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Avoidant Restrictive Food Intake Disorder Prevalent Among Patients With Inflammatory Bowel Disease

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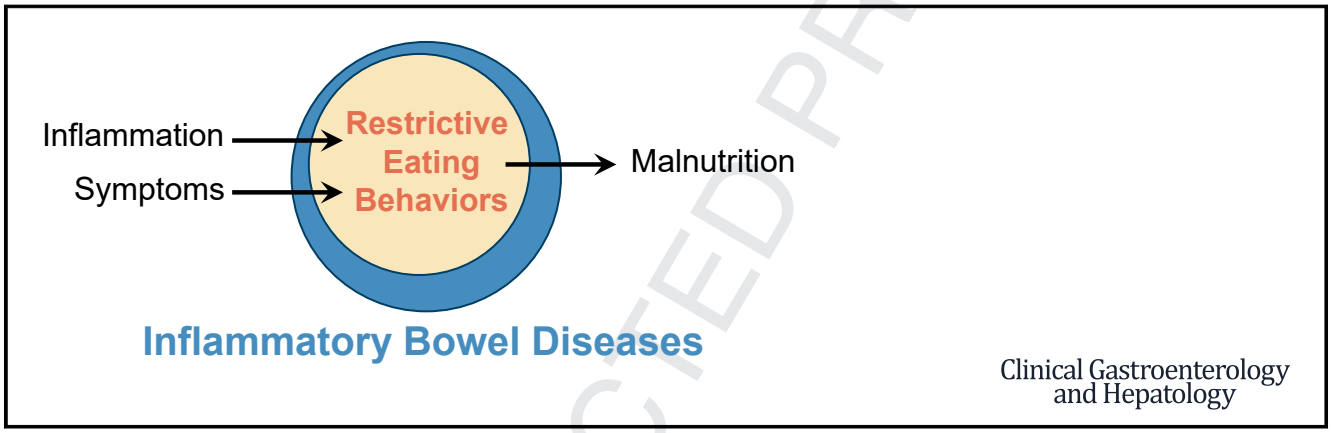

BACKGROUND & AIMS: Inflammatory bowel disease (IBD) patients alter their dietary behaviors to reduce disease-related symptoms, avoid feared food triggers, and control inflammation. This study aimed to estimate the prevalence of avoidant/restrictive food intake disorder (ARFID), evaluate risk factors, and examine the association with risk of malnutrition in patients with IBD.

METHODS: This cross-sectional study recruited adult patients with IBD from an ambulatory clinic. ARFID risk was measured using the Nine-Item ARFID Screen. Nutritional risk was measured with the Patient Generated-Subjective Global Assessment. Logistic regression models were used to evaluate the association between clinical characteristics and a positive ARFID risk screen. Patient demographics, disease characteristics, and medical history were abstracted from medical records.

RESULTS: Of the 161 participants (Crohn's disease, 45.3%; ulcerative colitis, 51.6%; IBD-unclassified, 3.1%), 28 (17%) had a positive ARFID risk score (≥24). Most participants (92%) reported avoiding 1 or more foods while having active symptoms, and 74% continued to avoid 1 or more foods even in the absence of symptoms. Active symptoms (odds ratio, 5.35; 95% confidence interval, 1.91–15.01) and inflammation (odds ratio, 3.31; 95% confidence interval, 1.06–10.29) were significantly associated with positive ARFID risk. Patients with a positive ARFID risk screen were significantly more likely to be at risk for malnutrition (60.7% vs 15.8%; $P < .01$).

[a]Authors share co-first authorship.

Abbreviations used in this paper: ARFID, avoidant/restrictive food intake disorder; BMI, body mass index; CD, Crohn's disease; CI, confidence interval; CRP, C-reactive protein; DSM-5, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; IBD, inflammatory bowel disease; IBS, irritable bowel syndrome; IOIBD, International Organization for the Study of Inflammatory Bowel Diseases; IQR, interquartile range; NIAS, Nine Item Avoidant/Restrictive Food Intake Disorder Screen; OR, odds ratio; PG-SGA, Scored Patient-Generated Subjective Global Assessment; SCCAI, Simple Clinical Colitis Activity Index; SD, standard deviation; UC, ulcerative colitis; UCLA, University of California Los Angeles.

