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ORIGINAL ARTICLE

Evaluation of My Nutrition Index in an IBD Patient Population

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Abstract

Background: Measuring overall dietary nutritional value necessary for wellness is complex for healthy individuals, and even more so for patients suffering from complex diseases such as Crohn's Disease. Clinical dieticians are challenged to provide beneficial dietary advice balanced against using incremental changes in patients' selected diets to increase long-term adherence to dietary improvements. The My Nutrition Index (MNI) is a validated, personalized nutritional scale based on personal characteristics and dietary needs. In this study, we evaluated and adapted the MNI for use in an inflammatory bowel disease (IBD) patient population and validated it against the recommended diets suggested by a certified dietician.

Methods: This is a cross-sectional study with patients' pre-consultation diets based on 24-hour recall of dietary intake and post dietary consultation diets as recommended by a certified dietician. Participants were Crohn's disease patients seen in the IBD subspecialty medical home at an academic IBD center, selected to represent the range of patients for whom a nutritional index would be most impactful. The primary outcome variable was the MNI for pre and post-consultation diets. Four focused subscales are also available: Vitamin Index, Mineral Index, Electrolyte Index, Macro Nutrient Index. In addition, consideration of Energy Ratio (observed calories relative to target calories) is important for IBD patients. The MNI and its subscales were calculated for each patient's diet pre and post-consultation with the certified dietician and presented graphically.

Results: The MNI and its subscales correctly marked the improved nutrient values of the recommended diets.

Conclusions: The MNI tool, while not a substitute for dietitian advice, can inform both patients and their nutrition providers with numeric feedback around the nutritional value of their diet and reinforce small, customized, incremental changes to reach their goals.

Keywords

Personalized nutrition, Nutrition index, Crohn's disease, Dietary consultation, Incremental changes

Introduction

Growing evidence supports the use of "food as medicine", with data supporting its benefits in preventing disease, managing chronic mental and physical symptoms and improving overall wellness. One barrier to understanding the full impact of nutrition on health is the lack of validated assessment tools that consider an individual's nutritional needs and status *in context* (e.g. age, gender, weight, food accessibility, cultural preferences, presence of medical conditions, dietary goals) and *over time.*

This gap has implications for both research and practice. Clinical dietitians often make incremental changes to patients' diets to improve their intake, and seek feedback to promote long-term adherence, but have little way of tracking how these expert-recommended and incremental changes improve diet quality. Cardiometabolic intervention trials have largely relied on the USDA's Healthy Eating Index (HEI) [1] as a way to capture change in diet quality associated with a specific dietary recommendation (e.g. low fat, low carbohydrate) [2]. While the HEI can capture multiple dietary changes simultaneously to determine

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improvement in diet quality, it does not capture more subtle changes to diet that might be necessary in conditions or settings in which dietary goals are more heterogeneous or less understood, such as Crohn's Disease.

Crohn's Disease is an immuno-inflammatory condition of the gastrointestinal tract, typically diagnosed in the second decade of life. The disease is incurable and lifelong and therefore disease self-management skills including nutrition are critical to outcome. Given nutrient absorption concerns, acute and chronic inflammation and unpleasant symptoms associated with eating, malnutrition rates in IBD range from 20-85%, and are associated with the poorest clinical outcomes, response to therapy and, therefore, quality of life [3]. Micronutrient depletion (primarily of calcium, vitamin B12, vitamin D, folate, iron, magnesium, vitamin B6, and zinc) and protein-energy malnutrition are of clinical concern in IBD patients [4]. A highly symptomatic condition, including urgent diarrhea, nausea, abdominal discomfort, fatigue, poor appetite and weight loss, food choices and eating behavior are often problematic and, when not addressed, can contribute to further decline. Further complicating its symptom profile, IBD itself is a highly heterogeneous disease, varying with respect to disease activity (e.g. flare vs. remission), disease behaviors (e.g. stricturing), disease location (e.g. small bowel, colon, esophagus, perianal) and surgical history (e.g. ostomy, short-bowel)- therefore one diet or approach does not fit all and nutritional goals often change over time. For example, individuals with stricturing Crohn's disease may need to follow a liquid or reduced particle size diet and a patient with small bowel Crohn's may require nutritional supplementation [5]. A patient with diarrhea may require changes to fiber intake, and or require increased hydration. Individuals with ostomies may need support with managing the thickness of output and maintaining hydration. In other words, dietitians working with these patients must be creative in how they alter a person's diet to optimize their nutrition without increasing their risk for an adverse outcome (e.g. bowel obstruction, dehydration).

