ORIGINAL ARTICLE

NUTRITIONAL EVALUATION AND LIPODYSTROPHY IN PEOPLE LIVING WITH HIV
AVALIAÇÃO NUTRICIONAL E LIPODISTROFIA EM PESSOAS QUE VIVEM COM HIV
EVALUACIÓN NUTRICIONAL Y LIPODISTROFÍA EN PERSONAS QUE VIVEN CON VIH

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ABSTRACT
Objective: to evaluate the nutritional and food profile of people living with HIV and muscle lipodystrophy. *Method:* this is a quantitative, descriptive, cross-sectional study in a school clinic. Food consumption was measured through a 24-hour recall, using the Food Frequency Questionnaire. Anthropometric information was used. The NUTWIN® software, 2010, was used to analyze dietary intake. We proceeded with the descriptive statistical analysis of the data. *Results:* it is reported that 45 people participated in this study, being 53.3% female. The mean age of 43.3 years was recorded and the average time of treatment with antiretrovirals was ten years. It is observed that the most common form of lipodystrophy was lipohypertrophy, followed by lipoatrophy, respectively, with 51.1% and 28.9%. In the anthropometric evaluation, the mean Body Mass Index of 24.7 kg / m^2 was verified, with eutrophy classification to 44.4%. *Conclusion:* there was, at R-24h, insufficient intake of energy, carbohydrates, lipids, fibers and calcium for both sexes. It is considered essential to promote nutritional monitoring and education to mitigate the metabolic changes caused by lipodystrophy. *Descriptors*: Nutritional Assessment; Lipodystrophy; HIV; Antiretroviral Terapy; Food Consumption; Quality of Life.

RESUMO
Objetivo: avaliar o perfil nutricional e alimentar das pessoas que vivem com HIV e lipodistrofia muscular. *Método:* trata-se de um estudo quantitativo, descritivo, transversal, em um ambulatório escola. Aferiu-se o consumo alimentar por meio de um recordatório de 24 horas, aplicando-se o Questionário de Frequência Alimentar. Utilizaram-se infomações de avaliação antropométrica. Recorreu-se ao *software NUTWIN®*, 2010, para analisar a ingestão dietética. Procedeu-se com a análise estatística descritiva dos dados. *Resultados:* informa-se que participaram nesse estudo 45 pessoas, sendo 53,3% do sexo feminino. Registrou-se a média de idade de 43,3 anos e a média do tempo de tratamento com antirretrovirais foi de 10 anos. Observa-se que a forma de lipodistrofia mais presente foi a lipohipertrofia, seguida pela lipoatrofia, respectivamente, com 51,1% e 28,9%. Verificou-se, na avaliação antropométrica, o Índice de Massa Corporal médio de 24,7 kg/m^2, com classificação de eutrofia para 44,4%. *Conclusão:* verificou-se, pelo R-24h, a ingestão insuficiente de energia, carboidratos, lipídios, fibras e cálcio para ambos os sexos. Considera-se essencial promover o acompanhamento nutricional e a educação para se amenizar as alterações metabólicas provocadas pela lipodistrofia. *Descritores*: Avaliação Nutricional; Lipodistrofia; HIV; Terapia Antirretroviral; Consumo Alimentar; Qualidade de Vida.

RESUMEN
Objetivo: evaluar el perfil nutricional y alimentario de las personas que viven con VIH y lipodistrofia muscular. *Método:* este es un estudio cuantitativo, descriptivo, transversal en una clínica escolar. El consumo de alimentos se midió a través de un recuerdo de 24 horas, utilizando el Cuestionario de Frecuencia de Alimentos. Se utilizó informaciones de evaluación antropométrica. El *software NUTWIN®*, 2010, se utilizó para analizar la ingesta alimentaria. Se procedió al análisis estadístico descriptivo de los datos. *Resultados:* se informa que 45 personas participaron en este estudio, siendo 53.3% mujeres. Se registró la edad media de 43,3 años y el tiempo promedio de tratamiento con antirretrovirales fue de 10 años. Se observa que la forma más común de lipodistrofia fue la lipohipertrofia, seguida de la lipoatrofia, respectivamente, con 51.1% y 28.9%. En la evaluación antropométrica, se verificó el índice de Masa Corporal promedio de 24.7 kg / m^2, con clasificación de eutrofia al 44.4%. *Conclusión:* se verificó, por el R-24 h, una ingesta insuficiente de energía, carbohidratos, lípidos, fibras y calcio para ambos sexos. Se considera esencial promover el monitoreo nutricional y la educación para ablandar los cambios metabólicos causados por la lipodistrofia. *Descriptores*: Evaluación Nutricional; Lipodistrofia; HIV; Terapia Antirretroviral; Consumo de Alimentos; Calidad de Vida.

