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ORIGINAL ARTICLE

NUTRITIONAL STATUS OF ADULTS LIVING WITH HIV/AIDS AT THE UNIVERSITY OF GONDAR REFERRAL HOSPITAL, NORTHWEST ETHIOPIA

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ABSTRACT

Introduction: *People living with HIV (PLHIV) are more likely to become malnourished due to reduced food intake or poor absorption of nutrients. While nutritional management is considered as a vital part for the effectiveness of the ART program in Ethiopia in general and in Gondar in particular, studies on nutritional assessment of PLHIV are limited, if at all available. This study is, therefore, important in that it aims to show the nutritional status of PLHIV and the risk factors for malnutrition.*
Objective: *The objective of this study was to assess adult nutritional status and associated factors among PLHIV on ART at UoG Referral Hospital.*
Methods: A h*ospital-based cross-sectional study was conducted from October 01 to November 30, 2007, at UoG Referral Hospital. The systematic sampling technique was used to select study subjects from all adult ART clients. One physician and four nurses collected the data using clinical assessment, measurements, and interview. BMI and percentage of body weight loss were calculated from the data. Logistic regression analysis was done to identify factors associated with malnutrition.*
Results: *The complete records of 331 subjects (64.4% female and 35.6% male) were obtained and included in the analysis. The mean (±s.d) age was 33.9 ± 8.2 years; the prevalence of malnutrition (BMI<18.5kg/m^2) was 27.8%. The percentage of body weight lost was (BWL>5%) was 60.9%. Severe malnutrition (BWL>20%) accounted for 10.1%. Income, duration of ART in months, presence of eating problems, and nutritional support were significantly associated with malnutrition (BMI<18.5). BWL showed statistically significant relationship with nutritional support and duration of ART.*
Conclusion and recommendation: *There is a high burden of malnutrition in PLHIV. Income, eating problems, duration of ART, and current clinical condition were associated with malnutrition in this group of patients. Nutritional assessment and management, timely initiation of ART, and treatment of eating problems should be the key intervention during the course of chronic HIV care and follow up.*

Key words*: nutritional status, HIV/AIDS, developing country, North Gondar*

INTRODUCTION

The estimated number of Adults living with HIV worldwide in 2007 was 30.8 million (28.2–33.6 million) of which Sub-Saharan Africa's share constitutes 22.5 million (20.9 million–24.3 million) people living with HIV/AIDS *(1).*

In Ethiopia, 1.4 percent of the adults aged 15-49 are infected with HIV. Based on ANC sentinel surveillance, the adjusted national HIV prevalence in 2005 was 3.5%. The estimated prevalence in urban areas was 10.5% and 1.9% in rural areas (2-3). According to the report of the HIV/AIDS Prevention and Control Office (HAPCO) Ethiopia, the single point estimate of HIV prevalence is 2.1% (4).

In Ethiopia, the ART program, mainly for people who could afford to pay for the treatment, was launched in July 2003 and the Road Map in June 2005. By the end of September 2007, 109,252 people 51% of whom were female, started ART in 272 treatment sites at the national level. Currently, about 82,248 people, 77,904 (94.7%) of whom are adults above the age of 14, are on ART. Ethiopia has one of the world's highest incidences of undernourished individuals. About 47% of the children under five experience chronic and 24% severe malnutrition *(2, 8).*

Malnutrition and HIV/AIDS compound one another.

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People Living With HIV (PLHIV) are more likely to become malnourished due to reduced food intake, poor absorption of nutrients, and changes in the way the body uses nutrients it receives or has stored(*9).* Malnutrition contributes to immune impairment, making the body vulnerable to frequent illnesses and increasing demand for energy and nutrients, thereby accelerating disease progression. Malnutrition can also increase an individual's risk of contracting HIV by forcing her/him into high-risk activities to secure the daily consumption *(9, 10).*

This complex interaction acts through the immune functions of the body *(11).* Optimal nutrition can help boost the immune function, maximize the effectiveness of antiretroviral therapy, reduce the risk of chronic illnesses, such as diabetes and cardiovascular disease, and contribute to a better overall quality of life. One general impact is the number of impoverished female-headed households which increases as the male breadwinner of the household dies of AIDS *(12, 13).*

The direct and indirect effects of HIV/AIDS on nutritional status are decreased intake, impaired nutrient absorption, changes in metabolism, and increased requirements for energy of up to 10%-15%, protein≥50%, vitamins (E, C, beta-carotene) and mineral (zinc, selenium, iron) *(14, 15).As a result,* AIDS related wasting occurs in a significant number of patients. Nutritional status may also be a major determinant of survival in patients with HIV (16-19).