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CONCLUSIONS: **Avoidant eating behaviors are common in IBD patients, even when in clinical remission. Patients who exhibit active symptoms and/or inflammation should be screened for ARFID risk, with referrals to registered dietitians to help monitor and address disordered eating behaviors and malnutrition risk.**

Keywords: Inflammatory Bowel Disease; Ulcerative Colitis; Crohn's Disease; Avoidant/Restrictive Food Intake Disorder.

Crohn's disease (CD) and ulcerative colitis (UC) are chronic inflammatory disorders of the gastrointestinal tract that cause symptoms that may be triggered by dietary intake. This connection leads patients with inflammatory bowel disease (IBD) to seek dietary solutions for disease management; however, current dietary recommendations for IBD management are largely based on low-quality studies with few randomized controlled trials.[1–5] Although the literature in this field is evolving, the lack of easily accessible, conclusive dietary recommendations have led to patient confusion and, in an attempt to avoid symptoms and/or control intestinal inflammation, the development of misapplied, independent dietary alterations.[6] When patients with IBD take an independent, unsupervised approach to controlling their disease through diet, they risk developing restrictive eating behaviors that can result in deficient nutritional intake and increased risk of malnutrition.[7]

In 2013, avoidant/restrictive food intake disorder (ARFID) was introduced into the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) to broaden the scope of what was previously known as feeding disorder of infancy and early childhood. The new ARFID diagnosis is applicable to individuals of any age whose avoidant/restrictive eating behaviors lead to insufficient caloric and/or nutrient intake and causes at least one of the following burdens: significant weight loss, significant nutritional deficiency, dependence on nutritional supplements, or marked psychosocial impairment.[8] The DSM-5 describes 3 categories that can lead to ARFID symptoms: avoidance of many foods based on their sensory properties ("picky eating"); low appetite or limited interest in eating; and fear of negative consequences such as choking, vomiting, abdominal pain, and bloating.[8,9] A systematic review of ARFID research found a wide ranging prevalence of ARFID from 1.5 to 64% among clinical eating disorder populations; however, most studies were small clinical samples of children and adolescents.[10] In patients with various gastrointestinal disorders, studies have shown that the prevalence of ARFID is 12%–21%.[9,11] Although these studies demonstrate that ARFID is prevalent in patients with gastrointestinal disorders, they do not address associations between ARFID and malnutrition risk.

The association between restrictive eating and nutritional status is important in patients with IBD because they are at a higher risk for malnutrition. Studies have shown that between 16% and 68% of patients with IBD are malnourished.[12,13] Patients with IBD who are malnourished are at higher risk for nonelective surgeries, hospitalizations, longer lengths of stay, mortality,[14] and active flares, which impact physical and mental health and contribute to a poorer quality of life.[12]

The 3 aims of this study were to estimate the prevalence of ARFID risk in adult patients with IBD to identify risk factors for ARFID and to examine the relationship between ARFID risk and malnutrition risk. With more information on the prevalence of restrictive eating and its association with malnutrition, clinicians can provide targeted screening, prevention, and treatment for high-risk patients going forward.

Methods

Participant Recruitment

This cross-sectional study was conducted at the University of California Los Angeles (UCLA) Center for Inflammatory Bowel Diseases. Non-consecutive English-speaking adult patients receiving care at the ambulatory clinic from October 2019 to March 2020 with a confirmed diagnosis of IBD were invited to participate in the study. Exclusion criteria included celiac disease, anorexia nervosa or bulimia nervosa, unmanaged psychological disorder, alcohol abuse, and pregnancy. The study was approved by the UCLA Institutional Review Board.

Data Collection

Participants completed surveys about eating behaviors and nutritional status after scheduled clinic visits. Medical data regarding age, sex, race, ethnicity, substance use, disease subtype (CD, UC, IBD-unclassified), disease duration, disease phenotype (location, behavior), medications (corticosteroids, aminosalicylates, immunomodulators, biologics), and surgical history were abstracted from the electronic medical records. Laboratory values (albumin, C-reactive protein [CRP], calprotectin) and endoscopy findings were abstracted if obtained within 3 months of study participation. The presence of active IBD-related symptoms was defined as having a Harvey-Bradshaw Index >4 for patients with CD or a Simple Clinical Colitis Activity Index (SCCAI) >2 for patients with UC.[15,16] Active inflammation was defined as CRP ≥5.0 mg/L, calprotectin ≥250 μg/g, or active inflammation detected on colonoscopy.

