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Body weight loss and associated factors among adults People living with HIV/AIDS on antiretroviral therapy in Shashemane referral Hospital, Oromia national regional state, Ethiopia:
A facility based cross sectional Study

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Abstract

Background: HIV/AIDS and under nutrition commonly manifested as body weight loss are both highly prevalent in many parts of the world. Their effects are interrelated and act in a vicious cycle. Both HIV and under nutrition can independently cause progressive damage to the immune system and increased susceptibility to infection. Ethiopia is one of the countries affected by both epidemics, despite, study done on acute under nutrition among HIV/AIDS adults in particular were found inadequate. Thus the main aim of this study is to assess the magnitude of acute under nutrition (weight loss within 3 months) and associated factors among people living with HIV/AIDS adults on ART in Shashemane referral Hospital.

Methods: Facility based cross-sectional study conducted in shashemane referral Hospital Oromia region, Ethiopia from August 3 to September 4, 2016. Systematic random sampling technique employed and 402 study participants were included. Data was collected by interview patients using pre-tested structured questionnaire, review of patients register, weight and height measurements were taken. The data were entered into Epi Info version 3.5.1 and analyzed using version 20 SPSS statistical package and percentages of body weight loss were calculated. Logistic regression analyses were carried out to identify factors associated with body weight loss of $> 5\%$ within three months. Strength of association determined using $P < 0.05$ and odd ratio (95% CI).

Result: The magnitude body weight loss $> 5\%$ were 15.9% (95% CI; 12.4-19.7). Low CD4 level of less than 200mm³/ml (AOR=8.41, 95% CI: 3.46-20.44), inability to consume high protein diets like meat, egg & fish per week (AOR=2.97, 95% CI: 1.39-6.35), low meal frequency of 2 or less per day (AOR=3.09, 95% CI: 1.25-7.68) and low average income of 1000 birr per month (AOR=9.07, 95% CI: 3.71-22.14) were significantly associated with Body weight loss of $> 5\%$ within 3 months with $P < 0.05$.

Conclusion: Body weight loss $> 5\%$ within 3 months (acute under nutrition) is still a problem in people living with HIV/AIDS adults on ART, specifically among advanced immune compromised, low income, consumes less meal frequently per day and fewer or no consumption of animal product.

Key words: Body weight loss percentage, Weight loss, HIV/AIDS, Shashemane

Background of the study

More than 35.3 million people are living with human immunodeficiency virus/acquired immunodeficiency syndromes (HIV/AIDS) worldwide, out of which sub-Saharan Africa take the major share of 25 million. Among those HIV positive in the world, adult's accounts for 91% of the total [1], more over food shortages and under nutrition have combined with HIV/AIDS to bring some developing countries to the rim of crisis [2]. HIV/AIDS damage the immune system of an individual's over long period of time that lead to incidence of many opportunistic infections (OI). Thus, Opportunistic Infection place people living with HIV/AIDS (PLWHA) at a high risk of developing under nutrition [3]. In Ethiopia, 1.5 percent of the adults aged 15-49 are infected with HIV [4]. According to Antenatal care (ANC) sentinel surveillance, adjusted national HIV prevalence in 2005 was 3.5% with an estimated prevalence of 10.5% in urban areas and 1.9% in rural areas [5-6], Similarly the data of 2009 ANC based sentinel surveillance of adjusted national HIV prevalence also shows a point estimate of 2.3%; 5.3% in urban areas and 1.9% in rural areas [7]. Ethiopia is also one of the countries in Sub-Saharan Africa with the highest rates of under nutrition as a result of the interaction between poor diet and disease [8].

HIV/AIDS and under nutrition are both highly prevalent in many parts of the world, especially in sub-Saharan Africa and other developing countries. Their effects are interrelated and aggravate one another in a vicious cycle [9]. Both can independently cause progressive damage to the immune system of human being and increased susceptibility to infection. HIV/AIDS may lead to morbidity and mortality through OI that may manifest symptom like fever, diarrhea, loss of appetite, nutrient mal-absorption, and weight loss [2]. HIV specifically affects nutritional status by increasing energy requirements, reducing food intake, and adversely affecting nutrient absorption and metabolism. Asymptomatic and symptomatic adult HIV/AIDS clients have increased energy requirements by 15% and 30% respectively to maintain body weight and physical activity [10]. Under nutrition on the other hand, contributes to immune system impairment, making the body vulnerable to frequent illness and increasing its energy and nutrient demand, in this way it accelerate HIV/AIDS disease progression[2, 10]. According to CDC the most severe form of under nutrition in HIV disease defined as HIV wasting syndrome (that include body weight loss)[11]. This complex interaction between HIV & under nutrition acts through the immune system functions of the body [12]. Optimal nutrition can boost the immune

function, maximize the effectiveness of antiretroviral therapy (ART), reduce the risk of chronic illnesses, and contribute to a better overall quality of life [12-13].

