

Diet Advice for Crohn's Disease

Subjects: Nutrition & Dietetics

Contributor: Dan L Dumitrascu

Crohn's disease (CD) is a chronic, progressive, and destructive granulomatous inflammatory bowel disorder that can involve any part of the gastrointestinal tract. This is a review on diet and Crohn's disease; It is important for practitioners and patients with IBD.

Keywords: Crohn Disease Diet IBD

1. Introduction

Crohn's disease (CD) is a chronic, progressive, and destructive granulomatous inflammatory bowel disorder that can involve any part of the gastrointestinal tract from mouth to anus, predominantly the terminal ileum, ileocaecal region, colon, and perianal region ^{[1][2][3]}. The digestive symptomatology includes bloody mucopurulent diarrhea, abdominal pain, nausea, emesis, weight loss, perineal pain, and urgency to defecate while arthritis, anorexia, uveitis, and skin rash represent the main extra-intestinal manifestations. CD patients frequently experience periods of symptomatic relapse and remission ^{[1][2][3]}. While no gold standard for the diagnosis of Crohn's disease exists, the diagnosis is made by a combination of clinical, endoscopic, histological, imaging, and biochemical criteria. World Health Organization diagnostic criteria for CD include: discontinuous or segmental lesions, as well as a cobblestone appearance or longitudinal ulcer, noted on radiologic studies, endoscopy, and resected specimens; transmural inflammation, as evidenced by clinical evaluation, radiologic studies, biopsy findings, and resected specimens; noncaseating granulomas, as revealed on biopsy samples and resected specimens; fissures and fistulas, as evidenced by clinical evaluation, radiologic studies, and resected specimens; perianal disorders upon clinical evaluation ^{[4][5][6][7][8]}. Nevertheless, for 15% of patients initially diagnosed with CD, the diagnosis changes to ulcerative colitis (UC) during the first year ^{[5][6][7]}.

A low-“fermentable oligo-, di-, mono-saccharides and polyols” (FODMAP) diet is often used in irritable bowel syndrome (IBS) patients because symptoms of bloating, cramping, and diarrhea may be reduced by a diet that will limit foods high in fructose, lactose, fructans, galactans, and polyols ^[9]. FODMAPs are osmotic short-chain carbohydrates that are not completely absorbed in the small intestine, absorb water and are fermented by the bacteria in the distal small and proximal large intestine. The result of this cycle is the production of gas, which could partially explain the bloating and flatulence ^{[9][10][11]}. The daily intake of FODMAPs in a normal diet ranges from 15 g to 30 g per day. If the low-FODMAP diet (LFD) was considered an “avoidance diet” in the past, the present approach is also considering it as a diagnostic tool test in several gastrointestinal and non-gastrointestinal disorders ^{[9][10][11]}. FODMAPs have considerable osmotic properties, compelling water into the gastrointestinal lumen. Inside the colon, FODMAPs are easily and quickly metabolized by gut microbiota followed by the process of fermentation, and the result is an increased quantity of gas, which leads to abdominal distention and diffuse abdominal pain ^{[12][13][14][15]}.

The Mediterranean diet (MD) is characterized by a high intake of plant-based foods, unrefined cereals, fruit, vegetables, legumes, olive oil as the main source of fat, moderate to high consumption of fish, moderate consumption of dairy products (mostly as cheese and yogurt) and low consumption of non-fish meat products ^{[16][17][18]}. Although all the countries from the Mediterranean region have different diets, influenced by geographical, economic, historical, or religious parameters, it is considered that these subtypes are variations of the same MD diet with insignificant differences ^{[16][17][18]}. MD is associated with low risk of late-onset CD and because it frequently presents high adherence among patients, it has been demonstrated to improve quality of life and reduce intestinal inflammation.

2. Discussion

Studies show that dietary intervention in CD may have a positive impact regarding a patient's quality of life, symptom reporting, inflammatory markers and overall disease progression, while, for the vegetarian (and derivatives such as ovo-lacto vegetarian and semi-vegetarian diets) and low-lactose diets, the evidence is not yet compelling ^{[19][20]}. For

Mediterranean and FODMAP diets, there are numerous studies presenting the benefits of these interventions [15][21][22][23][24].

In the past five decades, the overall FODMAP intake has considerably increased in the Western world because of the use of high-fructose corn syrup in almost all processed foods, ranging from juice, bread, yogurt, frozen junk food, salad dressings and even granola bars, macaroni, cheese and canned fruit [15][21][22][23][24]. Because FODMAPs distend the small bowel, as a consequence of increased intraluminal secretion of water and increased gas production, the hypothesis that an LFD could prevent FGID symptoms was widely tested in IBS patients.

