

ORIGINAL ARTICLE**Prevalence of Malnutrition and Associated Factors among Hospitalized Patients with Acquired Immunodeficiency Syndrome in Jimma University Specialized Hospital, Ethiopia****Habtamu Mulu¹, Leja Hamza¹, Fesehay Alemseged²****ABSTRACT**

BACKGROUND: *HIV/AIDS predisposes to malnutrition. Malnutrition exacerbates HIV/AIDS progression resulting in increased morbidity and mortality. The magnitude of malnutrition in HIV/AIDS patients has not been well studied in Ethiopian setup. Our objective was to assess the prevalence of malnutrition and associated factors among HIV/AIDS patients admitted to Jimma University Specialized Hospital (JUSH).*

METHOD: *A cross-sectional study was conducted to assess the nutritional status of 109 HIV/AIDS patients admitted from November 2013 to July 2014. Cohort design was also used for outcome assessment. Serum levels of hemoglobin, albumin and CD4 counts were determined. Data were organized, coded, cleaned, entered into a computer and analyzed using SPSS version 16.0. Descriptive analysis was done initially. Those variables in the bivariate analysis with P-value < 0.25 were then considered as candidates to be included in the multivariable logistic regression model. A P-value of < 0.05 was considered as statistically significant.*

RESULTS: *The mean age of the patients was 32.7±8.12 with male to female ratio of 1:1.9. Patients were in either clinical stage, 3(46.8%), or stage, 4(53.2%). Forty nine (45%) of the respondents had a CD4 count of < 200 cells/μL. The overall prevalence of malnutrition was 46.8% (BMI<18.5kg/m²) and 44.1% (MUAC≤ 20cm). Eighty four (77.1%) of the patients had a serum albumin level of ≤3.5g/dl while 76 (69.6%) of the patients had anemia (Hg<12g/dl).*

CONCLUSION: *The prevalence of malnutrition was found to be high. WHO Stage 4 disease and CD4 count <200cells/μl were independent predictors of malnutrition.*

KEYWORDS: *Malnutrition, HIV/AIDS, WHO Clinical Stage, CD4 count, Jimma, Ethiopia*

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INTRODUCTION

Malnutrition is defined as the cellular imbalance between supply of nutrients and energy and the body's demand for them to ensure growth, maintenance and specific functions (1,2). Nutrition and HIV are strongly related and complement each other. Both can independently cause progressive damage to the immune system. Malnutrition is a frequent problem in persons infected with HIV. It adds fuel to the fire by accelerating the progress of HIV infection to

AIDS. HIV/AIDS is also associated with biological and social factors that affect the individual's ability to consume, utilize and acquire food (1,3).

Causes of malnutrition in patients with AIDS may be multi-factorial. It includes disorders of food intake, opportunistic infections, diarrhea, nutrient malabsorption and wasting syndrome (3,4,5,6). Furthermore, HIV specifically affects nutritional status by increasing energy requirements through alterations in metabolism

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and oxidative stress (5,6,7). HIV/AIDS patients require 10% more energy when asymptomatic and 20–30% more when symptomatic compared to uninfected individuals (4).

The world's highest HIV infection rates are found in Sub-Saharan Africa (SSA). Food shortages and malnutrition have combined with HIV/AIDS to bring some countries to the brink of crisis (8,9). Malnutrition and food insecurity are associated with increased mortality and poor clinical outcomes among people living with HIV/AIDS (10). The HIV/AIDS epidemic has had security and overall socioeconomic development in countries that have been greatly affected by the disease (11).

Attention to the problems of malnutrition in patients with AIDS is of paramount importance because the timing of death in these patients may be more closely related to the degree of body cell mass depletion than to any specific underlying infection [3]. The nutritional problems have been shown to be significant and contribute to morbidity and mortality in HIV+/AIDS patients (8). Evidence indicates that even relatively small losses in weight (5%) are associated with decreased survival rate (12). There is an urgent need for renewed focus on and use of resources for nutrition as a fundamental part of the comprehensive package of care at country level (7, 11).

