Original Research Article

Prevalence of Malnutrition and Associated Factors Among HIV Seropositive Adults on Antiretroviral Therapy at the Regional Hospital, Buea, Cameroon

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ABSTRACT

Introduction: Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients and HIV which infects CD4 cells causes immune suppression which can further be worsened by poor nutrition. More than 37.7 million people are living with HIV in the world out of which about 36 million are adults.

Aims: The study aimed to determine the prevalence of malnutrition and associated factors among human immunodeficiency virus (HIV) seropositive adults on antiretroviral therapy at the HIV care and treatment center of the Buea Regional hospital, Cameroon.

Study design: A Hospital-based Cross sectional study design

Place and duration of study: Buea regional hospital at the HIV care and treatment centre, South West Re gion of Cameroon between April 2022 to June 2022.

Materials and method: We included 139 HIV seropositive individuals (17 men, 177 women age range 26 to 59 years). Nutritional status was assessed using anthropometric and clinical methods. A 24-hour dietary diversity was assessed using a questionnaire. Data was analyzed using SPSS version 25.0.

Results: The prevalence of underweight, overweight and obesity among the participants were 1.4 %, 38.8%, and 24.4% respectively. In the bivariate analysis, ~~S~~sex of the participants ($\chi 2 = 4.715$, $p = 0.030$) and attendance to HIV-related counseling sessions ($\chi 2 = 4.512$, $p = 0.034$) were significantly associated with malnutrition. The mean dietary diversity score of the study respondents was 4.97±1.6 with only 37% of the respondents achieving a minimum dietary diversity. In the multivariate logistic regression analysis, the odds of those who received HIV-related counselling being malnourished(overweight) was 3.29 times more than those who did not receive HIV-related counselling(AOR=3.29, p=0.036).

Conclusions: There is a high burden of overweight and obesity in the HIV population of the Regional Hospital Buea. The only factor independently associated to malnutrition(overweight) was uptake of nutrition related counselling. ~~–~~Majority of the HIV seropositive patients in the Regional Hospital Buea had a poor dietary diversity. Nutritional counseling should be an important part of persons living with HIV/AIDS (PLWHA) routine follow-up.

Keywords: Prevalence, Malnutrition, HIV, Adults, Antiretroviral therapy, Regional Hospital Buea

ABBREVIATIONS

AIDS : ACQUIRED IMMUNE DEFICIENCY SYNDROME
HIV : HUMAN IMMUNODEFICIENCY VIRUS
ART : ANTIRETROVIRAL THERAPY
BMI : BODY MASS INDEX
CD4+ : CLUSTER OF DIFFERENTIATION 4
CDC : CENTRE FOR DISEASE CONTROL AND PREVENTION
PLWHA : PERSONS LIVING WITH HIV/AIDS
FAO : FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
FFQ : FOOD FREQUENCY QUESTIONNAIRE
IBM : INTERNATIONAL BUSINESS MACHINES CORPORATION
IDDS : INDIVIDUAL DIETARY DIVERSITY SCORE
MUAC : MID UPPER ARM CIRCUMFERENCE
WHR : WAIST TO HIP RATIO
MDD : MINIMUM DIETARY DIVERSITY
DDS : DIETARY DIVERSITY SCORE

1. INTRODUCTION

More than 37.7 million people are living with HIV in the world out of which about 36 million are adults. The greatest burden of the disease is concentrated in sub-Saharan Africa [1]. In 2021, the Prevalence of HIV among adults' ages 15-49 years in Cameroon was 2.9% [2]. In the Fako Division of the South West Region of Cameroon, the adult prevalence of HIV/AIDS was estimated at 3.2% in 2018 [3]. The availability of Antiretroviral Therapy (ART) has extended the lives of many people living with HIV/AIDS and has greatly reduced morbidity and death due to AIDS and its related complications [4]. Adherence to ART is essential for long-term therapeutic success because it is necessary not only in reducing the risk of emergence of HIV resistance strains, but also in improving the health status of the PLWHA [5]. ART has been shown to improves the quality of life of PLWHA [6].

Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients [7]. Poor nutrition crosses economic lines and leads to health problems caused by eating too little (under-nourishment), too much (over nourishment) or an unbalanced diet that lacks essential nutrients for a healthy life (micronutrient deficiencies) [8]. HIV infects CD4 cells causing immune suppression which can further be worsened by poor nutrition [9, 10]. Among adults with advanced HIV infection in sub-Saharan Africa, the magnitude of malnutrition (BMI-below 18.5) was shown to be between 10 and 30%, where social factors like income, employment, inadequate food intake, and sanitation were identified as risk factors [11].