Ethiopia is one of the countries hit hardest by the HIV epidemic in Africa [14] and a country with the highest incidences of under nutrition; the country has high levels of chronic food insecurity and is further prone to acute food insecurity, primarily during times of drought, environmental degradation, and insufficient access to and availability of food. According to the report of Ethiopia Demographic and Health Survey (EDHS) 2005 and the EDHS 2000, one in four women of reproductive age have chronic energy deficiency and 27% are anemic [15]. HIV/AIDS and under nutrition act synergistically to undermine the immunity of many Ethiopians [15] and has taken lives of millions even in the era of ART, thus HIV/AIDS could not be managed well since the dispute of under nutrition is unanswered [16].

Despite huge problem of HIV/AIDS and under nutrition in the country, there are few studies conducted at a country level in general and study done on acute under nutrition among people living with HIV/AIDS adults in particular were found inadequate. Therefore this study aims to assess magnitude of acute under nutrition (weight loss within 3 months) and associated factors among people living with HIV/AIDS adults on ART in Shashemane referral hospital, Oromia regional state, Ethiopia.

Methodology

Study setting

The study conducted at Shashemane referral Hospital in Oromia Region. Shashemane is located 250kms south of Addis Ababa on the way to Hawassa and has an altitude of 1940 meters above sea level. The total population of the town in 2013 estimated to be 157,604 of which 78,014 and 79,590 were male and female respectively [Shashemane municipality 2014 report]. Staple food in are were teff with injera (injera with shiro wot) like most of Ethiopian towns. There are three health centers and two hospitals that are led by Shashemane town administration that provide HIV/AIDS care, of which Shashemane referral hospital has heavy case load and selected in this study by sample size connivance. The hospital at Kuyara serves around 2.2 Million populations from Shashemane town and its surroundings. Shashemane referral hospital had begun HIV/AIDs chronic care and ART service in 2005 GC. Currently there are 123 clients on pre ART and 2,199 clients taking ARV drugs actively [Shashemane Town Health office 2015 biannual report].

Study design, period and population

A facility based cross-sectional study design was employed from August 3 to September 4, 2016. The source population was all adults ≥ 18 years who were on ART and the study population were those randomly selected adults on ART in Hospital during the study period that fulfils the inclusion criteria. Patients who were seriously/mentally ill, patients whose weight not taken three months prior to data collection and pregnant women were excluded during data collection.

Sample size determination

The required sample size was determined using single population proportion formula

$$\frac{n}{D^2} = Z^2 P(1 - P)$$

Where **n** is the sample size, **z** is the standard normal score set at 1.96 (with assumption of 95% confidence interval), **D** is the desired degree of accuracy (maximum allowable error set at = 0.05) and **p** is the estimated proportion of the target population, $P=61\%$ (proportion of Undernourished people living HIV/AIDS with the use of BWL percentage of $> 5\%$)[28] , the computed sample size were 366, *and after* 10 % non-response rate added the final total sample size became 403.

Sampling technique:

From the total 2199 HIV/AIDS clients who were currently on ART in Shashemane referral Hospital, 2008 were Adults ≥ 18 years and 191 were children and adolescents < 18 years. In order to select 403 adults' participants from those currently on ART, the total adult clients currently on ART greater than or equal to 18 years was divided to the required sample size ($2008/403=4.99$) which is approximately 5. The first case was selected from the first five card of the first day of data collection by lottery methods by labeling the chart of the patients, and then every 5th adults by use of systematic random sampling selected on their coming order for follow up to ART clinic for interview, their registration and follow up card reviewed, height and weight measurement taken.

Data collection technique

Three month prior to data collection (in April 2016) training was given to all ART clinic staffs on how to appropriately measure weight and to take weight of all clients come to clinic for their routine follow up, so that this weight used as baseline to calculate Body Weight Loss percentage. During this time weight scale has been checked for accuracy and has been followed for one month. Then three months later (in August 2016) training were given to two data collectors and supervisor on how to collect data using prepared pretested questionnaires and how to measure weight and height. Before measuring weight and height of the clients during data collection, standardization were done to eliminate the individual's variability in the following ways, one clients was selected, weight and height was measured by two of data collectors two times each, then principal investigator have taken the weight of the same person with the same adult height and weight scale, then first the variation of two data collectors were evaluated (precision). Second their difference from principal investigator weight and height value was compared (accuracy). Then based on the result (deviation) discussion and reorientation were provided. Then data were collected from August 3 to September 4 /2016 on working days for one month in hospital using pretested structured questionnaire together with weight and height measurements. Two data collectors outside ART clinic staffs and one supervisor were recruited and two days training was given. The data collection process was closely supervised daily by the supervisor and principal investigator. Weight of the clients was measured using adult weighting scale calibrated using standard 2kg tool every morning and before and after each measurement. Participant's weight measured after removing heavy clothes and recorded to the nearest 0.1kg. Height of the clients measured after removing shoes and anything on head and recorded as 0.1cm

Data management and analysis

Data were entered into Epi Info version 3.5.1, and then exported to SPSS version 20 statistical packages for recoding and analysis. During analysis the frequency of different variable was determined and their association with outcome variables (weight loss >5%) was examined using bivariate and multivariable logistic regression analysis techniques. Only variables that have shown $P < 0.25$ in bivariate analysis were included in multivariate analysis.