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INTRODUCTION

It is known that the Acquired Immune Deficiency Syndrome (AIDS) was recognized in the 1980s, associated with sexual transmission and the use of injectable drugs, and that it is either an etiological agent or HIV (Human Immunodeficiency Viruses) (Viruses of Human Immunodeficiency). It is confirmed that an infected individual can remain for several years and show symptoms and cannot be diagnosed with AIDS.[1]

It is reported that this infection proceeds through four phases: the first, called acute HIV hair infection, for the first few weeks of viral hair infection, which recruits CD4 + T cells for viral reproduction. Later, he went to the clinic, being able to last for ten years after infection. It is characterized by a phase of symptomatic infection of the appearance of synais and symptoms, such as chronic diarrhea, weight loss and fever. It should be noted, therefore, that the symptoms appear and are prone to immunodeficiency, that infection progresses for Aids, increasing the chances of individual development of opportunistic infections.[2] It is noted that the proportional distribution of cases has the highest concentration in the Southeast and South regions of the country, corresponding to 52.3% and 20.1%, respectively.[3]

Antiretroviral Therapy (ART) is associated with the appearance of metabolic changes and abnormal redistribution of body fat in People Living with HIV (PLHIV), the so-called Muscle Lipodystrophy Syndrome.[4] Among the metabolic changes, abnormalities in the lipid profile and insulin resistance, similar to the metabolic syndrome, are included.[1]

Lipodystrophy can be classified into three types, according to the characteristics of body changes. It is known that the accumulation of fat in the region of the abdomen, breasts and cervical back indicates lipohypertrophy. Lipoatrophy is defined by the reduction of fat in peripheral regions, such as legs, arms, face and buttocks. It is pointed out that the mixed form of the syndrome is the combination of lipoatrophy and lipohypertrophy.[5]

For an adequate and early diagnosis of lipodystrophy, nutritional assessment is mandatory, through a detailed anamnesis, which addresses anthropometry, biochemical tests, clinical analysis and food surveys, in order to identify possible nutritional risks that directly affect the individual's state of health and appear due to their weakened immune status. It is observed that adequate nutrition helps in improving the patient's immune system and contributes to the best prognosis of the stipulated medical treatment, thus improving the quality of life of PLHIV.[6]

OBJECTIVE

• To evaluate the nutritional and food profile of people living with HIV and muscle lipodystrophy

METHOD

This is a study from the Scientific Initiation Project, quantitative, cross-sectional and descriptive, with a non-probabilistic sample design adopted for convenience. The research was carried out in a Reference Center for the Prevention and Treatment of STIs / AIDS and linked viral hepatitis, which has 948 registered patients. As inclusion criteria, adult patients, aged between 19 and 59 years, affected by muscle lipodystrophy, under treatment for at least three months, and who agreed to participate in the research were adopted. Adults with physical disabilities, adults with low cognition, pregnant women, children, adolescents and the elderly were excluded.

Authorization was requested from the Reference Center Coordination for the development of the research, together with the Free and Informed Consent Form (FICT). The research was submitted to the UEMG Research Ethics Committee. The purpose of the study was explained to the participants, as well as information about their rights to anonymity. It is noteworthy that the members also signed an ethical commitment.

Food consumption was measured using a 24-hour recall (R-24h), using the multiple-step technique.[7] The adequacy of food intake was evaluated from the comparison with the reference of the *Dietary Reference Intakes* (DRIs).

A Food Frequency Questionnaire (FFQ) containing several food items for all participants was applied, which included questions regarding the frequency of consumption of food and food groups (monthly, weekly or daily) and the size of the portion consumed in measures last month.

