OPEN ACCESS

Current Research in Complementary & Alternative Medicine

Devorkin B, et al. Curr Res Complement Altern Med 9: 267.

www.doi.org/10.29011/2577-2201.100267

www.gavinpublishers.com

GAVIN PUBLISHERS

Research Article

Dietary Trends in Crohn's Disease: A Comparison with Healthy Controls

Brian Devorkin[1], Fabio Cominelli[2,3,4,5,6], Abigail Raffner Basson[3,4,7*]

[1] Case Western Reserve University School of Medicine, Cleveland, OH 44106, USA

[2] Department of Medicine, School of Medicine, Case Western Reserve University, Cleveland, OH, USA

[3] Division of Gastroenterology and Liver Disease, Case Western Reserve University, Cleveland, OH, USA

[4] Digestive Health Research Institute, Case Western Reserve University, Cleveland, OH, USA

[5] Department of Pathology, Case Western Reserve University, Cleveland, OH, USA

[6] Digestive Health Institute, University Hospitals Cleveland Medical Center, Cleveland, OH, USA

[7] Department of Nutrition, Case Western Reserve University School of Medicine, Cleveland, OH, USA

***Corresponding author:** Abigail Raffner Basson, 2109 Adelbert Road, Biomedical Research Building 5920, Cleveland OH, 44106, USA. Email: axb860@case.edu

Citation: Devorkin B, Cominelli F, Basson AR (2025) Dietary Trends in Crohn's Disease: A Comparison with Healthy Controls. Curr Res Cmpl Alt Med 9: 267. DOI: 10.29011/2577-2201.100267

Received Date: 5 March 2025; **Accepted Date:** 11 March 2025; **Published Date:** 14 March 2025

Abstract

Crohn's disease (CD) is a chronic inflammatory bowel disease that significantly impacts patients' quality of life. Diet plays a critical role in modulating inflammation and disease activity, with high intake of added sugars, artificial sweeteners, and processed foods linked to worsened symptoms. Despite this, many CD patients continue to consume diets high in pro-inflammatory ingredients that may not align with clinical recommendations. A prospective, questionnaire-based study was conducted among 52 adult participants (29 CD, 23 HC) recruited from the Digestive Disease Institute at University Hospitals Cleveland Medical Center as part of a larger diet intervention study. CD participants had a higher intake of fructose, total protein, arachidic acid, and white potato starchy vegetable compared to HC. HEI-2015 component scores for dairy, and intake of Greens and Beans were all significantly lower for CD compared to HC. There was also a trend for lower HEI-2015 total scores among CD participants compared to HC, suggesting slightly poorer dietary quality. Strategies to reduce intake of pro-inflammatory nutrients, such as saturated fats, trans fats and added sugars, and to promote nutrient-dense foods may enhance dietary quality in patients with CD. Further research is warranted to explore these trends and their clinical implications. This study aimed to compare dietary patterns between CD patients and healthy controls (HC) to identify potential targets for nutritional intervention.

Keywords: Crohn's disease; Dietary intake; Healthy eating index; Inflammation; Gut dysbiosis

Introduction

Crohn's disease (CD) is a subtype of inflammatory bowel disease (IBD) that is characterized by chronic inflammation of the gut which affects the quality of life for those affected. While the exact cause of CD is not fully understood, it is thought to arise from a complex interaction between host genetics, an abnormal immune response, gut microbiota, and environmental factors. Diet represents a potentially modifiable environmental risk factor that can influence the onset and severity of IBD by promoting intestinal inflammation and gut microbial dysbiosis. Specifically, the Western diet, which is characterized by high intakes of refined carbohydrates and animal protein, has been associated with worsening IBD symptoms. Despite evidence showing that certain foods can exacerbate IBD symptoms [1], many patients continue to eat diets rich in sugar, processed foods, and other pro-inflammatory ingredients [2-4].

The effects of a poor diet in CD go beyond gastrointestinal symptoms, with malnutrition and nutrient deficiencies being a significant concern. This is often attributed to chronic inflammation, impaired nutrient absorption and food avoidances. Many CD patients impose strict dietary restrictions to help manage their symptoms, often in the absence of clear guidelines. Studies indicate that a majority of patients believe that diet triggers relapses, with approximately 80% making dietary changes such as avoiding spicy or fatty foods, raw fruits, vegetables, and dairy [1]. However, these self-imposed restrictions frequently do not align with scientific recommendations, underscoring the need for professional dietary guidance as a component of CD management.

