

RESEARCH REPORT

Diet quality of persons living with HIV/AIDS on highly active antiretroviral therapy

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Keywords

diet quality, healthy eating index, highly active antiretroviral therapy, HIV/AIDS, nutrition.

Abstract

Background This study sought to assess the diet quality of individuals living with HIV/AIDS who were receiving antiretroviral therapy in São Paulo, Brazil.

Methods This cross-sectional study involved 56 HIV-infected adults. Demographic and anthropometric data were collected, and diet quality was measured using the Healthy Eating Index (HEI), modified for Brazilians, which included ten components: adequacy of intake of six different food groups, total fat, cholesterol, dietary fibre and dietary variety.

Results Among the individuals assessed, 64.3% of the participants had a diet needing improvement, while 8.7% had a poor diet. The overall HEI score was 68.3 points (SD = 14.9). Mean scores were low for fruits, vegetables, dairy products and dietary fibre; and high for meats and eggs, total fat and cholesterol. The overall HEI score was higher among individuals who were not overweight ($P = 0.003$), who were also more likely to achieve dietary goals for dairy products ($P = 0.039$) and grains ($P = 0.005$).

Conclusion Most of these adults living with HIV/AIDS had diets that required improvement, and being overweight was associated with poorer diet quality. Nutritional interventions aimed at maintaining healthy body weight and diet should be taken into account in caring for HIV-infected people.

Conflicts of interests, source of funding and authorship

The authors declare that they have no conflicts of interest.

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Introduction

Achieving basic nutritional recommendations is an important issue when treating people living with HIV/AIDS (PLWHA) at all stages of the disease (World Health Organization, 2003a). Although undernutrition is still found among infected individuals, the use of highly active anti-retroviral therapy (HAART) has not only prolonged their survival, but also increased the prevalence of obesity (Amorosa *et al.*, 2005; Hendricks *et al.*, 2006). Therefore, long-term complications, such as cardiovascular diseases (CVD) relating to diet and obesity have become more important (Hendricks *et al.*, 2006).

Recent studies have also shown the adverse effects of some antiretroviral drugs, which include insulin resistance, hypertriglyceridemia, low serum levels of high-density lipoprotein cholesterol and lipodystrophy (Grinspoon & Carr, 2005). Since 1996, HAART has been available in Brazil through the public health system, which has resulted in a significant decrease in AIDS-related mortality in this country. Nevertheless, new issues have been raised regarding the care needs of Brazilians living with HIV/AIDS (Dourado *et al.*, 2006). The present study aimed to assess overall diet quality among PLWHA on HAART who were

attending an outpatient HIV care clinic in São Paulo, Brazil.

Materials and methods

Subjects

A cross-sectional study was conducted among individuals aged 20–59 years who had been receiving HAART for up to 12 months. Out of 2870 patients on HAART who were attending the HIV care clinic in São Paulo between April and August 2005, 100 fulfilled the above characteristics. However, 16 of these individuals could not be included in the study because of at least one of the following exclusion criteria: pregnancy, metabolic syndrome, use of drugs for hyperglycaemia or dyslipidaemia and use of corticosteroids or steroids. A further 28 could not be contacted or did not agree to participate in the study.

This study was approved by the Ethics Committees of both the School of Public Health and the School of Medicine of the University of São Paulo. All the patients were fully informed about the objectives and procedures of the study and all provided their written informed consent.

Food intake assessment

The dietary intake was assessed as the average of two 24-h dietary recalls administered by a trained nutritionist. These were spaced approximately 1 week apart, in order to study food intake variability. After collection, the food intake data were converted into energy and nutrients by means of the NutWin software, version 1.5 (Federal University of São Paulo, São Paulo, Brazil).

