



## NUTRITIONAL INTERVENTION WITH A BIOACTIVE FOOD COMPOUND IN HIV/ AIDS PATIENTS WITH HYPERTRIGLYCERIDEMIA: CASE REPORTS

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### ABSTRACT

**Introduction:** The Highly Active Antiretroviral Therapy (HAART) in individuals infected by the Human Immunodeficiency Virus (HIV) may provide changes in lipid metabolism, increasing the risk of cardiovascular diseases.

**Objective:** To evaluate the clinical and nutritional status by laboratory tests, anthropometry and food consumption, proposing nutritional intervention with a Bioactive Food Compound (BFC).

**Material and Methods:** Clinical case reports of two patients in outpatient care at a referral hospital; approved by the Ethics Committee/Universidade Federal de Mato Grosso do Sul (UFMS), number 1630, with signing of the informed consent form. Patients, male, 45 e 40 years old, with infection by HIV, diagnostic of Acquired Immunodeficiency Syndrome (AIDS) and hypertriglyceridemia, in use of medication to control of triglycerides (TG) and HAART containing medications with side effects for dyslipidemia.

**Results:** It was observed in both cases in the end of 210 days, eutrophy, body mass index (BMI) (20.54/20.80 kg/m<sup>2</sup>), waist circumference (WC) (87/79 cm) and conicity index (CI) (1.33/1.25), controlled levels of TG (79/83 mg/dL). In the begin of study the patients presented low ingest of micronutrients and fibers, beyond of high concentration of simple and complex carbohydrates. It was proposed to lifestyle changes (LC), restriction of foods that predispose to hypercholesterolemia, hypertriglyceridemia, hyperglycemia and physical activity. During 210 days were evaluated with use of BFC, containing oat bran, flaxseed and textured soy protein; with potential contribution to the control of atherosclerotic diseases. The potential contribution to the control of atherosclerotic diseases, nutritional goals reached and TG reduced, with medication suspension ciprofibrate. Were maintained the recommendations of LC and diary consume of 40 g of BFC.

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## INTRODUCTION

The nutritional interventions represent one adjuvant therapeutic strategy in the clinical improvement of HIV-infected patients submitted to the HAART.

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On the other hand, even against of the benefits arising from the HAART, especially in the case of increased of survival of the infected by HIV and reduce of the opportunistic infections, frequently is observed high proportion of patients with severe metabolic disorders, determining a lipid profile unfavorable, especially in relation to serum values of TG and VLDL-cholesterol (Very Low Density Lipoprotein). The knowledge of this relation pathophysiological still not yet totality cleared

up, this metabolic condition may be justified mainly by the use of protease inhibitors (PI) (KEARNS *et al.*, 2017). Besides that, the exposition to HIV and yours therapy predisposes these patients to chronic-degenerative processes such as atherosclerosis, which leads them to high morbidity and mortality rates as a result the progression of atherosclerotic damage, event that can be physiologically explained by the chronic inflammatory process, leading to severe vascular damage (Bittencourt; Peixoto, 2015). In considering these important metabolic alterations, it is verified that changes in lifestyle and in the eating habits are considered notable strategies in order to ensure gastrointestinal benefits, especially cardiovascular benefits, since the functional foods are appointed as an affordable and viable alternative, acting directly on lipid metabolism, from the control of their serum levels according to Ferreira *et al.* (2016). The use of functional foods in patients submitted to HAART with dyslipidemic alteration was significantly demonstrated in study of Ferreira *et al.* (2016), in which it was used as nutritional intervention a BFC that have high nutritional potential because it is rich in polyunsaturated fatty acids (PUFA), especially the n-3 series, soluble fibers and phytochemicals, which contributed to the reduction of serum levels of TG and LDL-cholesterol (Low Density Lipoprotein). This study aimed to report two clinical cases, to evaluate the nutritional status and to propose a diet with functional characteristic, in order to contribute to improvements in the life condition of these patients, especially for demonstrating the positive impact of BFC on hypertriglyceridemia.

## METHODOLOGICAL DESCRIPTION

This is a study prospective intervention study that presents two case reports in which HIV-infected patients diagnosed with AIDS treated in outpatient up at the Esterina Corsini Day Hospital at the Maria Aparecida Predrossian Universidade Federal de Mato Grosso do Sul (HUMAP/UFMS) and after 210 days of participation, according to the conduct of the cardiologist, the use of medication to control hypertriglyceridemia triggered by the use of HAART was suspended, due to the implementation of LC and daily use of BFB. The study was approved by the Ethics Committee/UFMS, number 1630 on October 20, 2009; with the consent of the participants after signing of the informed consent form, and registration of the study variables in a structured questionnaire. This study is considered a clinical trial, with Trial Url Register number RBR-6m2fch.

