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Restriction of dairy products; a reality in inflammatory bowel disease patients

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Abstract

Introduction: **Calcium deficiency is considered a risk factor for the development of osteoporosis in inflammatory bowel disease (IBD) patients. Various dietary restrictions, including milk products are reported by these patients.**

Objective: **To evaluate dairy product and dietary calcium intake by IBD patients.**

Methods: **This cross-sectional study enrolled 65 outpatients with IBD recruited from one reference center for IBD. A semi-structured questionnaire (to collect demographic, socioeconomic and clinical data) and a quantitative food frequency questionnaire were administered. With regard to clinical data, we evaluated the anthropometric nutritional status, the disease classification, the disease activity index and the presence of gastrointestinal symptoms. Self-reported modifications in the use of dairy products were evaluated.**

Results: **The IBD patients' ages ranged from 20-75 years and 67.0% were diagnosed with ulcerative colitis. The majority (64.7%) reported restricting dairy products. The frequency of gastrointestinal symptoms was higher among the Crohn's disease patients who restricted dairy products than among those with no restrictions (100% *vs* 42.9%; p = 0.013); this result was not observed among the UC (ulcerative colitis) patients. Disease activity was also more frequent in the IBD patients who restricted dairy products than in those with no restrictions (23.8% *vs* 4.5%; p = 0.031), and among the UC patients, extensive disease was more common in the patients who restricted dairy products than in those with no restrictions (42.9% *vs* 20.0%; p = 0.03).**

Conclusion: **Restricting dairy products is common among IBD patients, possibly due to disease activity, the presence of gastrointestinal symptoms and the extension of the disease.**

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Keywords: *Inflammatory bowel disease. Ulcerative colitis. Crohn's disease. Dairy products. Dietary calcium.*

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RESTRICCIÓN DE PRODUCTOS LÁCTEOS; UNA REALIDAD EN PACIENTES CON ENFERMEDAD INFLAMATORIA INTESTINAL

Resumen

Introducción: **Se considera que la deficiencia de calcio es un factor de riesgo para el desarrollo de osteoporosis en pacientes con enfermedad inflamatoria intestinal (EII). En estos pacientes se han notificado diversas restricciones dietéticas.**

Objetivo: **Evaluar la ingesta de productos lácteos y calcio de la dieta en pacientes con EII.**

Métodos: **En este estudio cruzado se reclutaron 65 pacientes ambulatorios con EII procedentes de un centro de referencia para EII. Se administraron un cuestionario semi-estructurado (que recogía datos demográficos, socio-económicos y clínicos) y un cuestionario de frecuencia de consumo de alimento. Con respecto a los datos clínicos, evaluamos el estado nutricional antropométrico, la clasificación de la enfermedad, el índice de actividad de la enfermedad y la presencia de síntomas gastrointestinales. Se evaluaron las modificaciones auto-notificadas en el uso de los productos lácteos.**

Resultados: **Las edades de los pacientes con EII variaban entre los 20 y 75 años y el 67,0% fueron diagnosticados de colitis ulcerosa. La mayoría (64,7 %) notificaban una restricción de los productos lácteos. La frecuencia de síntomas gastrointestinales fue mayor en los pacientes con enfermedad de Crohn que restringían los productos lácteos que en aquellos que no lo hacían (100% frente a 42,9%; p = 0,013); este resultado no se observó en los pacientes con colitis ulcerosa CU. La actividad de la enfermedad también fue más frecuente en los pacientes con EII que restringían los productos lácteos que en aquellos sin restricción (23,8% frente a 4,5%; p = 0,031) y, en los pacientes con CU, la enfermedad extensa fue más habitual en pacientes que restringían los productos lácteos que en aquellos que no lo hacían (42,9 % frente a 20,0%; p = 0,03).**

Conclusión: **La restricción de productos lácteos es habitual en pacientes con EII, posiblemente debido a la actividad de la enfermedad, la presencia de síntomas gastrointestinales y la extensión de la enfermedad.**

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Palabras clave: *Enfermedad inflamatoria intestinal. Colitis ulcerosa. Enfermedad de Crohn. Productos lácteos. Calcio de la dieta.*

Abbreviations

IBD: Inflammatory bowel disease.
CD: Crohn's disease.
UC: Ulcerative colitis.
BMI**:** Body Mass Index.
FFQ: food frequency questionnaire.

