

**FOOD INTAKE IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE***Ingestão alimentar em pacientes com doença inflamatória intestinal*Alice Freitas da **SILVA**, Maria Eliana Madalozzo **SCHIEFERDECKER**, Heda Maria Barska dos Santos **AMARANTE**

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**ABSTRACT - Background** - Patients with inflammatory bowel disease may have nutritional deficiencies. **Aim** - To verify the adequacy of dietary intake of patients with Crohn's disease and ulcerative colitis. **Methods** - To assess food intake of 55 patients, 28 with Crohn's disease and 27 with ulcerative colitis treated in the gastroenterology clinic, was used the 24-Hour Food Recall and Food Frequency Questionnaire. The inflammatory activity of the disease was evaluated by serum C-reactive protein and Harvey and Bradshaw Index. For comparison of means t test was used, and the average on non-parametric, the Mann-Whitney test, with level of significance  $p < 0.05$ . **Results** - The patients were aged between 19 and 63 years and time since diagnosis was 7.9 years (1 to 22). According to the food intake was identified deficiency in energy intake, fiber, iron, potassium, sodium, magnesium, calcium, menadione, riboflavin, niacin, folate, pantothenic acid, tocopherol and cholecalciferol in Crohn's disease and ulcerative colitis, active or in remission. The intake of vegetables, fruits, dairy products and beans were low, and intake of fats and sweets was higher than the recommendations. **Conclusion** - There was a deficiency in food intake both in Crohn's disease and in ulcerative colitis, in activity and in remission. These deficiencies can adversely affect the disease course, and justify the need for nutritional intervention with these patients.

**HEADINGS** - Crohn disease. Proctocolitis. Eating.

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**DESCRITORES** - Doença de Crohn. Proctolite. Ingestão de alimentos.

**RESUMO - Racional** - Pacientes com doença inflamatória intestinal podem apresentar deficiências nutricionais. **Objetivo** - Verificar a adequação da ingestão alimentar de pacientes com doença de Crohn e retocolite ulcerativa inespecífica. **Métodos** - Para avaliação da ingestão alimentar de 55 pacientes, 28 com doença de Crohn e 27 com retocolite ulcerativa atendidos em ambulatório de gastroenterologia, utilizou-se o Recordatório Alimentar de 24 Horas e o Questionário de Frequência Alimentar. A atividade inflamatória da doença foi avaliada pelos níveis séricos de proteína C reativa e o Índice de Harvey e Bradshaw. Para comparação de médias foi usado o teste t não pareado e, para as médias não paramétricas, o teste de Mann-Whitney, considerando nível de significância valor de  $p < 0,05$ . **Resultados** - Os pacientes tinham idade entre 19 e 63 anos e tempo de diagnóstico de 7,9 anos (1 a 22). De acordo com a ingestão alimentar identificou-se deficiência na ingestão de energia, fibras, ferro, potássio, sódio, magnésio, cálcio, menadiona, riboflavina, niacina, folato, ácido pantotênico, tocoferol e colecalciferol na doença de Crohn e na retocolite ulcerativa em atividade ou em remissão. A ingestão de legumes, frutas, laticínios e feijão foi baixa, e a de doces e gorduras foi maior que as recomendações. **Conclusão** - Houve deficiência na ingestão alimentar tanto na doença de Crohn como na retocolite ulcerativa, em atividade e em remissão. Essas deficiências podem afetar negativamente o curso da doença e justificam a necessidade de intervenção nutricional com esses pacientes.

**INTRODUCTION**

**I**nflammatory bowel disease (IBD) is the general name given to a group of inflammatory disorders of unknown cause involving the gastrointestinal tract, which can be divided into two main groups: non-specific chronic ulcerative colitis (UC) and Crohn's disease

(CD). The cause of IBD is still unknown and there is interaction between genetic, environmental and immune influences<sup>33</sup>.