The laboratory analyzes were performed, following the protocol of Day Hospital, for detection of viral load (VL): HIV-1 VL quantification test, technique/method: b-DNA, minimum detection limit: 50 copies / mL and a maximum of 500,000 copies/ mL; and for CD4 count: flow cytometry/Facscalibur-Multitest technique. For the analysis of total cholesterol, high and low density lipoprotein (HDL-cholesterol/LDL-cholesterol), TG, glucose was used the colorimetric method, which were carried out in the Laboratory of Clinical Analyzes of HUMAP/UFMS. The classification of nutritional status was obtained by the interpretation of the BMI for adults (WHO, 1997), where:  $\leq 17.9$  kg/m<sup>2</sup> (low weight), 18-24.9 kg/m<sup>2</sup> (eutrophic), 25-29.9 kg/m<sup>2</sup> (overweight),  $\geq 30$  kg/m<sup>2</sup> (obesity); and also through the anthropometric measures: WC, where the cut-off point for man is  $\geq 102$  cm (NCEP, 2002) and CI considered the presence of coronary risk

for a score  $> 1.25$  (Gonwda, Philip, 2015). To evaluate the consumption of food, we considered the History and Frequency of Food, as well as the Reminder of 24 hours (R 24 h), according to Fisberg *et al.* (2005), and finally, a nutritional intervention was proposed with BFC which has functional activity (Ferreira, 2014). The patients were evaluated during the period of 210 days, in three nutrition consultations for clinical-nutritional evaluation and evaluation of laboratory data. Nutritional intervention was proposed through dietary counseling, with LC, indicating restriction of consumption of foods predisposing to hypercholesterolemia, hypertriglyceridemia and hyperglycemia; and inclusion of physical activity practice three times a week (AHA, 2009; ADA, 2004). In addition, it was prescribed BFB containing oat bran, triturated brown flaxseed and soybean textured protein in a ratio of 2:1:1 for consumption of 40 g/day in continuous use (FERREIRA *et al.*, 2016). The energy requirement was calculated using the basal metabolism rate method (BMR) from the body weight, whereas for the male sex between 30 and 60 years of age the following equation was used:

$$BMR = [(11,3 \times \text{body weight (16 x height (m))} + 901] \times \text{physical activity} *$$

\*Male with moderate activity of 1.78, according to Calixto-Lima; Gonzalez (2013) adapted from FAO/WHO (1985).

As food product used as a nutritional intervention, the BFB that was prepared and analyzed chemically and microbiologically in the laboratories of the Faculdade de Ciências Farmacêuticas, Alimentos e Nutrição (FPSFN)/UFMS and offered to patients for consumption in the first stage of the study (three months), being suitable for consumption according to the microbiological analyzes. For the remainder of the period up to 210 days, the patients were instructed to prepare the BFB at home, maintaining the necessary proportions of ingredients, quantities, hygiene and handling. The BFB presented a high nutritional potential due to its richness in PUFA (60.41 %), especially  $\alpha$ -linolenic acid (30 %), linoleic acid (27 %) and 14 % oleic acid, considered the main monounsaturated acid. It also presents high nutritional quality regarding lipids, considering the effects of fatty acids on lipid metabolism, showing low atherogenicity (0.2), thrombogenicity (0.13), hypocholesterolemia/hypercholesterolemia (6.11) and omega ratio 3:6 (1.05), contributing significantly in the control of atherosclerotic diseases.

The compound is registered at the Instituto Nacional de Propriedade Industrial (INPI), Rio de Janeiro (Brazil), under number BR 10 2013 018002 5, as an innovative product developed by the UFMS. The record file was published in August 2015 at the Ministério da Indústria, Comércio Exterior e Serviços, Brazil. At the end of the study, the foods presents in routine diet of the patients were calculated using the tables of reference chemical composition (TACO, 2011; TUCUNDUVA, 2012) and the DietPro program 5: 5i Professional (2008): nutrition technology [CD-ROM].