Introduction

Inflammatory bowel disease (IBD), mainly represented by Crohn's disease (CD) and ulcerative colitis (UC), is a chronic inflammatory disorder associated with gastrointestinal and systemic complications.[1] IBD has been a major gastroenterological problem in the Westernized world.[2]

Calcium deficiency, mainly as a result of steroid use, has been reported in both CD and UC patients.[3] The development of osteoporosis and an increased risk of fractures are increasingly common in these patients.[4] These problems become more severe when patients reduce the amount of calcium-rich foods they consume. This behavior is perpetuated by food beliefs in an attempt to control symptoms or to prevent the recurrence of the disease. Health professionals who advise restrictive diets also contribute to this deficiency.[5]

Between 1960 and 1970, some studies reported an improvement in symptoms and a lower likelihood of the recurrence of disease activity in UC patients who excluded dairy products from their diet. These results suggested that milk could be an important factor in the onset or exacerbation of UC,[6,7] although the studies had methodological limitations.[8]

Considering the significant impact of calcium deficiency on bone health and patients' quality of life, the objective of this study was to evaluate the intake of dairy products and dietary calcium by inflammatory bowel disease patients.

Materials and methods

Patients

This is a cross-sectional study conducted between September 2011 and March 2012 in the outpatient Gastroenterology and Nutrition Unit at Professor Edgar Santos University Hospital, Salvador, Bahia, Brazil. Sixty-five consecutive patients were included in this study. Informed consent was obtained from all the patients, and the Ethics Committee and the Institutional Review Board of the Professor Edgar Santos University Hospital approved the protocol of this study.

Inclusion and exclusion criteria

Patients were invited to participate in the study according to the following inclusion criteria: age over 18 years and a UC or CD diagnosis according to clinical, endoscopic, radiological and/or pathological study findings.[9] The exclusion criteria were pregnancy, intestinal resection, malignant diseases, celiac disease, lactose intolerance, chronic renal failure and severe liver disease.

Demographic, socioeconomic, clinical and dietary data

The demographic and socioeconomic data included gender, age and education level. With regard to clinical data, we evaluated anthropometric nutritional status, the disease classification, the disease activity index and the presence of gastrointestinal symptoms (abdominal pain, bloating, nausea, vomiting, diarrhea, bloating and bloody stools). The dietary data comprised self-reported information about changes in the current consumption of dairy products (cow's milk and derivatives) as well as the reasons for such changes.

For the CD patients, we applied the Harvey and Bradshaw index (1980),[10] considering disease activity as a score ≥ 5 points. The Lichtiger index (1994)[11] was used for UC patients, and active disease was defined as an index value ≥ 10 points. We applied the Montreal Classification for both CD and UC patients.[12]

The Body Mass Index (BMI) was used to describe the patients' anthropometric nutritional status.[13,14] The anthropometric measurements were taken by professionals who were experienced in taking these measurements. Body weight (kg) was measured twice with the patients wearing light clothes and no shoes. Weight was evaluated using a digital scale accurate to 100 g, and height (in centimeters) was measured with a stadiometer accurate to 0.5 cm.[13]

Evaluation of dietary data

The food frequency questionnaire (FFQ) was used in combination with a photo album for the assessment of the portions and average daily intake of dairy products and calcium (dietary calcium). This FFQ was validated for use in studies of interventions and/or prevention programs for chronic diseases.[15]

The consumption of dairy products was transformed into daily portions for the statistical analysis, and one serving or more per day was considered adequate intake.[16] We analyzed information concerning the self-reported changes in the most recent consumption of dairy products (cow's milk and derivatives) as well as the justifications for these changes. The reduction or exclusion of cow's milk and derivatives or substitution with soy milk was considered dairy product restriction.

The average daily dietary calcium intake was calculated using the Personal Nutrition software (DietWin-Porto Alegre, Rio Grande do Sul, Brazil). Adequate calcium intake was defined as the equivalent of 800 mg per day

Table I
Description of the demographic, anthropometric and clinical characteristics of the Crohn's disease and ulcerative colitis patients

Variables	*CD (n = 21)*	*UC (n = 44)*
Age (years) (mean ± SD)	39.9 (9.9)	47.1 (14.4)
Gender [*n* (%)]		
Male	9 (42.9)	16 (36.4)
Female	12 (57.1)	28 (63.6)
Anthropometric status[1] [*n* (%)]		
Underweight	3 (14,4)	4 (9.1)
Normal	9 (42,8)	28 (63.6)
Overweight	9 (42,8)	11 (25.0)
Disease duration (years) (mean ± SD)	6.8 (3.2)	7.5 (4.9)
Extension of ulcerative colitis (*n* (%))		
Distal	–	22 (50.0
Left-sided	–	10 (22.7
Extensive	–	12 (27.3)
Location of Crohn's disease [*n* (%)]		
Terminal ileum	4 (19.0)	–
Colon	9 (42.9)	–
Ileocolon	8 (38.1)	–
Upper GI	0 (0.0)	–
Behavior of Crohn's disease (*n* (%))		
Nonstricturing, nonpenetrating	13 (61.9)	–
Stricturing	3 (14.3)	–
Penetrating	3 (14.3)	–
Stricturing + perianal	1 (4.8)	–
Penetrating + perianal	2 (9.5)	–
Disease activity index [*n* (%)]		
Remission	17 (81.0)	41 (93.2
Activity	4 (19.0)	3 (6.8
Gastrointestinal symptoms [*n* (%)]		
No	8 (38.1)	28 (63.6)
Yes	13 (61.9)	16 (36.4)