There are multiple risk factors associated to malnutrition secondary to HIV. These include food insecurity, lack of access to medical treatment, increased energy and nutrient requirements, drug side effects, gastrointestinal symptoms, reduced food intake, malabsorption and comorbidities among others[12]. In the elderly people, age-

associated changes in body physiological functions, hormonal or vitamin imbalances, and sensory loss may lead to high possibility of malnutrition [13].

Dietary diversity is the number of different food groups consumed over a given period that provides a balance of nutrients that promote healthy, growth and development. Low dietary diversity is associated with a higher probability of metabolic syndrome and cardiovascular disease risk factors in adults [14]. Eating a diversity of foods (varieties of food groups) is an internationally accepted recommendation for a healthy diet, and is associated with positive health outcomes such as reduced incidence of mortality. Dietary diversity is therefore a key concept that should be promoted in managing the nutritional situation of PLWHA [15].

The staple foods of Cameroon vary from region to region and depend on climate, urbanization, household income, nutritional education, health, gender, and age group. Generally, starchy foods (e.g. corns; cassava, yam, cocoyam, potatoes; plantains; unripe bananas; and rice) dominate in Cameroonian dishes and are served with sauces, which usually contain leafy vegetables, legumes and seeds with meat or fish added, depending on affordability, availability and cultural habits [16, 17]. Although the prevalence of malnutrition and associated factors have been reported in many countries, there is little data on the burden of malnutrition and associated factors among PLWHA in Cameroon in general and particularly in the South West Region of Cameroon. This study was therefore conducted to assess the prevalence of malnutrition and its associated factors among adult HIV/AIDS persons on ART at the HIV care and treatment centre of the Buea Regional Hospital to generate evidence-based data to inform public health interventions to improve the nutrition status of HIV-infected patients.

2. MATERIAL AND METHODS

2.1 Study design and settings

The study was a hospital-based cross-sectional study carried out at the HIV Care and Treatment Centre of the Regional Hospital Buea, a secondary health care facility. About 2000 adult HIV/AIDS persons are enrolled in the HIV/AIDS Unit (Care and Treatment Centre) in this Hospital. The Centre provides various services such as reception of HIV/AIDS patients, intake service, referral drug refill, screening, medical consultation and counselling.

2.3 Study population and sampling

The study population consisted of adult persons living with HIV/AIDS who had been on uninterrupted ART for at least six months. Adult HIV/AIDS persons who had kyphoscoliosis were excluded from the study. Pregnant women living with HIV/AIDS were excluded from the study. A total of 139 HIV Seropositive adults on antiretroviral therapy who consented were included in to the study. Recruitment of participants into the study was consecutive.

2.5 Data collection

Data on demographic factors, socioeconomic factors, and health-related factors were collected using a structured questionnaire from April 2022 to June, 2022. The clinical characteristics of the patients were extracted from their treatment registers using a data extraction form. The participants were counselled on clothing before being weighed. Measurement of body weight was conducted using a manual weighing balance and recorded to the nearest 0.1kg. The body weight was taken with participants in light clothing and shoes taken off. Measurement of height was conducted using a measuring gauge that was regulated to the nearest 0.1cm. BMI (kg/m^2) was calculated as a proxy nutritional status by dividing body weight (kg) by the square of the height (m^2). It was classified according to the conventional classification of the World Health Organization. BMI was stratified according to the WHO criteria: <18.5 kg/m^2 (underweight), >18.5 to 25 kg/m^2 (normal weight), and >25 kg/m^2 (overweight and obese) [20]. The measurement of waist and hip circumferences was conducted using a stretched resistant tape that was regulated to the nearest 0.1cm. Waist circumference was measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest, using a stretch-resistant tape. Hip circumference was measured around the widest portion of the buttocks. For both measurements, the subject stood with feet close together, arms at the side that guarantee evenly distribution of the body weight. The subjects were relaxed, and the measurements were taken at the end of a normal expiration. The measurements were collected twice and the average of each taken [21]. The waist to hip ratio (WHR) was calculated as waist circumference (cm) divided by the hip circumference (cm) to get the abdominal obesity [22]. Guideline and cut-offs for underweight, normal weight, overweight, obesity for BMI were, <18.5, < 18.5 to 24.9, 25 to 29.9, > 30 respectively and for obesity classification, guidelines for class 1, class 2 and class 3 obesity were, 30 to < 35, 35 to < 40, > 40 respectively [20–and WHR for men low, moderate and high is ≤ 0.95, 0.96 to 1.0, and ≥1.0 respectively and for women is ≤ 0.80, 0.81 to 0.85 and ≥ 0.86 [22] respectively.