Measuring nutritional status among PLHIV is an essential part of the ART program. It involves the assessment of risk in HIV/AIDS positive persons, estimating percentage of body weight loss and Body Mass Index (BMI) *(20-22). Weight loss and wasting prevalent among HIV/AIDS patients are predictors of prognosis, but ARV reduces the incidence of these conditions (23-25).Studies reveal that* mild malnutrition is observed in 12.9% of the participants (95%CI: 10.3±23.5), and moderate and severe malnutrition in 16.9% and 8.1%, respectively using (the BWL index *22).* Muscle mass and fat mass proportions are mostly below the ideal proportions for their body weights (26).

Studies found out that deficiencies of one or several micronutrients, especially of vitamins B12, E, A, and β carotene have been associated with accelerated progression to AIDS *(11, 27).*
Patients who had jobs, family situation, affection, rural residence, a CD4 count of <200, and anemia were associated with poor nutritional condition *(28-34).*

In an experimental study, episodes of diarrhea, nausea or vomiting, lower respiratory tract infections, oral ulcers, thrush, severe anemia, and low CD4+ cell counts were each significantly related to an increased risk of wasting. Vitamins C, E and B complex have a protective effect on wasting in HIV-infected women ***(35-37).***

The problem of HIV/AIDS and malnutrition in Ethiopia is so marked that it needs descriptive as well as analytic research for better awareness on the nutritional status and on the determinants of malnutrition in order to design palliative programs accordingly.

While nutritional management is considered as a vital part of the ART program effectiveness, in Ethiopia in general and in Gondar in particular, studies on nutritional assessment of PLHIV are limited, if at all available. This study is important in that it will show the nutritional status of PLHIV and the risk factors associated with malnutrition which can be used by health workers for nutritional management. The aim of the study was to determine nutritional status and identify factors associated with malnutrition among adult PLHIV at UoG Referral Hospital.

PATIENTS AND METHODS

Study Design: Institution based cross-sectional study was conducted at UoG Referral Hospital from October 1 – November 30, 2007.

Study Area: The University of Gondar Referral Hospital is found in Gondar city, which is located 727 km northwest of Addis Ababa, and has a population of about 260,000(38). Gondar is one of the towns strongly affected by HIV/AIDS epidemic with a prevalence of 10.3% *(7).* The ART service for the University of Gondar Hospital was initiated in 2005 and has had Adult, Paediatric, and PMTCT clinics. In the adult ART clinic, there were about 3600 persons on HIV care of whom 2,468 were started on ART.

Source and Study Population: The source population includes all adult HIV/AIDS patients who are on anti-retroviral treatment (follow up) in Gondar city and its surroundings. The study participant were all male and female adult clients above the age of 15, attending ART in the adult clinic of UoG Referral Hospital for any duration of treatment.

Sample size and sampling procedure: The sample size of the study was calculated using the formula for the estimation of single proportion as *(39):*

$$n = \frac{z^2_{\alpha/2} \times p(1-P)}{w^2}$$

with the following assumptions:

n = sample size

p = proportion of HIV positive individuals with malnutrition (taken as 50%).

W = maximum allowable error (margin of error) = 0.05

Z = value of standard normal distribution (Z-statistic) at 95% confidence level *(z=1.96).*

n = 384 subjects

The study population was less than 10,000; finite population, correction was employed to decrease the sample size as follows

$$n_f = \frac{n_i}{1+\frac{n_i}{N}} \quad \text{and this gave} \quad \frac{384}{1+\frac{384}{2468}} = 332$$

subjects

Where; N= number of clients following ART at UoG hospital (N=2468).

n_i= initial sample size;

n_f= final(corrected) sample size

Taking the average number of patients who come for follow up to be 1200 per month based on daily observation of patient flow in the clinic, the sampling fraction of ¼ was used to determine. The study subjects were selected by the systematic sampling technique making a continuous list of subjects from the first to last day of data collection. The first subject was selected from first day registration of patient one to four using the lottery method and then taking every 4^{th} individual from the list of clients (sampling fraction is k= n/N = 1200/332 =4) and going on serially until the total number is achieved. Each patient was recruited (studied) only once, on his/ her first visit during the study period, if selected. Repeat visits were excluded by recording registration numbers of each client at the time of interview and checking thereafter for avoidance of possible repetition.

