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Adequacy of the nutritional value of weight loss diets conveyed in nonscientific magazines

Madeline Guimarães de Souza[1]
Ingride Even Lopes de Andrade[1]
Alanderson Alves Ramalho[2]

[1] Universidade Federal do Acre, Curso de Nutrição. Rio Branco-Acre, Brasil.

[2] Universidade Federal do Acre, Centro de Ciências da Saúde e Desporto. Rio Branco-Acre, Brasil.

Correspondence
Alanderson Alves Ramalho
E-mail: alandersonalves@hotmail.com

Abstract

Objectives: To evaluate the adequacy of the nutritional value of weight loss diets conveyed in nonscientific magazines according to recommendations of macronutrients and micronutrients. *Methodology:* It is an observational descriptive study in which 98 magazines were evaluated with a total of 151 diets published between 2010 and 2013. Version ®5i of the DIETPRO software was used to develop quantitative nutrients, which were then compared with the current recommendations of macronutrients (NCEP ATP III) and micronutrients (DRIS,IOM). *Results:* Based on the information transmitted to the reader, it can be noticed that 80.8% were designed by nutritionists, 64.0% were reported to have an energy value lower or equal to 1,200 calories, and 50% promised a weight loss lower or equal to 3 pounds. In relation to the macronutrients, most diets showed a hypoglycid (53.6%), hyperprotein (78.1%), and hypolipidic (45.7%) composition. Only two of the 12 micronutrients analyzed (vitamin A and C), had their levels in accordance to the recommendations by DRIS. The others, which had more insufficient amounts, were: calcium (47.7%), iron (43.7%), zinc (71.5%), vitamin B12 (53.6%), vitamin D (97.7%), potassium (100%) and fiber (84.8%). *Conclusion:* This study suggests that weight loss diets in Brazilian nonscientific magazines are not appropriate for a healthy weight loss program because they do not have a nutritional adequacy of macronutrients and micronutrients according to recommendations of the Dietary Reference Intakes.

Key words: Fads Dietary Trends. Weight Loss. Recommended Dietary Allowances. Women.

Introduction

With the increase of the overweight population worldwide, restrictive diets have gained momentum, and they are known as "trend diets". However, since they offer great nutritional restrictions, these diets are hard to maintain and do not last for a reasonable time.[1-3]

An adequate diet for weight loss must be individually planned and be constituted by all nutritional groups, aiming at constantly promoting good eating habits. For a healthy loss of 0.45kg to 1 kg a week, they daily deficit shall not exceed 500kcal to 1,000kcal, and it must be maintained for up to six months. Any diet with nutritional value lower than 800kcal/day is considered restrictive and damaging to the body.[4]

The objective of this study was to evaluate the adequacy of the nutritional value of weight loss diets conveyed on non-scientific magazines that promote such diets as being in agreement with the suggested macro- and micronutrient recommendations.

Methods

This is an observational descriptive study. Through active search, national magazines whose main advertising appeal was weight loss or weight maintenance for woman over 20 years old were identified. After the search, a title was chosen, since most of the content regarded the promotion of diets and their broad national distribution in newsstands and supermarkets, with 50 thousand copies. In total, 98 magazines (consecutive editions) were analyzed, with a total of 151 diets/eating plans distributed as follows: 52 from 2010; 35 from 2011; 19 from 2012, and 45 from 2013.

As criteria for inclusion, the publication period (2010 to 2013) and diets directed toward women were used. Magazines with no articles that indicated any diets, eating plans that had no specifications as to the type of foods and determination of the amount (portion) to be consumed and preparations elaborated with no specification of respective recipes were disregarded.

For the exploratory analysis, the diets were grouped according to the time necessary to perform it, the informed nutritional value, whether it was elaborated by a nutritionist or other professional, and whether it instructed the reader to obtain the monitoring of a nutritionist.

In order to analyze the quantitative nutritional composition of the selected diets/eating plans, the following nutrients were considered: energy (kcal), carbohydrates (g), proteins (g), lipids (g), calcium (mg), iron (mg), zinc (mg), niacin (mg), selenium (mcg), sodium (mg), potassium (mg), fibers (g), and vitamins A (eq. ret.), C (mg), B12 (mcg) and D (mcg).

From each article on diets, each day of the week was considered individually in order to calculate the nutritional adequacy. On articles that offered as an eating plan variation several meal options, a system of combinations of meal options with the same number was considered. For example: breakfast option 1 + morning snack option 1 + lunch option 1 + afternoon snack option 1 + dinner option 1 + supper option 1, and thus consecutively.