Avoidant/Restrictive Food Intake Disorder Risk

ARFID risk was measured using the validated Nine Item Avoidant/Restrictive Food Intake Disorder Screen (NIAS).[17] The NIAS is organized into the 3 specific ARFID domains, each of which is addressed by 3 questions. The 3 domains assess eating restriction due to picky eating, poor appetite/limited interest in eating, and fear of negative consequences from eating. Compared with other instruments that measure picky eating, appetite, and fear, the ARFID risk screening tool has high internal consistency (Cronbach's $\alpha = 0.90$), test-retest reliability (intraclass correlation coefficient, 0.65; 95% confidence interval [CI], 0.56–0.72), and convergent/discriminant validity for adults aged 18–65.[17] Questions are based on a 6-point Likert scale. Zero indicates "strongly disagree" and 5 indicates "strongly agree" for a total ARFID risk score of 0–45. A total threshold of 24 was used to identify patients at ARFID risk based on previous research demonstrating good sensitivity (0.74) and specificity (0.84) for identifying a positive ARFID diagnosis.[18] Additional survey questions asked about food groups avoided during a flare and during remission.

Assessment of Nutritional Status

Malnutrition risk was measured using an adapted version of the validated Scored Patient-Generated Subjective Global Assessment Short Form (PG-SGA).[19] The PG-SGA is based on self-reported criteria and has been used to evaluate the nutritional risk of malnutrition in patients with IBD.[12] The PG-SGA has 4 sections covering recent weight change, changes in food intake, symptoms with possible nutrition impact, and activities and functions. The overall PG-SGA score ranges from 0 (low malnutrition risk) to 36 (high malnutrition risk).[19] Gabrielson et al[20] found that a cutoff score of $\geq$6 had high sensitivity (0.938) and specificity (0.776) and was optimal for capturing patients with confirmed malnutrition. In the third section of the PG-SGA, participants selected symptoms that subjectively kept them from eating their normal amount during the preceding 2 weeks. IBD-related symptoms reviewed included lack of appetite, vomiting, nausea, diarrhea, constipation, smells bother me, early satiety, fatigue, and pain.

Statistical Analysis

Categorical variables were compared using the χ^2 or Fisher exact test. Continuous variables were tested for normal distribution using the Shapiro-Wilk test. Parametric data were summarized as means (± standard deviation [SD]) or percentages, and non-parametric data were summarized as medians with interquartile range (IQR). To test for significant differences between ARFID domains and ARFID risk score across clinical characteristics (eg, sex, IBD type, body mass index [BMI], active symptoms) and eating behaviors (dietary choice and food avoidance during or in absence of active symptoms), the Kruskal-Wallis test was performed. Logistic regression models were used to evaluate associations between clinical characteristics and a positive ARFID risk score $\geq$24. Covariates were determined a priori on the basis of factors thought to influence ARFID risk. Because of collinearity between active symptoms and inflammation, regression models evaluated these 2 variables separately. This also enabled evaluation of the independent association between these factors and ARFID risk. Results were considered statistically significant when $P < .05$. Statistical analyses were performed using SPSS 26.0 (SPSS Inc, Cary, NC) and Python 3.8.

What You Need to Know

Background

Patients with IBD often alter their dietary intake. Malnutrition is prevalent in the IBD population and is associated with poorer physical health, mental health, and quality of life.

Findings

Avoidant/restrictive eating behaviors are common in patients with IBD. Active gastrointestinal symptoms and intestinal inflammation contribute to ARFID risk. ARFID risk is associated with malnutrition risk.

Implications for patient care

Among patients with IBD who exhibit active gastrointestinal symptoms and/or inflammation, clinicians should consider screening for ARFID.

