

Nutritional composition of fad diets published on websites and blogs

Composição nutricional de dietas da moda publicadas em sites e blogs

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ABSTRACT

Objective

To analyze quantitatively the diets available on blogs and websites.

Methods

The following 15 diets were analyzed: low-carb diet, gluten-free diet and intermittent fasting diet using the Virtual Nutri software program. The nutrients analyzed were as follows: carbohydrates, fibers, proteins, lipids, iodine, sodium, calcium, magnesium, iron, zinc, manganese, phosphorus, selenium, vitamins A, C, B6, B12, D, niacin, and folate. The nutrient values were compared with the Dietary Reference Intake recommendation for adults between the ages of 19-50 years. The macronutrient adequacy percentage was based on a 2000-kcal diet for a healthy life, as recommended by the World Health Organization.

Results

It was observed that most of the composition of macro and micronutrients was lower than the one established by the World Health Organization and the Dietary Reference Intake recommendation for adults between the ages of 19-50 years.

Conclusion

Long-term dieting can be a risk factor for several deficiency diseases and may endanger the health of individuals.

Keywords: Fad, Diet. Media. Nutrients. Nutritional Adequacy.

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RESUMO

Objetivo

Analisar quantitativamente dietas disponíveis em blogs e sites.

Métodos

Analisou-se 15 cardápios de dietas intituladas: Low Carb, Dieta Sem Glúten e Jejum Intermitente utilizando o software, Virtual Nutri. Os nutrientes analisados foram: carboidratos, fibras, proteínas, lipídios, iodo, sódio, cálcio, magnésio, ferro, zinco, manganês, potássio, fósforo, cobre, selênio, vitaminas A, C, B6, B12, D, niacina e folato. Os nutrientes tiveram seus valores comparados com recomendações diárias de ingestão das Dietary Reference Intake para adultos da faixa etária de 19 a 50 anos. O percentual de adequação foi feito baseado em uma dieta de 2000kcal para indivíduos saudáveis, de acordo com o preconizado pela Organização Mundial da Saúde.

Resultados

Observou-se que a maioria dos cardápios teve sua composição de macro e micronutrientes aquém do determinado pela Organização Mundial da Saúde e das recomendações das Dietary Reference Intake para adultos de 19 a 50 anos.

Conclusão

O seguimento dessas dietas em longo prazo pode ser um fator de risco a diversas doenças carenciais que pode trazer perigos à saúde dos indivíduos.

Palavras-chave: Dietas da Moda. Mídia. Nutrientes. Adequação nutricional.

INTRODUCTION

Dietary and nutritional patterns in the Brazilian population are influenced by the so-called 'nutritional transition', which refers to changes in the diet of individuals and it is correlated with economic, demographic and epidemiological changes. Nutritional transition is characterized by reduced deficits of malnutrition and short stature instead of obesity [1]. However, the increase in obesity and high prevalence of chronic diseases are outstanding [2].

Together with the concern regarding diseases and current beauty pattern, a significant portion of the population is excessively concerned with weight and body composition. Having a lean body seems to be the only type valued in society, which leads to illnesses in individuals who do not fit into the hegemonic beauty patterns. Fat has become a symbol of moral failure and the obese carry a stigma as inappropriate weight is considered a morally and socially undesirable quality [3,4].

Thus, irregular eating practices seeking weight loss have become prevalent. The media plays an important role in the construction and deconstruction of food processes [5]. Websites and blogs have become vehicles of fad diets that target fast weight loss and suppression of foods labelled as the "villains". These diets may be deficient in micronutrients, promoting unfavorable nutritional, emotional and weight loss effects. Among these diets, the intermittent fasting diet, gluten-free diet and low-carb diet are the most common ones. The strategy of the intermittent fasting diet is to undergo different periods of fasting [6]. The gluten-free diet excludes any source of gluten from the diet and it has been widely used for weight loss [7]. The low-carb diets include the Atkins diet, ketogenic diet and zone diet, which restrict consumption of carbohydrates. Some of these diets are stricter than others [8].

The aim of this study was to analyze and evaluate the menus of the intermittent fasting diet, low-carb diet and gluten-free diet on national websites and blogs and compare them with the dietary macro and micronutrient recommendations for adult women.