Variables of the Study: The dependent variable of the study is nutritional status (as measured by percent of BWL and BMI) of PLHIV on ART.

The independent variables of the study are: Socio-demographic variables (including sex, economic status, educational level and job presence/absence, marital status), clinical stage of HIV disease, regimen of ART, presence of nutritional support, current clinical condition, presence concomitant/ opportunistic infections, presence of eating problem, and duration of ART.

Operational definitions: Economic status is classified using the income quintile measure calculated based on the average monthly income (all types changed to cash per month) reported by subjects and taken as lowest to fifth quintile (2, 40, 41).

Usual Body Weight is the weight a person has in the majority of measurements he had prior to detection and notification of HIV infection by the health worker.

Nutritional Status is the nutritional condition of a subject as can be classified according to percentage BWL and BMI classification tools:-

Body Weight Loss: According to the criteria for classification *(42, 43),* patients were categorized into four classes of nutritional status using the percentage of body weight loss (BWL), calculated by reference to the usual body weight (UBW), as follows:

(1) BWL $\leq$ 5% (no malnutrition)

(2) 5 % < BWL $\leq$ 10% (mild malnutrition)

(3) 10 % < BWL $\leq$ 20% (moderate malnutrition)

(4) BWL > 20% (severe malnutrition).

Body Mass Index (BMI): is the ratio of weight to height in meters squared.

Using the BMI calculation, the subjects nutritional status was classified as *(44, 45):*

<18.5 = Underweight

18.5-24.9 = Normal weight

25-29.9 = Overweight

30 and above=Obese

Data collection instruments: The English version of the questionnaire was tested in the University of Gondar Hospital on ten patients by the data collectors for the presence of ambiguous words/sentences, checking order of questions, estimate time required, and then structured. The weighing scale and the measuring scale for height were prepared and checked to make measurements reliable. Patients were transferred from nurses to physicians after the necessary assessment for further clinical evaluation.

Data on socio-demographic and nutritional history were collected using the structured and pre-tested questionnaire by clinical nurses working in the clinic. Clinical diagnosis for opportunistic infection (OI) and other illnesses as chronic illness and staging was made by physicians using standard diagnostic techniques and WHO staging criteria *(46, 47).*

Clinical staging at diagnosis was used as correlate of the nutritional status based on the WHO criteria. Current clinical stage assessment is not a principle be-

cause once a person is identified as having a clinical stage, new stages will not be assessed. But transition to severe stages is possible.

Measurement of weight was conducted using a standard beam balance that is used for weight measurement in the medical setup.The scale pointer was checked at zero before taking every measurement. The person was required to dress in light clothes. Women were asked to remove scarf. He/she stood straight and unassisted on the centre of the balance platform. The single measurement of weight was recorded to the nearest 0.1kg.

Height was measured using the standard scale. The subjects were asked to remove their shoes, stood erect, postioned at the Frankfert plane with feet together and knees straight. The heels, buttocks, shoulder blades and the back of the head (occiput) were in touch against the vertical stand of the stadio meter and the values were recorded to the nearest 0.1cm.
BMI was calculated using the formula: BMI = Weight in kgs/ (Height in mts)^2

Then classification was made using the standard BMI chart. Self-reports of usual body weight (UBW) and weight measurements taken to define body weight loss (BWL) as a percentage of UBW according to the formula:

$$BWL=100-\left(\frac{\text{current body weight}}{\text{UBW}}\times 100\right)$$

Data collectors were one medical doctor (working in HIV care clinic) and four nurses who are working in the general HIV care and refill clinics. Initial contact has been with the nurses and then sent to the physician for further evaluation of current condition and presence of OI.

Training on how to conduct interview, obtain consent, how to measure weight and height, and record data, along with discussion of terms used in the questionnaire was provided by the principal investigator for half a day to all data collectors. All procedures for data collection were cleared during the discussion. A training guideline was prepared and presented during the training period.

Data quality checking: was conducted everyday by the principal investigator for the completeness of each questionnaire and errors in registration. On the site observation during the data collection was also made and five percent of the questions were cross – checked by the principal investigator daily. The training of the data collectors and the pre-testing of the data collection tools was done prior to the start of data collection.