Results

Participant Demographics

The ARFID risk questions were completed by 162 patients, and data were abstracted from their electronic medical records. One patient later withdrew consent and was excluded from the final analysis. Of the 161 remaining participants, 73 (45.3%) had CD, 83 (51.6%) had UC, and 5 (3.1%) had IBD-unclassified. Eighty-eight participants (54.7%) were female, and 73 (45.3%) were male. The average age of participants was 41.1 years (mean, 41; SD, 15.5). The majority of participants were white (n = 114, 70.8%), 6 (3.7%) were black, and 3 (1.9%) were Asian. Ethnically, 14 (8.7%) were identified as Hispanic. The mean duration of IBD diagnosis was 13.0 years (SD, 11.6). The majority of patients had no symptoms (n = 110, 68.3%), 11 patients (6.8%) had recent symptoms within 60 days, and 40 patients (24.8%) had active symptoms. Fifty-four percent of participants had a BMI in the normal range, 5.6% were underweight, and 40.4% were overweight/obese (mean,

24.7 kg/m^2; SD, 4.6 kg/m^2). BMI did not differ between IBD types (Kruskal-Wallis H: 2.395; $P = .302$) (Table 1).

Avoidant/Restrictive Eating Behaviors

Almost all participants (92%) reported avoiding 1 or more foods whenever having active symptoms, and most (74%) continued to avoid 1 or more foods even in the absence of symptoms. Avoidance of diverse food groups (ie, lactose containing foods, spicy foods, alcohol, wheat products, deep fried/fatty foods, and caffeine) was widely prevalent, regardless of symptoms activity; however, avoidance was significantly higher in each food group during episodes of active symptoms (Figure 1). A positive ARFID risk score (≥24) was present in 17% of participants. Of the 3 domains assessed by the ARFID risk screener, fear of negative consequences scored the highest with a median score of 5 (IQR, 3–9), followed by picky eating (median, 4; IQR, 2–7), and poor appetite (median, 3; IQR, 0–6).

Risk Factors

In univariable logistic regression models, active symptoms (odds ratio [OR], 4.48; 95% CI, 1.89–10.61), active inflammation (OR, 3.35; 95% CI, 1.28–8.71), extraintestinal manifestations (OR, 3.40; 95% CI, 1.02–11.3), and recent corticosteroid use (OR, 0.43; 95% CI, 0.18–0.99) were associated with positive ARFID risk (Table 2, Supplementary Table 1). CD behavior or location was not associated with ARFID risk. After adjustment for potential confounders, only active symptoms (OR, 5.35; 95% CI, 1.91–15.01) and inflammation (OR, 3.31; 95% CI, 1.06–10.29) remained significantly associated with positive ARFID risk.

Forty-six percent of participants reported 1 or more symptoms that subjectively prevented them from eating their normal amount over the preceding 2 weeks. The most frequently reported problems were fatigue (17%), lack of appetite (16%), diarrhea (16%), pain (15%), early satiety (14%), and nausea (13%). Participants who responded affirmatively to symptoms of lack of appetite and fullness were significantly more likely to have an ARFID risk score of 24 or greater compared with those who did not report those symptoms (lack of appetite and ARFID risk, 57%; $P \leq .001$; fullness and ARFID risk, 56%, $P \leq .001$, respectively). Age, sex, race/ethnicity, BMI, IBD type, disease duration, recent biologic or immunomodulator use, IBD-related surgery, and alcohol, tobacco, or drug use were not found to be associated with positive ARFID risk (Table 2, Supplementary Table 1).

Malnutrition Risk

The PG-SGA questionnaire was completed by 133 participants (83%). Twenty-nine percent of participants scored ≥6 (threshold for malnutrition risk). Patients

Table 1. Participant Characteristics (n = 161)