Minimum dietary diversity was assessed using a minimum dietary diversity questionnaire, as indicator of the nutrient adequacy of the diet of the persons based on guidelines from the Food and Agricultural Organization (FAO) [23]. Dietary diversity was recognized by using the approved 24- hour recall method adopted from the food and agriculture organization (FAO). The MDD was made up of 10 main food groups. A PLWHA was classified as having food insecurity or inadequate dietary diversity if he or she consumed less than five food groups. A PLWHA who consumed five or more food groups was classified as having reached MDD with good diet variety and food security [24].

2.6 Data analysis

Data was analyzed using the Statistical Package for Social Sciences (SPSS) Version 25.0. Descriptive statistics were performed for categorical data, mean and standard deviation and median were calculated for continuous variables. Logistic regression was used to identify factors associated to malnutrition. Simple logistic regression was used

to screen predictors at p-value < 0.2 and a multiple logistic regression was used to select the factors associated with nutritional status of patients at p-value ≤0.05.

3. RESULTS

3.1 Socio-demographic Characteristics of study participants

A total of 139 participants were enrolled into the study of which 122 (87.8%) were females. The mean age of participants was 43 ± 7 years with 46.6% participants in the age group of 36 - 45 years. Majority of the participants 134(96.4. %) were Christians with, 58 (41.7%) were married, 69 (49.6%), were self-employed and 77 (55.4%) had an estimated monthly income (FCFA) between 50,000 to 100,000 (Table 1).

Table 1: Socio-demographic characteristics of study participants

Variable	Categories	Frequency	Percentage
Sex	Female	122	87.8
	Male	17	12.2
	Total	**139**	**100**
Age groups (years)	21- 35	18	12.9
	36 – 45	62	44.6
	46 – 55	50	36
	> 55	9	6.5
	Total	**139**	**100**
Marital Status	Cohabiting	5	3.6
	Divorced	11	7.9
	Married/Concubinage	58	41.7
	Single	46	33.1
	Widow(er)	19	13.7
	Total	**139**	**100**
Religion	Christian	134	96.4
	Muslim	5	3.6
	Total	**139**	**100**
Profession	Private employee	37	26.6
	Public employee	19	13.7
	Self-employee	69	49.6
	Unemployed	14	10.1
	Total	**139**	**100**
Education Level	Not a student	4	2.9
	High school	14	10.1

	Primary school	61	43.9
	Secondary school	47	33.8
	University	13	9.4
	Total	**139**	**100**
Residence	Rural	102	73.4
	Urban	37	26.6
	Total	**139**	**100**
Household size	1 _ 3	54	38.8
	4 _ 6	62	44.6
	7 +	23	16.5
	Total	**139**	**100**
Food money per day	1000 – 2000	94	67.6
	3000 – 5000	40	28.8
	> 5000	5	3.6
	Total	**139**	**100**
Income (FCFA)	<50000	55	39.6
	~~>100000~~	~~7~~	~~5~~
	50000-100000	77	55.4
	>100000	7	5
	Total	**139**	**100**

3.2 Clinical characteristics of the study participants

Regarding the HIV/AIDS-related characteristics of participants; more than half 78 (56.1%) were at clinical stage I, 115 (83.3%) of the participants had an undetectable viral load, 126 (90.6%) had disclosed their HIV status to their partner, 117(84.2%) were on first line treatment and 15 (10.8%) did not attend HIV-related counseling (table 2).

Table 2: Clinical characteristics of the study participants

Variable	Categories	Frequency	Percent
Duration of ART	≥3 years	119	85.6
	6 months to 3 years	20	14.4
	Total	**139**	**100**
Clinical stage	Stage I	78	56.1
	Stage II	18	12.9
	Stage III	39	28.1
	Stage IV	4	2.9
	Total	**139**	**100**
HIV advance disease	No	136	97.8