Data was assessed through nutritional anamnesis, anthropometric assessment, biochemical analysis and molecular analysis.

Items in the FFQ were classified based on the extent and purpose of food processing. It appears that this classification groups consumption items into three groups: 1) Fresh or minimally processed foods; 2) Processed culinary ingredients and 3) Processed and ultra-processed food products. For this study, only foods from group 3 (processed and ultra-processed food products) were evaluated, being calculated the quantity in grams consumed by the participants and the percentage of energy from these food products in relation to the total energy of the diet.[8]

The data presented by the FFQ was used for daily frequencies; the frequency option "once a day" was coded as "1" and the other options were

proportionally associated with the period. It is exemplified, for the items that were consumed "twice a week," that the daily frequency was 0.28 (estimated by the formula: 2/7 days).[9] It is noted, after determining these scores, that they were multiplied by the size of the food portion consumed by the participant.

The dietary calculation program was used to analyze the values obtained NUTWIN®. It is known that this program contains the compilation of data from the main nutritional tables and, through it; it is possible to acquire the nutritional value of the macros and micronutrients of the reported foods.

The lipodystrophy syndrome was considered by the participants' own report, through changes in the distribution of body fat, classifying it according to the changes presented.[10]

Weight was measured with a mechanical scale from the brand *Welmy®*, with a maximum capacity of 150 kg. It should be noted that the participants were barefoot and with minimal clothing. To measure height, a stadiometer attached to the scale was used, and the participants were in the Frankfurt position.[11]

For the calculation of BMI, the formula defined by dividing body mass in kilograms by height in meters, whose value is raised to the second power, was used: BMI = Weight (kg) / Height^2 (m). Subsequently, nutritional classification was carried out according to the cutoff points established:[12] malnourished (BMI <18.5 kg / m^2); eutrophic (BMI from 18.5 to 24.9 kg / m^2); overweight (BMI from 25 to 29.9 kg / m^2); grade I obesity (BMI from 30 to 34.9 kg / m^2); grade II obesity (BMI 35 to 39.9 kg / m^2) and grade III obesity (BMI> 40 kg / m^2).

For skin folds, the Prime Med® brand adipometer was used. The right hemibody of the subjects was chosen. It was collected from the Tricipital Skinfold (TSF), on the back of the arm, at the midpoint between the scapular acromial process and the ulna olecranon, with results in millimeters (mm). Due to the variability, three measurements were performed, calculating the average.[13] The diagnosis was made using the percentile tables of a reference population[14] and, in sequence, its percentage of adequacy.[15]

Inelastic measuring tape, with values in centimeters (cm), of the Prime Med® brand, was used to measure the waist circumference (WC) and the arm (AC). WC was measured in the abdominal region with a smaller perimetertro.[13] Its result was classified according to the cutoff points and risk of metabolic complications.[12]

AC was found at the central point between the acromion and the umeroradial articulation of the arm.[13] The data obtained was compared to the percentiles according to the age group[14] and the percentage of adequacy.[15] Subsequently, the nutritional status was evaluated from the calculations.

For the verification of biochemical tests of lipid profile, fasting glucose, renal function, liver function, complete blood count and molecular tests of viral load and CD4 + T cells, data from the medical records of the study participants and the results analyzed, following the references of the performing laboratory.

The NUTWIN® software, 2010, was used to analyze the dietary intake of the individuals studied. Duplicate food intake data was entered to ensure correct typing. All data and possible errors were reviewed before insertion. The nutritional value of foods for macronutrients and micronutrients was obtained.

For the statistical analysis, a quantitative approach and a descriptive analysis of the variables were performed using measures of central tendency, absolute and relative frequencies, with the aid of the Excel® program, 2016.

The percentage of caloric intake from carbohydrates, proteins and lipids, the average consumption of dietary fiber (g), cholesterol (mg), sodium (mg), iron (mg), calcium (mg), vitamins A and C and the consumption of ultra-processed foods.

Comparisons between two groups were made using Student's t test or chi-square test, when observing the non-compliance with any of the assumptions. In all analyzes, the significance level of 5% was considered and the abnormality was tested.