It has been postulated that the use of HAART would reduce the occurrence of HIV associated weight loss and wasting (13). Commencement of HAART in HIV infected individuals exhibits benefits to the circulating serum albumin levels (14).

Malabsorption resulting from intestinal problems leads to subtherapeutic levels of ARV drugs and treatment failure. Thus, patients with malabsorption could require dose adjustment and/or dietary supplements during periods of diarrheal illness (5).

Malnutrition at the time of starting ART was significantly associated with decreased survival (12,15,16). Low BMI at ART initiation was associated with poor treatment outcomes. Conversely, normal BMI was associated with adequate CD4 response and reduced lost to follow up cases (17). BMI at diagnosis is a strong, independent predictor of survival in HIV-infected patients in West Africa. In the absence of

sophisticated clinical and laboratory support, BMI may also prove a useful guide for deciding when to initiate antiretroviral therapy (10,18).

Unemployment, WHO clinical AIDS stage four, one or more number of previous opportunistic infections and gastrointestinal symptoms were found to be important risk factors for malnutrition among people living with HIV/AIDS (6). Tuberculosis, central nervous system toxoplasmosis and sepsis were the three most common disease complexes among admissions and deaths (19).

Anemia is the most common hematologic abnormality in HIV patients. Anemia is a predictor of progression from HIV infection to AIDS or death; more than 70% of HIV patients develop anemia and thus require blood transfusion (20). Anemia, thrombocytopenia and severe malnutrition were strong independent predictors of mortality (16).

Literatures on the prevalence and factors associated with malnutrition among people living with HIV/AIDS are limited in Ethiopia and not well documented either (6). Only few studies were done on malnutrition and HIV/AIDS in Ethiopia (6,7,19,20). There are no such studies done in hospitalized HIV/AIDS patients in Jimma. Therefore, the aim of this study was to assess the prevalence of malnutrition and associated factors in HIV/AIDS patients who were admitted to medical wards of our hospital during the study period. The outcome of this study is expected to encourage healthcare providers to strengthen the quality of nutritional assessment and care. It can also serve as a baseline for further large scale studies on nutrition and HIV/AIDS.

METHODS AND PATIENTS

The study was done on HIV/AIDS patients hospitalized to 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. The hospital has three medical wards with 85 admission beds. It also has a chronic care and training centre for HIV/AIDS and TB patients.

A hospital based prospective cross-sectional study design was used to study all adult (≥ 18 yrs of age) HIV/AIDS patients admitted to medical wards from November 10, 2013 to July 10, 2014. We also used cohort design to assess our secondary

objective, i.e. the outcome of patients with malnutrition at the end of discharge or at the end of the study. The required sample size was calculated using single population proportion formula, assuming the prevalence of malnutrition among HIV/AIDS patients to be 50%. It was calculated to be 384. From the hospital record, the total number of HIV/AIDS patients admitted to medical wards in the preceding year was 161. Applying a formula for finite population correction, the final required sample size to conduct the study was 114. To get the required sample size, we used convenience sampling. Therefore, All HIV/AIDS patients admitted to JUSH medical wards over the study period were included in the study. Patients with cognitive impairment and those who required immediate intensive care support were excluded. Accordingly, out of 114 admitted HIV/AIDS patients who were admitted during the study period, 109 patients who fulfilled the inclusion criteria were included in the study.

Data were collected by trained medical residents working in medical wards during the study period. Ethical clearance was obtained from the Ethical Review Board of the College of Public Health and Medical Sciences, Jimma University College. The medical director, ward physicians and nurses were contacted before starting data collection. The aim of the study was explained to the study participants. They understood that it has no any harm on them. No one was deprived of any medical treatment and all malnourished individuals were treated in accordance with the protocol of the hospital. To maintain confidentiality of the study participants, any personally identifiable information (e.g. name, address) was not recorded on the data collection format.