For bivariate and multivariable analysis, the outcome variable, weight loss >5% was coded as “1” and no weight loss > 5% was coded as “0. Odd ratio along with 95% confidence interval and P- value 0.05 were used to measure the strength of association and level of statistical significance respectively. Model of fitness were checked by use of omnibus in that all value shows (p<0.05) and hosmer and lemeshow (p>0.05) indicating that the model is doing well.

Operational definitions

Body Weight Loss percentage (BWLP): According to the criteria for classification(Morgan et al, 1980[18]; O'Sullivan et al, 1985[19]; Ysseldyke, 1991 [33]) patients were categorized into four classes of under nutrition using the percentage BWL calculated by reference to the previous body weight (PBW), Body weight loss percentage (BWLP) Calculated by

$$\text{BWLP} = \frac{(\text{Wt before (3m)} - \text{Current wt}) \times 100}{\text{Wt before(3m)}}$$

Where wt- for weight, 3m-for three months

1. $\text{BWL} \leq 5\%$ (no under nutrition),
2. $5\% < \text{BWL} \leq 10\%$ (mild under nutrition)
3. $10\% < \text{BWL} \leq 20\%$ (moderate under nutrition),
4. $\text{BWL} > 20\%$ (severe under nutrition). [18, 19]

Acute under nutrition; in adults of 18 years and above defined by use of percentage of recent body weight loss (BWL) greater than 5%, with the period of two to four months [18 ,19].

HIV/AIDS clients on ART; Those HIV positive confirmed by antibody test & currently taking ARV drugs in the facility.

Formal jobs: Are those jobs which routinely/regularly done, licensed and taxed (includes employments NGO /Government/ private jobs, licensed merchants and farmer who have his/her own land).

Informal jobs:-Those jobs which are not regularly done and not fulfill the above criteria (includes daily laborer, house wife, students, and merchants not registered and jobless).

Good adherence, Fair adherence & Poor adherence: those patients, who took > 95%, 85% - 94% and < 85% of given dose in the last months respectively

Results

Socioeconomic and demographic characteristics of study participants

A total of 402 adult HIV positive clients who were on ART participated in the study which is nearly 100% response rate. The majority of clients 258 (64%) were in the age range of 26 - 40 years, 256 (63.7 %) of participants were females, 319(79.4%) were urban dwellers, 230(57.2%) of participants have attended formal education, over 194 (48%) of participants had no formal jobs, 215(53.5%) of the study subjects were married, 40% households were headed by female and 186 (46.3%) of study participants were getting less than 1000 birr per month in the last three months prior to data collection

Table 1. Socio economic and demographic characteristics of the study participant in Shashemane referral Hospital, Oromia region, Ethiopia, August 2016

Variables (n=402)	Number	Percent (%)
Sex		
Male	146	36.3
Female	256	63.7
Age		
18-25	31	7.7
26-30	82	20.4
31-35	104	25.9
36-40	72	17.7
41-45	43	10.7
>46	70	17.4
Resident		
Urban	319	79.4
Rural	83	20.6
Head of households		
Male	242	60.2
Female	160	39.8

Table 1. Continued

Variables (n=402)	Number	Percent (%)
Religion		
Muslim	81	20.1
Orthodox	237	59
Protestant	75	18.7
Others	9	2.2
Educational level		
Attend formal education	230	57.2
Not attend formal education	172	42.8
Occupation		
Had formal jobs	208	51.7
No formal job	194	48.3
Marital status		
Single	24	6
Married	215	53.5
Divorced	34	8.5
Widowed	73	18.2
Separated	56	13.9
Average income per moths in birr		
<1000	186	46.3
1000-2499	135	33.6
>2500	81	20.2

Medical and ART related characteristics of the study participants

About 393 (95%) of the study population were in WHO treatment stage I, 195(48.5%) of study participants were on ART for more than five years and in the overall adherence to treatments 386 (96%) were good. About 215(53.5%) of the study participants had CD4 level of greater than 500, and only 16(4%) had opportunistic infection in the last three months prior to the study

Table 2 Medical & antiretroviral therapy (ART) related characteristics of study participants in Shashemane Referral Hospital, Oromia region, Ethiopia, August 2016

Variables (n=402)	Number	Percent (%)
Treatment stage		
I	393	95.3
Other than stage I	19	4.7
Duration on ART		
3months -5 years	207	51.5
>5 years	195	48.5
Adherence to ART		
Good	380	94.5
Fair & poor	22	5.4
CD4 level		
<200	31	7.7
200-500	156	38.8
>500	215	53.5
Opportunistic Infection		
Yes	16	4
No	386	96

Diet related characteristics of study participants

Majority of study participants 379(94.3%) had no eating difficult in the last three months prior to data collection. While 280(70%) received dietary counseling prior to data collection and 269 (67%) had changed eating style after counseling. About 340(85%) of study participants usually consume injera with shiro wot in the last three months prior to survey, While 269(67%) of study subjects ate two or less times per day in the three months period. About 179(44.2%) & 256(56.2%) of study participants did not get milk & milk products, meat or fish or eggs per week in the last three months prior to the study respectively.