Nutrition scientists working in IBD also struggle to capture nutrition in this population given the disease's heterogeneity and baseline differences in individual's eating behaviors and preferences. Successful diet trials require meals to be shipped to patients in order to control for micro and macronutrients across participants, but long-term adherence to a successful diet is limited when this is the case. Further, in other IBD research, nutrition is rarely evaluated as a co-variate, despite its likely contribution to outcome. Thus, a standardized metric of nutrition could improve both diet and other clinical research in IBD.

The My Nutrition Index (MNI) is a personalized dietary nutional metric which considers an individual's personal nutritional needs and status *in context* (i.e., based on patient characteristics and dietary preferences and goals) *over time.* The MNI incorporates 34 macro and micronutrients into a single score [6]. MNI is personalized by targeting nutrient ranges based on subject-specified characteristics and context such as age, sex, body size, activity level, behavior (e.g., smoking), and dietary restrictions and preferences. In this study, we evaluated and adapted the MNI and related subscales for use in Crohn's Disease. We hypothesized 1) The MNI would accurately capture the full range of nutrients and their value in an IBD patient diet; and 2) The MNI and its 5 subscales (Macronutrient Index, Energy-Ratio Index, Vitamin Index, Mineral Index, Electrolyte Index) would reflect small incremental changes in a patient's personal food choices and can be customized to the patient's needs and context to drive improved nutrient value.

Methods

Study participants

Participants were Crohn's disease patients seen in the IBD subspecialty medical home at an academic IBD center. They were selected by the research team to represent the range of patients for whom a nutritional index would be most impactful. Each patient was newly diagnosed (within 1 year) with ileal Crohn's Disease. To be eligible, participants were required to meet two of the following criteria: 1) Disease or nutritional complexity; 2) At risk for malnutrition; 3) Impact of diet on quality of life. All patients worked with the dietitian for an evaluation of their nutritional status and guidance for symptom management through diet. The study was approved by the institutional ethics board [GCO#: 20-1036].

Dietary evaluation

During their baseline dietitian consult, patients provided a 24-hour recall of food intake. This methodology has been shown to be valid and reliable for measuring nutritional value [7]. The dietitian then entered the 24-hour recall results into a validated digital tool, Cronometer®, which derives nutritional value from the USDA data bank of foods among other international databases. Data was also extracted from each patient's electronic medical record, including Montreal classification of Crohn's Disease [8], last office visit Harvey Bradshaw Index [9], most recent laboratory values [CBC (Hgb, Hct), chemistry (Na, Cl, Ca, K), anemia panel (B12, Ferritin), vitamins C, D, folate, zinc, magnesium] and inflammatory markers (CRP, ESR, fecal calprotectin)]. Based on the output of the Cronometer, the dietitian (LM) then created an updated diet for the patient, recommending incremental changes in either food type, portion size or texture to the individual's 24-hour recall, while considering the patient's personal nutritional needs and preferences, disease state, bowel length and psychosocial context.

Pre and post diets were then submitted, along with patient characteristics including sex, age, height, weight, smoking status, alcohol and caffeine consumption, need for a low-fat/high protein diet, hypertension and activity level to the My Nutrition Index (MNI) calculator to determine whether the MNI would detect improvements in overall nutrition status based on small, incremental dietary changes recommended by an expert dietitian and whether subscales would also reflect these changes.

Description of My Nutrition Index (MNI)

The MNI is comprised of 34 dietary components: Total fat, saturated fat, monounsaturated and polyunsaturated fat, energy, dietary protein, dietary carbohydrates, alcohol, caffeine, sugar, dietary fiber, vitamin E as alpha-tocopherol, vitamin C, cholesterol, potassium, sodium, calcium, magnesium, iron, phosphorus, zinc, thiamin, riboflavin, niacin, vitamin B_5, vitamin B_6, vitamin B_{12}, vitamin A, vitamin D, vitamin K, manganese, chloride, folate, and selenium. It is a metric of how close each component is to guideline values based on the appropriateness of the response for the characteristics of the subject. It assigns higher scores for nutrient concentrations that fall within the published dietary guidelines recommended concentration range and assigns lower scores if intake for a given nutrient deviates from this optimal range (i.e., deficient or excess intake). It provides an overall index score ranging from 0 to 100, with higher scores reflecting a more nutritious diet. Thus, a perfect MNI score would be obtained if adequate intake of all nutrients is met. Four focused subscales are also available: Vitamin Index, Mineral Index, Electrolyte Index, Macro Nutrient Index. Each are on the same scale as the MNI (0 to 100) with higher scores indicating a more nutritious diet. In addition, consideration of Energy Ratio (observed calories relative to target calories) is important for IBD patients. Values for the MNI and subscales above roughly 90 indicate adequate nutrition on each scale. Given some of the unique nutritional concerns of Crohn's Disease patients, the MNI was also subjected to changes based on the patient IBD status. For example, during an IBD flare the MNI was altered to require higher electrolyte levels with focus on soluble fiber instead of any fiber (Table A1).

