PREVALENCE OF OVERWEIGHT, CENTRAL OBESITY AND METABOLIC COMORBIDITIES RISK IN ADULTS LIVING WITH HIV/AIDS

Prevalência de excesso de peso, obesidade central e risco de comorbidades metabólicas em adultos com HIV/AIDS sem terapia antirretroviral

Prevalencia del exceso de peso, obesidad central y riesgo de comorbidades metabólicas en adultos con VIH/AIDS sin terapia antirretroviral

Original Article

ABSTRACT

Objective: To describe the prevalence of overweight, central obesity and risk of metabolic comorbidities in people living with HIV/AIDS, without antiretroviral (ARV) therapy. **Methods:** Observational, cross-sectional, descriptive study held in an Infectious and Parasitic Diseases Referral Treatment Center of Belo Horizonte, MG, with adults with HIV/AIDS, who had not initiated ARV therapy. The study collected information on weight, height, Body Mass Index (BMI) and waist circumference (WC). Food intake was investigated through the application of 24-hour dietary recall. Additionally, a questionnaire was used to collect socioeconomic data. **Results:** Of the 100 volunteers, 76% were men with average age of 37.1 years. Approximately one third had CD4 ≤ 200 and 64% were classified as sedentary. Men had higher mean weight (71.6 kg against 59.9 kg) and height (1.72m against 1.60m) compared to women. Weight excess and central obesity prevalences of were 4.1% and 35.7%, respectively. Substantially increased metabolic comorbidities risk was present in 20.4% of the subjects. Half of the sample consumed large amounts of processed foods and registered low consumption of fruits and vegetables. **Conclusion:** Before initiating the ARV therapy, the individuals with HIV/AIDS already presented overweight, central obesity, and consequent risk of metabolic comorbidities. Therefore, health education interventions prior to the ARV therapy are necessary for primary prevention of future metabolic problems.

Descriptors: Obesity; Anthropometry; Prevalence; HIV.

RESUMO

Objetivo: Descrever a prevalência de excesso de peso, obesidade central e risco de comorbidades metabólicas em adultos com HIV/AIDS, sem terapia antirretroviral (ARV). **Métodos:** Estudo observacional, transversal, descritivo realizado em um Centro de Tratamento e Referência em Doenças Infecto-Parasitarias de Belo Horizonte, MG, com adultos com HIV/AIDS que não iniciaram o tratamento antirretroviral. Foram coletadas informações sobre o peso, altura, Índice de Massa Corporal (IMC) e circunferência abdominal (CA). A ingestão alimentar foi investigada por meio da aplicação de recordatório alimentar de 24 horas. Além disso, um questionário foi usado para coleta dos dados socioeconômicos. **Resultados:** Dos 100 voluntários, 76% eram homens com idade média igual a 37,1 anos. Aproximadamente um terço apresentou CD4 ≤ 200 e 64% denominaram-se como sedentários. Homens apresentaram maiores médias de peso (71,6 Kg versus 59,9 Kg) e altura (1,72 m versus 1,60 m) em comparação às mulheres. As prevalências de excesso de peso e obesidade central foram iguais a 4,1% e 35,7%, respectivamente. Risco de comorbidades metabólicas aumentado substancialmente esteve presente em 20,4% dos indivíduos. Metade da amostra consumia grande quantidade de alimentos industrializados e baixo consumo de frutas, verduras e legumes. **Conclusão:** Antes de iniciar a terapia ARV, os indivíduos com HIV/AIDS já apresentavam excesso de peso, obesidade central e consequente

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risco de comorbidades metabólicas. Portanto, são necessárias intervenções de educação em saúde pregressa à terapia com ARV, para prevenção primária de problemas metabólicos futuros.