METHODS

Fad diets were selected from blogs and websites from October to November 2017. The three most popular dieting methods were: the low-carb diet, gluten-free diet and intermittent fasting diet. Fifteen examples of diets were used, five of each of the three types selected. The five diets of each group were chosen from the same website address and were obtained from two websites and one blog. The menus available on blogs and websites offer an average of 4 daily meals. Two meals from the intermittent fasting menu and six meals from the low carb menu were chosen. This variation occurred at the discretion of the website and blog that provided the information. For ethical reasons, the names of blogs and websites have been omitted.

The inclusion factors for choosing the diets were: to explain the goal of weight loss; be publicly accessible web pages. The exclusion criteria were: not specifying the type of food and quantity to be consumed; preparations that did not provide recipes and specific foods whose nutritional composition was not found in the food composition tables.

After choosing the menus, they were inserted into the Virtual Nutri Plus software program (São Paulo, Brazil), version 2.0, for calorie and nutrient verification. Arithmetic Mean, Standard Deviation (SD) and adequacy were calculated using Microsoft Excel®, 2013 version (Microsoft Corp., Redmond, Washington, DC, United States).

The following nutrients were analyzed: carbohydrates, fibers, proteins, lipids, iodine, sodium, calcium, magnesium, iron, zinc, manganese, potassium, phosphorus, copper, selenium, vitamins A, C, B6, B12, D, niacin and folate. The nutrient values were compared with the daily intake recommendations of the Dietary Reference Intake (DRI) for women aged 19-50 years.

The percentage of adequacy of macronutrients was based on a 2,000kcal diet for healthy individuals, according to the World Health Organization [5], corresponding to approximately 60% of carbohydrates or 1,200kcal (300g), 15% of proteins or 300kcal (75g) and 25% of lipids or 500kcal (56g).

The classification of energy level and calorie restriction were determined in accordance with Souza *et al.* [9]; a high calorie-restricted diet consisted of a daily intake of 800-1,200kcal and a mild calorie-restricted diet consisted of a daily intake of more than 1,200kcal.

RESULTS AND DISCUSSION

The minimum and maximum caloric values for each type of diet found on the websites and blogs surveyed are shown in Table 1. The intermittent fasting diets were classified as a highly calorie-restricted diet, while the low-carb and gluten-free diets ranged from highly calorie-restricted diet to mild calorie-restricted diet according to Souza *et al.* [9]. In the percentage calculation, 80% of the low-carb diets and 60% of the gluten-free diets were considered highly calorie-restricted diets. Floriano *et al.* [5] investigated diets published in non-scientific journals and found that 40% of the diets were calorie restricted.

Table 2 shows the arithmetic mean, standard deviation and percentage of macronutrient adequacy of the diets analyzed. All macronutrients in the intermittent fasting diet and gluten-free diet were below the 100% adequacy level regarding a 2,000kcal diet.

The macronutrients in the low-carb diet were below the recommended percentages, except for the lipids, as the principle of this diet recommends carbohydrate restriction and not lipid restriction [10,11].

Table 1. Minimum and maximum calorie levels found in the menus analyzed for the intermittent fasting diet, low-carb diet and gluten-free diet. *Ouro Preto* (MG), Brazil, 2018.

Level calorie	Intermittent fasting diet	Low-carb diet	Gluten-free diet
Minimum calorie level	229.42kcal	622.65kcal	877.06kcal
Classification	High calorie restriction	High calorie restriction	High calorie restriction
Maximum calorie level	869.39kcal	1,560.36kcal	1,750.25kcal
Classification	High calorie restriction	Mild calorie restriction	Mild calorie restriction

Table 2. Mean, Standard Deviation (SD) and percentage of adequacy of the menus analyzed for the intermittent fasting diet, low-carb diet and gluten-free diet. *Ouro Preto* (MG), Brazil, 2018.

Nutrients	Intermittent fasting diet			Low-carb diet			Gluten-free diet		
	M	SD(g)	Adequacy(%)	M	SD(g)	Adequacy(%)	M	SD(g)	Adequacy(%)
CHO									
PTN	32.2 ± 15.09	42.93	59.3 ± 24.63	79.08	59.81 ± 22.86	79.75			
LIP	11.4 ± 1.90	20.30	69.2 ± 30.06	123.48	36.18 ± 19.93	64.61			
FIB	10.1 ± 5.98	40.48	6.0 ± 4.00	1.50	20.05 ± 10.39	80.20			

Note: CHO: Carbohydrates; PTN: Proteins; LIP: Lipids; FIB: Fibers; M: Mean.