RESULTS

In the period from April to October of 2018, 123 PLHIVs were interviewed, of which 61 met all the inclusion criteria of the research, however, five did not accept to participate and 11 were excluded due to incomplete data.

The study included 45 individuals: 53.3% (n = 24) female, 42.2% (n = 19) single, with a mean age of 43.3 ± 8.9 years, with minimum 21 and maximum 59 years. In relation to education, 35.6% (n = 16) had incomplete elementary education. It is observed that the monthly income of 68.9% (n = 31) of the interviewees was between one and three minimum wages. It is noteworthy that, among the interviewees, 53.3% (n = 24) were not smokers and, among men, 57.1% (n = 12) were smokers. It is added that 62.2% (n = 28) of the interviewees did not consume alcoholic beverages.

The mean of 10 ± 6.4 years of treatment with antiretrovirals was obtained in the participating group, with a minimum of six months and a maximum of 27 years. It is pointed out that 48.9% (n = 22) used drugs of the class of Protease Inhibitors (PI) and the most frequent use was registered among women, with 54.2% (n = 13) (p = 0.28).

It should be noted that the form of lipodystrophy most present in those surveyed was lipohypertrophy, in 51.1% (n = 23), followed by 28.9% (n = 13), who had lipoatrophy and 20% (n = 9) , the mixed form, with no statistical difference between men and women (p = 0.57).

In the anthropometric evaluation, it was observed that the average weight of the participants was 68.6 ± 16.3 kg, with an average height of 1.66 ± 0.09 meters and the average BMI of 24.7 ± 5.4 kg / m², with classification of malnutrition to 11.1% (n = 5), eutrophy, to 44.4% (n = 20), overweight, to 28.9% (n = 13), grade I obesity, to 8.9% (n = 4) and grade II obesity, to 6.7% (n = 6). The most prevalent state of overweight was found among men (38.1% = 8) and malnutrition among women (20.8% = 5), without statistical significance (p = 0.81), as shown in tables 3 and 4.

It is understood that the mean WC for women was 86.3 ± 15.2 cm, with an increased risk classification for metabolic complications in 54.2% (n = 13) of the participants; for men, the mean was 89.8 ± 8.6 cm, with a normal rating for 61.9% (n = 13) of the participants, without statistical significance (p = 0.34), according to the data provided in the tables 3 and 4.

For TSF, an average of 18.3 ± 9.5 mm was found among women, with 70.8% (n = 17) of malnutrition and 15.2 ± 7.3 mm among men, with 57. 2% (n = 12) of obesity (p = 0.22). It appears that, in relation to AC, male participants had their highest percentage in the eutrophic classification 57.2% (n = 12), while women maintained equality in the malnutrition and eutrophic classifications (p = 0, 05) and, with regard to AMC, both genders had their highest percentage in the eutrophic classification (p = 0.00), as can be seen in Tables 1 and 2.

Table 1. Mean and standard deviation of participants' anthropometric variables according to sex. Passos (MG), Brazil, 2018.

Variables	Sex				Value of p*
	Male		Female		
	Average	SD	Average	SD	
Anthropometric					
Weight (kg)	75.2	13.3	62.8	16.7	0.00[1]
Stature (m)	1.73	0.07	1.60	0.06	0.00[1]
BMI** (kg/m²)	25.0	3.6	24.6	6.7	1.68
WC*** (cm)	89.8	8.6	86.3	15.2	0.34
TSF**** (mm)	15.2	7.3	18.3	9.5	0.22
AC***** (cm)	31.7	3.6	29.0	5.4	0.05
AMC****** (cm)	26.9	2.9	23.2	3.3	0.00[1]

* T test. ** BMI = Body Mass Index. *** WC = Waist circumference. **** TSF = Tricipital Skinfold. ***** AC = Arm circumference. ****** AMC = Arm Muscle Circumference.[1] Significant difference at the 5.0% level.

Table 2. Anthropometric characteristics of the participants according to gender. Passos (MG), Brazil, 2018.