Nutritional status in IBD may be affected by reduction in food intake caused by gastrointestinal symptoms, malabsorption and for drug treatment, with larger changes in the acute phase of illness. Besides the reduction in food intake due to gastrointestinal symptoms such as anorexia, nausea and vomiting, patients may have increased nutritional needs as a result of inflammatory activity and complications of the disease<sup>25</sup>.

It is unclear whether dietary manipulation combined with drug therapy might improve symptoms or induce remission. Food intolerances observed vary and should be treated individually<sup>26</sup>. Several nutritional deficiencies have been described in IBD, such as iron, cyanocobalamin, folate, calcium and zinc<sup>18</sup>. Folate deficiency can cause anemia and is also implicated in increased risk for cancer of the colon and rectum<sup>24</sup>. Vitamin D regulates the functioning of the immune system and tissue proliferation and differentiation<sup>20</sup>, and its important role in bone metabolism, together with calcium<sup>28</sup>. Another important nutrient is vitamin K, present in bone formation and reabsorption<sup>7</sup>.

Considering the changes that cause nutrient deficiency disease and the influence of food intake, this study aims to evaluate the adequacy of dietary intake of patients with IBD at different stages of inflammatory activity.

## METHODS

Cross-sectional study whose inclusion criteria were presence of diagnosis of inflammatory bowel disease, people physically able to anthropometric evaluation, age over 18 years. From 17 to April 14, 2008, 55 patients treated at the Clinic of Gastroenterology, Federal University of Paraná in Curitiba, Brazil who participated in the study were informed about the research objectives and signed a consent form in accordance with the approval by the Ethics Committee of Hospital de Clínicas number 1121.160/2005-10.

Information concerning the time of diagnosis of disease, previous operations, associated with other diagnoses and medications were obtained from medical records. Patients were asked about the presence of gastrointestinal symptoms, preferences and/or food intolerances, changes in food intake considering for how long and why, fluid intake per day, and the practice of physical activity or not.

To determine the inflammatory activity of CD and UC were considered values of C-reactive protein (CRP) by nephelometry performed considering normal values less than 0.50 mg/dl. Was considered

the PCR tests in the assessment or request made in the last 15 days. For patients with CD, was used disease activity index proposed by Harvey and Bradshaw<sup>17</sup> during the medical consultation. Patients with scores less than five points were considered in remission, between five and seven mildly active disease, eight and 16 moderate activity, and greater than 16 severe activity<sup>3</sup>.

Total energy expenditure was calculated considering the value of resting energy expenditure x 1.3<sup>9</sup>. Nutritional needs were calculated according to the Dietary Reference Intakes considering the recommendations in accordance with the Recommended Dietary Allowance or Adequate Intake according to sex and age. To assess the adequacy of protein intake were considered the values established by the Recommended Dietary Allowance of 0.8 to 1.2 g/kg/day and fiber intake were considered AI values established as for men of 38 g/day and for women 25 g/day, aged from 19 to 50 years, and 30 g/day for men and 21 g/day women over 51 years<sup>15</sup>. To assess the adequacy of macronutrient intake, were considered an appropriate percentage from 45 to 65% of total energy expenditure of carbohydrates, 10-35% protein and 20-30% lipids<sup>15</sup>. To analyze the intake of retinol, iron, zinc, thiamin, riboflavin, niacin, pyridoxine, folate, cyanocobalamin, ascorbic acid, tocopherol, selenium, magnesium and phosphorus was considered the Recommended Dietary Allowance. In the adjustment of consumption of menadione, manganese, pantothenic acid, biotin, potassium, sodium, calcium, and cholecalciferol, was considered the values of AI, because these nutrients have no Estimated Average Requirement and therefore have no points of reference for Recommended Dietary Allowance<sup>10,11,12,13,14,15</sup>.