Carbohydrate restriction promotes the mobilization of muscle and liver glycogen reserves, a metabolic process that leads to water uptake. Therefore, body weight loss is the result of water loss, and weight is recovered as soon as carbohydrate intake is reestablished [5].

Although most diets have adequate carbohydrate values, 20.0% of the diets analyzed in the study by Floriano *et al.* [5] had values below the recommended ones. Carbohydrate intake was also below the recommended levels in 10.8% of the diets published in the lay press for the female audience and in 33.3% of the diets for the male audience [12].

The low levels of fiber found in the three types of diet are also worrisome because dietary fiber deficiency leads to disorders and gastrointestinal diseases such as irritable bowel syndrome, appendicitis, diverticulitis, Crohn's disease, hemorrhoids and intestinal constipation [13].

Of the micronutrients analyzed in all three diets (Table 3), sodium, magnesium, zinc, manganese, potassium and copper were lower than the DRI. On the other hand, the percentages of calcium, phosphorus, iron and selenium were higher than 100% in the gluten-free menus and the percentages of phosphate and selenium were higher in the low-carb diet. Mineral deficiency was present in the intermittent fasting diet due to the long-term absence of food intake as the individual only eats two meals within a 24-hour interval.

Diets with high calorie restriction are inefficient for long-term weight loss. Floriano *et al.* [5] reported that the daily intake of less than 1,200kcal does not supply the minimum micronutrient needs and basal metabolic rate for adult women. Nutritional micronutrient deficiencies can cause various consequences to the body as they are important for vital metabolic reactions. For example, sodium and potassium cause hydroelectrolytic imbalance and cellular dysfunctions [14,15]. Iodine deficiency causes cognitive changes, goiter and hypothyroidism [16], and magnesium deficiency causes neurological, cardiovascular and gastrointestinal disorders [17]. Zinc deficiency reduces immune function [18], manganese deficiency causes neurodegeneration [19] and, finally, copper deficiency causes anemia, immune system and fertility alterations [20].

Table 3. Mean, Standard Deviation (SD) and percentage of adequacy of micronutrients in the menus analyzed for the intermittent fasting diet, low-carb diet and gluten-free diet. *Ouro Preto* (MG), Brazil, 2018.

Minerals	Intermittent fasting diet			Low-carb diet			Gluten-free diet		
	M	SD(g)	Adeq.(%)	M	SD(g)	Adeq.(%)	M	SD(g)	Adeq.(%)
I (µg)	20.53 ±	3.22	21.61	54.53 ±	34.11	57.4	13.23 ±	1.46	13.93
NA (mg)	542.87 ±	335.36	10.86	1106.53 ±	630.37	22.13	650.95 ±	239.69	13.02
CA (mg)	320.03 ±	294.61	40.00	202.04 ±	100.36	25.25	1035.76 ±	143.02	129.47
MG (mg)	77.37 ±	50.50	23.45	108.13 ±	36.07	32.77	252.43 ±	114.24	76.49
ZN (mg)	2.13 ±	1.76	22.61	7.62 ±	2.85	81.08	6.87 ±	2.49	73.06
MN (mg)	0.95 ±	0.18	23.68	1.00 ±	0.52	24.99	3.59 ±	1.60	89.77
K (mg)*	1,307.99 ±	898.87	32.7	1,376.78 ±	482.84	34.42	2,237.63 ±	988.73	55.94
P (mg)	387.31 ±	216.65	66.78	635.55 ±	244.87	109.58	718.36 ±	281.37	123.86
FE (mg)	2.75 ±	1.28	33.89	6.38 ±	1.97	78.74	13.66 ±	2.98	168.62
CU (mg)	0.42 ±	0.26	0.06	0.61 ±	0.23	0.09	1.34 ±	0.53	0.19
SE (µg)	26.49 ±	19.91	58.87	57.75 ±	43.47	128.34	125.02 ±	68.01	277.82

Note: I: Iodine; NA: Sodium; CA: Calcium; MG: Magnesium; ZN: Zinc; MN: Manganese; K: Potassium; P: Phosphorus; FE: Iron; CU: Copper; SE: Selenium.

Similar to what occurs in the intermittent fasting and low-carb diets, calcium and iron content was also found to be inadequate in studies by Floriano *et al.* [5], Abreu *et al.* [12], and Carvalho *et al.* [21]. The zinc content was unsuitable for the three types of diets analyzed, which was also reported in the studies by Floriano *et al.* [5] and Marangoni & Maniglia [22].