Data processing and analysis: Data was checked, coded, and entered to SPSS version 13.0 statistical package for windows, and analysis was made. Data entry was managed by the principal investigator. After checking, the data were analyzed using Odd's ratio with 95% confidence interval, and binary as well as multiple logistic regression analyses were done to determine the effect of numerous factors on the outcome variable and to control confounding effects. The prevalence of malnutrition was determined and analysis carried out for the determination of the relationship between predictor variables and malnutrition.

Ethical considerations: Ethical clearance was obtained from the Institutional Review Board of UoG and permission from the Medical Director of the Hospital. Informed verbal consent was obtained from each study subject after explanation that they would take part in the research and that their involvement would begin after their complete consent. Anyone not willing to participate in the study had full right not to do so or withdraw any time during data collection. Confidentiality was ensured from all data collectors and the principal investigator by using code numbers rather than names and by keeping the questionnaire locked.

Subjects identified as malnourished were given nutritional counseling in consultation with the clinician working in the ART Clinic, and those who could not afford to support themselves were helped by contacting local NGO's (OSSA, Mother Theressa) for possible help.

RESULTS

Socio-Demographic Characteristics: A total of 331 patients on ART were included in the study with a response rate of 99.7%. The majority were female 213(64.4%), while 118(35.6%) were male. The mean age of the respondents was 33.9years, with a standard deviation of 8.2 years. The largest number of the clients were in the age range of 25-45years (50.2%). Ninety-four (28.4%) were jobless while farmers accounted for 8.2% of the cases **(Table-1)**.

Table-1 - Socio-Demographic Characteristics of PLHIV on ART at UoG Referral Hospital, Gondar, December 2007, (n=331).

Characteristic		Number	Percent
Sex of respondent	Male	118	35.6
	Female	213	64.4
Age	15-24	27	8.2
	25-34	162	48.9
	35-44	103	31.1
	45-54	34	10.3
	55+	5	1.5
Residence	Urban	300	90.6
	Rural	31	9.4
Marital status	Married	114	34.4
	Single	51	15.4
	Divorced	78	23.6
	Widowed	82	24.8
	Separated	6	1.8
Ethnic Group	Amhara	315	95.2
	Tigrie	14	4.2
	Others	2	0.6
Religion	Orthodox	303	91.5
	Muslim	24	7.3
	Others	4	1.2
Educational level	Cannot read and write	105	31.7
	Read and write only	20	6.0
	Elementary	72	21.8
	Secondary	94	28.4
	above grade 12	40	12.1
Occupation	Farmer	27	8.2
	Merchant	42	12.7
	Government employee	66	19.9
	Daily labourer	84	25.4
	Commercial sex Worker	2	0.6
	No job	94	28.4
	Others	16	4.8
Income quintile	1	78	23.6
	2	72	21.8
	3	53	16.0
	4	62	18.7
	5	66	19.9
Total		331	100.0

Medical and Related Problems of Respondents: Many of the clients visited the health institution in WHO clinical stage III 221(66.8%), followed by stage IV 63 (19%), but the majority, 311(94%) of the total clients improved from the initial state of illness.

Eating problem was observed in 71(21.5%) patients, the commonest being loss of appetite in 55(77.5%) followed by swallowing difficulty in 14(19.7%).

The study identified opportunistic infections (OI) among 289(87.3%) patients; Tuberculosis was the leading OI observed, in 152 (45.9%) patients. The next common OI is chronic diarrhoea observed in 85 (25.7%) patients, followed by oral and oesophageal trush 83(25.1%) **(Table-2).**

Table-2 - Medical and other related problems of PLHIV at UoG Referral Hospital, Gondar; December 2007, (n=331)

Disease/problem		Number	Percent
Eating problems	Yes	71	21.5
	No	260	78.5
Type of eating problem	Swallowing Difficulty	14	19.7
	Loss of Appetite	55	77.5
	Others	3	4.2
Current or past opportunistic infection	Chronic Diarrhoea	85	25.7
	Chronic cough	61	18.4
	CNS infections	14	4.2
	Tuberculosis	152	45.9
	Thrush	83	25.1
	Other	11	3.3
	HZA	77	23.3
	URTI	5	1.5
Current condition in relation to clinical stage(condition at present)	No	42	12.7
	Improved	311	94.0
	Same	15	4.5
	Deteriorated	5	1.5
Clinical staging (WHO criteria)	Stage I	3	.9
	Stage II	44	13.3
	Stage III	221	66.8
	Stage IV	63	19.0