Foods were grouped according to composition and were classified using the Dietary Guidelines for the Brazilian population groups and serving sizes (Ministry of Health, 2005). They were separated into ingredients before the servings were counted, thereby greatly enhancing the ability to count food group and nutrient contributions from mixed dishes. The diet quality was assessed using a version of the Healthy Eating Index (HEI) that had been modified for the Brazilian population (Fisberg *et al.*, 2006). The HEI was developed for

American populations and has been modified several times according to its use. It is based on food group consumption and dietary variety, and is a practical tool for assessing changes in diet quality over a period of time (Kennedy *et al.*, 1995). The sodium component was replaced by 'dietary fibre' in the present study, and all the components of this index are shown in Table 1. The index was analysed as a continuous variable and individuals were divided into three different categories defined by the diet quality scores: ≤ 51 points corresponded to 'inadequate diet'; 51–80 points, 'diet needing improvement'; and ≥ 81 points, 'adequate diet' (Bowman *et al.*, 1998).

In addition to the dietary recall, all the participants answered a structured demographic questionnaire and anthropometric data were collected by a trained nutritionist. Body weight was measured to the nearest 0.1 kg using a digital scale (Tanita, Tokyo, Japan) and height to the nearest 0.1 cm using a stadiometer (Seca, Hamburg, Germany). The average of duplicate measures was used to compute body mass index (BMI), which was later categorized (World Health Organization, 2000).

Statistical analysis

Statistical analyses were performed using SPSS, version 13.0 (SPSS Inc., Chicago, IL, USA). The HEI scores were described using means and standard deviations, as were the nutritional status variables. The Kolmogorov–Smirnov test was used to investigate the adherence of the study variables to normal distribution. For skewed variables, the nonparametric *Mann–Whitney* test was used, whereas, for normally distributed variables, Student's *t*-test was employed.

Results

Most of the 56 HIV-infected individuals on HAART who were assessed were men (82%). The patients' mean age was 36.8 (SD 8.5) years, and the majority had at least completed high school (62.5%). The mean BMI was 23.3 (SD 2.7) kg m^{-2} , range 16.8–29.8 kg m^{-2} . Seventy-one percent presented a BMI in the range 18.5–24.9 kg m^{-2} , whereas 25% of the patients were overweight (25.0–29.9 kg m^{-2}). Only two individuals were classified as underweight (BMI $\leq 18.5 \text{ kg m}^{-2}$).

Component	Score range	Criterion for maximum score (10)*	Criterion for minimum score (0)
Food group			
1. Grains	0–10	6 servings	0 servings
2. Vegetables	0–10	3 servings	0 servings
3. Fruits	0–10	3 servings	0 servings
4. Milk	0–10	3 servings	0 servings
5. Meats and eggs	0–10	1 serving	0 servings
6. Beans	0–10	1 serving	0 servings
Dietary guidelines			
7. Total fat [†]	0–10	30% or less of energy intake from fat	45% or more of energy intake from fat
8. Cholesterol [‡]	0–10	<300 mg	≥ 450 mg
9. Dietary fibre [§]	0–10	≥ 25 g	≤ 7.59 g
10. Dietary variety [¶]	0–10	$\frac{1}{2}$ serving of eight or more kinds of foods	$\frac{1}{2}$ serving of three or fewer kinds of foods

Table 1 Components of the modified Health Eating Index for Brazilians

*Subjects with component scores between the maximum and the minimum cut-off points were assigned scores proportionately.

[†]According to the *Dietary Guidelines for Americans* (USDA, 1995).

[‡]According to the *Committee on Diet and Health* (NRC, 1989).

[§]According to the *Dietary Guidelines for the Brazilian population* (Ministry of Health, 2005), adults should have a minimum intake of 25 g/day of dietary fibre. Minimum score (0) was determined by the 10th percentile of dietary fibre intake within the study population (7.59 g/day).

[¶]Method previously described by Bowman *et al.* (1998).

The total HEI was 68.3 (SD 14.9) points and most individuals (64.3%) had an inadequate diet. Diet quality was better among those who were not overweight (BMI < 25.0 kg m⁻²) ($P = 0.033$), and higher scores for dairy products and grains were found in the same group ($P = 0.039$ and $P = 0.005$, respectively) (Table 2).

Discussion

In this sample, 23% of the individuals had a healthy diet. This frequency is greater than that found in a previous study among HIV-positive American adolescents (12%) (Kruzich *et al.*, 2004). Data from population-based studies among adults in the State of São Paulo, Brazil, and the United States have also yielded lower prevalence of adequate diet (Basiotis *et al.*, 2002; Fisberg *et al.*, 2006). The higher schooling levels among the study population, in comparison with the general Brazilian population, could explain this difference, because higher schooling levels have been positively associated with healthier food choices among Brazilians (Fisberg *et al.*, 2006).