Descritores: *Obesidade; Antropometria; Prevalência; HIV.*

RESUMEN

Objetivo: *Describir la prevalencia del exceso de peso, la obesidad central y el riesgo de comorbidades metabólicas en adultos con VIH/AIDS sin terapia antirretroviral (ARV).* **Métodos:** *Estudio observacional, transversal y descriptivo realizado en un Centro de Tratamiento y Referencia en Enfermedades Infecciosas y Parasitarias de Belo Horizonte, MG, con adultos con VIH/AIDS que no habían iniciado el tratamiento antirretroviral. Se recogieron informaciones sobre el peso, la altura, el Índice de Masa Corporal (IMC) y la circunferencia abdominal (CA). La ingesta alimentaria fue investigada a través de la aplicación de un recordatorio de 24 horas. Además, se utilizó una encuesta para recoger datos socioeconómicos.* **Resultados:** *De los 100 voluntarios, el 76% eran hombres con una media de edad igual a 37,1 años. Aproximadamente un tercio presentó CD4 ≤ 200 y el 64% se presentaron como sedentarios. Los hombres presentaron mayores medias de peso (71,6 Kg versus 59,9 Kg) y altura (1,72 m versus 1,60 m) en comparación a las mujeres. Las prevalencias del exceso de peso y obesidad central fueron iguales al 4,1% y al 35,7%, respectivamente. El riesgo de comorbidades metabólicas se presentó muy elevado en el 20,4% de los individuos. La mitad de la muestra consumía gran cantidad de alimentos industrializados y bajo consumo de frutas, verduras y legumbres.* **Conclusión:** *Antes del inicio de la terapia ARV, los individuos con VIH/AIDS ya presentaban exceso de peso, obesidad central y consecuente riesgo de comorbidades metabólicas. Por lo tanto, son necesarias intervenciones de educación en salud antes de la terapia con ARV para la prevención primaria de problemas metabólicos en el futuro.*

Descriptores: *Obesidad; Antropometría; Prevalencia; VIH.*

INTRODUCTION

According to the World Health Organization (WHO), in the year 2015, 2.1 million people became infected with HIV worldwide[1]. In the last eight years, in Brazil, 93,600 new cases of HIV-infected individuals were notified to the Ministry of Health, totaling 781,000 people living with HIV/AIDS (PLWHA) and a prevalence rate equal to 0.3%[2].

Unquestionably, the introduction of antiretroviral (ARV) drugs in the treatment of PLWHA since the 1990s has exponentially increased the survival of these individuals in Brazil and in the world[3,4]. In contrast to the decrease in mortality, there was also an increase in comorbidities associated with HIV infection and use of ARV drugs[2].

Among these comorbidities, chronic non-infectious diseases account for half of the causes of ARV-induced changes in the individual living with HIV/AIDS[5]. Weakened nutritional status is one of the factors that increase the risk of PLWHA developing chronic diseases[3,6].

Even though weight gain benefits the immune system and minimizes the impact of opportunistic diseases of these individuals, an increase in body fat, especially abdominal fat, may be a chronic source of pro-inflammatory proteins that influence the course of disease and premature aging[7,8]. Considering that HIV has inflammatory activity regardless of other factors, excess body fat in PLWHA is an additional risk factor for insulin resistance, diabetes mellitus and metabolic syndrome[9,10].

The detection of the body fat content of PLWHA can be estimated by different techniques, such as computed tomography scan, magnetic resonance imaging, dual-energy X-ray absorptiometry, electrical bioimpedance or anthropometry[11]. Due to measurement simplicity and low operating cost, the Body Mass Index (BMI), obtained by dividing the weight in kilograms by the square of height in meters (kg/m^2), has been widely used in epidemiological studies as an alternative method for obtaining information estimated for clinical analysis of overweight in PLWHA[12,13].

Taking into account the importance of knowledge of the nutritional profile of PLWHA without the use of ARV for prevention of future metabolic changes, this study aimed at describing the prevalence of overweight, central obesity and risk of metabolic comorbidities in adults living with HIV/AIDS without antiretroviral therapy.

METHODS

Observational, cross-sectional, descriptive study performed with PLWHA, without antiretroviral therapy, assisted by the Orestes Diniz Referral Treatment Center (RTC), located in Belo Horizonte, Minas Gerais.

The sample was selected by convenience. To calculate the sample, the OpenEpi Program and the following information were used: (a) number of HIV-infected patients in 2011, age group 19-40 years, Belo Horizonte; (b) prevalence of overweight in PLWHA using ARV[14]; (c) 5% variation; (d) confidence level equal to 95%. The minimum sample was 95 patients. In all, 135 individuals were selected by convenience sampling, from January to September 2012. Of these, 35 (25.9%) refused to participate in the study. Therefore, the final sample included 100 people, in total.

All volunteers who met the inclusion criteria, that is, HIV-confirmed infection, age above or equal to 18 years old, of both sexes, who agreed to participate in the study, signed the informed consent form (ICF). Invitation to the

survey, as well as data collection, were performed after consultation with the pharmacist of the RTC Service.