Nevertheless, in the last decade, the same hypothesis was tested not only in FGID but also in organic gastrointestinal disorders. Several systematic reviews and meta-analyses investigated the efficiency of an LFD on the clinical and biological outcomes of CD patients. The majority of those studies concluded that an LFD had the following effects: amelioration of gastrointestinal symptoms, the number of diarrheic stools decreased, decreasing of the inflammatory markers, and improved scores in QoL questionnaires indicating an improvement of general well-being [13][25][26][27][28][29]. Because current guidelines have insufficient recommendations for diet indications in CD, international cooperation is needed in order to overcome the present limitations represented by the lack of comparative studies analyzing different types of diets and the small number of patients included in the available studies. More studies are required to increase the level of evidence for dietary intervention in CD.

The main limitations of our study were the insufficient number of studies about the efficiency of VD and LLD (only two articles for each diet) and the small number of patients included in the majority of studies. Another limitation was the fact that a considerable number of studies analyzed the effect of different types of diet in both CD and UC patients. Our search did not find sufficient data about the efficiency of other types of diet in CD patients (vegan diet, low fiber diet, gluten-free diet, ketogenic diet), and the available studies include a limited number of patients with inconclusive results [30][31][32]. Although there considerable progress has been made with regard to enteral nutrition in CD, containing macro- and micro-nutrients [33], we did not analyze this subject because our search included only data about oral nutrition. Other studies provide evidence of the efficiency of the different types of diets in CD [34][35][36][37][38][39][40][41][42][43][44], but no official guidelines regarding nutrition in CD are available. Even though the majority of studies have demonstrated the efficiency of an LFD in CD patients [13][25][26][27][28][29], the fact that an LFD is highly restrictive, expensive and difficult to follow requires the active support of a dietician. Only a small percentage of the initially excluded foods are excluded until the end of the study, and this must be mentioned as a major limitation of those studies, this being the source of the heterogeneity among the overall results.

3. Conclusions

An LFD has a favorable impact on gastrointestinal symptoms in CD patients. Notwithstanding the evidence, it remains to be established whether an LFD is more efficient than other types of diets in the short term and especially in the long term.

References

1. Mills, S.C.; von Roon, A.C.; Tekkis, P.P.; Orchard, T.R. Crohn's disease. *BMJ Clin. Evid.* 2011, 2011, 0416.
2. Farraye, F.A.; Melmed, G.Y.; Lichtenstein, G.R.; Kane, S. V ACG Clinical Guideline: Preventive Care in Inflammatory Bowel Disease. *Am. J. Gastroenterol.* 2017, 112, 241–258.
3. Nikolaus, S.; Schreiber, S. Diagnostics of inflammatory bowel disease. *Gastroenterology* 2007, 133, 1670–1689.
4. Bernstein, C.N.; Eliakim, A.; Fedail, S.; Fried, M.; Gearry, R.; Goh, K.-L.; Hamid, S.; Khan, A.G.; Khalif, I.; Ng, S.C.; et al. World Gastroenterology Organisation Global Guidelines Inflammatory Bowel Disease: Update August 2015. *J. Clin. Gastroenterol.* 2016, 50, 803–818.
5. Travis, S.P.L.; Stange, E.F.; Lémann, M.; Oresland, T.; Chowers, Y.; Forbes, A.; D'Haens, G.; Kitis, G.; Cortot, A.; Pranter, C.; et al. European evidence based consensus on the diagnosis and management of Crohn's disease: Current management. *Gut* 2006, 55 (Suppl. 1), i16–i35.
6. Loftus, E.V. Clinical epidemiology of inflammatory bowel disease: Incidence, prevalence, and environmental influences. *Gastroenterology* 2004, 126, 1504–1517.
7. Lovasz, B.D.; Golovics, P.A.; Vegh, Z.; Lakatos, P.L. New trends in inflammatory bowel disease epidemiology and disease course in Eastern Europe. *Dig. Liver Dis.* 2013, 45, 269–276.