Dietary History and Nutrition Related Profiles: The dietary frequency assessment of the study subjects showed that 177 (53.5%) were taking staple diet (injera with wat) three or more times a day. Nutritional care and support was provided to 86(26%) of the subjects from one of the NGO's in Gondar (WFP, OSSA and Mother Theresa) which provided food stuff to the majority, 81(92%) of the subjects **(Table -3).**

Table- 3 - Food support and related conditions of PLHIV in UoG Referral Hospital, Gondar, December 2007

Characteristic		Number	Percent
Food and related support	Yes	88	26.6
	Food products	81	92.0
	Money & Clothing	9	10.2
	Shelter and Food	2	2.3
	No	243	73.4
Duration of Support	< 1 month	3	3.4
	1-3 months	22	25.0
	>3months &continuing	63	71.6
Witnessed food allergy or intolerance	Yes	5	1.5
	No	326	98.5
	Total	331	100.0

HIV Treatment and Related Conditions of PLHIV: The commonest regimen prescribed was 1c used in 85(25.7%) with a similar proportion 83(25.1%) of 1a (30). Side effects of either ART or OI treatment were observed in 68 subjects, with the commonest side-effect being any form of neuropathy, seen among 20 patients. Anaemia is the second common side effect of ART observed in 17(25%) subjects due mainly to AZT **(Table-4).**

Table-4 - HIV treatment status of PLHIV at UoG Referral Hospital, Gondar December 2007 (n=331)

Treatment condition		Number	Percent
Type of ART regimen currently in use	1a(30)	83	25.1
	1a(40)	19	5.7
	1b(30)	70	21.1
	1b(40)	11	3.3
	1c	85	25.7
	1d	60	18.1
	second line	3	.9
Change of regimen of ART	Yes	63	19.0
	No	268	81.0
Reasons for changing Regimen	Side effect	52	82.5
	resistance	3	4.8
	TB treatment	10	15.8
	others	2	3.2
Side effect of ART or OI treatment	Yes	68	20.5
	No	263	79.5
Type of side effect	Neuropathy	20	29.4
	Anemia	17	25
	Hepatotoxicity	12	17.6
	Food drug interaction	7	10.3
	Rash	6	8.8
	Vomiting	4	5.9
	other	4	5.9
Interruption of treatment	Yes	17	5.1
	No	314	94.9
Duration of ART in months	<1 month	22	6.6
	1-3 months	37	11.2
	3-6months	42	12.7
	>6months	230	69.5
	Total	331	100.0

Nutritional Status of PLHIV: The prevalence of the overall malnutrition is 60.9% with mild malnutrition (BWL between 5-10%) 22%, moderate (10-20% BWL) 28.8%, and severe malnutrition (>20%BWL) 10.1%. There was no malnutrition (body weight loss ≤ 5%) for 128(39.1%) of the patients. Using the BMI, the prevalence of malnutrition was 27.8%.The mean BMI was 20.2 ±2.9 kg/m^2 **(Table-5).**

Table-5 - Nutritional Status of PLHIV on ART at UoG Referral Hospital, Gondar, December 2007.

Measure		Number	Percent
BMI(kg/m^2)	<18.5	92	27.8
(n=331)	18.5-24.9	223	67.4
	25-29.9	15	4.5
	≥30	1	0.3
	Total	331	100.0
BWL (%) *(n=327)*	≤ 5	128	39.1
	5< BWL ≤ 10	72	22.1
	10< BWL ≤ 20	94	28.7
	>20	33	10.1
	Total	327	100.0

Factors Associated with Malnutrition in PLHIV: In the logistic regression analysis, malnutrition (BMI) was significantly associated with the duration of ART, income, current clinical condition, and eating problems. Persons who remained in the same clinical condition were 18 times more likely to be malnourished than those who improved from the previous state (OR= 18.3 95%CI 1.2, 101.4), and those deteriorating from their previous condition were 25 times (OR=25.5 95% CI 1.5, 426.8) more likely to be malnourished as compared to those improved clinically. The duration of ART was negatively linked to malnutrition. Clients treated for less than one month were 14 times more likely to be malnourished as compared to those treated for more than six months (OR=14.4 95%CI 4.3,48).