Variables	Sex				Value of p*
	Male		Female		
	n	%	n	%	
BMI					0.80
Malnourished	0	0	05	20.8	
Eutrophic	11	52.4	09	37.5	
Overweight	08	38.1	05	20.8	
Class I Obesity	02	9.5	02	8.4	
Class II Obesity	0	0	03	12.5	
WC*					0.34
Normal risk	13	61.9	11	45.8	
Increased risk	08	38.1	13	54.2	
TSF**					0.22
Malnutrition	07	33.3	17	70.8	
Eutrophy	02	9.5	04	8.4	
Excess weight*******	12	57.2	05	20.8	
AC***					0.05
Malnutrition	06	28.5	09	37.5	
Eutrophy	12	57.2	09	37.5	
Excess weight*******	03	14.3	06	25.0	
AMC****					0.00[1]
Malnutrition	05	23.8	02	8.3	
Eutrophy	16	76.2	22	91.7	

* T test. ** BMI = Body Mass Index. *** WC = Waist circumference. **** TSF = Tricipital Skinfold. ***** AC = Arm circumference. ****** AMC = Arm Muscle Circumference.******* Excess weight = Overweight + Obesity. [1] Significant difference at the 5.0% level.

In relation to biochemical tests, it is exalted that fasting blood glucose was found to be in the normal range among the participants. It is pointed out, in the evaluation of renal function, that both sexes had normal means, with higher results among male participants, with statistical significance for creatinine (p = 0.01). It is noted that women had higher values of total cholesterol (p = 0.28) and LDC-c (p = 0.12), and men in triglycerides (p = 48). The liver tests of Glutamic-Oxalacetic Transaminase (GOT) and Glutamic-Pyruvic Transaminase (GPT) were found with normal means. In the complete blood count, it was found that the mean hemoglobin was within the normal range for the diagnosis of anemia, with significant results between genders (p = 0.00) (Table 3).

It is noticed, in the evaluation of viral load and CD4 + T cells, that the values of their means were adequate for the participants, without statistical significance (p = 0.32) (p = 0.42), according to the exposed data in table 3.

Table 3. Biochemical and molecular characteristics of participants according to sex. Passos (MG), Brazil, 2018.

Variables	Sex				Value of P*
	Male		Female		
	Average	SD	Average	SD	
Biochemical analysis					
Fasting blood glucose (mg/dl)	93.5	20.7	93.7	14.6	0.96
Urea (mg/dl)	28.8	8.9	27.6	8.3	0.62
Creatinine (mg/dl)	1.02	0.4	0.8	0.1	0.01[1]
Total cholesterol (mg/dl)	178.9	46.0	196	58.5	0.28
LDL (mg/dl)	95.8	39.1	115.4	42.5	0.12
HDL (mg/dl)	43.5	8.9	46.8	11.1	0.27
Triglycerides (mg/dl)	231.3	404.6	166.8	78.5	0.48
TGO (U/l)	30.5	12.2	26.4	9.5	0.22
TGP (U/l)	40.6	34.8	24.4	14.3	0.06
Hemoglobin (g%)	14.6	1.2	12.8	1.6	0.00[1]
Molecular analysis					
Viral charge (copies of RNA/mL)	125.4	330.1	253.1	450.9	0.32
CD4 (cell units/mm³)	790.1	534.1	672.7	522.7	0.46

*T Test. [1] Significant difference at the 5.0% level.

The averages of nutrients calculated using the R-24h are shown in table 4. Insufficient energy, carbohydrates, lipids, fibers and calcium intake were detected for both sexes. It should be noted that men showed an increase in protein intake, while for women, the average was lower than recommended.

Among the evaluated minerals, the higher intake of iron for both sexes and sodium for women was noted, remaining adequate for men, without exceeding the maximum daily intake.

It was calculated that vitamin C consumed by men was lower than the recommended average and, for women, the amount was adequate. The average vitamin A was shown for the male sex to be high and for the female, within the recommendation.

In the evaluation of the average cholesterol intake, it was observed that men had a higher intake than women, with significant differences in their means (p = 0.00).

Table 4. Average and standard deviation of macro and micronutrients referring to participants' 24-hour recall according to sex. Passos (MG), Brazil, 2018.