8. Molodecky, N.A.; Soon, I.S.; Rabi, D.M.; Ghali, W.A.; Ferris, M.; Chernoff, G.; Benchimol, E.I.; Panaccione, R.; Ghosh, S.; Barkema, H.W.; et al. Increasing incidence and prevalence of the inflammatory bowel diseases with time, based on systematic review. *Gastroenterology* 2012, 142, 46–54.
9. Gibson, P.R.; Shepherd, S.J. Evidence-based dietary management of functional gastrointestinal symptoms: The FODMAP approach. *J. Gastroenterol. Hepatol.* 2010, 25, 252–258.
10. Iacovou, M.; Tan, V.; Muir, J.G.; Gibson, P.R. The Low FODMAP Diet and Its Application in East and Southeast Asia. *J. Neurogastroenterol. Motil.* 2015, 21, 459–470.
11. Staudacher, H.M.; Whelan, K.; Irving, P.M.; Lomer, M.C.E. Comparison of symptom response following advice for a diet low in fermentable carbohydrates (FODMAPs) versus standard dietary advice in patients with irritable bowel syndrome. *J. Hum. Nutr. Diet.* 2011, 24, 487–495.
12. Barrett, J.S.; Gearry, R.B.; Muir, J.G.; Irving, P.M.; Rose, R.; Rosella, O.; Haines, M.L.; Shepherd, S.J.; Gibson, P.R. Dietary poorly absorbed, short-chain carbohydrates increase delivery of water and fermentable substrates to the proximal colon. *Aliment. Pharmacol. Ther.* 2010, 31, 874–882.
13. Bellini, M.; Tonarelli, S.; Nagy, A.G.; Pancetti, A.; Costa, F.; Ricchiuti, A.; de Bortoli, N.; Mosca, M.; Marchi, S.; Rossi, A. Low FODMAP Diet: Evidence, Doubts, and Hopes. *Nutrients* 2020, 12, 148.
14. Gershon, M.D.; Tack, J. The serotonin signaling system: From basic understanding to drug development for functional GI disorders. *Gastroenterology* 2007, 132, 397–414.
15. Murray, K.; Wilkinson-Smith, V.; Hoad, C.; Costigan, C.; Cox, E.; Lam, C.; Marciani, L.; Gowland, P.; Spiller, R.C. Differential effects of FODMAPs (fermentable oligo-, di-, mono-saccharides and polyols) on small and large intestinal contents in healthy subjects shown by MRI. *Am. J. Gastroenterol.* 2014, 109, 110–119.
16. Khalili, H.; Håkansson, N.; Chan, S.S.; Chen, Y.; Lochhead, P.; Ludvigsson, J.F.; Chan, A.T.; Hart, A.R.; Olén, O.; Wolk, A. Adherence to a Mediterranean diet is associated with a lower risk of later-onset Crohn's disease: Results from two large prospective cohort studies. *Gut* 2020, 69, 1637–1644.
17. Papada, E.; Amerikanou, C.; Forbes, A.; Kalliora, A.C. Adherence to Mediterranean diet in Crohn's disease. *Eur. J. Nutr.* 2020, 59, 1115–1121.
18. Chicco, F.; Magrì, S.; Cingolani, A.; Paduano, D.; Pesenti, M.; Zara, F.; Tumbarello, F.; Urru, E.; Melis, A.; Casula, L.; et al. Multidimensional Impact of Mediterranean Diet on IBD Patients. *Inflamm. Bowel Dis.* 2020.
19. Schreiner, P.; Yilmaz, B.; Rossel, J.-B.; Franc, Y.; Misselwitz, B.; Scharl, M.; Zeitz, J.; Frei, P.; Greuter, T.; Vavricka, S. R.; et al. Vegetarian or gluten-free diets in patients with inflammatory bowel disease are associated with lower psychological well-being and a different gut microbiota, but no beneficial effects on the course of the disease. *United Eur. Gastroenterol. J.* 2019, 7, 767–781.
20. Chiba, M.; Abe, T.; Tsuda, H.; Sugawara, T.; Tsuda, S.; Tozawa, H.; Fujiwara, K.; Imai, H. Lifestyle-related disease in Crohn's disease: Relapse prevention by a semi-vegetarian diet. *World J. Gastroenterol.* 2010, 16, 2484–2495.
21. Parker, K.; Salas, M.; Nwosu, V.C. High fructose corn syrup: Production, uses and public health concerns. *Biotechnol. Mol. Biol. Rev.* 2010, 5, 71–78.
22. Rumessen, J.J.; Gudmand-Høyer, E. Absorption capacity of fructose in healthy adults. Comparison with sucrose and its constituent monosaccharides. *Gut* 1986, 27, 1161–1168.
23. Truswell, A.S.; Seach, J.M.; Thorburn, A.W. Incomplete absorption of pure fructose in healthy subjects and the facilitating effect of glucose. *Am. J. Clin. Nutr.* 1988, 48, 1424–1430.
24. van den Bogert, B.; de Vos, W.M.; Zoetendal, E.G.; Kleerebezem, M. Microarray analysis and barcoded pyrosequencing provide consistent microbial profiles depending on the source of human intestinal samples. *Appl. Environ. Microbiol.* 2011, 77, 2071–2080.
25. Gibson, P.R. Use of the low-FODMAP diet in inflammatory bowel disease. *J. Gastroenterol. Hepatol.* 2017, 32 Suppl 1, 40–42.
26. Barbalho, S.M.; de Alvares Goulart, R.; de Carvalho Araújo, A.L.; de Oliveira, P.G.C. Inflammatory Bowel Diseases and Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols: An Overview. *J. Med. Food* 2018, 21, 633–640.
27. Schwender, B.; Floch, M.H. Should FODMAP withdrawal be tried in inflammatory bowel disease patients with irritable bowel syndrome? *J. Clin. Gastroenterol.* 2014, 48, 393–394.
28. Barrett, J.S.; Gibson, P.R. Development and validation of a comprehensive semi-quantitative food frequency questionnaire that includes FODMAP intake and glycemic index. *J. Am. Diet. Assoc.* 2010, 110, 1469–1476.