Results

Participants

Five patients with Crohn's disease (60% female; 60% White, Non-Hispanic mean age 31, range 24-48, Mean BMI = 26, range 17-38) participated Table 1. All participants provided baseline diets and worked with the dietician (LM) to improve the nutritional value of the patient's diet through small, incremental achievable goals. The dietician based her diet recommendations on a variety of factors including disease characteristics, severity, activity and behavior, personal characteristics, patient preferences (e.g. kosher, vegan) and psychosocial determinants (See Table 2, Table 3, Table 4, Table 5 and Table 6).

MNI Index and subscales

The MNI and its subscales correctly marked the improved nutrient value of the recommended diets by a certified dietician compared to the pre-consultation diets, demonstrating it's internal and construct validity as well as its sensitivity to change. The indices changed in the expected direction after post-consultation and provided a clearer picture of the personalized recommendations made by the dietitian for each patient. Figure 1 reflects changes in overall index and subscales from baseline to post-consultation.

The average pre-consultation MNI was 58 and ranged between 22 and 78 (Figure 1A), compared to the post-consultation MNI averaged at 94 (range: 89 to 97). The macro nutrients were all in adequate ranges in the post-consultation diets (Figure 1E) with all five diets boasting at least 84% of targeted calories (Figure 1D). Three of five (60%) patients had pre-consultation diets with inadequate electrolytes, which were improved to guideline values in four of the five (80%) patients. The vitamin and mineral indices (Figures 1C and Figure 1F) were all improved to guideline levels for each component for all patients with the exception of one patient who had slightly reduced minerals.

Discussion

We have demonstrated that the MNI and subscales correctly measure the improved nutrient value of the recommended diets for IBD patients, as evaluated by a registered dietitian. This is important given the heterogeneous nature of Crohn's Disease as well as the complexity of patient disease and personal characteristics influencing decision-making.

Limitations include a small sample in a tertiary academic medical center so patients may be more complex than those seen in the IBD community at large. For this study we did not evaluate how adherent the patients were to using the recommended diet. Further, the dietitian balances changing a diet for nutrition and for adherence-with the plan that overtime, the recommendations could be further improved with minimally processed food, less red meat, less saturated fats and more fresh fruits and vegetables in tolerated forms.

Conclusions

The MNI tool, while not a substitute for dietitian advice, can inform both patients and their nutrition providers with numeric feedback around the nutritional value of their diet and appreciate small, customized, incremental changes to reach their goals. Further the tool could be used as a way to characterize patient nutritional value in the setting of clinical research.

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Table A1: Nutrient values per diet with recommendation indication for average adult (age 19-50 years-old).