	Yes	3	2.2
	Total	**139**	**100**
Condition	Cerebral Toxoplasmosis	1	33.3
	Pulmonary TB	2	66.7
	Total	**3**	**100**
Most recent viral load (copies/ml)	40-1000	17	12.3
	>1000	6	4.3
	Undetectable	115	83.3
	Total	**139**	**100**
HIV/AIDS-related symptoms	No	133	95.7
	Yes	6	4.3
	Total	**139**	**100**
Treatment Regimen	1st line	117	84.2
	2nd line	22	15.8
	Total	**139**	**100**
Depressed or anxious	No	128	92.1
	Yes	11	7.9
	Total	**139**	**100**
Disclosure of HIV/AIDS status	No	13	9.4
	Yes	126	90.6
	Total	**139**	**100**
HIV related counselling session	No	15	10.8
	Yes	124	89.2
	Total	**139**	**100**
Diarrhoea	No	135	97.1
	Yes	4	2.9
	Total	**139**	**100**

3.3 Prevalence of malnutrition among HIV/AIDS patients based on Body Mass Index (BMI)

The average BMI of the study population was 24.56 ± 4.97 kg/m^2. Based on BMI classification, 2(1.4%) of the participants were underweight, 49(35.3%) had normal weight, 54(38.8%) were overweight and 34(24.4%) were obese (Figure 1).

Figure 1: Prevalence of malnutrition among PLWHA based on BMI

Malnutrition in HIV persons classified based on the waist-hip ratio

Table 3 shows the waist to hip ratio categories whereas figure 3 shows the variation of WHR in the study population. Abdominal obesity was more present in women 67(48.2%) than in men 1(0.7%) as shown in figure 2. The mean WHR was 2.5±13.3. The overall prevalence of malnutrition based on WHR was 68(48.9%).

Table 3: Categories of Waist-hip ratio of persons living with HIV/AIDS
Categories of Waist-hip ratio of persons living with HIV/AIDS

Variable	Categories	Frequency(n)	Percent(%)
Waist/Hip ratio categories	High	68	48.9
	Low	38	27.3
	Moderate	33	23.7
	Total	139	100
Malnutrition(overnutrition)	Normal	71	51.1
	Malnourished	68	48.9
	Total	139	100

Figure 2: WHR distribution by Sex among PLWHA at the Buea Regional Hospital

3.4 Demographic factors associated with malnutrition among study participants

Of the demographic factors studied, there was a significant association between sex and malnutrition ($\chi^{2=}$4.72, p=0.03) with females being more malnourished than males (table 3).

Table 4: Association between malnutrition and socio-demographic characteristics

Variables	Categories	n	Nutritional status				²	*p-value*
			Malnourished	(%)	Normal	(%)		
Residence	Rural	**102**	67	48.2	35	25.18	0.15	0.701
	Urban	**37**	23	16.55	14	10.07		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Sex	Female	**122**	83	59.71	39	28.06	4.72	**0.030**
	Male	**17**	7	5.04	10	7.19		

	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Age groups (years)	> 55	**9**	6	4.32	3	2.16	3.74	0.291
	26- 35	**18**	8	5.76	10	7.19		
	36 – 45	**62**	42	30.22	20	14.39		
	46 – 55	**50**	34	24.46	16	11.51		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Marital Status	Cohabiting	**5**	4	2.88	1	0.72	5.79	0.204
	Divorced	**11**	6	4.32	5	3.6		
	Married/Concubine	**58**	32	23.02	26	18.71		
	Single	**46**	33	23.74	13	9.35		
	Widow(er)	**19**	15	10.79	4	2.88		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Religion	Christian	**134**	86	61.87	48	34.53	0.53	0.421
	Muslim	**5**	4	2.88	1	0.72		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Profession	Private employee	**37**	24	17.27	13	9.35	1.57	0.667
	Public employee	**19**	10	7.19	9	6.47		
	Self-employee	**69**	47	33.81	22	15.83		
	Unemployed	**14**	9	6.47	5	3.6		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Education Level	High school	**14**	10	7.19	4	2.88	1.75	0.808
	Not a student	**4**	2	1.44	2	1.44		
	Primary school	**61**	41	29.5	20	14.39		
	Secondary school	**47**	30	21.58	17	12.23		
	University	**13**	7	5.04	6	4.32		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Household size	1 _ 3	**54**	38	27.34	16	11.51	1.22	0.542
	4 _ 6	**62**	38	27.34	24	17.27		
	7 +	**23**	14	10.07	9	6.47		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Income (FCFA)	<50000	**55**	32	23.02	23	16.55	2.32	0.309
	50000-100000	**77**	54	38.85	23	16.55		
	>100000	**7**	4	2.88	3	2.16		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Food money(FCFA)	1000 – 23000	**94**	61	43.88	33	23.74	1.46	0.478
	3000 – 5000	**40**	27	19.42	13	9.35		
	> 5000	**5**	2	1.44	3	2.16		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		

3.5 Association between malnutrition and clinical characteristics

Table 4 presents the association bet malnutrition clinical variables. Attendance at HIV-related counseling sessions was significantly associated to malnutrition (χ^2=4.512, p=0.03). Those who attended HIV-related counselling were more malnourished (60.43) than those who did not attend the counselling.