Variables	Sex				Value of P*
	Male		Female		
	Average	SD	Average	SD	
Nutrients					
Carbohydrate (g)	185.5	78.4	174.7	85.3	0.66
Protein (g)	90.9	42.1	65.4	43.9	0.05
Lipids (g)	56.7	31.7	53.7	34.1	0.76
Energy(kcal)	1616.7	591.6	1441.2	735.2	0.38
Fiber (g)	21.7	17.5	14.3	10.2	0.10
Calcium(mg)	490.11	290.9	443.1	346.4	0.62
Iron (mg)	12.0	5.7	10.5	5.7	0.16
Sodium (mg)	1433.1	981.3	1594.2	1059.9	0.60
Vitamin A (µg)	1763.0	4450.3	497.7	1030.7	0.22
Vitamin C (mg)	55.4	57.8	60.9	70.2	0.77
Cholesterol (mg)	296.1	194.6	179.9	124.0	0.02[1]

*T Test.[1] Significant difference at the 5.0% level.

Table 5 shows data on processed and ultra-processed foods collected through the FFQ. A higher intake of carbohydrate, vitamin A, energy, sodium and lipid can be perceived among the female sample, while for the male sample, the mean values were higher for cholesterol, vitamin C, iron and fibers, while protein and calcium presented similar values among the participants. Statistical significance was recorded for lipid consumption between genders (p = 0.00).

Table 5. Mean and standard deviation of nutrients related to the participants' food frequency questionnaire according to sex. Passos (MG), Brazil, 2018.

Variables	Sex				Value of p*
	Male		Female		
	Average	SD	Average	SD	
Nutrients					
Carbohydrate (g)	109.1	76.9	119.8	77.6	0.64
Protein (g)	21.7	17.9	21.5	13.1	0.96
Lipids (g)	19.3	12.6	34.6	22.9	0.00[(1)]
Energy(kcal)	708.5	468.7	863.5	535.9	0.31
Fiber (g)	4.6	5.1	3.8	3.4	0.53
Calcium(mg)	205.3	147.7	206.1	136.2	0.98
Iron (mg)	5.6	5.0	4.7	3.4	0.47
Sodium (mg)	1250.1	1016.9	2580.1	3438.6	0.08
Vitamin A (µg)	79.2	58.5	92.1	129.8	0.66
Vitamin C (mg)	3.7	5.1	1.9	2.6	0.14
Cholesterol (mg)	38.3	33.8	28.1	24.3	0.26

*T Test.

DISCUSSION

In this study, it appears that all participants reported having physical signs in agreement with the Muscular Lipodystrophy Syndrome. It is noteworthy, to date, that there is no consensus in the literature for the diagnosis of this syndrome. Listed as the most used methods are the reports of PLHIV in combination with the assessment of the health professional.[4,10]

It was noticed the predominance of females, single marital status and schooling Incomplete elementary school, a result similar to that of a research,[16] in which 57.90% (n = 11) of the participants were women. Low education and low socioeconomic status in PLHIVs are evidenced in the literature, contributing to the concept of impoverishing the epidemic. It is suggested, as a possible explanation for this fact, that individuals with more years of study and higher socioeconomic level have greater access to information and understanding of the positive impact of treatment on the clinical evolution of the disease, as well as the best internal and external resources for live with their serological condition.[17]

It is understood that the mean age of 43.3 ± 8.9 years of the studied population, the monthly income and the time of treatment corroborate the data found in the literature.[4,10] It is known that, in 2016, the highest AIDS detection rate for men was in the age group of 35 to 39 years and, for women, the range with the highest detection was between 40 and 44 years. Sociocultural, economic and clinical contexts are considered to be influential in the HIV transmission chain.[17] Data is identified in the literature relating the use of antiretroviral drugs of the PI class with lipohypertrophy, information similar to that found in this research, since 51.1% (n = 13) of the studied population mentioned characteristics with the form of lipohypertrophy and 48.9 % (n = 22) used drugs in this class. It is emphasized that its function is to block the action of the protease enzyme, preventing the production of new infected cells.[18]

It is pointed out that lipodystrophy syndromes are a heterogeneous group of diseases characterized by the selective absence of adipose tissue.[19]

It appears that complementary biochemical tests are of great importance, since, through them, it is possible to assess the general health condition of PLHIV.[20] In this study, analyzes of the existing exams in the participants' medical records were performed, namely liver and kidney function, anemia, by means of hemoglobin, fasting blood glucose measurement and lipid profile. It is noteworthy, with the exception of the lipid profile, that all the others had their means within the normal range.