A structured questionnaire was used to gather sociodemographic information, and relevant clinical history was collected by interviewing patients using a structured questionnaire. Main variables of interest were time since HIV diagnosis, prior HIV related hospitalizations, medical conditions related to current hospitalization, duration of hospital stay, HAART status, history of drug interruption [adherence] and patient response to therapy [outcome]. Adherence to HAART was defined as regular use of ARVs at the right frequency of dosing and

timing. Ability to keep to this pattern of utilization was defined as 100% adherence, while adherence of >95% was accepted as optimal adherence. Levels of adherence below 95% were considered to be sub-optimal.

Nutritional status was assessed using Body Mass Index [BMI], Mid Upper Arm Circumference (MUAC), serum Albumin and serum Hemoglobin levels. Patients with BMI<18.5kg/m², MUAC < 20cm or serum albumin<3.5g/dl were categorized as malnourished (3,4,14,18). Patients were systematically evaluated for presence of opportunistic diseases and co-morbid illnesses which were further supplemented with the data obtained through patient interview and chart review. CD4 count was determined at the time of admission. Clinical outcome [i.e. patients' clinical status or response to therapy] was assessed at the end of the study period or in-between if an event like discharge, ICU transfer, or death occurred. The occurrence of death, prolonged hospitalization [≥ 14 days], need of ICU admission were considered as unfavorable outcomes. Anthropometric and laboratory measurements were done in a standard way. Weight was measured with a weight scale and height was measured with a height scale after daily calibration before starting data collection. The mean of three measurements of each of the anthropometric measurements were taken and reported as the final measurement. For laboratory assessments of nutritional status, blood tests for serum albumin and hemoglobin were performed by an experienced laboratory technologist. A 5 ml blood sample was taken from the cubital fossa, 2.5 ml was put in an EDTA tube for complete blood count and 2.5 ml was put in a tube with no anticoagulants for serum albumin determination. Serum albumin was determined by HORIBA medical™ ABX Pentra 400 with the use of appropriate human serum controls. Complete blood count determination was done using Cysmex KX21 machine. All results were expressed to the nearest 0.1 decimal place. The data collection instrument was pre-tested on 5% of the total sample size before actual data collection. The process of data collection was daily supervised and monitored by the principal investigator. The completeness and consistency of data is checked before compilation. The compiled

data were organized, cleaned, coded, entered into a computer and analyzed using SPSS version 16.0. First, descriptive analysis was done. Then, bivariate analysis was done to identify factors associated with nutritional status. Those variables with P-value < 0.25 in the bivariate analysis were considered as candidates to be included in the multivariable logistic regression model. A P-value of <0.05 was considered as statistically significant.

RESULTS

Socio-demographic characteristics: A total of 114 HIV/AIDS patients were admitted to medical wards during the study period. One hundred and nine of them fulfilled the inclusion criteria and included in the analysis. Two patients with cognitive impairment, another two patients a devastating impact on health, nutrition, food

who were directly admitted to ICU, and one patient who refused to be included in the study were excluded from the study. This resulted in a response rate of 95.6%.

Seventy-two (66.1%) of the patients were females. The mean age of the study subjects was 32.7±8.12. Fifty (45.9%) of them were in the age group of 25-34 years. Only 20(18.5%) of the respondents had completed college level education. Thirty-four (31.2%) were farmers. The majority of the study subjects, 68(62.2%), were urban residents. The majority of the patients, 83(76.1%), had poor socioeconomic status with annual income of < 1700 Birr, and the mean monthly income was 978 Birr with the majority being in the 2nd and 3rd quartiles (Table 1).

Table 1: Socio-demographic characteristics of HIV/AIDS patients admitted to JUSH from November 2013 to July 2014.