Table 5: Association between malnutrition and clinical characteristics of participants

Variables	Categories	n	Malnutrition				χ^2	p-value
			Malnourished	%	Normal	%		
Duration on ART	3 years and above	**119**	77	55.4	42	30.22	0.01	0.980
	6 months to 3 years	**20**	13	9.35	7	5.04		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Clinical stage	Stage I	**78**	53	38.13	25	17.99	2.27	0.530
	Stage II	**18**	9	6.47	9	6.47		
	Stage III	**39**	25	17.99	14	10.07		
	Stage IV	**4**	3	2.16	1	0.72		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Recently diagnosed with HIV advanced disease	No	**136**	87	62.59	49	35.25	1.67	0.196
	Yes	**3**	3	2.16	0	0		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Most recent viral load (copies/ml)	40 – 1000	**17**	9	6.47	8	5.76	1.80	0.411
	>1000	**6**	5	3.6	1	0.72		
	Undetectable	**115**	75	53.96	40	28.78		
	Total	**138**	**89**	**64.03**	**49**	**35.25**		
HIV/AIDS related symptoms	No	**133**	86	64.66	47	35.33	1.81	0.473
	Yes	**6**	4	2.88	2	1.44		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Treatment regiment	1st line	**117**	79	56.83	38	27.34	2.49	0.115
	2nd line	**22**	11	7.91	11	7.91		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Depression and anxiety	No	**128**	82	58.99	46	33.09	0.33	0.564
	Yes	**11**	8	5.76	3	2.16		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Disclosure of HIV/AIDS status	No	**13**	9	6.47	4	2.88	0.13	0.722
	Yes	**126**	81	58.27	45	32.37		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
HIV related counseling session	No	**15**	6	4.32	9	6.47	4.51	**0.034**
	Yes	**124**	84	60.43	40	28.78		
	Total	**139**	**90**	**64.75**	**49**	**35.25**		
Diarrhoea	No	**135**	87	62.59	48	34.53	0.19	0.663
	Yes	**4**	3	2.16	1	0.72		
	Total	**139**	90	64.75	49	35.25		

In the multivariate logistic regression analysis, only HIV counseling session was associated with nutritional status. The odds of those who attended HIV counseling sessions being malnourished was 3.29 times higher than those who did not attend any HIV related counseling session (AOR=3.29, p=0.036) (table 6).

Table 6: Factors independently associated with malnutrition among HIV/AIDS persons on follow-up care at the Buea Regional Hospital

Variable	Levels	AOR	95% CI		P-value
			Lower	Upper	
Treatment Regimen	2nd line	0.46	0.18	1.17	0.102
	1st line	1			
HIV related counselling session	Yes	3.29	1.08	9.99	**0.036**
	No	1			

3.6 Dietary diversity of PLWHA

Among the ten main food groups, participants consumed more of grains, white roots and tubers, and plantains 139 (100%), meat, poultry and fish 119 (85.6%), and dark green leafy vegetables 67 (48.2%), while eggs 15 (10.8%) was the lowest consumed food (Figure 3).

Figure 3: Distribution of 10 main groups consumed in the last 24-hour by HIV/AIDS persons aged 21-59 years old

For the dietary diversity, only 51 (37%) had a good dietary diversity while 63%% had poor dietary diversity (Figure 4).

Figure 4: Distribution of participants' dietary diversity score

4. Discussion

Prevalence of malnutrition:

The majority of the study participants were overweight and obese. The prevalence of undernutrition in our study was 1.4%. This was lower compared to that reported (8.5%) in a study conducted in the Centre Region of Cameroon [19], 19.5% reported in

Tanzania [25], 10% in Zimbabwe[26] and 19.2% in Senegal [27]. The difference in the prevalence of undernutrition might be due to differences in socioeconomic and other factors such as food habit and cultures. Also, these differences could be explained by the discrepancy in health care awareness of the community or feeding practices of different ethnic groups. Improvement in healthcare services could also account for these differences.