Table 3. Diet related characteristics of study participants in Shashemane referral Hospital, Oromia region, Ethiopia, August 2016

Variables (n=402)	Number	Percent (%)
Eating problem /difficulty		
Yes	23	5.7
No	379	94.3
Most usual food		
Injera with shiro wot	340	84.6
Other than injera with shiro wot	62	13.4
Dietary counseling		
Yes	280	69.7
No	122	30.3
Meal frequency per day		
3 or Less times	269	66.9
more than 3 times	133	30.1
Change eating style after HIV status known		
Yes	269	66.9
No	133	33.1
Milk & milk product intake per week		
No	179	44.6
One times	107	26.5
Two times	59	14.7
Three & more times	59	14.2
Meat/egg/fish intake per week		
No	226	56.2
One & more times	176	43.8

Magnitude of body weight change among adult's people living with HIV/AIDS on ART in Shashemane Referral Hospital

The proportion of participants who lost any amounts of weight were 176 (43.6%), However the magnitude of body weight loss percentage (BWLP >5% within three months) among people living with HIV/AIDS adults on ART in Shashemane referral hospital were 64 (15.9%), among which most of them (13.9%) are mild. Moderate and severe under nutrition both together accounts for 2% of the study participants.

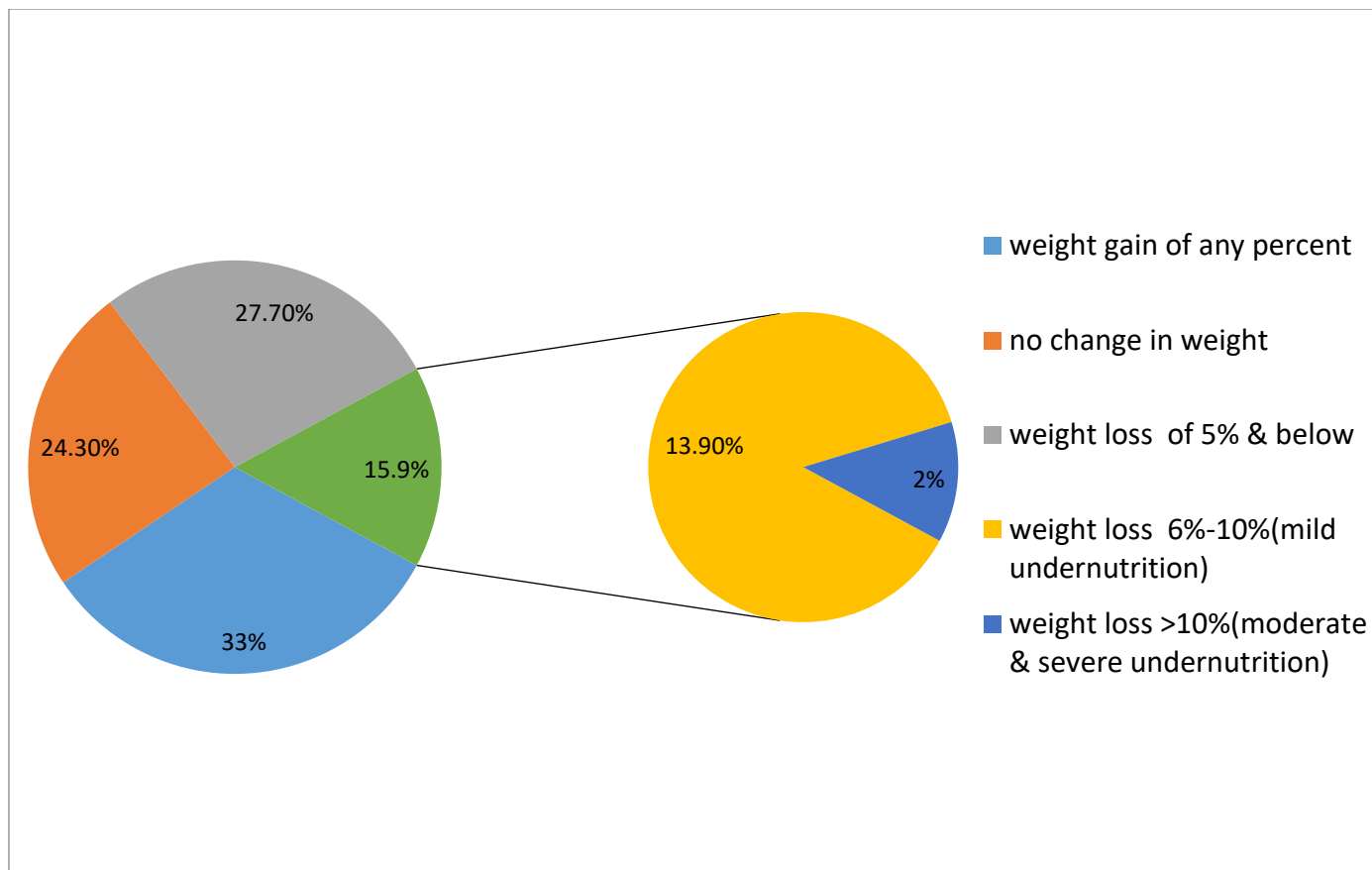


Figure 1- Magnitude of body weight loss percentage within three months period among people living with HIV/AIDS adults on ART in Shashemane referral Hospital, Oromia, region, Ethiopia, August 2016

Table 4. Results of bivariate analyses on selected socio-economic and demographic characteristics associated with Body weight loss > 5% (acute under nutrition) among people living with HIV/AIDS adults on ART in Shashemane Referral Hospital, Oromia region, Ethiopia, August 2016

Variable (n=402)	Body weight loss > 5%		OR (95% CI)	
	Yes No (%)	No No (%)	Crude (OR)	p- value
Age in years				
18-30	18(28.1)	95(28.1)	1	
31-40	32(50)	144(42.6)	1.2(0.6-2.2)	0.622
>41	14(21.9)	99(29.3)	0.7(0.35-1.5)	0.446
Sex				
Male	25(39.1)	121(35.8)	1	
Female	39(60.9)	217(64.2)	0.87(0.5-1.5)	0.62
Marital status				
Single	30(46.9)	157(46.4)	1	
Couple	34(53.1)	181(53.6)	1(0.6-1.7)	0.95
Residences				
Rural	13(20.3)	70(20.7)	1	
Urban	51(79.7)	268(79.3)	1.03(0.51-1.9)	0.943
Educational level				
Grade 6 & below	38(59.4)	179(53)	1	
Above grade 6	26(40.6)	159(47)	0.77 (0.45-1.3)	0.345
Occupation				
No formal job	38(59.4)	156(46.2)	1	
Formal job	26(40.6)	182(53.8)	0.586(0.4-1.1)	0.052
Family Size				
<3	24(37.5)	109(32.2)	1	
