

Predictors of dietary diversity among adults on antiretroviral therapy in Debre Tabor Hospital, northwest Ethiopia: A cross-sectional study

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Abstract

Background: Diversified diet to improve better tolerates human immunodeficiency virus drugs, enhance antiretroviral therapy adherence and maintain a healthy weight to reduce mortality and morbidity. Therefore, the aim of this study was to assess dietary diversity and associated factors among adult human immunodeficiency virus positive patients who were on antiretroviral therapy at Debre Tabor Hospital northwest Ethiopia

Methods: Institutional based cross-sectional study was conducted at Debre Tabor Hospital and participants selected by the systematic random sampling techniques. Data collection was done by using a structured interview questionnaire. Dietary diversity was computed from all food and drink list consumed in the 24 hours preceding the survey. A variable having p- value < 0.2 in the bivariate logistic regression was entered into the multivariable logistic regression, and independent variables having p- value < 0.05 was considered as significantly associated.

Results: Of the total 341 adults on antiretroviral therapy 336 participants gave a complete response with a response rate of 98.50%. Among the participants 336 [32.4% (95% CI: 27.4, 37.1)] had adequate dietary diversity and 22.9% were BMI <18.5kg/m². Government employment [AOR= 2.5; 95%CI: 1.28, 4.98) and diploma and above educational status [AOR=2.3; 95% CI: 1.01, 5.31) were factors for adequate dietary diversity.

Conclusions: In this study the magnitude of adequate dietary diversity was low. Employment and educational status were significantly associated with dietary diversity among people living with HIV/AIDS. Hence, improving education status as well as income generation activities are highly recommended strategy to improve the dietary diversity of patients on antiretroviral therapy.

Introduction

Globally, 36.7 million people are living with HIV/AIDS (PLWHA) (1). Poor nutrition and HIV/AIDS are interrelated and aggravate each other in a vicious cycle by attacking the immune system(2). The nutritional status of an individual is affected by HIV/AIDS through increasing energy requirements, reducing food intake, and decreasing nutrient absorption and metabolism (3, 4). Having good nutritional status and eating diversified diets have an important role in enhancing antiretroviral therapy (ART), encouraging good adherence to ART drugs, and maintaining healthy weight (5).

HIV/AIDS attacks the immune system and make the body susceptible to opportunistic infections like fever, diarrhea, tuberculosis, pneumonia. Hence, adequate dietary intake alongside ART helps the immune system to be strong, and enable it to fight diseases better (6). On the other hand, undiversified diet can intake possibly contribute to micronutrient deficiencies that lead to HIV/AIDS progression and the depletion of the cluster of differentiation of the CD4 count which increases the risk of opportunistic infections in addition to oxidative stress (7, 8).

Dietary diversity is the assessing qualitative utilization of food which reflects an individual's right use to different foods; it is also an indicator of a diet's micronutrient adequacy, an important dimension of its quality (9, 10). It even serves as a proxy indicator of diet quality and indicates its association with the nutrient adequacy of an individual's diet (11, 12).

Dietary diversity is a challenge to communities the cause their diets are mainly starchy staples with inadequate animal products, fruits, and vegetables (13). Utilizing diversified diet among PLHIV is still poor among resource limited nations like Africa. For instance, 58.8 and 62.3% of the PLHIV in Nigeria and Uganda (14, 15) received inadequate dietary diversity respectively while, 28.7–58.8% of adults obtained inadequate dietary diversity in Ethiopia (13, 16). Previous studies reported residence (17), wealth index (13, 17), employment status (13), duration of ART treatment (16), owning mobile cell phones (18), media exposure status (18) and nutritional counseling (18) were factors affecting dietary diversity among adults living with HIV/AIDS.

Ethiopia has made a notable effort to address the impact of HIV/AIDS on nutrition by preparing national guidelines for HIV/AIDS and by taking actions to provide quality care and support to people living with the disease (19). In addition, it provided livelihood support and food assistance and strengthened community based nutrition care and support activities for PLHIV through health extension workers, agriculture extension workers, and health development armies, in addition to HIV/AIDS treatment, care, and support (20, 21). But, diversified diet is a serious unmovable problem among 29.5% of adults living with HIV/AIDS (18). Yet, there is little information regarding the effects of undiversified diet among PLHIV in Ethiopia, including the study setting (16, 18). Therefore, this study aimed to assess the prevalence and associated factors of dietary diversity among of HIV positive adults on ART attending at Debre Tabor hospital, northwest Ethiopia.