Overweight and obesity were more dominant in our study than undernutrition. This result raises a concern with the quality of food consumed by participants. Many food types consumed by our study participants are rich in carbohydrates and this could explain the high prevalence of overweight and obesity in this study population. Also, Dolutegravir, a recently added integrase inhibitor antiretroviral drug has been associate to short-term weight gain in HIV/AIDS persons who begin ART[28]. Mostly women were obese in our study cohort with almost half of the study population with abdominal obesity. Abdominal obesity might reflect a metabolic syndrome which has been shown to affect 32.8% of PLWHA in Cameroon [29].

Factors associated with malnutrition

Females were more malnourished than males. This finding is similar to that of a study conducted in Ethiopia [30]. This may be due to the low number of males that were included in the study. In order to sustain their children and husband's life, women live a more sedentary life style to pay attention to their family. Those who attended counseling sessions were more prone to malnutrition than those who did not. This could be probably because the counselling they receive was HIV-related counselling and not nutrition related counselling. This suggest that a nutritional counselling arm should be included in the HIV-related counselling to improve on their nutritional status. This suggests that the reinforcement of the health personnel's implication on nutritional education of persons should be improved. This finding is comparable to that reported by Perpetue *et al*., in 2021 in Cameroon [19].

The only predictor of malnutrition identified was the treatment regimen, although there was no significant association. The odds of those on 2nd line treatment regimen being malnourished was 0.46 less than those who were on 1st line treatment. Those who were in clinical stage I were more malnourished than those in clinical stage II, III and IV, but the difference was not significant. This is similar to a study reported in Ethiopia where the stage of HIV didn't show any significant effect on respondent's nutritional status [30]. Our findings are contrary to those of a studies conducted at Sella Hospital in Ethiopia [31], where WHO clinical stage II was significantly associated to undernutrition. A study also revealed that individuals at all stages of HIV disease are at risk of nutritional deficiency, but clinical stages show the severity of the disease from primary HIV infection to advanced stages of HIV or AIDS [32]. This discrepancy might be due to the clinical stage of the study participants, where majority of them are found at the clinical stage one in the current study.

With regards to HIV/AIDS related symptoms, there was no significant association between malnutrition and HIV/AIDS related symptoms. This is in contrast to the findings

of a study carried out at the Elege Hiwot referral Hospital in Ethiopia where those who developed disease symptoms two weeks prior to the survey were almost two times more malnourished than those who were free of symptoms [33].

In this study, the duration on ART was not significantly associated to malnutrition. This is in contrast to reports by Daniel and collaborators in a study carried out in Ethiopia where patients who were on ARV drugs for less than 12 months were 1.7 times more malnourished than those who took the drug more than a year [33]. ART contributes to the wellbeing of people living with HIV (PLHIV), and reduces the threat of the ongoing transmission of HIV.

Minimum dietary diversity:
Dietary diversity which is the number of different food groups consumed over a given time period is of great importance as it can be used as a simple indicator of nutritional adequacy in individuals [34]. The present study revealed that only 37% of the participants had achieved a minimum dietary diversity. This is similar to findings from a study carried out in Ethiopia where 29·5 % of participants consumed a diversified diet [35]. The poor dietary diversity observed in our study could be due to the ongoing socio-political crisis in the South West Region of Cameroon which might prevent PLWHA to have access to diversified foods. However, this percentage is lower than that reported in a study carried out in Ethiopia at the Hiwot Fana and Dilchora Hospitals that reported an MDD of 71.3%. [36]. This discrepancy might be due to variation in the data collection periods, i.e. data collection period for the Hiwot Fana & Dilchora Hospitals was November to February, which was harvesting time when there was better food access.

CONCLUSIONS

The prevalence of overweight and obesity among PLHIV at the Buea regional hospital treatment site was very high with female more affected than males. The only factor significantly related to malnutrition was HIV-related counselling. Majority of HIV/AIDS patients in Buea had a poor dietary diversity. This study highlight the need to develop and implement a nutritional based intervention in HIV treatment centre for the improvement of the nutritional status of PLHIV.

ETHICAL APPROVAL AND CONSENT

This study was approved by the Institutional Review Board of the Faculty of Health Sciences, University of Buea (Ref. No. 2022/177104/UB/SG/IRB/FHS). Administrative clearance was obtained from the Regional Delegation of Public Health for the South West region, (Ref. No. RII/MINSANTE/SWR/RDPH/PS/419/424) and written informed consent was obtained from the patients recruited into this study.

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