CD: Crohn's disease; UC: ulcerative colitis.
[1]*n* = 43 UC patients.

for individuals from 19 to 50 years old of both genders, 800 mg per day for males 51 to 70 years old and 1000 mg per day for female subjects 51 to 70 years old.[17] The calcium present in beverages, nutritional supplements and medications was not recorded in this study.

Statistical analysis

For the descriptive analysis, we calculated the means with standard deviations (mean ± SD) and medians with ranges for the continuous variables; we calculated the absolute and relative frequencies for the categorical variables. The differences between CD and UC patients with regard to calcium and dairy product intake, the restriction of dairy products and disease duration were analyzed with the Mann-Whitney test. The chi-square test or Fisher's exact test was calculated to determine the strength of the association between two categorical variables. SPSS 15.0 software (SPSS, Chicago, IL, United States) was used for the statistical analyses. $P < 0.05$ was considered statistically significant.

Results

The patients' mean age was 44.8 ± 13.5 years, and the mean disease duration was 7.2 ± 4.4 years. The age ranges of the men and the women were 20-61 years and 23-75 years, respectively. The majority were female (61.5%), and 72.0% had at least a high school education. Among the women, 45.0% were older than 50 years.

Of the IBD patients, 56.9% had adequate anthropometric nutritional status, and 30.8% were overweight. Of the patients evaluated, 89.2% were clinically in remission. Gastrointestinal symptoms were reported by 44.6% of the IBD patients. Bloating and bleeding were the main symptoms, reported by 20.5% (9/44) and 18.2% (8/44) of the UC patients, respectively. However, abdominal distension and abdominal pain were reported by 57.1% (12/21) and 33.3% (7/21) of the CD patients, respectively (data not shown). The demographic and medical characteristics of the Crohn's disease and ulcerative colitis patients are shown in table I.

Modifications to the consumption of dairy products

Regarding the patients' dietary characteristics, 52.3% of the patients reported some change in their consumption of dairy products after being diagnosed with IBD. The majority of the patients (64.7%) reported restricting cow's milk and its derivatives (reducing or excluding these foods and substituting soy milk). The most common reason for this behavior was the exacerbation or onset of symptoms (45.5%), followed by guidance by health professionals (36.4%). Approximately 80.0% of the CD patients had seen a nutritionist (table II).

Consumption of dairy products and dietary calcium

The majority of IBD patients had low dairy product intake (52.0%) and inadequate dietary calcium intake (90.8%) (table II). Only three patients reported taking calcium supplements (data not shown).

There was no statistically significant difference in the intake of dairy products or dietary calcium between the CD and UC patients ($P = 0.37$ and $P = 0.28$, respectively) (table II).

Consumption of dairy products and demographic, anthropometric and clinical characteristics

No association was observed between the reported restriction of dairy products and age, gender, anthro-

Table II
Frequency of modifications in dairy product and dietary calcium intake by inflammatory bowel disease patients

Variables	*IBD (n = 65)*	*CD (n = 21)*	*UC (n = 44)*
Modifying the consumption of dairy products [*n* (%)]			
No	31 (47.7)	11 (52.4)	20 (45.5)
Yes	34 (52.3)	10 (47.6)	24 (54.5)
Types of modifications [*n* (%)]			
Exclusion/Reduction	17 (50.0)	6 (28.6)	11 (25.0
Substitution for nonfat milk	9 (26.5)	2 (9.5)	7 (15.9
Substitution for soy milk	5 (14.7)	1 (4.8)	4 (9.1)
Increased intake	3 (8.8)	1 (4.8)	2 (4.5)
Justifications for restrictions[1] [*n* (%)]			
Exacerbation or onset of symptoms	10 (45.5)	5 (23.8)	5 (11.4)
Advice for healthcare professionals	8 (36.4)	1 (4.8)	7 (15.9)
Fear of eating	1 (4.5)	0 (0.0)	1 (2.3)
Magazines/Brochures/Books	1 (4.5)	1 (4.8)	0 (0.0)
Others	2 (9.1)	0 (0.0)	2 (4.5)
Counseling with nutritionist[2] [*n* (%)]	36 (55.4)	15 (78.9)	21 (48.8)
Steroid use (*n* (%))	6 (9.2)	2 (9.52)	4 (9.09)
Daily intake of dairy product (servings) [median (range)]	0.90 (0.0-5.9)	0.90 (0.0-4.8)	0.88 (0-5.9)
Daily intake of dietary calcium (mg) (mean ± SD)	564.7 ± 348.9	625.8 ± 361.2	535.5 ± 343.2
Inadequate dairy product intake [*n* (%)]	34 (52.0)	11 (52.4)	23 (52.3)
Inadequate dietary calcium intake [*n* (%)]	59 (90.8)	18 (85.7)	41 (93.2)