It is pointed out that PLHIVs using ART have found alterations in the biochemical examination of lipidogram in both sexes: total cholesterol was high in 26.1% of people, agreeing with the findings of this research, which show elevations in cholesterol averages, which can lead to more severe metabolic changes, such as Diabetes Mellitus.[21-2]

In the molecular analysis, results favorable to ART were found: 60% (n = 27) of PLHIVs had a low risk of developing opportunistic diseases by examining CD4 + T cells and, in 66.7% (n = 30), the load viral infection was undetectable, reinforcing treatment adherence and drug efficacy. It is known that in a study,[22] found 82.6% (n = 38) PLHIVs with undetectable viral load values and 86.7% (n = 39) had CD4 + T ≥ 201 mm ³.

Several factors are associated with the pathophysiology of lipodystrophy, including cART's Protease Inhibitor (PI), which appears to accelerate the rate of development of body composition and metabolic changes. Improving the cART therapeutic regime is considered to be one of the greatest achievements in public health in recent decades and HIV infection has become a manageable chronic disease.[23]

It is argued that advances in highly active antiretroviral therapy (HAART) have led to unquestionable benefits and a considerable improvement in the management of HIV-positive patients, with viral infection being transformed

into a chronic disease. However, it appears that the therapy has specific toxic effects, such as morphological changes and changes in lipid and glycid metabolism.[24]

This data is similar to that of another research carried out,[25] in which 49% of participants were classified as eutrophic according to BMI. It is noticed that this research had 44.4% (n = 28) in the same classification.

It was emphasized, in a study with a sample consisting of 238 patients on ART and 76, without ART, that the average levels of total cholesterol, triglycerides and blood glucose were higher in the ART group. The majority of those surveyed, with and without ART, were eutrophic, with a mean body mass index of 24.4 (± 4.3) and 24.3 (± 3.5) kg / m^2, respectively. It is understood that the waist-to-hip ratio was higher among men on ART than among those without ART. It is pointed out that the group on ART presented an average of scores indicative of higher consumption of "non-protective" foods for CVD. Undesirable nutritional and metabolic conditions were found among those on ART predisposing to CVD risk. We emphasize the need to target health interventions to people living with HIV/AIDS to control the factors associated with these diseases before the outcome.[26]

Plasma samples obtained from 28 HIV-1-infected adult patients before and 12 months after the start of cART were characterized in a cohort to investigate the immunometabolic changes associated with cART. It was revealed that the altered immunometabolic pathways identified from an untreated HIV infection showed minimal changes after 12 months of cART. It is concluded that 12 months of cART only slightly impact the metabolic dysregulation underlying an untreated HIV infection, providing insights into the comorbidities present in HIV patients with viral suppression.[20]

In this study, women with depletion of muscle mass by TSF and AC were presented, whereas WC showed the accumulation of adiposity in the abdominal region. In men, the prevalence of obesity due to TSF was recorded. AMC eutrophy was indicated for both men and women. These data are shown to be compatible with the adverse effects of ART that cause Muscle Lipodystrophy Syndrome. It is pointed out, before ART, that malnutrition and nutritional deficiencies prevailed among PLHIVs, worsening the clinical condition of these patients. It is understood, nowadays, that modifications of this pattern are occurring, showing a tendency for the accumulation of body fat and a series of morphological (lipodystrophy) and metabolic alterations, such as the increase in total cholesterol, triglycerides, LDL- cholesterol and the decrease in HDL-cholesterol. In addition, hyperglycemia, insulin resistance, lactic acidosis

and changes in bone metabolism interfere with the quality of life of these patients.[27]

In a study carried out with 40 HIV carriers, high rates of overweight and obesity (57%) were presented, with 40% of patients classified as eutrophic and only one individual as malnourished. It also refers to body self-image in many studies as a very affected point for this group. It is evident that the morphological and biochemical changes of PLHIVs require multidisciplinary attention to reduce the risk of new diseases in these patients.[28]