For analysis of food consumption were asked to patients throughout the history food, who reported their usual dietary intake 24 hours. At that time, patients also answered a food frequency questionnaire, which was analyzed according to the Food Guide for the Brazilian population<sup>4</sup>. For the calculation of dietary intake was used the software Dietwin Nutritional Assessment<sup>6</sup>.

Results were presented considering mean and standard deviation. To compare means was used the unpaired t test, and the average non-parametric the Mann-Whitney test, level of significance  $p < 0.05$ .

## RESULTS

Were evaluated 55 patients with inflammatory bowel disease, aged between 19 and 63 years and time since diagnosis of 7.9 years (1 to 22). All were literate and 80% (44) lived in Curitiba and metropolitan area; 58% (32) were female and aged

40 years (Table 1).

**TABLE 1 - Characterization of the population**

	DC	UC	All
Population (n) H/M	28 (14/14)	27 (9/18)	55
Age (years)	39,3 (23-62)	41,0 (19-63)	40,2 (19-63)
Time since diagnosis (years)	8,3 (2-17)	7,4 (1-22)	7,9 (1-22)
Activity mild/moderate (n)	8	8	16
<b>Location</b>			
- Mouth / ileus / small bowel and colon / rectum	5 (9,1%)	1 (1,8%)	6 (10,9%)
- Small intestine / ileum	5 (9,1%)	0	5 (9,1%)
- Colon	5 (9,1%)	9 (16,4%)	14 (25,5%)
- Rectum	3 (5,5%)	9 (16,4%)	12 (21,8%)
- Not determined	10 (18,2%)	8 (14,5%)	18 (32,7%)
Previous operations	16 (29,1%)	2 (3,6%)	18 (32,7%)

DC: Crohn's disease, ulcerative colitis, chronic ulcerative colitis, M: male, F: females.

The classification of disease activity according to the PCR was compared with disease activity by Harvey Bradshaw index in patients with CD; both PCR as this index classified 30.8% of patients in activities and 69.2% in remission. Of the patients with UC were active 39% and 61% in remission. Of these patients, 17 received corticosteroid therapy.

Less than 20% of patients reported physical activity as walk, football in weekends, gymnastics and weight training performed with an average frequency of one to three times a week.

CD patients, in activity or in remission, had lower energy intake that apparently needs, but was not significant. Protein intake was higher than necessary, with a significant difference for patients in remission (p <0.05). All CD patients showed low intake of potassium, magnesium, calcium, cholecalciferol and tocopherol (p <0.005). It was found that activity in CD patients also had low intake of sodium, riboflavin, retinol, folate, pantothenic acid (p <0.05) and menadione (p <0.005), while patients in remission had low intake of niacin (p <0.05), sodium and riboflavin (p <0.005). CD patients in remission had retinol intake and manganese higher than needed (P <0.005) (Table 2).

Patients with active UC had a lower intake of energy and kcal/kg (p <0.05), with lower energy intake of patients with UC in remission (p <0.01). Both in activity or in remission had low intake of potassium, magnesium, calcium, cholecalciferol and tocopherol (p <0.005). Patients with active UC had low intakes of thiamin, folate, pantothenic acid (p <0.005), riboflavin, pyridoxine and ascorbic acid (p <0.05). Patients with UC in remission had low intake of retinol (p <0.005), phosphorus, folate (p <0.05) and pantothenic acid (p <0.01). The intake of manganese was greater than the needs (p <0.05) for all patients with UC (Table 3).