For eating plans that did not indicate the amount of the portion of each food, the suggested home-used measurements were converted. Salt, sugar or sweeteners were added to the preparations only when the magazine informed their amount. Teas and infusions were disregarded, since they do not have a significant amount of macro- and micronutrients. For the quantitative analysis of the nutrients, the DIETPRO ® version 5i software was used. The food composition tables used by the program were: Tab. Sônia Tucund. – Food Composition Table: Support for Nutritional Decision; Tab. DLI – Diet, Light and Whole Food Table; Dietpro4 – Dietpro4 Table; Diet Recipe Table. For foods that were not found on the tables of the program, the data from other food chemical composition tables was used.[5-7]

In order to compare the nutritional values of the diets and the macronutrient diet recommendations, the distribution suggested by the Third Report of The National Cholesterol Education Program (NCEP ATP III) was used,[8] with 55% of the energy coming from carbohydrates, 15% from proteins, and 30% from lipids. Values between 90 to 110% of the recommendation were considered adequate; they were considered insufficient when <90%; and excessive when >110%.

The daily amounts of micronutrients found on the diets/eating plans of the magazines were compared to the reference dietary intake values (Dietary Reference Intakes – DRIS)[9] for calcium, iron, zinc, niacin, selenium, sodium, potassium, fibers and vitamins A, C, B12, and D for women from 19 to 50 years old.

For the classification level, the reference points were classified as:

a) ***Adequate:*** all values found between the Recommended Dietary Allowances (RDA) and the Tolerable Upper Intake Level (UL);

b) ***50% of probability of being adequate:*** values between the Estimated Average Requirement (EAR) and RDA;

c) ***Inadequate:*** values lower than EAR;

d) ***Excessive:*** values higher than UL.

For the nutrients calcium, potassium and fibers which had not EAR determination, the value of 50% of the adequate intake (AI) was used to determine the "50% of probability of being adequate" category.

Results

151 diets were analyzed, 80.8% from which were planned by nutritionists; and 64.0% informed an energetic value lower or equal to 1,200 calories (table 1). By analyzing the time necessary for the weight loss informed by the magazine, 98.7% stated a loss of 3kg in seven or less days (data not shown on tables).

Table 1. Information described on diets published on a non-scientific magazine that conveys diets in Brazil, 2014.

Variables	N (%)
Weight loss estimated by the magazine	
Lower or equal to 3 kg	72 (50)
Higher than 3 kg	72 (50)
Time estimated by the magazine	
Lower or equal to 7 days	58 (38.4)
8 to 14 days	15 (9.9)
Higher than 14 days	78 (51.6)
Energetic value informed by the magazine	
Lower or equal to 1200 Kcal	32 (64)
Higher than 1200 Kcal	18 (36)
Elaborated by a nutritionist	
Yes	122 (80.8)
No	29 (19.2)

Table 2 shows the means and standard deviations of the nutrient estimations. The mean energetic value was 1183.3 kcal (DP: 428.0), considering that 590.4kcal came from carbohydrates (μ=147.6g DP: 71.1); 76 kcal came from proteins (μ=69g DP: 35.3); and 324.9kcal from lipids (μ=36.1g DP: 16.1). For micronutrients, means of 9.4 grams of iron, 195.6 of vitamin C, 1.2 of vitamin D, 52.7 of selenium and 16.6 of fibers were found.

Table 2. Estimated nutritional composition of diets published on a non-scientific magazine that conveys diets in Brazil, 2014.

Variables	Mean (SD) (n 151)
Energetic value (Kcal)	1,183.3 (428.0)
Protein (g)	69.0(35.3)
Lipid (g)	36.1(16.1)
Carbohydrates (g)	147.6(71.1)
Calcium (mg)	616.4(373.3)
Iron (mg)	9.4 (5.0)
Zinc (mg)	5.3(3.2)
Vitamin C (mg)	195.6(153.5)
Niacin (mg)	17.3(13.4)
Vitamin A (Eq. Retinol)	1,352.9(1021.5)
Vitamin B12 (mcg)	2.7(3.9)
Vitamin D (mcg)	1.2(1.3)
Selenium (mcg)	52.7(35.3)
Sodium (mg)	1,363.0(814.2)
Potassium (mg)	2,044.3(847.0)
Fiber (g)	16.6(7.0)

Table 3 describes the nutritional composition of the diets according to the macro- and micronutrient recommendations. From the 151 diets analyzed, the carbohydrate and lipid values found were insufficient, about 53.6% and 45.7% respectively. In opposition, the excessive protein values on the diets exceed 78%. In relation to micronutrients, it is noteworthy that from the 12 analyzed nutrients, the content of only two (vitamin A and C) was in agreement with the recommendation of DRIS. The nutrients with higher relative frequency of insufficiency were: calcium (47.7%), iron (43.7%), zinc (71.5%), vitamin B12 (53.6%), vitamin D (97.7%), potassium (100%) and fiber (84.8%).