## RESULTS

### 1st Case Report

A.S., male, 40 years old, married, retired from activity in rural area by INSS (Instituto Nacional do Seguro Social), resident in the state of Mato Grosso do Sul/Brazil, with diagnostic of AIDS since 2003, in use of HAART containing 2 ITRN (Zidovudine/didanozine) + 2 PI (boosted lopinavir with

**Board 1. Food consumption by R 24 h, considering Food History and Frequency**

Meal	Foods	Home Measure	g ou mL
Breakfast	Whole milk UHT	1 cup of tea	200
	Refined sugar	NA*	NA*
	Black coffee	NA*	NA*
	Simple Homemade Cake	1 medium slice	60
Collation	Banana	1 medium unit	40
	Cooked white rice	10 soup spoons	NA*
Lunch	Beans	1 medium conch	NA*
	Chicken meat (Thigh)	2 medium units	NA*
	Watercress	1 shallow dish	20
	Tomato	5 medium slices	NA*
	Onion	1 soup spoon	10
	Pumpkin	2 soup spoons	NA*
	Chuchu	2 soup spoons	NA*
	Soy oil	1 dessert spoon	NA*
	Iodized salt	½ teaspoon	NA*
	Snack	Papaya	1 medium slice
BFC		2 soup spoons	40
Dinner	Rice	10 soup spoons	NA*
	Beans	1 medium conch	NA*
	Fish meat	2 medium units	NA*
	Lettuce	1 shallow dish	NA*
	Tomato	5 medium slices	NA*
	Cucumber	1 soup spoon	NA*
	Pod	2 soup spoons	NA*
	Soy oil	1 dessert spoon	NA*
	Iodized salt	½ teaspoon	NA*
Supper	Maçã	1 medium unit	NA*
<b>Dietary Nutrition Calculation</b>			
<b>TEV**</b>	2.515,25 Kcal	<b>Fatty Acids Monounsaturated</b>	23.05 mg
<b>Carbohydrates</b>	326.24 g	<b>Polyunsaturated Fatty Acids</b>	30.33 mg
<b>Lipids</b>	86.85 g	<b>Cholesterol</b>	404.23 mg
<b>Protein</b>	122.61 g	<b>n-3/n-6</b>	4.68/25.12 mg
<b>Fiber</b>	53.9 g	<b>Vitamin C</b>	226.50 mg
<b>Zinc</b>	14.49 mg	<b>Vitamin E</b>	7.28 mg
<b>Magnesium</b>	395.49 mg	<b>Selenium</b>	55.44 mcg
<b>Copper</b>	3.75 mg	<b>Iron</b>	12.11 mg

\*NA: Not Applicable; \*\*VET: Total Energy Value.

ritonavir), in use of medication to control hypertriglyceridemia (ciprofibrate 100 mg). To clinical exam during the segment, the patient was hydrated, normocorated. To superficial palpation of the abdomen was flat; absence injuries of skin, scars, collateral circulation or herniations; arterial pulsations and peristalsis not identifiable upon inspection, normal peristalsis present in four quadrants and in the absence of puffs abdominal artery outbreaks, impalpable liver and spleen. Painless abdomen to superficial and deep palpation, no masses. As for the physical examination of the respiratory tract, typical tórax, eupneic, without respiratory effort, expandability preserved bilaterally, clear atimpanic sound to percussion, with universally audible vesicular murmur without adventitious noise. In the cardiovascular auscultation was observed normodynamic precordium, absence of pathological jugular turgidity, symmetrical peripheral arterial pulses, synchronic and with good breadth.

Regarding the immunological and virological status performed at baseline and end of respective study, CD4 of 654/569 and VL below detection limit. Regarding nutritional assessment, was observed in the begin of study, eutrophy the according BMI (21.23 kg/m<sup>2</sup>), WC of 87 cm and CI of 1.33, with level of TG in 112 mg/dL in use of medication to treatment (ciprofibrate 100 mg) there is 04 years. By the nutritional survey methods, was observed in begin of study, improper eating habits by consuming only 3 times a week food from the vegetable and fruit groups, conferring low intake of vitamins, minerals and fiber. Regarding the gastrointestinal aspect, he did not report any intercurrent. In the end of study, was maintained nutritional status of eutrophy and the caloric aim achieved of 2.515,25 kcal with protein offer of 122.61 g (19.49 % TEV (Total Energy Value) of diet), serum levels of TC and fractions, fasting blood glucose within normality and TG reduced to 79 mg/dL; where the cardiologist suspended the medication ciprofibrate, being maintained the consumption