IBD: Inflammatory bowel disease; CD: Crohn's disease; UC: Ulcerative colitis.
[1]*n* = 22 to IBD patients, *n* = 7 to CD patients, *n* = 15 to UC patients who reported reducing or excluding and substituting soy milk.
[2]*n* = 19 CD patients because of the absence of data.

pometric status, disease duration or counseling from a nutritionist ($P > 0.05$). Among the CD patients, no association was found between the restriction of dairy products and the location and behavior of Crohn's disease ($P > 0.05$). However, the frequency of gastrointestinal symptoms was higher among the CD patients who restricted dairy products compared with those with no restrictions (100% *vs* 42.9%; $P = 0.013$); the same result was not observed in UC patients (table III).

Disease activity was more frequent in the IBD patients who restricted dairy products than in those with no restrictions (23.8% *vs* 4.5%; $P = 0.031$). Among the UC patients, extensive disease was more frequent among the patients who restricted dairy products than among those with no restrictions (42.9% *vs* 20.0%; $P = 0.03$) (table III).

Discussion

In our study, the majority of IBD patients reported having changed their dairy product intake after being diagnosed with IBD, and the majority had low dairy product intake and inadequate dietary calcium intake. The restriction of dairy products seems to be associated with gastrointestinal symptoms and the activity and extension of the disease in these patients.

During active disease, the restriction of dairy products is common among IBD patients.[18] Among the factors associated with the restriction of dairy products, the presence of gastrointestinal symptoms, the desire to relieve symptoms, food beliefs and dietary advice are most strongly related.[5,18,19] However, in prospective studies, no association was found between dairy product intake and an increased frequency of disease relapse.[5,20]

In this study, the extensive form of the disease in UC patients seems to be associated with the restriction of dairy products. However, Jowett and colleagues (2004) found the same association in a group of UC patients.[5] One possible explanation for our findings is that gastrointestinal symptoms are related to active disease and the extensive form of the disease in UC patients. Thus, the restriction of dairy products could be attributable to the spread of information among patients and health professionals about the occurrence of lactose intolerance in IBD patients.

Although no association was found between dairy product restriction and counseling from a nutritionist, the recommendation of a health professional is another factor that has encouraged these individuals to restrict their dairy product intake.[5] The fact that some IBD patients, most commonly CD patients, may develop lactose intolerance contributes to the prescription of this nutritional restriction. Some factors must be evaluated before the patient restricts dairy products, such as the fat present in these foods,[21,22] the amount of lactose consumed, the residual activity of intestinal lactase,

Table III
Modifications in dairy product intake and the demographic, anthropometric and clinical characteristics of the inflammatory bowel disease patients