There was a statistically significant association between malnutrition and the presence of eating problems (OR=2.35 95% CI 1.18, 4.66). There was no significant association between the clinical stage of HIV/AIDS, sex, educational status, occupation, marital status, the presence of nutritional support, and malnutrition among ART clients (Table-6).

In the logistic regression analysis to check the relationship between malnutrition (as percentage of BWL) and predictor variables, there was a statistically significant association between the presence of nutritional support, duration of ARV treatment, the presence of eating problems, and malnutrition as percentage of BWL. Persons with eating problems were 1.85 times more likely to have significant weight loss (lose of more than 5% of their usual body weight) as compared to those without eating problems (OR=1.85 95% CI 1.2, 3.4).

Those treated for over three months were less likely to develop malnutrition with OR=0.25 95% CI 0.06, 0.97) and (OR=0.2 95% CI 0.06, 0.7) for treatment 3 -6 months and more than three months, respectively. Body weight loss was not significantly associated with current clinical condition, WHO clinical staging, educational level, companions with whom clients were living, income quintile, marital status, occupation, educational level and sex of the respondent .

Table-6 - Logistic regression of BMI with predictor variables among PLHIV at UoG Referral Hospital, Gondar, December 2007 (n=331).

Predictor variable		Malnutrition		Total	Crude OR (95% CI)	Adjusted OR(95% CI)
		Yes	No			
Occupation	No job	36	58	94	1	1
	Merchant	8	34	42	.38 (.14 , .98)	.37(.10, 1.31)
	Government employee	15	51	66	.47(.22, 1.02)	2.29(.52, 9.96)
	Daily laborer	19	65	84	.47 (.43, .96)	.45(.17, 1.19)
	Others	5	13	18	.62(.18, 2.08)	.95(.21, 4.23)
	Farmer	9	18	27	.81(.3, 2.16)	.49(.14, 1.74)
Marital status	Married	26	88	114	1	1
	Single	10	41	51	1.2(0.54, 2.75)	1.18(.11, 12.62)
	Divorced	30	48	78	2.12(1.07,4.18)	.92(.08, 10.21)
	Widowed	25	57	82	1.48(.74, 2.96)	2.35(.22, 25.13)
	Separated	1	5	6	.68(.03, 6.46)	2.09(.19, 22.44)
Presence of nutritional support	No	73	170	243	1.6 (.85, 2.9)	1.28 (.64, 2.6)
	Yes	19	69	88	1	1
Current clinical condition	Improved	82	229	311	1	1
	Same	6	9	15	11.2(1.2,101.4)	18.3(1.6, 210.7)*
	Deteriorated	4	1	5	6.0(.53,,67.65)	25.5(1.5, 426.8)*
Duration of ART in months	<1 month	16	6	22	12.3 (4.2,37.8)	14.4(4.3,48)*
	1-3 months	19	18	37	4.9(2.2,10.7)	4.6 (2,10)*
	3-6 months	16	26	42	2.8 (1.3,6.1)	3.4 (1.5, 7.7)*
	>6months	41	189	230	1	1
Income quintile	1	31	47	78	3.3 (1.4, 7.5)	6.5(1.5,27)*
	2	26	46	72	2.8 (1.2, 6.9)	8.0 (1.9,34)*
	3	14	39	53	1.8 (.8, 4.8)	4.8 (1.2, 19.9)*
	4	10	52	62	.96 (.3,2.7)	1.1(0.3,3.7)
	5	11	55	66	1	1
Eating problem	No	59	201	260	1	1
	Yes	33	38	71	2.96(1.65,5.32)	2.35(1.18,4.66)*
`	Total	92	239	331		

**Statistically significant association*

DISCUSSION

The number of female subjects in this study exceeded that of male, which could be attributed to the higher proportion of women with HIV infection as seen in the DHS 2005 and AIDS in Ethiopia, 6th edition. In the same manner, the national HIV single point prevalence for 2007 was 2.1%, 1.7 % among men and 2.6% among women who also accounted for 53.2% of the new HIV infections in 2005 **(2, 7).** A large number of subjects following ART in this study was in the age group of 25-35 years because of the high prevalence of HIV infection in the age group; the urban prevalence for the age group 25-34 was 10.5% which was the highest of all age categories as could be seen in AIDS in Ethiopia, 6th Report.