Anthropometric information was obtained according to procedures standardized by the World Health Organization[15]. For measurement of height and weight, we used the stadiometer coupled to a "Filizzola®" brand mechanical scale, divided into 100 grams and with 150 kg capacity, and a 2-meter altimeter. The BMI was obtained through the weight/height^2 ratio (kg/m^2) and categorized following the standards for adults published by the WHO into: malnutrition (<18.4 kg/m^2), eutrophy (18.5-24.9 kg/m^2), excess weight (> 25.0 kg/m^2)[15].

In this study, the response variable denominated body fat was created from the combination between BMI and waist circumference, which are the two most used indicators of obesity in population studies. Waist circumference (WC) was measured using a non-extensible measuring tape, graduated in 0.1 cm[15]. The absence of overweight and central obesity was considered when men and women presented BMI≤25 kg/m^2 and WC<94 cm for men or WC<80 cm for women; overweight without central obesity (when BMI>25 kg/m^2 and WC<94 cm for men or WC<80 cm for women), and central obesity (when BMI<25 kg/m^2 and WC>94 cm for men or WC>80 cm for women).

To estimate the risk of metabolic changes, the response variable was divided into three categories: no risk (BMI<25 kg/m^2 and WC<94 cm for men or WC<80 cm for women); increased risk of metabolic changes (BMI= 25 - 29.9 kg/m^2 and WC 94-102 cm for men or WC 80-88 cm for women), and substantially increased risk of metabolic changes (BMI≥30 kg/m^2 and WC 94-102 cm for men or WC 80-88 cm for women)[16]

The evaluation of food intake was performed individually through the application of a 24-hour dietary recall. The collection of 24-hour dietary recalls consisted of a standardized interview, whose food portions consumed were obtained through a photographic album, to guarantee the standardization of the amount consumed. In order to facilitate the measurement of the amounts consumed at home and their subsequent conversion into grams or milliliters, the standardization of foods by portions was used[17]. In addition to this proposal, the food labels listed during the interviews were also consulted. The 24-hour recall data was analyzed using the Diet Win Software (Reinstem, 2001)[18], food chemical composition table[19] and Food Guide for the Brazilian Population[20]. Food was evaluated in the form of groups according to the Food Guide for the Brazilian Population[20].

The subjects completed a form developed by the researchers, which investigated the date of birth, schooling, and practice, type, duration and frequency of physical

activity (PA), being classified as very active (PA>5 days/week and ≥30 minutes/session), active (PA≥3 days/week and ≥20 minutes/session), poorly active (those individuals who perform physical activity but insufficient to be classified as active because they do not follow the recommendations regarding frequency or duration), and sedentary (those who do not perform any physical activity). The volunteers were referred to the Central Laboratory belonging to Orestes Diniz RTC to perform the CD4+ lymphocyte receptor counting, which was performed using the flow cytometry method.

The database was built with double typing in the software EpiData, version 3.1, and statistical analysis was performed with use of the statistical package Stata, version 11.0. Descriptive statistics were performed by means of the frequency and percentage distribution of categorical variables and measures of central tendency and dispersion for the continuous variables, after application of the Shapiro-Wilk normality test. The Chi-square test was used to compare the categorical variables, and the Mann-Whitney test for the continuous variables.

The study was approved by COEP under opinion no. 0251.0.203.000-11 and conducted in compliance with the norms of the ethics code for research in humans, National Health Council, Resolution no. 466/2012.

RESULTS

The sample of this study was composed of 100 PLWHA without the use of ARV. Of these, 76% (n=76) were males, with a mean age of 37.1±9.4 years. The percentage of individuals with higher education was higher among men (35.1%, n=26 versus 8.7%, n=2; p=0.04) than among women. Approximately one third presented CD4≤200 and 64% (n=64) regarded themselves sedentary (Table I).

Men had higher body weight (71.6 kg *versus* 59.9 kg) and height (1.72 m *versus* 1.60 m) compared to women. No statistical differences were observed when evaluating the presence or absence of central obesity and overweight by sex.

The prevalences of overweight and central obesity were equal to 4.1% and 35.7%, respectively (Table I).

Regarding the interpretation by the set of variables BMI/WC, which evaluates the risk of developing metabolic changes, 20.4% (n=20) presented a substantially increased risk, being more pronounced in females (43.5%, n=10). The proportion of people at risk of developing metabolic changes was higher in the female group (p=0.008).