3-5	25(39.1)	161(47.6)	0.71(0.4-1.2)	0.26
>5	15(23.4)	68(20.1)	1(0.5-2)	0.99
Head of house hold				
Male	38(59.4)	204(60.4)	1	
Female	26((40.6)	134(39.6)	1.04(0.6-1.7)	0.88
Average income per month				
< 1000 birr	55(85.9)	140(41.4)	8.6(4.1-18)	000
1000 birr & above	9(14.1)	198(58.6)	1	

Results of bivariate analyses on medical and antiretroviral related factors associated with Body weight loss > 5% within 3 months (Acute under nutrition).

Among those Body weight loss $\geq 5\%$ (undernourished) study participants, 22(34.4%) had CD4 level of less than 200mm³/ml, 7(10.9 %) were in treatment stage other than stage I and 6(9.4%) had opportunistic infection in the last three months prior to data collection. In bivariate analysis those variables have shown significant ($P < 0.05$) association.

Table 5. Results of bivariate analyses on medical /health and ART related factors - associated with Body weight loss > 5%(under nutrition) among people living with HIV/AIDS adults on ART in Shashemane Referral Hospital, Oromia region, Ethiopia, August 2016.

Variable (n=402)	Body weight loss > 5%		OR (95% CI)	
	Yes No (%)	No No (%)	Crude (OR)	P-value
Treatment stage				
Stage I	57(89.1)	326(96.4)	1	
Other than stage I	7(10.9)	12(3.6)	3.3(1.3-8.8)	0.01
Duration on ART				
< 2 years	16(25)	60(17.8)	1.4(0.7-2.7)	0.31
2-4 years	17(26.6)	114(33.7)	0.8(0.4-1.4)	0.46
5 & above	31(48.4)	164(48.5)	1	
Adherence to ART				
Good	59(92.2)	321(95)	1	
Fair & poor	5(7.8)	17(5)	1.6(0.6-4.5)	0.369
CD4 level				
< 200	22(34.4)	22(6.5)	6.6(3.2-13.5)	0.00
200-500	15(23.4)	137(40.5)	0.7(0.4-1.4)	0.345
>500	27(42.2)	179(53)	1	
Opportunistic Infection				
Yes	6(9.4)	10(3)	3.9(1.2-9.7)	0.016
No	58(90.6)	328(97)	1	

Results of bivariate analyses on diet related factors associated with Body weight loss > 5 % (Acute under nutrition)

Among those body weight loss > 5 % (undernourished) study participants 50(78.1%) usually eat injera with shiro wot, 29 (45.3%) have no dietary counseling after HIV was confirmed, 52(81.2%) did not get meat / egg or fish per week, and 54 (84.4%) had eaten meals three or less times per day in the last three months. As shown in Table 6, among diet related factors meal frequency, dietary counseling and consumption of meat/ fish /egg per week in the last three months showed significant ($P < 0.05$) association, while the other variable like most usually eaten food and change in feeding style showed weak association ($p < 0.25$).