Table 4 shows the levels of vitamin inadequacies (deficits or excesses) for the all diets analyzed. Deficiencies were found for vitamin C (low-carb diet), vitamin B6 (intermittent fasting diet), vitamin B12 (intermittent fasting and gluten-free diets), vitamin D (all diets), vitamin B3 (intermittent fasting and low-carb diets) and vitamin B9 (all diets).

Vitamin inadequacy causes disorders in the body like mineral deficiency. Vitamin A was above recommended levels in all diets. Excess vitamin A can cause hair loss, double vision, vomiting, headaches and damage to the liver and bones [23]. This result differs from that reported by Floriano *et al.* [5] who found that 5 of the 20 diets analyzed had lower values of vitamin A than the recommended level.

Table 4. Mean, Standard Deviation (SD) and percentage of adequacy of vitamins in the menus analyzed for the intermittent fasting diet, low-carb diet and gluten-free diet. *Ouro Preto* (MG), Brazil, 2018.

Vitamins	Intermittent fasting diet			Low-carb diet			Gluten-free diet		
	M	SD(g)	Adeq.(%)	M	SD(g)	Adeq.(%)	M	SD(g)	Adeq.(%)
Vit A (RE)	683.74 ±	76.78	109.40	1,299.49 ±	1,045.44	207.92	3,080.3 ±	1,368.8	492.85
Vit C (mg)	140.71 ±	93.02	187.60	52.07 ±	50.01	69.43	236.14 ±	82.72	314.85
Vit B6 (mg)	0.72 ±	0.45	65.49	1.17 ±	0.5	106.8	1.53 ±	0.25	139.25
Vit B12 (µg)*	0.78 ±	0.67	32.32	3.07 ±	0.36	127.8	1.75 ±	1.39	73.02
Vit D (µg)	0.47 ±	0.37	4.66	1.53 ±	0.47	15.33	0.44 ±	0.21	4.42
Vit B3 (mg)	6.92 ±	5.06	57.64	9.41 ±	7.61	78.41	12.34 ±	3.9	102.8
Vit B9 (µg)	118.49 ±	46.56	37.03	119.88 ±	53.21	37.46	180.52 ±	110.36	56.41

Note: Vit A: Vitamin A; Vit C: Vitamin C; Vit B12: Vitamin B12; Vit D: Vitamin D; Vit B3: Vitamin B3; Vit B9: Vitamin B9.

Excess vitamin C, as found in the intermittent fasting and gluten-free diets, causes diarrhea, urinary oxalate excretion and formation of renal calculus [24], whereas its deficiency, as found in the low-carb diet, is associated with neurodegenerative diseases including Alzheimer's, Parkinson's and Huntington's diseases, multiple sclerosis and amyotrophic lateral sclerosis [25]. In the studies of Floriano *et al.* [5] and Abreu *et al.* [12], 80% and 82% of the analyzed diets, respectively, had adequate levels of vitamin C. Similarly, Marangoni & Maniglia [22] found adequate vitamin C levels in their study, as recommended by the DRI.

It is noteworthy that the level of B-complex vitamins was inadequate in intermittent fasting diet and vitamin B9 and vitamin D were deficient in all diets.

Vitamin B9 deficiency is associated with a number of diseases such as megaloblastic anemia, congenital malformations and cardiovascular diseases [26], whereas vitamin D deficiency can cause bone disorders and rickets [27].

In addition to anemia, B12 deficiency may also be associated with non-hematological complications, including increased risk of failed pregnancy, cognitive impairment, osteopenia, and vascular occlusive disease, probably due to Homocysteine accumulation (Hcy) [28].

Thus, 'fad diets' promoted by social media can contribute to the increase in deficiency diseases and eating disorders, as both macro and micronutrients are deficient in these diets.

CONCLUSION

Calorie, macronutrient and micronutrient values were lower than the recommended levels for adult women in most of the menus. Food plans published on the Internet may be a potential risk to human health. Dietary planning should be individualized and prescribed by a nutritionist considering each individual's nutritional needs and goals.

CONTRIBUTORS

Braga DCA and Coletro HN contributed to the development of the experimental approach, data collection, creation of tables and result discussion, and conception and writing of the manuscript. Freitas MT contributed to creation of tables and result discussion and conception, writing and revision of the manuscript.

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