**TABLE 2 - Dietary intake of patients with CD in remission and active**

Nutrients	CD activity		CD reference	
	needs	ingested	needs	ingested
Energy (kcal)	1820,0±345,9	1432,5±526,1	1953,0±315,6	1730,9±555,5
kcal / kg	31,7±5,0	27,8±17,0	29,6±3,9	26,9±10,0
Fiber (g)	28,9±5,9	20,0±12,7	29,7±7,3	26,1±10,3
Protein (g)	59,9±19,4	67,2±34,6	67,4±15,7	88,8±34,4*
Iron (mg)	14,3±5,2	10,2±6,0	13,0±5,1	12,2±5,3
Manganese (mg)	2,0±0,3	3,1±2,7	2,1±0,3	4,9±2,6†
Zinc (mg)	9,1±1,6	9,6±7,0	9,5±1,5	11,4±6,0
Potassium (mg)	4700,0±0	1726,2±990,3†	4700,0±0	2372,2±968,0†
Sodium (mg)	1500,0±0	1129,5±378,1*	1500,0±0	1105,9±758,8†
Magnesium (mg)	353,8±49,8	145,3±71,0†	363,3±47,5	228,4±84,3†
Phosphorus (mg)	700,0±0	788,5±383,0	700,0±0	952,0±379,1†
Calcium (mg)	1025,0±70,7	345,1±176,0†	1055,6±92,2	482,2±206,8†
Retinol (mcg)	775,0±103,5	490,8±256,1*	800,0±102,9	824,5±938,0†
Menadione (mcg)	101,2±15,5	21,2±31,8†	105,0±15,4	112,3±166,0†
Thiamin (mg)	1,1±0,1	1,0±0,7	1,2±0,1	1,4±1,8
Riboflavin (mg)	1,2±0,1	0,8±0,4*	1,2±0,1	0,9±0,4†
Niacin (mg)	14,8±1,0	12,8±5,3	15,0±1,0	13,4±7,1*
Pyridoxine (mg)	1,4±0,1	1,0±0,5	1,4± 0,1	1,4±0,7
Folate (mcg)	400,1±0,1	240,4±203,4*	400,1±0,1	348,1±155,5
Cyanocobalamin (mcg)	2,4±2,3	2,9±2,5	2,4±2,2	3,3±1,7
Pantothenic acid (mg)	5,0±0	3,3±1,7*	5,0±0	4,0±1,4†
Biotin (mcg)	30,0±0	27,2±20,5	30,0±0	35,0±19,1
Ascorbic acid (mg)	80,6±7,8	87,2±71,7	82,5±7,7	143,7±109,7
Tocopherol (mg)	15,0±0	6,9±5,0†	15,0±0	5,9±3,4†
Cholecalciferol (mcg)	5,6±1,8	1,6±1,3†	6,4±2,3	3,9±5,0†

Mean ± standard deviation, \* p <0.05, † p <0.005.

**TABLE 3 - Dietary intake of patients with active UC and in remission**

Nutrients	UC activity		UC remission	
	needs	ingested	needs	ingested
Energy (kcal)	1986,1±368,5	1537,0±420,1*	1892,1±178,0	1535,6±421,9†
kcal / kg	30,0±2,6	23,7±7,1*	28,1±4,1	23,3±8,7
Fiber (g)	25,0±0	23,6±5,4	26,8±6,9	22,7±9,9
Protein (g)	66,9±15,7	70,6±24,6	68,7±12,7	81,7±35,8
Iron (mg)	13,6±5,3	11,1±2,2	14,9±4,8	12,4±5,7
Manganese (mg)	2,0±0,3	3,3±1,4*	2,0±0,2	4,4±2,2*
Zinc (mg)	9,3±1,6	11,1±7,0	8,9±1,4	12,3±5,8
Potassium (mg)	4700,0±0	1588,9±509,5†	4700,0±0	1912,8±789,7†
Sodium (mg)	1500,0±0	1411,4±379,6	1500,0±0	1575,6±541,6
Magnesium (mg)	357,8±50,2	185,7±37,9†	347,7±43,6	197,3±85,7†
Phosphorus (mg)	700,0±0	842,5±231,0	700,0±0	950,2±446,7*
Calcium (mg)	1022,2±66,7	399,3±288,5†	1076,9±101,3	510,5±338,8†
Retinol (mcg)	788,9±105,4	569,7±716,1	761,5±96,1	478,3±159,3†
Menadione (mcg)	103,3± 15,8	56,2±137,8	99,2±14,4	252,2±307,2
Thiamin (mg)	1,1±0,1	0,8±0,2†	1,1±0	1,1±0,5
Riboflavin (mg)	1,2±0,1	0,9±0,4*	1,2±0,1	1,0±0,6
Niacin (mg)	14,9±1,1	14,1±4,2	14,6±1,0	15,2±10,7
Pyridoxine (mg)	1,3±0,1	1,1±0,3*	1,4±0,1	1,3±0,7
Folate (mcg)	400,0±0,1	229,8±75,8†	400,0±0	313,8±205,1*
Cyanocobalamin (mcg)	2,4±2,3	3,1±2,6	2,4±2,3	3,5±1,8
Pantothenic acid (mg)	5,0±0	3,1±1,2†	5,0±0	3,6±2,0†
Biotin (mcg)	30,0±0	36,7±22,3	30,0±0	31,6±26,4
Ascorbic acid (mg)	81,7±7,9	48,7±38,7*	79,6±7,2	73,9±54,5
Tocopherol (mg)	15,0±0	6,0±2,6†	15,0±0	6,1±1,7†
Cholecalciferol (mcg)	5,6±1,7	2,1±2,3†	6,9±2,5	2,4±1,5†