Table 6. Results of bivariate analyses on diet related factors associated with Body weight loss > 5% (under nutrition) among people living with HIV/AIDS adults on ART Shashemane Referral Hospital, Oromia region, Ethiopia, August 2016

Variable (n=402)	Body weight loss > 5%		OR (95% CI)	
	Yes No (%)	No No (%)	Crude (OR)	p-value
Eating problem				
Yes	5(7.8)	18(5.3)	1.5 (0.6-2.7)	0.432
No	59(92.2)	320(94.7)	1	
Most usually eaten food				
Injera with shiro wot	50(78.1)	290(85.8)	1	0.119
Others	14(21.9)	48(14.4)	1.6(0.9-3.2)	
Change eating style after HIV status known				
Yes	40(62.5)	240 (71)	1	0.175
No	24(37.5)	98 (29)	1.5(0.8-2.6)	
Meal frequency per day				
3 & less time	54(84.4)	215(63.6)	3.1 (1.5-6)	0.001
More than 3 time	10(15.6)	123(36.4)	1	
Diet counseling				
Yes	35(54.7)	234(69.2)	1	0.023
No	29(45.3)	104(30.8)	1.9(1.1-3.2)	
Milk & milk product intake per week				
No	32(50)	147(43.4)	1.3(0.8-2.2)	0.337
Yes	32(50)	191(56.5)	1	
Meat/egg/fish intake per week				
No	52(81.2)	178(52.7)	3.9(2-7.6)	0.000
Yes	12 (18.8)	160(47.8)	1	

Factors associated with body weight loss > 5 % (under nutrition) among people living with HIV/AIDS adults on ART

Bivariate logistic regression analyses of independent variables: average income per month, CD4 level, meal frequency, high protein diet (meat/egg/fish) intake per week, opportunistic infection in the last three months and treatment stage other than WHO treatment stage I(one) have shown significant ($p < 0.05$) association with body weight loss of greater than 5%. on the other hand previous diet counseling, occupation, most usually eaten food and change eating style after HIV results confirmed have shown weak ($p < 0.25$) association with BWL >5%(acute under nutrition).

However, during multivariable logistic regression analyses after controlling for all possible confounding, the variables that retained statistical significance ($P < 0.05$) were CD4 level, consumption of high protein diet like meat/ egg /fish per week, ,average income and meal frequency per day in the last three months prior to data collection. The odds (95% CI) of becoming body weight loss $\geq 5\%$ (undernourished) were 8.41(3.46-20.44) times higher for the individuals who had CD4 level less than 200mm³/ml as compared to those who had CD4 level more than 500mm³/ml in the last three months. The odds (95% CI) of becoming body weight loss $\geq 5\%$ (undernourished) were 2.97(1.39-6.35) times higher for those who were unable to consume high protein diet like meat or egg or fish per week as compared to those who were able to consume those diets per weeks at least once. The odds (95% CI) of becoming body weight loss $\geq 5\%$ (undernourished) were 9.07 (3.71-22.14) higher for those who earn less than 1000birr as compared to those who earn more than 1000 birr per Month and the odds (95% CI) of becoming body weight loss $\geq 5\%$ (undernourished) were 3.09 (1.25-7.68) higher for those who reported to have less meal frequency (2 or less times) per day as compared to those who get high meal frequency (more than three times) per day in the last three months prior to data collection.

Table 7. Factors associated with body weight loss > 5% within 3 months among people living with HIV/AIDS adults on ART in Shashemane Referral Hospital, Oromia region, Ethiopia, August 2016

Variables (n=402)	Body weight loss > 5%		OR (95% CI)	
	Yes No (%)	No No (%)	Crude	Adjusted
Income in birr per month				
<1000	55 (85.9)	140 (41.1)	8.64(4.14-18.07)***	9.07(3.71-22.14)***
≥ 1000	9(14.1)	198(58.9)	1	1
CD4 Level				
<200	22 (34.4)	22(6.5)	6.63(3.24-13.56)***	8.41(3.46-20.44)***
200-499	15(23.4)	137(40.5)	0.7(0.3-1.4)	0.92 (0.43-1.96)
>500	27(42.2)	179(53)	1	1
Occupation				
No Formal job	38(59.4)	156(46.2)	1.71(0.99-2.93)	0.99(0.50-1.9)
formal jobs	26(40.6)	182(53.8)	1	1
Diet counseling				
Yes	35(54.7)	234(69.2)	1	1
No	29(45.3)	104(30.8)	1.87(1.08-3.21)	1.36(0.65 -2.86)
Meat, egg & fish intake per week				
No	52(81.2)	178(52.7)	3.89(2.01-7.56)***	2.97(1.39-6.35)**
1 or more times	12 (18.8)	160(47.8)	1	1
Meal frequency per day				
3 & less time	54(84.4)	215(63.6)	3.09(1.52-6.29)**	3.09(1.25-7.68)*
More than 3 time	10(15.6)	123(36.4)	1	1
Most usually food				
injera with shiro wot	50(78.1)	290(85.8)	1	1
Others	14(21.9)	48(14.4)	1.69(0.87-3.30)	1.73(0.77-3.90)

Table. 7. Continue ...