Sociodemographic Characteristics	Category	Frequency	Percent
Age	<24	11	10.1
	25-34	50	45.9
	35-44	37	33.9
	≥45	11	10.1
Sex	Male	37	33.9
	Female	72	66.1
Educational status	Illiterate	39	35.8
	Primary education	30	27.5
	Secondary education	20	18.5
	College and above	20	18.5
Occupation	Government employee	28	25.5
	Merchant	11	10.1
	Farmer	34	31.2
	Student	6	5.5
	unemployed	30	27.5
Monthly income (in Birr)	<193	27	24.8
	193-420	28	25.7
	421-1700	28	25.7
	>1700	26	23.9
Residence	Urban	68	62.4
	Rural	41	37.6

Clinical characteristics: Seventy five (68.8%) of the study subjects were known HIV/AIDS patients already on chronic care and follow-up. Of these, 64(85%) were on HAART. Fifteen (23.4%)

of the patients taking HAART had sub-optimal (<95%) adherence. All of the patients admitted were in either WHO clinical stage III, 51(46.8%) and stage IV, 58(53.2%). The average current

CD4 count was 247.7 ± 165 cells/liter, and 49(45%) of the respondents had a CD4 count of less than 200 cells/liter. The major medical conditions associated with the current hospitalization were tuberculosis (both pulmonary and disseminated TB), 36(33%), bacterial pneumonia, 24(22%), severe anemia, 24(22%), and oro-esophageal candidiasis 18(16.5%). The average hospital stay was 19.3 ± 10.6 days and 69(63.3%) of the patients were hospitalized for more than 14 days. Patients

with malnutrition stayed for 22.7 days on average, while those without malnutrition stayed for 16.3 days. A large proportion of patients with malnutrition (80.3%, n=41) had greater than 14 days of hospital stay as compared to those who are not malnourished (48.3%, n=28). Most, 70(64.2%), of the patients were discharged improved, while 23(21.1%) of them died (Table 2).

Table 2: Clinical characteristics of HIV/AIDS patients admitted to JUSH from November 2013 to July 2014

Clinical Characteristics	Category	Frequency	Percentage
Time since HIV Diagnosis	New	34	31.2
	<2years	33	30.3
	≥ 2 years	42	38.5
On HAART	Yes	64	58.7
	No	45	41.3
Medical conditions associated with current hospitalization	Tuberculosis	36	33
	Pneumonia	24	22
	Severe anemia	24	22
	PCP	8	7.3
	Oro-esophageal candidiasis	18	16.5
	Bacterial meningitis	9	8.3
	CNS Toxoplasmosis	6	5.5
	Cryptococcal meningitis	4	3.7
	Chronic diarrhea	7	6.4
	GI onset sepsis	4	3.7
	CLD, chronic viral hepatitis	4	3.7
	Others*	40	36.7
	2 or more comorbidities		
WHO Clinical Stage	Stage III	51	46.8
	Stage IV	58	53.2
CD4 Count at admission	<200	49	45
	≥ 200	60	55
Days of hospitalization	<14days	40	36.7
	≥ 14 days	69	63.3
Outcome	Improved	70	64.2
	The Same	7	6.4
	ICU admission	9	8.3
	Death	23	21.1

*NHL, acute viral hepatitis, IRIS, brain abscess, Kaposi sarcoma, splenic abscess, ESRD

Nutritional status: The average BMI and MUAC was 19.0 ± 3.39 and 21.5 ± 3.75 , respectively. Fifty-one (46.8%) and 46(42.2%) of the patients were malnourished using BMI < 18.5kg/m² and MUAC < 20cm, respectively. The mean serum albumin was 2.87 ± 0.73 . Eighty-four (77.1%) of the

patients had a serum albumin of less than 3.5g/liter. The mean hemoglobin was 9.7 ± 3 . Seventy-six (69.6%) of the patients were anemic (Hg < 12g/dl), and 19 (17.7%) of them had severe anemia (Table 3).

Table 3: Nutritional status of HIV/AIDS patients admitted to JUSH from November 2013 to July 2014.

Nutritional status	Category	Frequency	Percent
Body mass index	<18.5	51	46.8
	≥18.5	58	53.2
MUAC	<20	46	42.2
	≥20	63	57.8
Albumin	<3.5	84	77.1
	≥3.5	25	22.9
Hemoglobin	<7	27	24.8
	7-9.9	30	27.5
	10-11.9	19	17.4
	≥12	33	30.3

Factors associated with malnutrition: Among the socio-demographic variables, only female sex and being farmer were found to have statistical association with malnutrition (Table 4).

