advanced stages of HIV or AIDS (Munthali et al., 2014). As the disease progresses, there will be increment in energy need and development of different opportunistic infections which affects the appetite, absorption, and utilization of nutrients from the diet (RCQHC, FANTA Project, 2000; WHO, 2003).

It is well-documented that adequate nutrition is vital for the health and survival of all individuals regardless of HIV status (Muthamia et al., 2014). In the current study, patients consuming low dietary quality foods (DDS of 3 and below) were 3.6 times more likely to be undernourished than those patients consuming foods with high dietary quality. This finding is consistent with a study conducted in Ghana which shows positive association between dietary quality and nutritional status (Muthamia et al., 2014. This is because dietary diversity has been recognized as an indicator of food security, with consumption of more food groups suggesting better nourishment. Greater dietary diversity has been associated with better nutritional outcomes and improved micronutrient intake (Akwiwu and Akinbile, 2012).

The results imply the need for inclusion and strengthening of dietary care and avoidance of alcohol intake in the delivery of a counseling service for people

Table 3. Bivariate and multivariable logistic regression model predicting the likelihood of under nutrition among People living with HIV/AIDS attending antiretroviral clinic in Jimma University Specialized Hospital.

Variable	Nutritional status		COR	AOR	P-value
	Undernourished	Well nourished			
Alcohol consumption					
No	58	194	0.29 (0.15-0.57)	0.13 (0.05-0.32)	0.001*
Yes	23	23	1.00	1.00	-
WHO staging of the disease					
I	13	82	0.17 (0.7-0.4)	0.2 (0.07-0.52)	0.001*
II	11	44	0.27 (0.11-0.67)	0.25 (0.085-0.75)	0.014*
III	36	68	0.58 (0.28-1.2)	0.65 (0.27-1.54)	0.334
IV	20	22	1.00	1.00	-
DDS					
Low	61	129	2 (1.17-3.69)	3.6 7 (1.72-7.817)	0.001*
High	20	88	1.00	1.00	-

COR, Crude odds ratio; AOR, adjusted odds ratio.

living with HIV/AIDS attending ART services to prevent undernutrition.

The results of this study should be interpreted by consideration of the following limitation. Although single 24 h dietary recall may show the dietary intakes; in a group level, it does not indicate the usual intake of individuals.

This study did not quantify the nutrient intake from the foods consumed. The finding of the current research cannot be generalized to the whole community, because of its institution based nature.

Conclusion

The results attest to the high prevalence of undernutrition among people living with HIV/AIDS in Jimma Town, Southwest Ethiopia. The odd of undernutrition is significantly associated with alcohol consumption, WHO clinical stage and dietary quality of the food. Therefore, concerted efforts should be made to create awareness through behavior change communication for all patients regarding no or minimal alcohol consumption and dietary diversification, enhanced care, standard follow up and timely initiation of ART and management of opportunistic infections (OIs) should be practiced and nutritional support should be given. Finally, the authors recommend other longitudinal study and a study which accounts for "dose-response" effect.

CONFLICT OF INTERESTS

The authors have not confirmed any conflict of interests.

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