Historically, dietitians have played a limited role in the management of CD. However, as our understanding of the impact of diet on IBD has progressed, the involvement of a dietitian has become an essential part of CD patient care. Dietitians are now integral members of the multidisciplinary CD team, providing education from diagnosis throughout the disease course [5,6]. Understanding the dietary habits of CD patients is crucial for healthcare providers, as diet plays a key role in disease management and progression. This study aimed to explore the dietary habits of CD patients compared to healthy controls within our hospital setting.

Methods

Questionnaire: Dietary intake data was collected and analyzed using the Diet History Questionnaire (DHQ), version III, developed by the National Cancer Institute, Bethesda, MD [7]. The questionnaire was designed to assess food and dietary supplement intake among adults aged 19 and older. The survey took approximately 30 minutes to complete. The DHQ III is the latest iteration of the DHQ series, with updates and improvements based on previous versions, DHQ I and DHQ II. The questionnaire asked participants to recall their typical food consumption in the past month. The surveys were collected confidentially online between November of 2019 and November of 2022. All participants were given unique code and password to login and complete the survey.

An online information sheet explaining the purpose of the diet survey, the required time commitment, and other consent details preceded the survey. Electronic consent was obtained before participants could access the survey. Participants were advised to complete the survey in a private setting to maintain confidentiality.

Participant recruitment: Participants were identified as part of a larger dietary intervention study focused on the microbiome in CD patients seen at University Hospitals Cleveland Medical Center; UHCMC (NCT04065048). In brief, CD participants (outpatients) were identified through advertisement flyer, recruitment letter & email by screening appointment schedules, as well as during normally scheduled appointment with their treating gastroenterologist. Criteria for inclusion of participants were as follows: 18 to 65 years of age, male or female, documented diagnosis of CD, capable of providing consent to participate, access to technology that permits the completion of online survey. Healthy controls (HC) without IBD were recruited via posted flyers at the Digestive Health Institute at UHCMC. Written informed consent was obtained from all participants.

Institutional Approval: The study protocols were approved by the institutional review board responsible for oversight at University Hospitals IRB STUDY20190080.

Statistical Analysis Statistical analysis was performed using Python's SciPy library (Python v3.13.2, SciPy v1.15.1, NumPy v2.2.2). Descriptive statistics, including means, standard deviations (±), and percentages (%), were used to summarize demographic and dietary data. Independent sample t-tests were conducted to evaluate differences in means between groups. Chi-squared and Fisher's exact tests were used to compare categorical variables. A p-value of ≤ 0.05 was considered statistically significant.

Results

General Characteristics of Respondents

A total of 52 participants (29 CD, 23 HC) completed the survey. There was no significant difference in age, gender, education level, employment status, and income between the groups (Table 1). The majority of participants identified as White (76.9%), with smaller proportions identifying as Black (11.5%), Asian (9.6%), or Hispanic/Latino (1.9%).

	CD N=29 N (%)	HC N=23 N (%)	p*
Gender			
Male	12 (41.4)	5 (21.7)	0.229
Female	17 (58.6)	18 (78.3)	0.229
Age			
Mean	47.6 ± 10.9	40.5 ± 13.4	0.199
Weight			
BMI	29.53 ± 6.54	28.68 ± 5.68	0.565
Education			
Highschool	8 (27.6)	1 (4.4)	0.091
Some college or more	21 (72.4)	22 (95.6)	0.091
Race			
White	26 (89.7)	14 (60.9)	0.013
African American	3 (10.3)	3 (13.0)	1.000

Asian	0 (0)	5 (21.7)	0.055
Hispanic/Latino	0 (0)	1 (4.4)	1
Relationship Status			
Single/divorced	11 (37.9)	11 (47.8)	0.473
Married	18 (62.1)	12 (52.1)	0.473
Pre-Tax Income			
< $60,000	14 (48.3)	15 (65.2)	0.347
>$60,000	15 (51.7)	8 (34.8)	0.347
Employment Status			
Employed	24 (82.8)	21 (91.3)	0.626
Unemployed	5 (17.2)	2 (8.7)	0.626
*Fisher's exact or Chi-square statistics p.			