Characteristic	N (%)
Age, mean, *y* (SD)	41.1 (15.5)
Female	88 (54.7)
Race	
White	114 (70.8)
Black	6 (3.7)
Asian	3 (1.9)
Other	38 (23.6)
Hispanic	14 (8.7)
Body mass index	
Underweight	9 (5.6)
Normal	87 (54.0)
Overweight	47 (29.2)
Obese	18 (11.2)
IBD type	
Crohn's disease	73 (45.3)
Ulcerative colitis	83 (51.6)
IBD-U	5 (3.1)
Disease duration, mean, *mo* (SD)	13 (11.6)
CD location (n = 73)[a]	
Ileal	21 (28.8)
Colon	16 (21.9)
Ileocolonic	35 (47.9)
Upper gastrointestinal involvement	1 (1.4)
CD behavior (n = 73)[a]	
Inflammatory	36 (49.3)
Stricturing	17 (23.3)
Fistulizing	21 (28.8)
Perianal disease (n = 73)[a]	25 (15.5)
Two or more EIM	13 (8.1)
Symptoms activity[b]	
None	110 (68.3)
Recent symptoms within 60 days	11 (6.8)
Active symptoms	40 (24.8)
Current medications	
Aminosalicylates	64 (39.8)
Corticosteroids	38 (23.6)
Immunomodulators	49 (30.4)
Biologics	88 (54.7)
Surgical history	
None	134 (83.2)
Small bowel resection	15 (9.3)
Colectomy	14 (8.7)
Ileal pouch-anal anastomosis	7 (4.3)
Current substance use	
Tobacco	6 (3.7)
Drug[c]	20 (12.8)
Alcohol	73 (45.3)

CD, Crohn's disease; EIM, extraintestinal manifestations; IBD, inflammatory bowel disease; IBD-U, inflammatory bowel disease-unclassified; SD, standard deviation.
[a]Only calculated for patients with Crohn's disease.
[b]Active IBD-related symptoms were defined as Harvey-Bradshaw Index score >4 for patients with Crohn's disease or Simple Clinical Colitis Index score >2 for patients with ulcerative colitis. Patients with colectomy and ileal pouch-anal anastomosis in this study population were asymptomatic.
[c]n = 156 (5 without response).

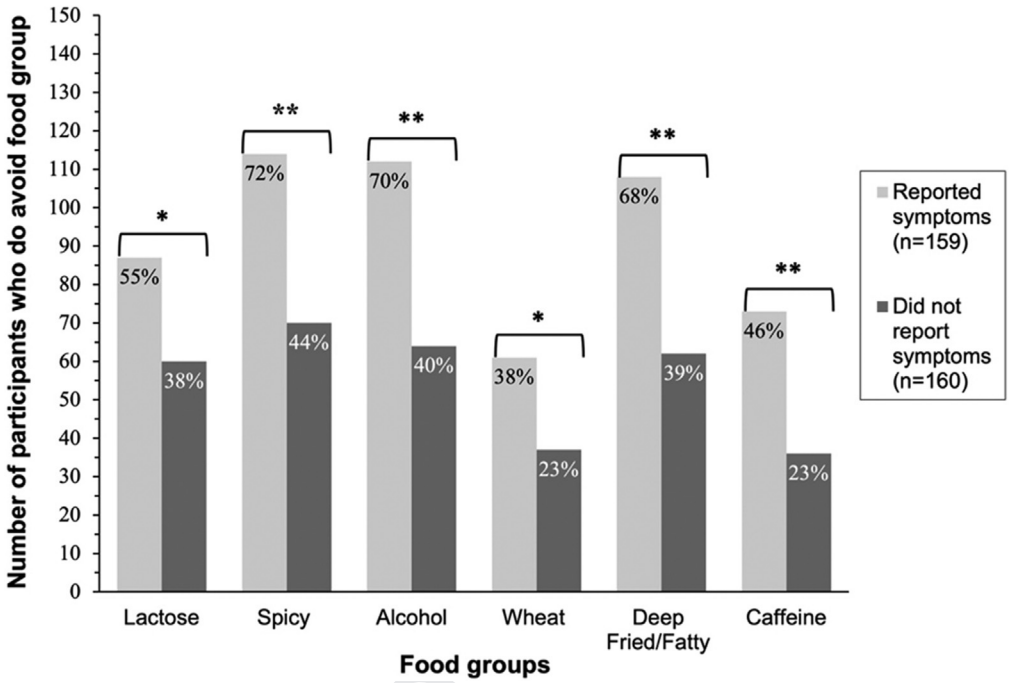

Figure 1. Avoidance of food groups according to presence or absence of active symptoms. *$P < .05$; **$P < .001$.

with a positive ARFID risk screen were significantly more likely to be at risk for malnutrition (60.7% vs 15.8%; $P < .01$). There was otherwise no difference in mean serum albumin concentrations (4.1 vs 4.3; $P = .60$) when comparing those with versus without a positive ARFID risk screen. There was a higher proportion of patients with low BMI who had a high risk of malnutrition (40.0% vs 22.5%; $P = .38$), although this was not statistically significant.