29. Croagh, C.; Shepherd, S.J.; Berryman, M.; Muir, J.G.; Gibson, P.R. Pilot study on the effect of reducing dietary FODMAP intake on bowel function in patients without a colon. *Inflamm. Bowel Dis.* 2007, 13, 1522–1528.
30. Southworth, E.; Parsi, K. How Should a Physician Counsel a Vegan Patient With IBD Who Might Benefit From Supplements? *AMA J. Ethics* 2018, 20, E1025–E1032.
31. Herfarth, H.H.; Martin, C.F.; Sandler, R.S.; Kappelman, M.D.; Long, M.D. Prevalence of a gluten-free diet and improvement of clinical symptoms in patients with inflammatory bowel diseases. *Inflamm. Bowel Dis.* 2014, 20, 1194–1197.
32. Aziz, I.; Branchi, F.; Pearson, K.; Priest, J.; Sanders, D. A study evaluating the bidirectional relationship between inflammatory bowel disease and self-reported non-celiac gluten sensitivity. *Inflamm. Bowel Dis.* 2015, 21, 847–853.
33. Logan, M.; Gkikas, K.; Svolos, V.; Nichols, B.; Milling, S.; Gaya, D.R.; Seenan, J.P.; Macdonald, J.; Hansen, R.; Ijaz, U. Z.; et al. Analysis of 61 exclusive enteral nutrition formulas used in the management of active Crohn's disease-new insights into dietary disease triggers. *Aliment. Pharmacol. Ther.* 2020, 51, 935–947.
34. Damas, O.M.; Garces, L.; Abreu, M.T. Diet as Adjunctive Treatment for Inflammatory Bowel Disease: Review and Update of the Latest Literature. *Curr. Treat. Options Gastroenterol.* 2019, 17, 313–325.
35. Kakodkar, S.; Mutlu, E.A. Diet as a Therapeutic Option for Adult Inflammatory Bowel Disease. *Gastroenterol. Clin. N. Am.* 2017, 46, 745–767.
36. Komperød, M.J.; Sommer, C.; Mellin-Olsen, T.; Iversen, P.O.; Røseth, A.G.; Valeur, J. Persistent symptoms in patients with Crohn's disease in remission: An exploratory study on the role of diet. *Scand. J. Gastroenterol.* 2018, 53, 573–578.
37. Charlebois, A.; Rosenfeld, G.; Bressler, B. The Impact of Dietary Interventions on the Symptoms of Inflammatory Bowel Disease: A Systematic Review. *Crit. Rev. Food Sci. Nutr.* 2016, 56, 1370–1378.
38. Donnellan, C.F.; Yann, L.H.; Lal, S. Nutritional management of Crohn's disease. *Therap. Adv. Gastroenterol.* 2013, 6, 231–242.
39. Smith, M.A.; Smith, T.; Trebble, T.M. Nutritional management of adults with inflammatory bowel disease: Practical lessons from the available evidence. *Frontline Gastroenterol.* 2012, 3, 172–179.
40. Durchschein, F.; Petritsch, W.; Hammer, H.F. Diet therapy for inflammatory bowel diseases: The established and the new. *World J. Gastroenterol.* 2016, 22, 2179–2194.
41. Rapozo, D.C.M.; Bernardazzi, C.; de Souza, H.S.P. Diet and microbiota in inflammatory bowel disease: The gut in dish harmony. *World J. Gastroenterol.* 2017, 23, 2124–2140.
42. Wolters, F.L.; Russel, M.G.V.M.; Stockbrügger, R.W. Systematic review: Has disease outcome in Crohn's disease changed during the last four decades? *Aliment. Pharmacol. Ther.* 2004, 20, 483–496.
43. Weber, A.T.; Shah, N.D.; Sauk, J.; Limketkai, B.N. Popular Diet Trends for Inflammatory Bowel Diseases: Claims and Evidence. *Curr. Treat. Options Gastroenterol.* 2019, 17, 564–576.
44. Mentella, M.C.; Scaldaferri, F.; Pizzoferrato, M.; Gasbarrini, A.; Miggiano, G.A.D. Nutrition, IBD and Gut Microbiota: A Review. *Nutrients* 2020, 12, 944.