Table 1: Demographic of Participants.

Dietary trends

Dietary patterns were analyzed for macronutrient, micronutrient, Healthy eating Index (HEI) scores and specific food group consumption. Herein, we report on selected nutrition categories based on their role in health and disease. Table 2 summarizes the mean and standard deviation for selected macro and micronutrients for the CD and HC participants.

Macronutrient and Fat Intake

There was no difference between the CD and HC participants in total fat intake (61.51 ± 27.19 g vs. 52.73 ± 26.46 g, p = 0.162), polyunsaturated fat (15.54 ± 6.64 g vs 11.37 ± 5.83 g, p = 0.193), monounsaturated fat intake (22.56 ± 10.28 g vs 18.78 ± 9.68 g, p = 0.116), or saturated fat intake as a percentage of total calories (11.52 ± 2.10% kcal vs. 11.88 ± 2.54% kcal, p = 0.605, respectively). However, the diet of CD participants was found to have significantly higher intakes of arachidic acid (C20:0) (0.16 ± 0.07 g vs. 0.11 ± 0.06 g, p = 0.011) and behenic acid (C22:0) (0.19 ± 0.16 g vs 0.08 ± 0.06 g, p = 0.002) compared to HC participants. While there was also no difference in trans fat intake among CD participants (2.90 ± 1.61 g vs. 2.43 ± 1.22 g, p = 0.348), it is important to note that dietary guidelines recommend zero dietary intake of trans fat, and that trans fat intake has been linked to worsening of IBD symptoms.

Carbohydrates, Sugars, and Fiber

Fructose consumption was significantly higher in CD compared to HC participants (23.86 ± 15.24 g vs. 16.89 ± 10.84 g, p = 0.054). Added sugar intake (in grams) was also higher in CD participants (51.38 ± 39.57 g vs. 42.95 ± 26.41 g, p = 0.525), although this was not significant and was driven primarily by three CD participants exceeding recommended daily allowances. White potato starchy vegetable consumption was also significantly higher among CD participants (0.24 ± 0.21 cups vs 0.14 ± 0.14 cups, p = 0.037). There was no difference in dietary fiber intake, or in consumption of non-nutritive sweeteners (aspartame, acesulfame, sucralose, erythritol, saccharin) intake between CD and HC participants.

Food Groups and Dietary Patterns

Overall, there was a trend for HEI-2015 total scores to be lower among CD participants compared to HC (59.22 ± 8.50 vs. 63.76 ± 8.62, p = 0.062), indicating poorer dietary quality. Specifically, CD participants reported lower consumption of whole grains (HEI-2015 whole grains component score: 1.83 ± 1.29 vs. 2.84 ± 2.49, p = 0.064) and lower density of whole grains per 1000 kcal (0.27 ± 0.19 vs. 0.44 ± 0.42, p = 0.063) compared to HC. There was however no difference in refined grains intake per 1000 kcal between the groups (2.27 ± 0.94 vs. 1.99 ± 0.80, p = 0.252).

CD participants had lower HEI-2015 component scores for intake of Greens and Beans compared to HC (2.87 ± 2.13 vs 4.20 ± 1.48, p = 0.018). CD patients also had lower dairy intakes (1.17 ± 0.78 cups/day vs. 1.34 ± 1.01 cups/day, p = 0.513), in particular cups of milk (0.28 ± 0.0.19 cups/day vs. 0.59 ± 0.54 cups/day, p = 0.021), with HEI-2015 dairy component scores in CD of 5.31 ± 2.69 compared to 6.89 ± 2.25 among HC (p = 0.029).

There was no difference in vegetable (1.34 ± 0.85 cups/day vs. 1.09 ± 0.59 cups/day, p = 0.379) or fruit intake (1.17 ± 0.89 cups/day vs. 1.55 ± 1.85 cups/day, p = 0.538), albeit intakes in both groups were below the recommended guideline of 2-3 cups per day. There was also no difference between CD and HC participants in total protein (62.84 ± 31.19 g vs. 53.00 ± 34.06 g, p = 0.162), animal protein (41.70 ± 23.05 g vs. 35.81 ± 27.35 g, p = 0.215) or sodium intake (2655.00 ± 1325.43 mg vs 2117.02 ± 1049.77, p = 0.10).