Variables	IBD (n = 65)		CD (n = 21)		UC (n = 44)	
	Restriction	No restriction	Restriction	No restriction	Restriction	No restriction
Age (years) (mean ± SD)	43.4 ± 12.9	45.4 ± 13.8	41.3 ± 7.7	39.3 ± 11.1	44.5 ± 15.1	48.3 ± 14.2
Sex [*n* (%)]						
Male	11 (52.4)	14 (31.8)	5 (71.4)	4 (28.6)	6 (42.9)	10 (33.3)
Female	10 (47.6)	30 (68.2)	2 (28.6)	10 (71.4)	8 (57.1)	20 (66.7
Anthropometric status[1] [*n* (%)]						
Underweight	2 (10.0)	5 (11.4)	1 (14.3)	2 (14.3)	1 (7.7)	3 (10.0)
Normal	13 (65.0)	24 (54.5)	3 (42.9)	6 (42.9)	10 (76.9)	18 (60.0)
Overweight	5 (25.0)	15 (34.1)	3 (42.9)	6 (42.9)	2 (15.4)	9 (30.0)
Disease duration (years) (mean ± SD)	8.0 ± 4.5	6.9 ± 4.4	8.3 ± 3.3	6.0 ± 3.0	7.3 ± 4.9	7.9 ± 5.1
Extension of ulcerative colitis [*n* (%)][a]						
Distal					3 (21.4)	19 (63.3)
Left-sided					5 (35.7)	5 (16.7)
Extensive					6 (42.9)	6 (20.0)
Location of Crohn's disease [*n* (%)]						
Terminal ileum			2 (28.6)	2 (14.3)		
Colon			1 (14.3)	8 (57.1)		
Ileocolon			4 (57.1)	4 (28.6)		
Upper GI			0 (0.0)	0 (0.0)		
Behavior of Crohn's disease [*n* (%)]						
Nonstricturing, nonpenetrating						
Stricturing			0 (0.0)	2 (14.3)		
Penetrating			1 (14.3)	2 (14.3)		
Stricturing + perianal			5 (71.4)	8 (57.1)		
Penetrating + perianal			0 (0.0)	1 (7.1)		
Disease activity index [*n* (%)][a]			1 (14.3)	1 (7.1)		
Remission	16 (76.2)	42 (95.5)	4 (57.1)	13 (92.9)	12 (85.7)	29 (96.7)
Activity	5 (23.8)	2 (4.5)	3 (42.9)	1 (7.1)	2 (14.3)	1 (3.3)
Gastrointestinal symptoms [*n* (%)][a]						
No	7 (33.3)	29 (65.9)	0 (0.0)	8 (57.1)	7 (50.0)	21 (70.0)
Yes	14 (66.7)	15 (34.1)	7 (100)	6 (42.9)	7 (50.0)	9 (30.0)
Counseling with nutritionist[2]						
No	7 (35.0)	19 (45.2)	1 (14.3)	3 (25.0)	6 (46.2)	16 (53.3)
Yes	13 (65.0)	23 (54.8)	6 (85.7)	9 (75.0)	7 (53.8)	14 (46.7)

IBD: Inflammatory bowel disease.
[1]*n* = 43 UC patients.
[2]*n* = 19 CD patients because of the absence of data.
[a]*P* < 0.05.

the ability of the colonic flora to ferment lactose and individual sensitivity to the products of lactose fermentation.[23]

Some patients have replaced dairy products with soy milk. However, it is known that soy milk products are usually enriched with tricalcium phosphate. This fortificant has the best sensory characteristics, however, the calcium bioavailability is lower compared with cow's milk and other fortificants such as calcium carbonate.[24-27] Therefore, soy milk does not seem to be a good option as a rich source of bioavailable calcium, and recommendations for the intake of foods rich in calcium need to be part of the treatment for IBD patients if dairy product restriction is recommended for some reason. In addition, dairy products are poor sources of lactose and can be consumed by patients with lactose intolerance. They are not only rich sources of calcium but also sources of other micronutrients such as B complex vitamins.

Low dietary calcium intake is already common among the Brazilian population.[25] The mean daily dietary calcium intake among adults is 476.4 mg for females and 546.4 mg for males, and the prevalence of inadequacy among females and males is 90.7% and 83.8%, respectively.[28] The decrease in dietary calcium intake is clinically important in IBD patients, particularly those treated with steroids, postmenopausal women and the elderly because they have a higher risk of developing osteoporosis[29] and fractures.[30,31] Adequate dietary calcium intake is one

of the preventive measures to reduce osteoporosis in IBD patients.[32] The minimum recommended daily intake of calcium for the prevention of fractures in IBD patients is 1,000 mg and for postmenopausal women and men over the age of 55 years, the recommendation is 1,200 mg.[33]

This study has some limitations, such as the sample size, the absence of a control group and the fact that patients who agree to participate in this type of study may have different eating habits. In addition, dietary restrictions could be associated with other medical conditions not evaluated in this study. Nevertheless, some of the results were similar to other studies, but prospective studies are still necessary to confirm the findings.

In summary, the restriction of dairy products and reduced dietary calcium intake are evident in IBD patients. These restrictions are mainly influenced by gastrointestinal symptoms and the activity and extension of the disease. Even in the absence of conclusive data on the frequency of lactose intolerance in these patients and the advancements in the knowledge about the absence of an association between diet and the exacerbation of symptoms or disease activity, restrictive diets are still a reality and may contribute to the compromised nutritional status of IBD patients. However, we must investigate other possible diagnoses that can cause gastrointestinal symptoms and address the complaints of the patients more thoroughly.

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