Discussion

In a large tertiary-care medical center, we found that 17% of patients with IBD were at risk for ARFID. Although most participants consciously avoided foods when actively having symptoms, a large majority (74%) also avoided foods when in remission. Participants with active symptoms and inflammation were significantly more likely to screen positive for ARFID risk, and participants who screened positive for ARFID risk were significantly more likely to be at risk for malnutrition.

ARFID is associated with co-occurring anxiety disorders, gastrointestinal complications, and malnutrition, and a timely diagnosis can direct treatment and prevent nutritional and psychological complications.[21] Previous cross-sectional studies in the IBD population have found that 49%–90% of patients avoid or restrict foods.[6,22] Food avoidance is also common among those with inactive disease.[23] Among individuals in the general population with gastrointestinal disorders, ARFID risk has been reported between 12% and 21%.[9,11] This avoidance is likely due to patients' beliefs that certain foods exacerbate IBD symptoms.[24] Previous research has shown that IBD symptoms of pain, cramping, and diarrhea adversely impact dietary intake, with patients avoiding more foods during active disease than in remission.[22] We similarly found a higher proportion of participants avoiding specified food groups while experiencing active gastrointestinal symptoms than during times without symptoms. Nonetheless, because of the generally high prevalence of concurrent irritable bowel syndrome (IBS) in patients with IBD and poor concordance between symptoms and inflammation, we evaluated the latter 2 factors separately in regression models.[25] The consistent association of active symptoms and inflammation with a positive ARFID risk screen highlights that both indicators are important contributors to ARFID risk in the IBD population and that the presence of either should alert the clinician to consider screening for ARFID. This relationship between active symptoms/inflammation and ARFID risk also calls into question the durability of ARFID behaviors beyond symptom activity and inflammation, particularly after effective medical treatment.

Because of the prevalence of malnutrition in the IBD population[12,13] and the self-reported evidence that patients with IBD avoid or restrict foods in their diets,[6,21] this study investigated the relevance of ARFID in the IBD population and its association with malnutrition risk. Because malnutrition is challenging to measure, this study investigated multiple markers of malnutrition risk including weight and PG-SGA score. The prevalence of malnutrition risk in this study (29%) aligns with previously reported rates of 16%–68%.[10,11]

The potential role of diet in the management of IBD is a very commonly asked question among patients with IBD. Although the majority of this study's participants demonstrated food avoidance, there is limited evidence supporting the avoidance of specific foods to prevent or

Table 2. Risk Factors of Avoidant/Restrictive Food Intake Disorder

Characteristic	OR (95% CI)	*P* value	aOR (95% CI)[a]	*P* value
Age (*y*)				
18–40	Reference		Reference	
40–60	1.26 (0.50–3.13)	.62	1.75 (0.54–5.65)	.35
>60	0.62 (0.16–2.32)	.48	1.10 (0.20–5.92)	.91
Female	1.35 (0.59–3.10)	.48	0.82 (0.28–2.38)	.72
White	0.96 (0.39–2.37)	.94	0.49 (0.15–1.66)	.25
Hispanic	1.33 (0.35–5.12)	.68	1.54 (0.32–7.44)	.59
Body mass index				
Normal	Reference		Reference	
Underweight	1.09 (0.21–5.65)	.91	2.78 (0.34–22.49)	.34
Overweight	0.64 (0.23–1.76)	.39	0.56 (0.15–2.11)	.39
Obese	1.25 (0.36–4.30)	.72	1.07 (0.22–5.20)	.93
IBD type				
Crohn's disease	Reference		Reference	
Ulcerative colitis	1.21 (0.53–2.77)	.64	1.40 (0.53–3.68)	.50
Disease duration, *mo*	1.00 (0.96–1.03)	.83	1.00 (0.96–1.05)	.93
EIM (≥2)	3.40 (1.02–11.3)	<.05	4.96 (0.88–27.77)	.07
Recent corticosteroid use	0.43 (0.18–0.99)	<.05	0.46 (0.15–1.41)	.17
Recent immunomodulator use	0.55 (0.22–1.39)	.21	0.35 (0.08–1.49)	.15
Recent biologic use	1.74 (0.76–4.02)	.19	2.70 (0.80–9.10)	.11
Active symptoms[b]	4.48 (1.89–10.61)	<.01	5.35 (1.91–15.01)	<.01
IBD-related surgery	1.27 (0.63–2.56)	.50	1.83 (0.67–4.98)	.24
Tobacco use	0.40 (0.04–37.9)	.31	0.40 (0.04–3.88)	.43
Drug use	0.81 (0.25–2.66)	.73	0.73 (0.16–3.26)	.68
Alcohol use	1.62 (0.70–3.77)	.27	1.51 (0.50–4.58)	.47