Methods

Study design and settings

An institutional based cross-sectional study was conducted to assess the predictors of dietary diversity among adult HIV/AIDS patients on ART at Debre Tabor hospital, northwest, Ethiopia. Debre Tabor hospital is located in South Gondar zone, northwest Ethiopia 667 km from Addis Ababa, capital of Ethiopia. The hospital provides service to more than 1,000,000 people by 253 health professionals. On average, 45 HIV/AIDS adult patients used to attend the ART Clinic per day. At the moment 1980 HIV/AIDS patients were on ART at the clinic; 1822 of the patients were adults.

Sample size and sampling procedures

Sample size was determined by the simple population proportion formula by considering the following assumptions; a 95% confidence interval, marginal error of 5%, and 58.8% (13) proportion of inadequate dietary diversity which yielded a sample of 372. However, as the source population was less than 10,000, we considered a population reduction formula plus a non-response rate of 10%. The final sample size

was then 341. Participants were selected by the systematic random sampling technique. According to the report from the hospital administration, the monthly average number of adult HIV/AIDS patients on ART was 990. The sampling interval (k^{th}) value was determined by dividing the total monthly adult patients by the sample size ($990/341 = 3$). The first respondent was selected by the lottery method out of the first three clients. The procedure continued until the required sample size was obtained.

Data collection methods and quality control

Data were collected by a face to face interview using a structured questionnaire. The tool included socio demographic characteristics, clinical conditions, nutritional status, and dietary characteristics. Dietary diversity score was computed by asking the participants if they consumed all foods and drinks on the list in the preceding 24 hours of the survey according to the Food and Agriculture Organization (FAO) 2011(22). Likewise, the nutritional status of the participants was assessed by measuring weight and height and calculating Body Mass Index (BMI). BMI less than 18.5 kg/m^2 was considered as undernutrition, while a BMI scale of 18.5-24.9 and BMI $>30 \text{ kg/m}^2$ were taken as normal and obesity, respectively(23).

To maintain data quality, training was provided to data collectors and supervisors for two days by the principal investigator. The training was related to how to approach participants ethically while interviewing them. A pre-test was conducted on 5% of the participants at Debre Tabor health center. The completeness, accuracy and consistency of the collected data were checked daily by an assigned responsible supervisor and the principal investigator.

Measurements of dietary diversity score

The dependant variable of this study is dietary diversity. Individual Dietary Diversity Score (IDDS) of the study participants was measured by adding the food groups consumed over the preceding 24 hours before the survey from starchy staples, pulse, nuts and seeds, dairy, meat, poultry and fish, eggs, dark green leafy vegetables, other vitamin A-rich fruits and vegetables, other vegetables and other fruits. If participants consumed five or more food groups out of the ten listed, they were considered to have an adequate dietary diversity score(22).The independents variables in this study include socio demographic characteristics, clinical conditions and nutritional status of the participants.

Data analysis

The collected data were entered, coded, and cleaned using Epi INFO version 7.0 and data management and analyses were performed using SPSS version 20.0 software. The association of dependent and independent variables was assessed by using the binary logistic regression and in the bivariable analysis variables with p values <0.2 were entered into the multivariable logistic regression with 95% Confidence Intervals. The corresponding p value of < 0.05 was considered as statistically significant at a 95% confidence interval.

Result

A total of 336 HIV positive adults on ART participated in the study with a response rate of 98.5% and a mean age 39.08 ± 10.9 SD. Of the total respondents, almost all (99.4%) of respondents were Orthodox Christians and less than half (43.8%) were married. Most, (81.8%) of the respondents were urban dwellers; while 32.7% and 33% were college diploma graduates and government employees, respectively (**Table 1**).

More than half (58%) of the respondents were in WHO clinical stage one, and about half (53%) had CD4 count of greater than 500mg/mm, while nearly three-fourths (72.3%) were taking ART for more than three years (**Table 2**).