Table 3. Comparison of the estimated nutritional composition of diets published on a non-scientific magazine that conveys diets in Brazil and the recommended values for macro- and micronutrients. Brazil, 2014.

Variables	N (%)
MACRONUTRIENTS	
CARBOHYDRATES (% of VCT)	
Insufficient (<49.5%)	81 (53.6)
Adequate (49.5 - 60.5%)	42 (27.8)
Excessive (>60.5%)	28 (18.5)
PROTEIN (% of VCT)	
Insufficient (<13.5%)	18 (11.9)
Adequate (13.5 - 16.5%)	15 (9.9)
Excessive (>16.5%)	118 (78.1)
LIPIDS (% of VCT)	
Insufficient (<27%)	69 (45.7)
Adequate (27 – 33%)	42 (27.8)
Excessive (>33%)	40 (26.5)

Variables	N (%)
MICRONUTRIENTS	
CÁLCIUM (mg/day)	
Adequate (1000 – 2499.9)	18 (11.9)
50% of prob. of adequacy (500 – 999.9)	61 (40.4)
Insufficient (<500)	72 (47.7)
IRON (mg/day)	
Adequate (18 – 44.9)	5 (3.3)
50% of prob. of adequacy (8.1 – 17.9)	79 (52.3)
Insufficient (< 8.1)	66 (43.7)
Excessive (≥45)	1 (0.7)
ZINC (mg/day)	
Adequate (8 – 39.9)	24(15.9)
50% of prob. of adequacy (6.8 – 7.9)	19 (12.6)
Insufficient (<6.8)	108 (71.5)
VITAMIN C (mg/day)	
Adequate (75 – 1999.9)	127 (84.1)
50% of prob. of adequacy (60 – 74.9)	7 (4.6)
Insufficient (<60)	17 (11.3)
NIACIN (mg/ day)	
Adequate (14 – 34.9)	53 (35.1)
50% of prob. of adequacy (11 – 13.9)	25 (16.6)
Insufficient (< 11)	56 (37.1)
Excessive (≥35)	17 (11.3)

Variables	N (%)
VITAMIN A (Eq. Retinol)	
Adequate (700 – 2999.9)	97 (64.2)
50% of prob. of adequacy (500 – 699.9)	16 (10.6)
Insufficient (<500)	27 (17.9)
Excessive (≥ 3000)	11 (7.3)
VITAMIN B12 (mcg/ day)	
Adequate (≤2.4)	60 (39.7)
50% of prob. of adequacy (2 – 2.3)	10 (6.6)
Insufficient (<2)	81 (53.6)
VITAMIN D (mcg/ day)	
50% of prob. of adequacy (5 -49.9)	5 (3.3)
Insufficient (<5)	146 (96.7)
SELENIUM (mcg/ day)	
Adequate (55- 399.9)	64 (42.2)
50% of prob. of adequacy (45 – 54.9)	14 (9.3)
Insufficient (<45)	73 (48.3)
SODIUM (mg/ day)	
Adequate (1500 – 2999.9)	54 (35.8)
50% of prob. of adequacy (750 – 1499.9)	54 (35.8)
Insufficient (<750)	37 (24.5)
Excessive (≥ 2300)	6 (4.0)
POTASSIUM (mg/ day)	
Insufficient (<4700)	151 (100)
FIBER (mg/ day)	
Adequate (≥25)	23 (15.2)
Insufficient (<25)	128 (84.8)

Discussion

On this study, it was observed that, although most diets are planned by nutritionists, their enrollment number at the Regional Council of Nutritionists was not informed. A review conducted by Guedes[10] points out that individuals that are able to lose weight only by using diets, without a nutritional follow-up and physical activity, are not able to maintain their weight for over 90 days and tend to gain their initial weight back or even exceed it. On the research by Betoni et al.[1], about 72.72% of the individuals that went through the so-called "trend diets" reported that the time they maintained the reduced weight after the diet was short (less than one month) and/or very short (from one to three months).