aOR, adjusted odds ratio; CI, confidence interval; IBD, inflammatory bowel disease; IBD-U, inflammatory bowel disease-unclassified; OR, odds ratio.
[a]Multivariable models adjusted for the variables listed in the table.
[b]Active IBD-related symptoms were defined as Harvey-Bradshaw Index score >4 for patients with Crohn's disease or Simple Clinical Colitis Index score >2 for patients with ulcerative colitis. Patients with colectomy and ileal pouch-anal anastomosis in this study population were asymptomatic.

treat IBD flares. In a review of existing research into food and inflammation, the International Organization for the Study of IBD (IOIBD) was only able to make recommendations based on low-level evidence or expert consensus.[1] The strongest recommendation was the avoidance of trans fats, a dietary recommendation that is also applicable to the healthy general public. The IOIBD also recommended a reduction in maltodextrins, carrageenans, carboxymethylcellulose, polysorbate-80, titanium dioxide, and other nano particles. For patients with UC, the IOIBD found limited evidence to support a reduced intake of red/processed meats and myristic acid (palm oil, coconut oil, dairy fats). This body of research continues to evolve rapidly, with recent studies demonstrating benefit with a Crohn's disease exclusion diet,[3] specific carbohydrate diet,[4] and Mediterranean diet.[5] None of the research or recommendations support the pervasive food avoidance captured in our study.

Considering this predominant food avoidance, the European Society for Clinical Nutrition and Metabolism recommends that patients with IBD in remission undergo counseling by a dietitian to improve nutritional therapy and avoid malnutrition and nutrition-related disorders.[14] Furthermore, the American Gastroenterological Association specifies that dietitians should monitor any dietary restrictions to ensure the provision of nutritional adequacy.[26] Our findings that the majority of patients with IBD avoid 1 or more foods and that ARFID risk is associated with malnutrition risk further emphasize the need for dietitians in the care of patients with IBD.

There were several limitations in this study. First, the modest sample size may have contributed to inadequate power to detect the association of different factors (eg, IBD phenotype, extraintestinal manifestations, biologic use, smoking) and ARFID risk. Nonetheless, the sample size was adequate to detect stronger drivers of ARFID risk such as active symptoms and inflammation. Second, this study did not clinically confirm an ARFID diagnosis. Instead, it implemented the NIAS, which has high internal

Table 3. Comparison of Avoidant/Restrictive Food Intake Disorder Risk Score by Domain and Symptoms

Characteristic	Negative ARFID risk screen	Positive ARFID risk screen	*P* value
Picky eating domain, median score (IQR)	3.0 (2.0–6.0)	8.0 (6.0–10.0)	<.01
Poor appetite domain, median score (IQR)	2.0 (0.0–4.0)	10.0 (7.0–12.0)	<.01
Fear of negative consequences domain, median score (IQR)	4.0 (2.0–7.0)	12.0 (9.0–14.0)	<.01
Symptoms activity[a]			<.01
None	97 (72.9)	13 (46.4)	
Recent symptoms within 60 days	11 (8.3)	0 (0)	
Active symptoms	25 (18.8)	15 (53.6)	
Avoids foods during flare[b]	121 (91.0)	27 (96.4)	.56
Avoids food in absence of flare[b]	96 (72.2)	23 (82.1)	.39

ARFID, avoidant/restrictive food intake disorder; IQR, interquartile range.
[a]Active inflammatory bowel disease–related symptoms were defined as Harvey-Bradshaw Index score >4 for patients with Crohn's disease or Simple Clinical Colitis Index score >2 for patients with ulcerative colitis. Patients with colectomy and ileal pouch-anal anastomosis in this study population were asymptomatic.
[b]Self-reported historical flare.

consistency, test-retest reliability, and convergent/discriminant validity in addition to a validated cutoff score with good sensitivity and specificity.[17,18] We could therefore only provide an assessment of ARFID risk rather than diagnosis. Finally, because of the cross-sectional study design, we could not determine causality, onset, or duration of ARFID risk before data collection; however, the identified associations provide direction for future controlled, prospective studies.