The clinical variables significantly associated with malnutrition were longer duration (> 2years) since HIV diagnosis, having two or more opportunistic diseases/co-morbidities, longer duration (>14 days) of hospital stay, not being on HAART, suboptimal adherence to HAART, advanced clinical stage and in-hospital mortality. Similarly, CD4 count < 200 cell/μl, serum albumin <3.5 gm/dl and serum hemoglobin < 7gm/dl were found to be significantly associated with malnutrition (Table 5).

Table 4: Association of socio-demographic variables with nutritional status in HIV/AIDS patients admitted to JUSH, from November 2013 to July 2014.

Variables	Category	Nutritional status		P- value
		BMI≥18.5	BMI<18.5	
Sex	Male	20	17	0.016
	Female	38	34	0.899
Age group	≤24	5	6	1.863
	25-34	28	22	0.601
	35-44	21	16	
	>44	4	7	
Marital status	Single	9	12	3.099
	Married	28	18	0.377
	Divorced	9	6	
	Widowed	12	15	
Residency	Urban	40	28	2.287
	Rural	18	23	0.130
Educational status	Illiterate	19	20	7.340
	Primary	13	17	0.62
	Secondary	10	10	
	College& above	16	4	
Occupation	Government employee	22	6	13.258
	Merchant	4	7	0.021
	Student	3	3	
	Farmer	16	18	
	Unemployed	13	17	
Income (in birr)	<193birr/month	12	15	4.143
	193-420birr/month	12	16	0.246
	421-1700birr/month	18	10	
	>1700birr/month	16	10	

Table 5: Association clinical and laboratory variables with nutritional status in HIV/AIDS patients admitted to JUSH, from November 2013 to July 2014.

Variables	Category	Nutritional status		P- value
		BMI>18.5	BMI<18.5	
Time of HIV diagnosis	New	12	22	6.384
	<2years	20	13	0.041
	≥2years	26	16	
2 or more co-morbidities	Yes	9	31	23.938
	No	49	20	0.001
WHO Clinical stage	Stage 3	40	11	24.486
	Stage 4	18	40	0.000
HAART	Yes	40	24	5.373
	No	18	27	0.020
HAART Adherence	Optimal	34	15	4.232
	Sub-optimal	6	9	0.040
Prior HIV related admission	Yes	19	17	2.137
	No	27	12	0.144
CD4 count at admission	<200	18	31	9.706
	≥200	40	20	0.002
Mortality	Yes	8	15	3.976
	No	50	36	0.046
Hospital stay	<14days	30	10	12.049
	≥14days	28	41	0.001
Serum albumin	<3.5	35	49	19.605
	≥3.5	23	2	0.001
Hemoglobin	<7	9	18	17.009
	7-9.9	11	19	0.001
	10-11.9	12	7	
	≥12	26	7	

However, multiple logistic regression analysis showed that only advanced clinical disease and lower CD4 count were independent predictors of malnutrition. Patients with stage 4 disease had 14.5 times more likelihood of being malnourished

(95% CI 3.621, 58.297). Similarly, the likelihood of malnutrition in patients with baseline CD4 count < 200 cells/ μ liter was 5.7 times more than their counterparts (95% CI 1.286, 25.375) (Table 6).

Table 6: Multiple logistic regressions of clinical stage and baseline CD4 count with nutritional status of HIV/AIDS patients admitted to JUSH, from November 2013 to July 2014.

Variables	Category	Nutritional status		p-value	AOR(95.0% CI)
		BMI(18.525.0)(Ref)	BMI(<18.5)(1)		
Clinical stage	Stage 3	40	11	.000	1
	Stage 4	18	40		14.529(3.621,58.297)
CD4 count at admission	<200	18	31	.022	5.713(1.286,25.375)
	≥200	40	20		1
	Constant			.000	.045

DISCUSSION

A total of 109 HIV/AIDS patients were included in the analysis. Fifty (45.9%) of the study subjects were in the age group of 25-34 years, which is the most affected age group by HIV according to Ethiopian Demographic and Health survey [DHS] 2011 report. This is also in line with findings from other studies in similar setups (4,6,19).