Factors associated with dietary diversity among HIV/AIDS patients on ART

In the multivariate logistic regression analysis, educational and occupational statuses were significantly associated with adequate dietary diversity. Accordingly, patients who had diploma and above educational status were 2.3 times more likely to consume adequate diversified diet compared with those who were unable to read and write (AOR=2.3, 95% CI:1.01,5.31). Likewise, higher odds of diversified diet were noted among government employees than among the unemployed (AOR=2.6, 95%; CI: 1.28, 4.98) (**Table 3**). The overall prevalence of adequate dietary diversity among adult HIV/AIDS patients on ART was 32.4% (95% CI: 27.4, 37.1). The mean dietary diversity scores were 3.75 with 1.95 standard deviation.

Discussion

This study assessed the magnitude and predictors of dietary diversity among adult patients on ART. The overall prevalence of inadequate dietary diversity intake of the current study was 67.6%. This finding was comparable with that of a study done in Hosanna town, southern Ethiopia, (67.9%)(24); whereas, it was higher than those of studies done in Dembia (11.3%) (25), Uganda (14.7%) (26), Hiwot Fana and Dilchora hospital, eastern Ethiopia (28.7%) (16), Metema (58.8%) (13), and Nigeria (62.3%) (14). This variation might be due to differences in study settings, seasons, socio-economic status of respondents and cut-off points used to ascertain the outcome variable. Our study also verified that only 3.9% of the participants ate eggs. This finding was supported by that of a study done in Nigeria (14). That is because eggs were too expensive compared with staple diets.

In this study, patients who had completed college and above were more likely to get adequate dietary diversity compared to the non-educated. This was in line with studies done in Jimma (27), Metema (13), Amatole and Nyandeni districts, South Africa (28). This is due to the fact that if patients level of education is low, their access to finance and their contribution to the total producing income will be low while good education creates employment opportunities to generate income to assure food security and improve purchasing capacity of diversified diet. The other possible reason might be that more educated participants get better service in terms of nutrition education and counseling to improve their nutritional information. Nutritional knowledge has a role to play in dietary practices and the number of meals based

on their requirements(29, 30). Uneducated respondents may not understand the consequences of inadequate diversified diets easily(30, 31). Higher education is more likely to correlate with higher income to spend on a variety of foods (32). Furthermore, educated respondents have media exposure to improve their nutritional knowledge and allocate a larger proportion of their household food budget to food groups. This was supported by previous studies that participants who had exposure to the media were more likely to receive diversified diets (33, 34).

Employment status was the other factor significantly associated with dietary diversity in this study. Government employee HIV patients were 2.5 times more likely to consume adequately diverse diets than non-government employee patients on ART. This was supported by studies done in Jimma (27), Metema (13), and north India (35). The most possible explanation might be that government employees had regular income which they used to vary their food, while their counterparts had less chance of doing that. In addition, joblessness might be the result of how educational status which could result in poor wealth status that affects the capacity to purchase adequate and appropriate food. Besides, unemployed participants experienced food insecurity which decreased their capacity of consuming diverse diets at individual and household levels (36, 37).

Conclusion

This study showed that the prevalence of adequate dietary diversity was low. Government employment and diploma and above educational status were significantly associated with dietary diversity among adult people living with HIV/AIDS. Therefore, special emphasis on improving education status as well as income generation activities are highly recommended strategy to improve the dietary diversity of patients on antiretroviral therapy.

Limitations Of The Study

Although, this study has attempted to show factors affecting the dietary diversity of PLWHA, it has some limitations which should be taken into consideration. We didn't measure food weight to estimate calorie quantities in foods, and during measuring dietary diversity, recall bias was one of the likely constraints of the study. We also did not address seasonality when administering the FANTA HDDS questionnaire.

List Of Abbreviations

AIDS =Acquired Immune Deficiency Syndrome, AOR =Adjusted Odds Ratio, ART= Anti-Retroviral Therapy, BMI=Body Mass Index, CD4=Cluster of Differentiation4, COR=Crude Odds Ratio, DDS =Dietary Diversity Score, IDDS =Individual Dietary Diversity Score, FAO=Food and Agriculture Organization, GDP =Gross Domestic Product, HIV= Human Immune Deficiency Virus, MG=Milligram, MM=Milliliter, PLWHA=People Living with HIV/AIDS, SPSS =Statistical Package for Social Science, WHO=World Health Organization

Declarations

Ethics approval and consent to participate

Ethical clearance was obtained from Institute of Ethical Review Board of University of Gondar. An official permission letter was obtained Debre Tabor hospital. Written informed consent was obtained from study participants in their local language after explaining the purpose of the study, potential risks and benefits of the study, and the right to withdraw from the study at any time. The participants were also assured that the data was confidential.