In conclusion, this study establishes that avoidant/restrictive eating behaviors are common among patients with IBD even when in clinical remission and are associated with malnutrition risk. With this knowledge, patients with IBD who exhibit active symptoms and/or inflammation should be screened for ARFID risk. Regular ARFID screening of patients with IBD and subsequent referrals to registered dietitians would help direct appropriate dietary interventions for disease and symptom management and could help identify early malnutrition risk, leading to earlier intervention and improved clinical outcomes. Future longitudinal studies that investigate the impact of important etiologic factors (eg, cultural practices, IBS overlap, stress, anxiety, lifestyle, effective medical therapy) on ARFID risk would further improve strategies to prevent or reduce the risk of ARFID and malnutrition in patients with IBD.

Supplementary Material

Note: To access the supplementary material accompanying this article, visit the online version of *Clinical Gastroenterology and Hepatology* at www.cghjournal.org, and at https://doi.org/10.1016/j.cgh.2021.08.009.

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Conflicts of interest
The authors disclose no conflicts.

Supplementary Table 1. Risk Factors of Avoidant/Restrictive Food Intake Disorder

Characteristic	OR (95% CI)	*P* value	aOR (95% CI)[a]	*P* value
Age (*y*)				
18–40	Reference		Reference	
40–60	1.26 (0.50–3.13)	.62	1.35 (0.38–4.82)	.64
>60	0.62 (0.16–2.32)	.48	0.27 (0.03–2.82)	.28
Female	1.35 (0.59–3.10)	.48	1.32 (0.43–4.05)	.62
White	0.96 (0.39–2.37)	.94	0.66 (0.18–2.45)	.54
Hispanic	1.33 (0.35–5.12)	.68	1.32 (0.24–7.13)	.75
Body mass index				
Normal	Reference		Reference	
Underweight	1.09 (0.21–5.65)	.91	1.39 (0.19–10.65)	.75
Overweight	0.64 (0.23–1.76)	.39	0.79 (0.19–3.36)	.75
Obese	1.25 (0.36–4.30)	.72	0.71 (0.11–4.46)	.71
IBD type				
Crohn's disease	Reference		Reference	
Ulcerative colitis	1.21 (0.53–2.77)	.64	1.40 (0.52–3.75)	.51
Disease duration, *mo*	1.00 (0.96–1.03)	.83	1.01 (0.96–1.06)	.64
EIM (2 or more)	3.40 (1.02–11.3)	<.05	2.52 (0.38–16.72)	.34
Recent corticosteroid use	0.43 (0.18–0.99)	<.05	0.62 (0.20–1.95)	.42
Recent immunomodulator use	0.55 (0.22–1.39)	.21	0.41 (0.10–1.65)	.21
Recent biologic use	1.74 (0.76–4.02)	.19	2.42 (0.70–8.33)	.16
Active inflammation[b]	3.35 (1.28–8.71)	.01	3.31 (1.06–10.29)	.04
IBD-related surgery	1.27 (0.63–2.56)	.50	1.24 (0.36–4.32)	.73
Tobacco use	0.40 (0.04–37.9)	.31	0.20 (0.02–1.86)	.16
Drug use	0.81 (0.25–2.66)	.73	1.21 (0.25–5.86)	.81
Alcohol use	1.62 (0.70–3.77)	.27	1.44 (0.47–4.39)	.52

aOR, adjusted odds ratio; CI, confidence interval; IBD, inflammatory bowel disease; OR, odds ratio.
[a]Multivariable models adjusted for the variables listed in the table.
[b]Active inflammation was defined as C-reactive protein ≥5.0 mg/L, fecal calprotectin ≥250 μg/g, or active inflammation detected on lower endoscopy within 3 months of participation.