Variables (n=402)	Body weight loss > 5%		OR (95% CI)	
	YES NO (%)	NO No (%)	Crude	Adjusted
Treatment stage				
I	57(89.1)	326(96.4)	1	1
II,III & IV	7(10.9)	12(3.6)	3.33(1.26-8.83)*	1.97(0.56-6.96)
Opportunistic infection				
Yes	6(9.4)	10(3)	3.39(1.19-9.70)*	2.66(0.57-12.46)
No	58(90.6)	328(97)	1	1
Change eating style after HIV status confirmed				
Yes	40(62.5)	240 (71)	1	1
No	24(37.5)	98 (29)	1.47(0.84-2.57)	0.54(0.25-1.15)

Key: * P<0.05, ** P<0.01, and *** P<0.001

Discussion

The study of a representative sample of clients on ART in Shashemane referral hospital showed that 43.6% of study participants lost weight of any percentage, moreover 15.9% (95% CI 12.4-19.7) of the study participants have lost weight more than 5% of their body over the three months periods that were defined as acute under nutrition. This finding was higher than the study conducted in Northern Cape Province, South Africa [33] which was 9.2 % for weight loss percentage of greater than 5%. The reason for the lower proportion of body weight loss greater than 5% could be due to the ongoing nutritional intervention in Northern Cape Province, South Africa. However the overall weight loss is almost similar for both studies (40.2% & 43.8%). On the other hand the prevalence rate of acute under nutrition (body weight loss greater than 5%) observed in this study is lower than the study conducted among HIV seropositive subjects in one of the AIDS clinic in Paris (37.9%) [23]. This may be due to Paris study include pre-ART patients where the complication like eating problems that contribute to body weight loss are more prevalent. Moreover the discrepancy could also be due to the longer period of time the patients followed (six months) and smaller sample size (n=124) in Paris study. The prevalence of acute under nutrition reported (BWLP >5%) were 60.9% in the study conducted at University of Gondar referral Hospital is much higher than the results observed in this study [28]. This could be due to methodological difference. The Gondar study used usual body weight as baseline (usually body weight before HIV status was known/ reported by clients), while in this study body weight taken/recorded by health care worker in ART clinic three months ago was used as a baseline. Furthermore most of the study participants were on ART for less than six months in the study done at University of Gondar referral Hospital, whereas this study includes over 80% of participants who are on ART for more than two years.

This study revealed that CD4 level less than 200mm³/ml, inability to consume animal product(meat /egg/ fish) per week, average income of less than 1000 birr per month and meal frequency of three or less per day in the last three months were significantly ($p<0.05$) associated with body weight loss percentage greater than 5% body weight. However, treatment stage other than WHO stage I, opportunistic infection in the last three months, no nutrition information/counseling after HIV status known and occupation demonstrated association with weight loss percentage greater than 5% in the bivariate analysis but lost their significance in the multivariate analysis.

This finding is similar with the study on relationships among nutritional status, disease progression and survival of HIV infection conducted by University of Pennsylvania, United State of America [34] and a study on review of weight loss and wasting in the era of highly active antiretroviral therapy from the nutrition for Healthy Living done by Tufts University School of Medicine, England [35] that showed that lower CD4 level is associated with malnutrition. This could be due to low CD4 level corresponds with low immunity that predispose patients to frequent opportunistic infection, loss of appetites, eating difficulty, nausea/vomiting and frequent diarrhea results in reduced food intake and weight loss.

The finding related to the strong association of meal frequency to body weight loss observed in this study is supported by the finding reported in the study conducted on under nutrition based on Body Mass Index and associated factors in health facilities at Hosanna Town [34].

This finding were also similar with study conducted in Nigeria on nutritional status of HIV-positive individuals on free HAART treatment in developing nation indicated that low socioeconomic status was associated with under nutrition[24]. The issue of low income could be related with some other points which may include no access to good quality and quantity of food that has direct relation with weight loss (under nutrition).No consumption of meat/egg/fish at least once per week has shown significant ($p<0.05$) association with acute under nutrition within three months. As there are no studies found regarding the association of consumption of these protein rich foods with body weight loss comparisons have been difficult. However, these food contain quality protein that are required for maintenance and growth of the body tissue, it is apparent that lack of these foods in the diet of PLWHA on ART significantly contribute to body weight loss. The other variable like Opportunistic infection 16 (4%), eating problem 23 (5.7 %), nutritional support 23 (5.7 %) & HIV related symptom 18 (4.5) which were significant in other study were not obtain enough sample size to show significant association with body weight loss greater than 5% in the three months period (acute under nutrition) in this study. This may be due to that most of the clients participated in this study (> 80%) were on antiretroviral therapy (ART) for more than 2 years, whereas most of the previous study conducted include early ART initiation and those not on ART.