Table II describes the food intake per group of food consumed reported by the 24-hour recall, according to the sex of the evaluated individuals. This table, presented by

Table I - Sociodemographic, clinical, lifestyle and anthropometric data related to sex of people with HIV/AIDS, without antiretroviral therapy, assisted by a Referral Center. Belo Horizonte, MG, 2012.

Variables	Total		Sex				p-value#
			Male		Female		
	n	%	n	%	n	%	
Schooling (n=97)							0.04*
Illiterate	2	2.06	2	2.70	0	0.00	
Functional illiterate	2	2.06	0	0.00	2	8.70	
Fundamental	17	17.53	11	14.86	6	26.09	
High school	48	49.48	35	47.30	13	56.52	
Superior	28	28.87	26	35.14	2	8.70	
Physical activity (n=100)							0.1
Sedentary	64	64.00	45	59.21	19	79.17	
Poorly active	10	10.00	10	13.16	0	0.00	
Active	26	26.00	21	27.63	5	20.83	
CD4 lymphocyte receptor (mm³) (n=98)							0.91
≤200	30	32.90	22	32.30	8	34.70	
200- 350	34	37.30	25	36.70	9	39.10	
≥350	27	29.60	21	30.80	6	26.00	
BMI (kg/m²) (n=100)							0.83
<18.5	6	6.00	4	5.26	2	8.33	
18.6-24.9	60	60.00	47	61.84	13	54.17	
25-29.9	26	26.00	19	25.00	7	29.17	
>30	8	8.00	6	7.89	2	8.33	
Body Fat (n=98)	98	100.00	75	100.00	23	100.00	0.91
Absence of overweight or central obesity	59	60.20	46	61.30	13	56.50	
Excess weight without central obesity	4	4.10	3	4.00	1	4.30	
Central obesity	35	35.70	26	34.70	9	39.10	
Risk of metabolic changes (BMI/WC) (n=98)	98	100.00	75	100.00	23	100.00	0.008**
Without risk	65	66.33	55	73.33	10	43.48	
Increased risk	13	13.27	10	13.33	3	13.04	
Substantially increased risk	20	20.41	10	13.33	10	43.48	

n: sample; BMI: Body Mass Index; WC: Waist Circumference. # Chi-Square; Fisher

grams of food consumed, represents the estimate of the food intake of this population in relation to the food groups, determined according to the Food Guide for the Brazilian Population (*Guia Alimentar para a População Brasileira - GAPB*)[20]. It was observed that half of the sample consumed a large quantity of industrialized foods and, when differentiating the type of industrialized food consumed, a significant importance was observed as regards to the high intake quantities of ultra-processed foods in comparison to processed foods (Table II). When comparing the intake of infusion beverages by sex, a greater amount of grams was observed among men, but without statistical difference (Table II).

Despite the greater consumption of fruits, vegetables and legumes (FVL) in men, there was no statistical difference in this consumption with regard to sex. Moreover, it can be observed that the consumption of FVL was much lower than that recommended by the GAPB (400 grams/day, equivalent to 4.5 portions)[20].

When stratifying the sample in relation to the risk of metabolic comorbidities, verified through the anthropometric variables BMI and WC, it was observed that tuber consumption was higher in the group of patients who did not present risk of developing metabolic changes (Table III).

A curious fact was observed regarding the consumption of milk and yogurt. Half of the sample of men or women (Table II), individuals with or without risk of metabolic comorbidities (Table III), did not consume milk and dairy products. Similarly, half the sample of men and women did not include the consumption of tubers and roots in their daily diet.

Table II - Food intake per food group evaluated by sex in people with HIV/AIDS without antiretroviral therapy. Belo Horizonte, MG, 2012.

Food groups (grams)	Sex						p-value
	Male (n=75)			Female (n=24)			
	P25	Median	P75	P25	Median	P75	
Cereal	36.56	70.10	139.52	39.01	67.92	181.58	0.92
Tubers	0.00	0.00	23.07	0.00	0.00	62.91	0.17
Milk and yogurt	0.00	0.00	161.42	0.00	0.00	160.90	0.63
Meat and eggs	30.33	76.15	123.26	17.49	67.38	129.12	0.87
Legumes	19.19	47.05	83.47	0.00	34.66	140.00	0.86
FVL	12.93	56.26	124.27	0.00	26.00	109.98	0.24
Processed	5.84	41.76	103.19	11.98	51.33	100.58	0.62
Ultra-processed	51.98	151.34	359.74	43.69	203.32	531.02	0.58
Infusion beverage	0.00	53.82	116.74	0.00	6.96	160.42	0.55
Industrialized	94.95	215.34	428.71	111.47	325.93	587.38	0.41

FVL: fruits, vegetables and legumes.