Board 2. Food consumption by R 24 h, considering Food History and Frequency

Meal	Foods	Home Measure	g ou mL
Breakfast	Whole milk UHT	1 cup of tea	200
	Adoçante artificial líquido	5 drops	NA*
	Pão	1 unit	50
Lunch	Rice	15 soup spoons	NA*
	Beans	1 medium conch	NA*
	Carne bovina (Bife)	1 medium unit	NA*
	Lettuce	3 medium leaves	NA*
	Tomato	3 medium slices	NA*
	Cucumber	1 soup spoon	NA*
	Cenoura crua	2 soup spoons	NA*
	Soy oil	1 dessert spoon	NA*
Lanche	Iodized salt	½ teaspoon	NA*
	Banana	1 medium unit	NA*
Jantar	Rice	15 soup spoons	NA*
	Beans	1 medium conch	NA*
	Carne bovina (Bife)	1 unit	NA*
	Watercress	1 shallow dish	NA*
	Tomato	3 medium slices	NA*
	Couve flor	1 soup spoon	NA*
	Beterraba crua	2 soup spoons	NA*
	Soy oil	1 dessert spoon	NA*
Ceia	Iodized salt	½ teaspoon	NA*
	Whole milk UHT	1 e ¼ cup of tea	250
	BFC	2 soup spoons	40
	Artificial liquid sweetener	5 drops	NA*
<b>Dietary Nutrition Calculation</b>			
<b>TEV**</b>	2.383,79 Kcal	<b>Fatty Acids Monounsaturated</b>	23.29 mg
<b>Carbohydrates</b>	336.74 g	<b>Polyunsaturated Fatty Acids</b>	25.80 mg
<b>Lipids</b>	64.89 g	<b>Colesterol</b>	209.70 mg
<b>Protein</b>	120.84 g	<b>n-3/n-6</b>	4.46/20.67 mg
<b>Fiber</b>	50.24 g	<b>Vitamin C</b>	41.63 mg
<b>Zinc</b>	17.61 mg	<b>Vitamin E</b>	4.57 mg
<b>Magnesium</b>	352.76 mg	<b>Selenium</b>	76.04 mcg
<b>Copper</b>	1.34 mg	<b>Iron</b>	10.88 mg

\*NA: Not Applicable; \*\*VET: Total Energy Value.

routine of 40 g of BFC, associated to good dietary practices and physical activity.

## 2nd Case Report

M.M.S., male, 45 years, single, farm worker, resident in the state of Mato Grosso do Sul/Brazil, beneficiary of INSS, HIV-infected, with diagnostic of AIDS since 2000, in use of HAART containing 1 ITRN (Biovir) + 1 ITRNN (Efavirenz) + 2 PI (Boosterized Atazanavir with Ritonavir), with hypertriglyceridemia in use of medication to control TG (ciprofibrate 100 mg), with hyperglycemia in use of metformina 850 mg. In the begin and end of the study, was observed eutrophy the according BMI (20.41 kg/m<sup>2</sup>), WC of 79 cm and CI of 1.25, with level of TG in 140 mg/dL controlled by medication of category of the fibrates there is 06 months, presenting fasting blood glucose of 92 mg/dL controlled by oral hypoglycemic. When considering the history and feeding frequency associated with R 24 h, presenting inadequate dietary habits with low intake of dietary sources of vitamins, minerals and fiber, high-food sources of simple and

complex carbohydrates. There were no reports of gastrointestinal alterations. It was obtained as a clinical outcome, in the end of the 210 days of nutritional monitoring, maintenance of the nutritional status, was achieved the caloric aim of 2.383,79 kcal with protein offer of 120.84 g (20.30 % TEV of diet), serum levels of TC and fractions and fasting blood glucose; TG reduced to 83 mg/dL, resulting in the suspension of the medicament for control. It was maintained the recommendations of LC and daily consumption of BFC.

## Conclusion

The clinical outcome of the cases presented was adequate for clinical, immunological and virological conditions, in which the functional diet therapy proposed reached the caloric and protein aim and TG were reduced with suspension of medication for control, thus providing, improvement in metabolic condition and quality of life.

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## AUTHOR CONTRIBUTIONS

None of the authors have any conflicts of interest to declare. Rosângela dos Santos Ferreira: Author responsible for the research design, structuring of the work method, data collection, involved in the analysis and interpretation of the data and writing the manuscript. Lígia Aurélio Bezerra Maranhão Mendonça: Author responsible for the analyses of results and writing the manuscript. Rita de Cássia Avellaneda Guimarães: guidance for writing the manuscript and literature review. Marta Marques David: Author responsible for analysis and calculation of diets. Priscilla Aiko Hiane: Author responsible for the orientation of the research. All authors agreed and contributed to the final version submitted for publication.

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