Alcohol Consumption

Alcohol intake, both in grams and as a percentage of total energy, was slightly lower in CD participants compared to HC (3.27 ± 5.87 g vs. 4.01 ± 7.20 g, p = 0.683; 1.50 ± 2.89% kcal vs. 1.80 ± 2.94% kcal, p = 0.708), although this was not significantly different.

Mean Differences	CD (N = 29) mean ± SD	HC Mean (N = 23) mean ± SD	Percent Difference Between CD and HC (%)	p
Total fat (g)	61.51 ± 27.19	52.73 ± 26.46	16.37	0.162
Total saturated fatty acids (g)	19.89 ± 8.4	17.84 ± 9.352	10.87	0.305
SFA 20:0 (arachidic acid) (g)	0.16 ± 0.07	0.11 ± 0.06	37.04	0.011
SFA 22:0 (behenic acid) (g)	0.19 ± 0.16	0.08 ± 0.06	81.48	0.002
Energy from saturated fatty acids (% kcal)	11.52 ± 2.10	11.88 ± 2.54	-3.08	0.605
Total trans fatty acids (g)	2.90 ± 1.61	2.43 ± 1.22	17.64	0.348
Omega-3 fatty acids (g)	1.22 ± 0.77	1.15 ± 0.71	5.91	0.558
Monounsaturated fatty acids (g)	22.56 ± 10.28	18.78 ± 9.68	18.29	0.116
Polyunsaturated fatty acids (g)	15.54 ± 6.64	11.37 ± 5.83	30.99	0.194
Total carbohydrates (g)	196.11 ± 103.59	163.71 ± 71.16	18.01	0.193
White potato starchy vegetable (cups)	0.24 ± 0.21	0.14 ± 0.14	52.63	0.037
Total Protein (g)	62.84 ± 31.19	53.00 ± 34.06	16.99	0.162
Total animal protein (g)	41.70 ± 23.05	35.81 ± 27.35	15.20	0.215
Fructose (g)	23.86 ± 15.24	16.89 ± 10.84	34.21	0.054
Total fruit (cups)	1.17 ± 0.89	1.55 ± 1.85	-27.94	0.538
Total vegetable (cups)	1.34 ± 0.85	1.09 ± 0.59	20.57	0.379
Added sugars by total sugars (g)	51.38 ± 39.57	42.95 ± 26.41	17.87	0.525
Total dietary fiber (g)	16.48 ± 8.37	14.79 ± 6.24	10.81	0.564
Aspartame (mg)	16.44 ± 28.35	46.22 ± 63.88	-95.05	0.067
Sorbitol (g)	0.492 ± 0.73	0.32 ± 0.33	42.36	0.807
Xylitol (g)	0.02 ± 0.01	0.02 ± 0.02	0.00	1.000
Inositol (g)	0.33 ± 0.28	0.26 ± 0.15	23.73	0.451
Maltitol (g)	0.02 ± 0.05	0.1 ± 0.06	133	0.302
Mannitol (g)	0.27 ± 0.20	0.19 ± 0.21	34.78	0.135
Erythritol (g)	0.02 ± 0.05	0.02 ± 0.03	0.00	0.870
Acesulfame Potassium (mg)	7.74 ± 12.19	6.85 ± 13.74	12.20	0.417
Sucralose (mg)	9.78 ± 16.03	11.7 ± 26.28	17.88	0.252
Saccharin (mg)	0.76 ± 1.94	0.34 ± 0.63	76.36	0.497
Sodium (mg)	2655.00 ± 1325.43	2117.02 ± 1049.77	22.55	0.099
Total Dairy (cups)	0.66 ± 0.51	0.61 ± 0.48	7.81	0.571
Milk (cups)	0.28 ± 0.19	0.59 ± 0.54	-71.26	0.021

Alcohol (g)	3.27 ± 5.87	4.01 ± 7.20	-20.33	0.683
Energy from alcohol (% kcal)	1.50 ± 2.89	1.80 ± 2.94	-18.18	0.708
HEI-2015 - Density of Refined Grains per 1000 Kcal	2.27 ± 0.94	1.99 ± 0.80	13.15	0.252
HEI-2015 Whole Grains Component Score	1.83 ± 1.29	2.84 ± 2.49	-43.35	0.064
HEI-2015 Density of Whole Grains per 1000 Kcal	0.27 ± 0.19	0.44 ± 0.42	47.89	0.063
HEI-2015 Dairy Component Scores	5.31 ± 2.69	6.89 ± 2.25	-25.90	0.029
HEI-2015 Greens and Beans Component Score	2.87 ± 2.13	4.20 ± 1.48	-37.62	0.018
Total HEI-2015 Score	59.22 ± 8.50	63.76 ± 8.62	-7.38	0.062

Table 2: Mean Differences in Nutrient Intake Between CD and HC Groups.

