

Andres Rodriguez, DO, MBA¹; Chunsu Jiang, MD¹; Yalda Zarnegarnia¹; Alberto Cruz¹; Oriana Damas, MD¹
¹University of Miami Miller School of Medicine

Introduction

- Several biologics now exist as treatment for inflammatory bowel disease (IBD), but effective induction of remission still ranges between 20-40 % for most.^{1,2}
- Studies suggest that diet may modify intestinal inflammation.³
- In this study, we sought to examine the effect of diet on biochemical response to biologic induction therapies.

Methods and Materials

- Conducted a single center retrospective analysis of patients with IBD seen at a tertiary referral center from 2019 to 2021.
- A validated 26-item diet questionnaire, the Dietary Screener Questionnaire (DSQ), was completed as part of a pre-check in process before each clinic visit.
- IBD patients who completed a DSQ within 3 months of induction of a biologic (anti-TNFs, vedolizumab, ustekinumab) and who had markers of inflammation available pre and post induction (C-Reactive Protein (CRP) and fecal calprotectin) were included.
- Follow-up period was 3 months post-induction.
- Using linear and average mixed effects models, we examined the contribution of food items in the DSQ (i.e., processed meats, red meats, fruits, vegetables) to reduction in CRP following induction.
- We used pre-induction biochemical markers (CRP and/or fecal calprotectin) as baseline reference.
- Current steroid use, prior biologic exposure, age, gender, body mass index (BMI), smoking status, IBD type (ulcerative colitis (UC) or Crohn's disease (CD)) and class of biologic were added as covariates in the models.

Demographic Categories

Category	Value
Total # of patients	N=105
Age median (min,max)	35.0 (19.0,82.0)
Gender Male (%) Female (%)	47 (44.8) 58 (55.2)
Race Asian (%) Black or African American (%) White (%)	3 (2.9) 10 (9.5) 91 (86.7)
Ethnicity Hispanic or Latino (%) Non-Hispanic or Latino (%) Unknown or Not Reported (%)	45 (42.9) 59 (56.2) 1(1.0)
BMI mean (SD) median (min,max)	25.8 (5.42) 25.1 (17.7,49.8)
IBD Type Crohn's Disease (CD) (%) Ulcerative Colitis (UC) (%) Indeterminate Colitis (%)	66 (62.9) 34 (32.4) 5 (4.7)
Tobacco Use Current (%) Former (%) Never (%)	3 (2.9) 23 (21.9) 79 (75.2)
Previous Biologic Use No (%) Yes (%)	43 (41) 62 (59)
Biologic Class Induced Anti-TNF agents (adalimumab, infliximab, certolizumab, golimumab) (%) JAK inhibitor (tofacitinib) (%) IL-23 monoclonal antibody (ustekinumab) (%) Integrin receptor antagonist (vedolizumab) (%)	55 (52.4) 1 (1.0) 31 (29.5) 18 (17.1)

Table 1: Demographic and clinical characteristics of IBD patients included

Covariate Factor	Average Mixed Effects (AME)	Standard Error (SE)	p-value
Age	0.01253	0.07186	0.862
Gender- Male	0.30313	0.23377	0.1977
Ethnicity (Non-Hispanic)	0.06876	0.13759	0.6189
BMI	0.08005	0.07203	0.2701
IBD - Ulcerative Colitis	-0.33136	0.14984	0.0304
Previous biologic use	-0.03417	0.14799	0.818
anti-TNF biologic induced (intercept)	1.29018	0.94172	0.1734
Ustekinumab induced	0.10442	0.15699	0.5082
Vedolizumab induced	0.1059	0.17734	0.5525
Steroids on induction	0.23593	0.14915	0.1181

Table 2: Average Marginal Effects (AME) Assessing the Contribution of Each Variable on the Reduction of CRP Level During Induction

Dietary Variables Examined	Average Mixed Effects (AME)	Standard Error (SE)	p-value
Fruits & Vegetables daily intake (cups)	-1.8186	0.87858	0.0406
Dairy (cups)	0.0488	0.32823	0.8821
Fruit (cups)	0.62825	0.76457	0.413
Red Meat	-0.01567	0.17881	0.9303
Processed Meat	-0.32794	0.34438	0.343
Fiber	0.05546	0.05404	0.3071
Calcium	0.15903	0.19979	0.4277
Whole grain (cups)	-0.40034	0.26105	0.1279
Added sugars (teaspoons)	-0.01585	0.0235	0.5014

Table 3: Average Marginal Effects (AME) Assessing the Contribution of Dietary Variables on the Reduction of CRP Level During Induction

Results

- A total of 105 patients were included in this study (62.9% had CD and 32.4% had UC) (Table 1).
- The most common biologic was anti-TNFs (52.4%).
- The mean CRP value pre-induction was 13.4 (SD 20.2) and post-induction was 6.63 (SD 12.4).
- On multivariable analyses adjusting for covariates mentioned, we found an independent effect of high daily intake of fruits and vegetables on reduction in CRP.
- For every 1 unit increase in daily fruits and vegetables, there was a reduction in CRP value by 1.82 post induction of biologics (p=0.04) (Table 3).
- Red meat intake, processed meats, fiber from whole grains and dairy were not associated with CRP reduction (Table 3).

Discussion

- In this preliminary analysis, we find that a diet high in fruits and vegetables during induction of biologics may independently improve biochemical response.
- Despite small sample size, the data is encouraging and could be evaluated longitudinally as a possible adjuvant intervention on biologic induction.
- It is unclear if previous biologic use or concomitant use of steroids on induction has an effect on biochemical response with diet and biologic induction.

Conclusions

- High dietary intake of fruits and vegetables within 3 months of biologic induction were found to have an associated decrease in CRP.
- Future clinical drug trials should consider dietary assessment and the influence of diet on response to medication treatment.

Contact

Andres Rodriguez, DO, MBA
University of Miami Miller School of Medicine
Email: a.rodriguez82@umiami.edu
Twitter: @ARodriguezDO

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