Consent for publication

Not applicable.

Availability of data and materials'

Data will be available upon request from the corresponding authors.

Funding

No fund was obtained for this study

Authors' contribution

KW conceived the study, developed the tool, coordinated the data collection activity, and carried out the statistical analysis. EA, MTH and GA participated in the design of the study and tool development, performed statistical analysis, and reviewed the manuscript. AK involved in the tool development, and performed statistical analysis. All authors read and approved the final manuscript.

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Competing interests

The Authors declare that they have no conflict of interest.

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Tables

Table 1: Socio-demographic and economic characteristics of adults on ART in Debre tabor Hospital, Northwest Ethiopia.

Variables	Frequency	Percent
Age (Years)		
18-30	77	22.9
31-45	181	53.9
46-60	66	20.5
>60	9	2.7
Sex		
Male	124	36.9
Female	212	63.9
Marital status		
Single	51	15.2
Married	147	43.8
Divorced	102	30.4
Widowed	36	10.7
Religion		
Orthodox Christian	334	99.4
Others	2	0.6
Residence		
Urban	275	81.8
Rural	61	18.2
Educational status		
Unable to read and write	49	14.6
Able to read and write	40	11.9
Primary school	86	25.6
Secondary school	51	15.2
Diploma and above	110	32.7
Occupational status		
Government worker	111	33.0
Private worker	123	36.6
Unemployed	102	30.3
Monthly income		
<600 Ethiopian birr	83	24.7
600-1000 Ethiopian birr	126	37.5
1001-1750 Ethiopian birr	44	13.1
>1750 Ethiopian birr	83	24.7

*Others= Muslim and protestants

* 1 USD dollar= 28 Ethiopian birr

Table 2: Health and Nutrition related characteristics Adults on ART in Debre Tabor hospital, northwest Ethiopia.

Variables	Frequency	Percent
WHO clinical staging		
Stage I	195	58
Stage II	65	19.3
Stage III	45	13.4
Stage IV	31	9.2
CD4 Count		
<200cells/mm ³	50	14.9
200-350cells/mm ³	54	16.1
351-500cells/mm ³	54	16.1
>500cells/mm ³	178	53
ART regimens		
AZT based	163	48.2
TDF based	160	47.6
Second line	14	4.2
Duration of ART		
<=18months	31	9.2
19-42months	62	18.5
>42months	243	72.3
Opportunistic infections		
Yes	7	2.1
No	329	97.9
Body mass index		
<18.5kg/mm ²	77	22.9
>= 18.5kg/mm ²	259	77.1

Table 3: Bivariate and Multivariate analysis of factors associated with adequate dietary diversity among Adults on ART in Debre tabor Hospital, Northwest Ethiopia

Variables	DDS		COR (95% CI)	AOR (95% CI)
	Adequate	Inadequate		
Sex				
Male	50	73	0.6(0.35-0.89)	0.7(0.43-1.22)
Female	59	154	1	1
Occupation status				
Government employed	25	86	2.2(1.22-4.03)	2.5(1.28-4.98)**
Private employed	44	79	1.2(0.67-1.99)	1.12(0.59-2.09)
Unemployed	40	62	1	1
Residence				
Urban	96	181	0.6(0.33-1.18)	0.6(0.27-1.13)
Rural	15	46	1	1
Educational status				
Unable to read and write	19	30	1	1
Able to read and write	18	22	0.7(0.33-1.81)	0.6(0.23-1.56)
Primary school	30	56	1.2(0.57-2.44)	1.03(0.44-2.29)
Secondary school	22	29	0.8(0.38(-1.86)	0.7(0.29-1.71)
Diploma and above	20	90	2.6(1.34-6.04)	2.3(1.01-5.31)**
Monthly income				
<600 Ethiopian birr	20	63	1	1
600-1000Ethiopian birr	40	86	0.7(0.36-1.28)	
1001-1750Ethiopian birr	12	32	0.8(0.37-1.95)	
>=1750 Ethiopian birr	37	46	0.4(0.20-0.77)	

**indicate that significant with the p-value <0.05

* 1 USD dollar= 28 Ethiopian birr