\* p<0,05; † p<0,01, ‡ p<0,005

According to food frequency, there was low intake of vegetables, fruits, dairy products and beans, adequate intake of starchy and excessive intake of sweets and fats (Table 4). The most common food intolerances reported by patients were related to lactose (50%), fruits and vegetables (33%), meat (20%), beans/soy and sweet (12%), condiments (9%) and fat/fried foods and oilseeds (9%). Intolerance to bread/pasta, coffee and soft drinks were reported less frequently (5%) patients.

**TABLE 4** - Number of daily servings of food in patients with CD and UC in remission and active

Food groups	servings / d * recommended	Ingested			
		CD activity	CD reference	UC activity	UC remission
Candies	1	4,1±1,5	4,2±2,3	4,5±2,5	3,0±2,0
Meat	1	2,0±0,9	2,4±2,3	2,3±2,0	1,4±0,4
Dairy	3	1,4±1,3	2,1±1,6	2,6±2,3	1,6±1,4
Starches	6	7,1±1,7	7,5±3,2	7,6±2,9	5,9±2,1
Vegetables	3	1,1±1,0	1,4±1,5	0,7±0,8	1,0±0,7
Fruits	3	0,8±0,8	1,4±1,3	1,4±1,5	1,1±0,1
Fats	1	1,4±1,2	1,8±1,0	1,4±0,9	1,4±1,5
Bean	1	0,3±0,3	1,3±1,3	0,9±0,7	0,7±0,6

\* Recommendations in accordance with the Food Guide for the Brazilian population<sup>4</sup>

## DISCUSSION

Studies have found that indirect calorimetry in relation to resting energy expenditure in patients with IBD in remission showed no difference compared with healthy controls<sup>9</sup>. The same was observed in active CD patients without steroids<sup>30</sup>, but activity in patients in remission and who received corticosteroids had higher resting energy expenditure than controls<sup>2</sup>.

Although there is no change in energy needs, it is observed that there is inadequate food intake in patients with IBD, both active and in remission. In the study by Geerling BJ et al.<sup>16</sup> patients with newly diagnosed IBD, in remission, had higher intake of carbohydrates and less protein compared with healthy controls, according to the dietary history. CD patients showed no difference in micronutrient intake, whereas patients with UC ate significantly less calcium, riboflavin and vitamin C. Evaluating the three-day food records of 54 patients with CD in remission Filippi et al.<sup>9</sup> was found inadequate diet, with significantly lower intake of vitamin C and pyridoxine intake than controls and deficient in pyridoxine, folic acid, ascorbic acid, cholecalciferol, tocopherol, calcium and zinc. When evaluated the dietary intake of outpatients in seven days of food records, Aghdassi et al.<sup>1</sup> found no significant difference between patients in remission or activity, however poor intake was observed for retinol, tocopherol, ascorbic acid, thiamine, riboflavin,

niacin, folate, pyridoxine, calcium, zinc and iron in both groups of patients. In the study based on food intake in 1543 subjects, there was greater variability in the food groups in nutrient intake, possibly because nutrients can come from different food sources<sup>27</sup>.