The overall prevalence of malnutrition was found to be high. This is comparable with the rate of malnutrition in hospitalized AIDS patients in similar setups (6,16,17,19,20). This is because most of the admitted AIDS patients had advanced disease stage with CD4 counts < 200/ μ L which is known to be related with malnutrition. The higher rate of concomitant opportunistic diseases like tuberculosis in such patients could also contribute to the high prevalence of malnutrition. Similarly, most of our patients were also found to be anemic. This can be justified by the advanced stage of the disease, high prevalence of malnutrition, low socioeconomic status, high occurrence of co-morbidities and drug side effects (3, 6, 7, 10, 16, 19).

All of the patients admitted were either WHO clinical stage III or stage IV. Thirty nine (35.8%) of our patients had unfavorable outcome with overall mortality of 21.1%. The major medical condition associated with current hospitalization was tuberculosis (33%) followed by pneumonia (22%) and anemia (22%). Having two or more co-morbid medical conditions at admission had a significant association with malnutrition (p value=0.001). Similarly, long duration of hospital stay and in-hospital death were statistically associated with malnutrition (p value=0.019; p value=0.007, respectively). This is also in line

with the commonest causes of HIV/AIDS related admissions and mortality worldwide (6,7,9,10,12,16,17, 18,19). Patients with clinical stage 4 disease were found to have more than 14 times higher likely hood of being malnourished compared to those with clinical stage 3 disease (AOR=14.529; 95.0% CI=3.621,58.297). This is also comparable with other studies which showed similar results (3, 6, 7, 12, 15, 16, 19).

Most of the patients were hospitalized for 14 or more days. The length of hospital stay had a statistically significant association with nutritional status (P=0.001). The average hospital stay was 19.3 \pm 10.6 days. This is a shorter duration compared to the mean length of hospital stay (27.5 days) found by a similar study done in a national referral hospital (19). Since the later study was conducted in a national referral hospital, there is increased chance of admitted patients being more complicated and critical who are referred from all regions of the country. Moreover, it was conducted in 2003 before the wide spread use of HAART which is important for favourable treatment outcome and shorter hospital stay. On the other hand, the duration of hospital stay in our study is longer than the average HIV-related hospital stays in Australia (14 days) and in USA (6.9 days). This could be due to the fact that the studies were done at different setups and level of standards of care. The higher rate of malnutrition could also contribute to the prolonged hospital stay in our study. Other similar studies done in Ethiopian setup did not analyze the length of hospital stay (6,7,20).

Similarly, patients with CD4 count below 200 cells/ μ liter had more than fivefolds chance of being malnourished compared to those with CD4 count \geq 200cells/ μ liter (AOR=5.713; 95.0% CI=1.286, 25.375). Similar studies done in

Ethiopian setup (6,7,20) showed similar association between CD4 count and nutritional status. The finding also goes with similar studies done in other developing countries (4,16,17). Even a study done in developed countries showed statistically significant association of lower CD4 count (<100cells/ μ l) with malnutrition (14).

In conclusion, most of our patients were younger with male to female ratio of 1:1.9. The majority of them were also found to have poor socioeconomic status and advanced stage of AIDS with high rate of opportunistic diseases and/or co morbidities. As a result, most of them also had longer (≥ 14 days) hospital stay with unfavorable outcomes.

The overall prevalence of malnutrition was found to be high. WHO clinical stage 4 diseases and CD4 count <200/ μ L were independently associated with malnutrition. We recommend comprehensive nutritional assessment and care with special emphasis on patients with CD4 count of less than 200/ μ L and/or those with advanced stages of the disease as part of their HAART care. We also recommend that large scale prospective cohort study be conducted including all HIV/AIDS patients in Ethiopian setup.

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