Table III - Food intake by food group associated with risk of metabolic changes in patients with HIV/AIDS without antiretroviral therapy. Belo Horizonte, MG, 2012.

Food groups (grams)	Risk of metabolic changes						p-value
	Without risk (n=65)			At risk (n=33)			
	P25	Median	P75	P25	Median	P75	
Cereal	43.03	78.42	150.51	24.80	64.25	135.25	0.38
Tubers	0.00	64.25	100.94	0.00	0.00	58.58	0.03
Milk and yogurt	0.00	0.00	136.64	0.00	0.00	187.09	0.35
Meat and eggs	31.10	77.12	115.58	0.00	57.62	148.50	0.72
Legumes	24.54	48.71	88.06	0.00	32.21	99.67	0.26
FVL	15.95	49.55	120.43	5.14	30.78	99.45	0.30
Processed	17.20	39.87	95.63	0.50	49.49	120.97	0.49
Ultra-processed	50.45	155.92	362.43	54.63	164.12	514.44	0.51
Infusion beverage	0.00	53.01	106.38	0.00	13.67	175.25	0.94
Industrialized	100.56	225.34	439.16	58.48	263.58	587.81	0.74

FVL: fruits, vegetables and legumes.

DISCUSSION

As a main result, the prevalences of overweight and abdominal obesity found in this study were equal to 34.0% and 35.7%. The assessment of overweight and abdominal obesity in PLWHA is of extreme importance in the clinical practice and follow-up of HIV-infected individuals, since the accumulation of body fat increases the risk of various metabolic comorbidities[21,22].

In Brazil, a cross-sectional study with the objective of investigating the prevalence of overweight and abdominal obesity in individuals with HIV/AIDS using high-potency ARV therapy concluded that 30.5% of the subjects presents excess weight, and abdominal obesity was present in 32.7% of women and 6.4% of men[14]. It is worth noting that, in the present study, the high percentage of individuals found overweight, with central obesity and risk of future comorbidities was detected in a period prior to the start of ARV medication use.

A study of 14,084 PLWHA from 17 cohorts showed that, three years after initiating ARV therapy, 22% and 18% of the subjects with normal BMI (18.5-24.9 kg/m²) had been reclassified into overweight (BMI 25.0-29.9 kg/m²) and obesity (BMI $\geq$30 kg/m²), respectively[23]. The present study used the GAPB[20] to investigate the dietary intake of PLWHA because there is no food guide in the literature that addresses the nutritional needs of these individuals. This instrument is used to promote healthy eating habits for the general population, with the intention of reducing the occurrence of Chronic Non-Communicable Diseases. There is no scientific evidence for preventing the use of GAPB in PLWHA.

The GAPB considers the daily consumption of at least 400g of fruits, vegetables and legumes (FVL) to be the most important of all the guidelines, as it can contribute to the variety and supply of nutrients, and might also aid in reducing the consumption of foods high in fat, salt and sugar[20]. Thus, insufficient consumption may have a negative impact on immune recovery.

Even though the male menu is richer in FLV, both men and women did not consume the ideal amount of this group of food regulators, as recommended by the GAPB. These data contradicts the results found by POF 2008-2009[24], in which men presented lower frequencies of FVL consumption, when compared to women.

High intake of industrialized foods (source of simple carbohydrates and saturated fats) was also observed in this study, which may be associated with body fat accumulation in both men and women. The cross-sectional study carried out in Brazil with 226 adults living with HIV/AIDS suggested that every 10g of dietary lipid ingested increases the odds of having abdominal obesity by 1.28 times[25].

In view of the reality observed in this study, which points to a higher metabolic risk in individuals with HIV/AIDS, it is suggested that the planning of interventions be supported on the motivation of patients for adherence to measures of primary prevention of metabolic disorders, such as dyslipidemia, insulin resistance, metabolic syndrome and type 2 diabetes mellitus. These prevention measures permeate the improvement in eating habits, physical activity, and the decrease or termination of drinking and smoking habits.

CONCLUSION

Before initiating the ARV therapy, the individuals with HIV/AIDS already presented overweight, central obesity, and consequent risk of metabolic comorbidities. Therefore, health education interventions prior to the ARV therapy are necessary for primary prevention of future metabolic problems.

ACKOWLEDGMENTS

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