Corroborating with this statement, a study conducted by Freedman et al.[11] shows that one of the most used tactics by individuals that try to lose weight is the reduction of the energetic intake. Our study observed that most diets had an energetic value lower or equal to 1,200 kcal. Pacheco et al.[12] found similar results on a study involving the analysis of diets conveyed on non-scientific magazines, where 46.70% of the diets had caloric values of less than 1,200 Kcal/day. Low calorie diets help to lose weight fast, since they cause a mobilization and use the body fat as source of energy. [1,11,13]

However, diets with a reduced energetic value may offer severe complications to the body, such as headaches, irritability, weakness, difficulty to concentrate, irregular heartbeat, nausea, vomiting, abdominal discomfort, uric acid kidney stones, lethargy, fatigue, halitosis, dry skin, hair loss, acute gout, abnormalities of mineral salts and electrolytes.[1,4,10]

Carbohydrates constitute most of the human diet, about 45 to 65% of VET, and their main function in the organism is to make energy available for the cells, especially the brain cells.[4,14] After the intake, carbohydrates are converted into glucose, and stored as hepatic and muscular glycogen. In case there is no glucose available or the amount is insufficient to meet the cellular needs, lipids are oxidized and an excessive amount of ketone is produced, and it may cause metabolic acidosis, coma, and even death.[4]

Diets with low energetic value coming from carbohydrates, the so-called "low carb diets", are broadly used as the basis for trend diets. This association is very common, since it offers, during the first week of the diet, a loss of 2-3 kg, usually caused by excessive diuresis. The diuresis caused through the restriction of carbohydrates occurs through two mechanisms: the first one is the mobilization of the glycogen stored on the liver and the muscles, which contains 100 and 400g o glycogen, respectively. Each gram of glycogen is mobilized with approximately two grams of water,

which results on a weight loss of approximately 1 kg. It is during this phase that the individual feels less swollen. On the second process, the low glucose level on the blood leads to the catabolism of the endogenous and exogenous fat and, consequently, to a production of ketone bodies by the liver. With a high production of ketones, ketonemia occurs, which is then released on the breath and urine. The liver excretion of ketones is followed by sodium excretion, which leads to increased diuresis and reduced Ph.[10,15]

A study conducted by Perinazzo & Almeida[16] analyzed the nutritional composition of weight loss diets conveyed on non-scientific magazines and, from the 82 analyzed diets, 56 showed insufficient carbohydrate values (<49.5% of VET). On another study, conducted by Carvalho & Faicari,[17] from the 16 analyzed diets, 11 had a carbohydrate content below the recommended values. By analyzing the main trend diets, Camargo et al.[18] showed that the diets called "USP diet", "diet of points" and "tuna diet" had inadequate carbohydrate values, with 29%, 47% and 38% respectively.

Studies reported that diets with carbohydrate restrictions offer negative metabolic effects to the organism, since they are associated to the low intake of fruits, vegetables, and whole cereals, causing undesirable symptoms to those who follow them, such as: constipation, headache, ketone breath, diarrhea, skin eruptions, weakness, and it may also affect the central nervous system and change the cognitive function.[4,10]

Almost half of the analyzed diets on this study showed insufficient fat values; a similar value was also found on the study conducted by Pacheco et al.,[12] in which 50% of the eating plans had low lipid contents. Similarly, Perinazzo & Almeida[16] observed that 47.67% of the diets analyzed on their study sowed insufficient lipid values. In opposition, Souza et al.[19] observed on their study that about 58.57% of the diets had an excessive lipid content.

Lipids also have energetic functions and constitute about 34% of the energy on the diet, offering 9 kcal/g. They also transport liposoluble vitamins (A, D, E and K), improve the taste of meals, cause higher satiation and increase the time for gastric emptying. A low-fat content eating plan may cause an increase on the triglyceride levels and a reduction on the HDL levels.[7,15] On the other hand, fat excess is a concern, since it involves an increase on the incidence of obesity worldwide, as well as an increase of dyslipidemias and cardiovascular diseases.[4] The Institute of Medicine[20] claims the lack of sufficient data to estimate the lipid needs, but it advises that diets should have the lowest possible amount of cholesterol, trans fatty acids and saturated fats, in order to prevent health hazards.