In order to suggest criteria for the diagnosis and classification of lipodystrophy, the following reasons were proposed: fat mass ratio by DEXA (FMR); waist-thigh ratio (WTR); waist-calf ratio (WCR) and arm-trunk ratio (ATR). It is noted that the best cutoff points observed for FMR, WTR and ATR were 1.26, 1.74 and 2.08, respectively. Using the cutoff point proposed for FMR, the worst metabolic profile was observed, with increased triglycerides, fasting serum glucose and more hypercholesterolemia in the lipo + group. It appears that the WTR and ATR showed a significant correlation with the FMR. It is understood that the anthropometric ratios (WTR / ATR) and FMR can be used to aid the diagnosis of lipodystrophy, in order to contribute to a more accurate and early diagnosis, allowing intervention and even preventing metabolic disorders.[29]

It is observed that the association of lipodystrophy with non-communicable disease, mainly atherosclerosis, is due to the negative effects of lipodystrophy on the lipid profile and insulin sensitivity and pro-inflammatory effects on endothelial cells. Thus, it is estimated that an earlier diagnosis and treatment of lipodystrophy can prevent or delay the development of some non-communicable diseases, leading to better health and general well-being of PLHIVs, reducing the costs of treatment and premature deaths.[30] It is pointed out that the additional problems associated with lipodystrophy include social and psychological suffering, which can contribute to the discontinuation of treatment with cART.[10,20]

It is noteworthy that several factors are associated with the pathophysiology of lipodystrophy, including cART PI, which seems to accelerate the rate of development of body composition and metabolic changes.

It was observed, through the evaluation of food consumption by the R24H and the FFQ, an inadequate diet, in which some nutrients were consumed in addition to the recommended by the reference used and others, with lower values, data in agreement with those found in the literature.[31] The food surveys of this study were applied to only one service due to the difficulties encountered in scheduling the returns of the studied population. The importance of replicating

methods is known to avoid errors in measuring food consumption.

It is considered that the FFQ collaborated with the R-24h, showing higher averages in the sodium intake for the female sex and in the cholesterol intake for the male sex. It is estimated that the combination of the excess of these nutrients with the low fiber intake shown by food surveys contributes to the development of cardiovascular diseases in PLHIV.[31] The benefits of fiber are linked to the prevention of coronary heart disease, hypertension, obesity and diabetes.[32]

It was verified, in a research referring to ultra-processed foods and the diet in Brazil, that, for a reduction of sodium by the population, the industry should make this reduction in its products and the population should be made aware of the use of salt in culinary preparations.[33]

It is emphasized that the body of an infected individual who has healthy eating habits prevents the appearance of signs and symptoms, as well as strengthening the immune system.[1] It appears that changes in body composition, or lipodystrophy, can lead to serious health problems in people living with HIV / AIDS (PLWHA).[34] It is known that monitoring and improving nutritional status throughout treatment correlates with a better quality of life for this population.

CONCLUSION

It can be concluded, according to anthropometric findings, that the majority of the interviewees presented a nutritional status of eutrophy, with the women having the highest percentage of increased risk for metabolic complications, according to the waist circumference and the altered values in the lipid profile, situation that emphasizes the profile of lipodystrophy and its correlations.

It should be noted that women also had the highest percentage of malnutrition, according to the tricipital skinfold, and a food intake of protein below the recommended, a fact that also shows the loss of lean mass.

It was found, among men, that the dietary intake of vitamin C was below the recommended level and that most of them are smokers, which requires an even greater consumption of this vitamin.

Inadequacies in food consumption were observed for both men and women, which can be explained by the unfavorable socio-demographic and economic conditions reported by most respondents and also by the lack of information on the benefits of adequate food.

Therefore, it is considered that research that makes it possible to clarify a subject on which there is still no consensus for diagnosis and classification is of great relevance, as is the case of lipodystrophy, as well as interventions related to factors that directly impact the quality of life of these people, focusing on food consumption and prevention of CVDs associated with the use of ART and eating habits that contribute to an unfavorable outcome of metabolic conditions.

In this population, nutritional assessment and monitoring of physical and metabolic conditions throughout the treatment are essential to avoid nutritional changes, in order to mitigate the metabolic effects caused by ART in relation to lipodystrophy and its comorbidities.

FUNDING

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