The low scores found for fruits and vegetables corroborated previous studies, thus reinforcing the need for nutritional education that emphasizes that the intake should be at least 400 g of fruits and vegetables per day, which is known to help prevent CVD (World Health Organization, 2003b). Greater intake of dietary fibre also decreases the risk of

CVD among the general population (World Health Organization, 2003b). Hendricks *et al.* (2003) found that a fibre-rich diet was negatively associated with the occurrence of fat deposition among PLWHA. Therefore, we decided to include a specific category for dietary fibre in order to achieve a single measurement of its intake among the study population.

The score for dietary fibre was low in the present study (4.8 points), as was the score for dairy products (5.5 points), which agreed with previous findings (Kruzich *et al.*, 2004; Fisberg *et al.*, 2006). In addition, being overweight was associated with lower scores for dairy products ($P = 0.039$) and grains ($P = 0.005$). This association has not yet been studied among this population and further research is needed. Nevertheless, adequate intake of dairy products and fibre-rich grains should form an important part of healthy eating promotion.

Overweight individuals had a significantly poorer diet quality in the sample, in accordance with previous findings (Bowman *et al.*, 1998). Hendricks *et al.* (2006) studied an outpatient sample of PLWHA and found not only a high prevalence of overweight and obese men (52%) and women (62%), but also a negative association between BMI and fibre intake, which suggested that these individuals had a poor-quality diet. Underweight and normal weight individuals were grouped in the present study because no statistical differences were found between them. Among

Table 2 Healthy Eating Index and its component scores for individuals living with HIV/AIDS in São Paulo, Brazil, 2006, according to body mass index

	Total Mean (SD)	Body mass index		P^*
		< 25.0 Mean (SD)	≥ 25.0 Mean (SD)	
Grains	7.3 (2.2)	7.8 (2.0)	5.9 (2.2)	0.005 [†]
Vegetables	5.2 (3.5)	5.2 (3.5)	5.3 (3.3)	0.988 [†]
Fruits	4.7 (3.9)	4.8 (3.9)	4.5 (4.1)	0.793 [†]
Dairy products	5.5 (3.1)	6.0 (3.1)	4.0 (2.9)	0.039 [†]
Beans	7.0 (4.3)	7.4 (4.2)	5.7 (4.7)	0.255 [‡]
Meats and Eggs	8.8 (2.5)	8.9 (2.4)	8.6 (2.6)	0.593 [‡]
Total Fat	9.0 (2.0)	9.2 (1.8)	8.6 (2.4)	0.236 [‡]
Cholesterol	8.1 (3.7)	8.4 (3.5)	7.2 (4.3)	0.152 [‡]
Dietary Fibre	4.8 (3.4)	4.9 (3.3)	4.4 (4.0)	0.587 [†]
Dietary Variety	7.7 (2.7)	8.0 (2.5)	6.8 (3.0)	0.197 [‡]
Final HEI	68.3 (14.9)	70.7 (13.7)	61.0 (16.5)	0.033 [†]

*Significant association when $P < 0.05$; [†]Student's t -test; [‡]Mann-Whitney test.

Brazilians living with HIV/AIDS on HAART, a high prevalence of overweight individuals has also been demonstrated (30.5%) (Jaime *et al.*, 2004). Dietary interventions addressed to PLWHA on HAART should take the increasing prevalence of overweight and obesity into consideration.

The limitations of the present study include the small sample size, which was the result of the large number of exclusion criteria; however, this may have decreased the variations within the Healthy Eating Index. Nevertheless, despite the small number of participants, the present study provides valuable insight because there is a lack of research on diet quality among PLWHA. Additional investigations on more representative samples are required.

In conclusion, Brazilian adults living with HIV/AIDS appear to have an inadequate diet, and being overweight was associated with poorer diet quality and lower intake of dairy products and grains. Therefore, implementation of nutritional interventions targeted at maintaining normal body weight by promoting a healthy diet is a priority in the comprehensive care approach towards PLWHA.

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