Although studies in the literature have used different methodologies for assessment of food intake deficiencies, in this study were similar.

The reported food intolerance, especially lactose, fruits, vegetables and beans may have influenced the low consumption of these groups. The portions were lower than the daily intake recommendations of the Ministry of Health of Brazil<sup>4</sup>.

The decreased intake of fruits and vegetables in this study was similar to that observed in 32 patients with IBD<sup>32</sup>. Reducing the intake of fruits and vegetables results lower intake of fiber, which may be associated during active disease, to reduce intestinal motility and bacterial fermentation and to prevent abdominal symptoms<sup>1</sup>. However, some patients continue with their restrictions after the disease activity is controlled, which contributes to lower intake of micronutrients and antioxidants<sup>9</sup>. The exclusion of fruits and vegetables also contributed to the low intake of folate in patients with UC<sup>19</sup>.

The report of lactose intolerance is an important finding of this paper, and can influence calcium intake. Experimental oral tolerance to lactose in 67 patients with IBD and 25 controls, showed no significant difference between groups<sup>22</sup>. Insufficient calcium intake in patients with IBD (n = 152) was higher than in healthy controls (n = 73). The major deficiencies were found in 47% (n = 71) of patients who were lactose-restricted diet, although the tolerance tests were abnormal in only 25% (n = 18) of patients<sup>31</sup>. These findings indicate the importance of an observed individual tolerance to milk and dairy products, identifying whether the acceptance of these foods is related to lactose intolerance or allergy to milk proteins<sup>8</sup>.

Among the studied patients, was observed that there was deficiency of iron intake only in patients with UC in remission, similar to what Heatley<sup>18</sup> found in his paper that iron deficiency was more common in patients with UC.

Intolerance of bread or pasta in patients with IBD reported by some patients may be explained by the production of *Saccharomyces cerevisiae* antibodies (ASCA positive), especially in individuals with localized disease in the small intestines<sup>5</sup>.

The lower intake of fruits, vegetables and milk and higher intakes of animal protein, cereals, fats and simple carbohydrates in patients with UC was associated with a higher risk of developing

colon cancer<sup>29</sup>. The intake of processed foods and highly refined, characteristic of the modern diet is detrimental mainly by adding the risk factor related to consumption of sulfite present in processed meats<sup>23</sup>. The beliefs of these patients may also influence food intake of important nutrients<sup>19</sup>.

It must be put in mind, that the present study evaluated only nutrient intake according to dietary recall, not considering the use of supplements such as folate, calcium and vitamin D used by some patients. It is known that drug treatment of IBD with sulfasalazine decreases the absorption of folic acid and corticosteroids reduce calcium absorption<sup>33</sup>. It is well established that patients treated with corticosteroids should receive supplementation of cholecalciferol 800-1000 IE / 1000 mg / d calcium ion<sup>21</sup>. The diet should be balanced and without restrictions, and patients, especially those in remission, should be encouraged to improve their eating habits<sup>32</sup>.

## CONCLUSION

There was deficiency in food intake in both CD and UC in active and in remission. These deficiencies are mainly related to the intake of macronutrients, energy and fiber and micronutrients, including calcium, folic acid, cholecalciferol, tocopherol, menadione, retinol, riboflavin, pyridoxine, thiamine and niacin. The shortcomings can adversely affect the course of the disease, and justify the need for nutritional intervention with these patients.

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