The excessive amount of protein on the popular diets is a concern, not only on this study sample, but also on the researches elaborated by Carvalho & Faicari,[17] Perinazzo & Almeida,[16] Camargo et al.,[18] Pacheco et al.,[27] Souza et al.,[19] which found alarming numbers for this excess of this nutrient.

Proteins may come from vegetable or animal sources and they provide amino acids, which are involved in several biochemical and physiological functions of the human body, acting to create and maintain tissues and on the metabolism.[21] The high protein consumption may overcharge the kidneys and raise the urinary calcium concentration: when there is a higher protein intake than the recommended dose, they are stored; amino acids are converted into fat, and the excess of nitrogen is eliminated by the urine. In general, high protein content diets need a higher water intake for the body to be able to prevent dehydration due to an excessive production of urea and assist in the elimination of ketones.[10,22]

Carvalho & Faicari[17] analyzed the nutritional adequacy of the calcium and iron micronutrients and their findings were concerning: 87.5% of the diets had calcium values below the recommended dose, and 93.75% for iron. Perinazzo & Almeida,[16] by analyzing the same nutrients on 86 diets, observed that approximately 56 eating plans had 50% of probability of not being adequate for calcium; for iron, the same probability reached 57%. Pacheco et al.[12] also analyzed the calcium and iron nutrients and found in 90% of the diets an insufficiency of calcium; the iron content was adequate in 53% of the analyzed diets.

In addition to being essential for the formation of bones and teeth, calcium also has a role in cellular transportation, to transmit nervous impulses and in other parts of the organism. According to Heaney,[23] calcium is lost daily in several ways (skin, hair, nails, sweat, urine, etc.). If a diet hos not enough calcium and the body notices a deficiency of this mineral, bone structure units are broken with the purpose of providing calcium for the circulation. This lack is extended when the body is not able to remain with a positive feedback, and a cascade of reactions starts, beginning with an increase on the secretion of the parathyroid hormone (PTH). Bedani & Rossi[24] believe that there may be a positive relationship between calcium consumption and bone loss reduction and the risk of fractures, and, consequently, the probability of developing osteoporosis.

Anemia is one of the greatest nutritional problems found worldwide. The United Nations Children's Fund (UNICEF) declared that, in the developing world, iron deficiency anemia would affect up to three and a half billion individuals, and it would reach even higher values than the iodine and vitamin A deficiencies A.[25]

Low zinc content diets may lead to a deficiency of the mineral and to its complications, such as growth retardation, immune response problems, scarring difficulties, abortion promotion, diarrheas, anorexia and weight loss.[26,27]

Vitamin B12 is hydrosoluble, and it is found in foods from an animal origin. Its deficiency is more common in people with vegetarian or low-protein diets, and it may lead to hematological, neurological and cardiovascular dysfunctions.[28] As any other vitamin, B12 is not created by the organism, therefore, the body depends completely on the diet to obtain it.[29]

Vitamin D is associated with the calcium homeostasis and the adequate development of the skeleton; its deficiency causes damages to the calcium and phosphate absorption, and it may lead to severe metabolic bone diseases. When associated to the lack of dietetic calcium, it may cause rickets in adults, known as osteomalacia.[6] The mechanisms are still unknown, but there is great evidence that the deficiency of this vitamin may be a risk factor for glucose intolerance, resistance to insulin and DM2.[30]

Working as the main intracellular cation on the human body, potassium is indispensable for the normal cellular function, performing its roles together with other nutrients, such as sodium, working for the hydric balance of the body, and with calcium, participating in neuromuscular activities. Its deficiency, characterized by hypokalemia, may lead to glucose intolerance, muscular weakness or even irregular heartbeats.[14]

Although most diets contain fruits, vegetables and cereals, this study found a high fiber inadequacy. One possible explanation may be the reduced amount portioned throughout the day. It is noteworthy that, for the diets that let the readers choose their preferred amount, a home-based portion/measure was used for each food. Other studies also found inadequate diets in relation to the fiber recommendation (below 25g/day). Pacheco et al.[12] found a prevailing inadequacy in 97% of their analysis, and on the research by Faria et al.[31], this inadequacy was found in 100% of the diets.

The importance of food fiber is related to its role to treat or prevent constipation, to assist the bowel function, to prevent severe dysfunctions of the digestive tract, in the satiation process, influence on the gastric emptying speed and fat absorption and elimination through feces.[14,32]

Conclusion

This study suggests that weight loss diets on Brazilian non-scientific magazines are not appropriate for an adequate food reeducation and healthy weight loss.

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