Limitation of the study:

This study did not consider the seasonal variation of food access in area and may not represent the whole year nutritional status of the population. Lack of adequate similar studies in our country to make comparative discussion difficult and the study didn't use qualitative method for detail investigation.

Conclusion

Body weight loss (Under nutrition) is still huge problem among adults people living with HIV/AIDS on ART particularly among those advanced immune compromised ($CD4 < 200$), low income family per month, consume less frequently meal per day and no animal products diet per week.

Abbreviations

AIDS	Acquired Immunodeficiency Syndromes
AOR	Adjusted Odd Ratio
ART	Antiretroviral Therapy
BMI	Body Mass Index
BWL	Body Weight Loss
BWLP	Body Weight Loss Percentage
CDC	Center for Disease Control
ETB	Ethiopian Birr
EDHS	Ethiopian Demographic Health Survey
GIS	Gastrointestinal Symptoms
HAART	Highly Active Antiretroviral Therapy
HIV	Human Immunodeficiency Virus
OI	Opportunistic Infection
OR	Odd Ratio
NGO	None Governmental Organization
PLHIVA	People Living With HIV/AIDS
SPSS	Statistical Package for Social Science
WHO	World Health Organization
WSU	Wolaita Soddo University
UOG	University of Gondar

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Authors' contributions

Corresponding author participated in the design of the study, conducted the statistical analysis, interpretation of data and drafted and revised the manuscript. The rest none corresponding author participated in the design of the study and critical review of the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

Corresponding author can be contacted for data and material when required

Ethics approval and consent to participate

Ethical clearance was obtained from research & community service approval committee of Wolaita Soddo University. Permission was also obtained from Shashemane Town health office and hospital administration through a cooperation letter from the university. The purpose of the study was explained to respondents before data collection commenced. Confidentiality of the respondents was maintained and respected. Participants were informed that their involvement in the study purely voluntary and the right of respondents to refuse or to participate in the study was thoroughly explained. The data collection commenced only when the consent of participants were orally obtained.

Consent for publication: Not applicable

Competing interests:

The authors declare that they have no competing interests

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Figures

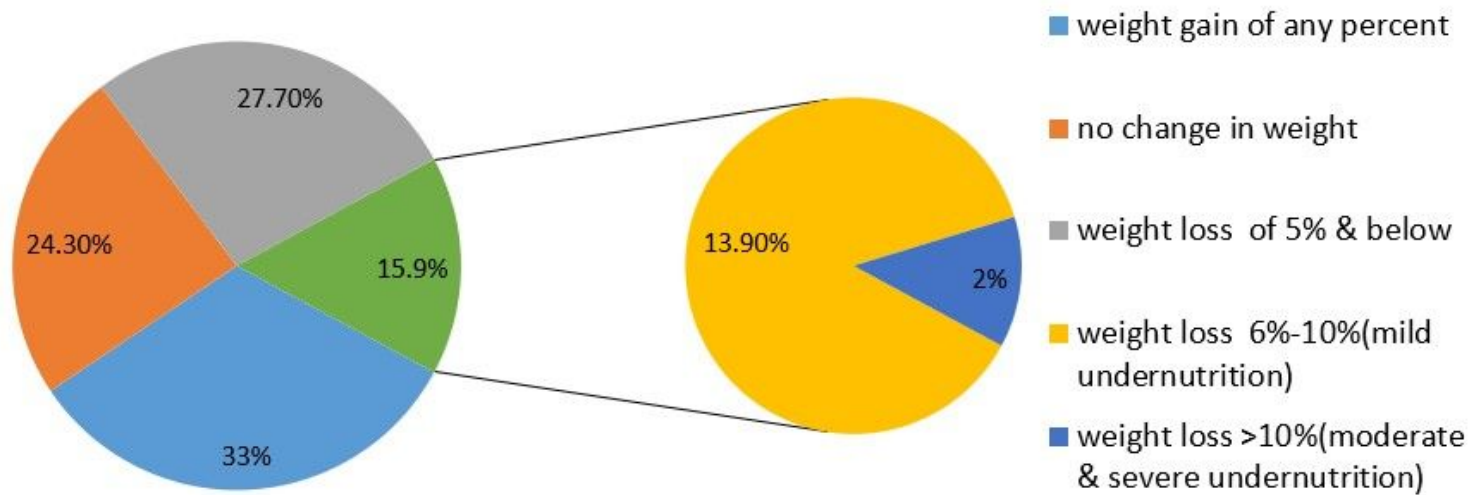


Figure 1

Magnitude of body weight loss percentage within three months period among people living with HIV/AIDS adults on ART in Shashemane referral Hospital, Oromia, region, Ethiopia, August 2016