Discussion

Our analysis of dietary patterns in CD patients compared to HC revealed several significant findings with clinical implications. CD participants had significantly lower HEI-2015 component scores for Greens and Beans compared to HC. This may be due to CD patients avoiding beans and other legumes due to gastrointestinal symptoms, potentially related to fermentable oligosaccharides, disaccharides, monosaccharides, and polyols (FODMAPs). This finding aligns with previous research indicating that CD patients often restrict legume consumption due to concerns over symptom exacerbation. Another significant finding was the higher intake of white potato starchy vegetables in CD participants compared to HC. This could reflect dietary modifications where CD patients opt for more easily digestible starches to minimize gastrointestinal distress.

Additionally, CD participants had significantly lower HEI-2015 Dairy Component scores and consumed significantly less milk. Given that CD patients often experience low bone mineral density due to long-term corticosteroid use and dietary restrictions, this highlights the importance of monitoring bone health through DEXA scans and recommending calcium and vitamin D supplementation. This finding is consistent with previous studies that have reported inadequate calcium intake among CD patients, emphasizing the need for targeted nutritional interventions.

CD participants also had significantly higher intakes of arachidic acid and behenic acid. While the clinical implications of these differences in very long-chain saturated fatty acid intake are not well established, they warrant further investigation in the context of CD-related inflammation and metabolism. However, higher levels of saturated fatty acid intake have been shown to exacerbate inflammatory bowel disease symptoms and worsen patient health outcomes.

Conclusion

Overall, these findings underscore the importance of dietary assessment and nutritional guidance for CD patients. The significant differences in HEI-2015 total score further highlights the need to address healthy eating behaviors in patients with CD. Future research should focus on targeted interventions that promote adequate intake of nutrient-dense foods, particularly dairy and calcium sources, while also considering the role of symptom-triggering foods in dietary patterns.

Acknowledgments: This study was primarily supported by the NIH/NIDDK grant 1K01DK127008 awarded to Abigail Raffner Basson.

Ethical Considerations: Participants were fully informed about the nature and purpose of the research before agreeing to participate. Consent was obtained voluntarily without coercion.

Conflict of interest statement: None declared.

References

1. Basson AR, Katz J, Singh S, Celio F, Cominelli F, et al. (2023) Sweets and Inflammatory Bowel Disease: Patients Favor Artificial Sweeteners and Diet Foods/Drinks Over Table Sugar and Consume Less Fruits/Vegetables. Inflamm Bowel Dis 29:1751-1759.

2. Wark G, Samocha-Bonet D, Ghaly S, Danta M (2020) The Role of Diet in the Pathogenesis and Management of Inflammatory Bowel Disease: A Review. Nutrients 13:135.

3. Guo A, Ludvigsson J, Brantsæter AL, Klingberg S, Östensson M, et al. (2024) Early-life diet and risk of inflammatory bowel disease: a pooled study in two Scandinavian birth cohorts. Gut 73:590-600.

4. Day AS, Yao CK, Costello SP, Andrews JM, Bryant RV (2022) Food-related quality of life in adults with inflammatory bowel disease is associated with restrictive eating behaviour, disease activity and surgery: A prospective multicentre observational study. J Hum Nutr Diet 35:234-244.

5. Fitzpatrick JA, Melton SL, Yao CK, Gibson PR, Halmos EP (2022) Dietary management of adults with IBD - the emerging role of dietary therapy. Nat Rev Gastroenterol Hepatol 19:652-669.

6. Sasson AN, Ananthakrishnan AN, Raman M (2021) Diet in Treatment of Inflammatory Bowel Diseases. Clin Gastroenterol Hepatol 19:425-435.e3.

7. Diet History Questionnaire III (DHQ III) | EGRP/DCCPS/NCI/NIH. Accessed July 23, 2024.