The prevalence of malnutrition in this study using BMI (BMI<18.5kg/m^2) was 27.8%; this high proportion of underweight could be because of low income leading to lack of access to food resulting in malnutrition. There was large number of persons with eating problems of any form that reduced the amount of

food intake contributing to malnutrition. Similar studies conducted in Uganda in 2004 indicated the prevalence of malnutrition (underweight) to have been 13.3%. This could be due to the low number of study subjects used in the Ugandan study as compared to this one (78), leading to the underestimating of the prevalence of malnutrition in the former ***(31).*** A Hospital-based study conducted among eighty-one HIV/AIDS patients from January to May 1995 in South Africa found out similar results (mean BMI= 22.4kg/m^2) as compared to the Mean BMI =20.2 kg/ m^2 in our patients **(30).**

A study in Malawi showed that, the prevalence of malnutrition among patients receiving home-based care was 50% (36) which is higher than the result of this study. The difference could be due to the enrollment of home based care patients who had no means to feed themselves, (50% could not support themselves in the Malawi study as compared to 26.6% needing food and related support in this study) and are more likely to be malnourished than the general ART clients who can help themselves.

Based on the percentage BWL assessment, the prevalence of all levels of malnutrition was 60.9% with mild, moderate and severe malnutrition being 22%, 28.8% and 10.1%, respectively. It indicated that HIV contributed to loss of body weight on top of other causes of malnutrition. This result is higher as compared to a study in Paris (60.9% versus 37.9%) both in overall and different levels of malnutrition. This was because of the high prevalence of malnutrition among the population in general in Ethiopia compared to the population of Paris, a developed nation with better care for HIV patients, possible earlier presentation to clinics, and better baseline nutritional status (22). Malnutrition could be higher among PLHIV due to HIV morbidity. This was observed in a hospital-based study in Spain where the relationship between weight loss over habitual weight with progressive impairment and the different stages of disease was encountered (27).

The larger discrepancy in malnutrition prevalence between the two measures, BMI and BWL, is due to the possible over estimation of malnutrition in BWL index, as it measures the relative loss of weight as compared to the pre-morbid weight, and not the absolute measure as we can see in BMI.

Eating problems were also significantly associated with malnutrition showing the high prevalence of oral and/or esophageal thrush and loss of appetite resulting in a high level of malnutrition despite the availability of food. This was also observed in Oslo among HIV infected patients where the presence of malnutrition was explained by low intake of nutrients due to anorexia and other eating problems and impaired gastrointestinal function (28).

The duration of treatment (ART) reduces the risk of getting malnutrition as shown by the statistically significant association between duration of more than one month and reduction of the risk of developing malnutrition. As a patient gets ART, there increases resistance (immunity) against opportunistic and other infections as a result of which the patient will have less risk of loss of appetite because of the absence of eating problems, thus enjoying a better nutritional status from increased intake and utilization.

A study in Tanzania found out that episodes of diarrhea, nausea, or vomiting, lower respiratory tract infections, oral ulcers, thrush, severe anemia, and low CD4 cell counts were each significantly related to an increased risk of wasting. In this study, it is reflected that the longer the duration of treatment, the lesser the risk of facing malnutrition. This is because there will be low risk of diarrhoea, vomiting, respiratory tract infections, and increasing CD4 count as treatment duration increases and improved nutritional status maintained (35).

Limitations of the study: This is a cross-sectional study whose results may not represent the situation of the whole year, for malnutrition is affected seasonally in Ethiopia. As the calculation of BWL is dependent on memory of usual body weight, there may be a possibility of recall bias. It may be difficult to generalize results to patients in other institutions and localities because of differences in socio-economic and educational status and lifestyle variations.

CONCLUSIONS

The prevalence of malnutrition was very high among PLHIV in this area. Weight loss was a major problem in HIV/AIDS patients. OIs were common with Tuberculosis being the commonest. Better income, longer duration on ART, improved clinical condition from the time of diagnosis, and absence of eating problem were positively associated with good nutritional status.

RECOMMENDATIONS

I. To HIV/AIDS Program Managers

Because nutritional problems are very common among HIV/AIDS patients, attention needs to be

given to nutritional management in addition to ART and OI treatment facilities.

II. To clinicians and other health workers managing PLHIV

Nutritional assessment and management of eating problems of PLHIV should be the vital part of HIV care management and is an entry point to the planning of general nutritional support for PLHIV.

III. To researchers

The effect of nutritional support and malnutrition on patient response to treatment, improving lifestyles, and hence survival which is not included in this study, are worth investigating by prospective studies.

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