			Subject 1		Subject 2		Subject 3		Subject 4		Subject 5	
Nutrient	unit	**Recommendation for Adults**[a]	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
Energy	kcal	2,000 kcal	1975	2145	1573	1722	1747	1847	2177	2199	603	1795
Protein	g	10-35% of cal	72.5	102	50	84.3	62.3	118.9	85.8	145.6	35.3	102
Fat	g	20-35% of cal	78.2	86	64.4	72.2	75.5	61.7	91	66.6	22.4	59.4
Carbohydrates	g	45-65% of cal	245	250	209	198.2	195	219	251	261.9	67.9	223
Sodium	mg	2,300 mg	5213	2072	2384	2304	2001	1405.9	3956	2235	1256	778
Sugar	g	10% or less of cal	40.4	68.9	58	56.4	66	78.1	85.5	90.5	16.3	79.7
Alcohol	g	1-2 serv/d	0	0.5	0	0	0	0	0	0	0	0.5
Caffeine	mg	< 400 mg	0	0	0	0	14.9	0	42.8	0	0	0
Fiber	g	25-38 g	14.2	34.3	22.3	24	15.3	27.4	7.1	28	9.2	29.1
Calcium	mg	1,000 mg	1172.1	1113	1017	1952	198	1099	968	1199	120.6	635
Iron	mg	8-18 mg	14	11.8	19.1	23	12.6	20	15.5	15.4	5.7	12.1
Mg	mg	310-420 mg	187	516.5	232.5	374	205	506	183	437	157	409
Phosphorus	mg	700 mg	1190	1811	673	1212	768.5	1843	1224	1673	514	1531
Potassium	mg	2,600-3,400 mg	1943	3353	2366	3190	2710	4690	1602	4085	943	3615
Zinc	mg	8-11 mg	8.9	13.3	4.9	8.7	11.1	15.9	9.3	10.6	7	15.3
Vitamin A	IU	2333-3000 IU (700-900 ug)	2327	29627	2382	5931	6148	39322	5639	63488	340	33548
Vitamin E	mg	15 mg	9	14.6	11.7	12.3	6.3	27.8	14.7	23.2	4.8	14.5
Vitamin C	mg	75-90 mg	30.7	237	86.2	95.7	110.6	257	35.2	143.7	10.5	208
Vitamin D	IU	600 IU (15 ug)	24.2	529	252	378	186	354	298	313	41.7	167
Vitamin K	ug	90-120 ug	69.2	127	25.1	182	32.8	215	140	486	5.2	307
Thiamin	mg	1.1-1.2 mg	2.3	1.7	0.9	1.1	1.2	1.7	2	1.7	0.4	1.2
Riboflavin	mg	1.1-1.3 mg	1.8	2.1	1.6	2.5	1.4	2.7	2.2	3.4	0.7	2.4
Niacin	mg	14-16 mg	21.3	31.6	25	25.7	17.5	41.7	18.3	44.3	6.2	27.3
Vitamin B5	mg	5 mg	3.7	7.2	7.5	8.1	5.5	12.1	5.8	8.1	1.8	7.5
Vitamin B6	mg	1.3 mg	1.1	2.8	2.8	3.1	2.2	5.4	1.1	3.7	0.7	3.1
Vitamin B12	ug	2.4 ug	2.3	5.4	7.3	10.6	4.7	7	3.7	6	2.1	5.5
Cholesterol	mg	As low as possible	129.4	198	89.5	107	592	682	844	248	222	410

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Total saturated fat	g	< 10% of cal/ As low as possible	22.7	23.8	23.6	25.7	26.4	13.8	31.6	17.4	5.2	13.2
Selenium	ug	55 ug	128.8	147	39.7	82	88.9	131	168	176	43.5	115
Folate	ug	400 ug	617	298	365	494	290.5	855	540	545	95.7	392
Mn	mg	45 mg	2.2	8.7	1.8	3.4	1.4	5	2.9	5	2.3	5.7
Total monounsaturated fat	g	10% of cal	22.2	31.8	19	22.6	30.3	29.5	30.4	29.6	9.8	28.8
Total polyunsaturated fat	g	10% of cal	26.8	21.3	8.6	13.6	11.7	12.8	20.6	11.6	4.5	12.7

[a]Based on age range (19-50) and sex of patients seen in the IBD Center at Mount Sinai. First number in range is indicted for women

Table 1: Patient characteristics for the five case studies.

Subject ID	Sex	Age (yrs)	Height (in)	Weight (kg)	BMI	Disease characteristics
1	Male	27	70	75.8	24	Crohn's ileal, small and large intestine
2	Female	32	68	62.2	21	Crohn's ileal (vegetarian)
3	Male	48	66	78.5	28	Crohn's ileal; a very selective eater
4	Female	24	61	91.2	38	Crohn's ileal; has a regular/lactose free diet.
5	Female	24	67	48.1	17	Crohn's ileocolitis. Usually skips lunch, keeps Kosher

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Table 2: Reported pre-consultation diet and recommended post-consultation diet for Subject 1.

Patient Evaluation:

Disease location: ileal with scarring, obstructive symptoms

Biologic: Yes

Vitamin Deficiencies: Vit C, Vit D, Low HGB

Pt reports abdominal pain after eating, possible obstructive symptoms. Pt reports binge eating type behaviors. Eats once a day.

Restrictions/preferences- only to have easily accessible meals due to current living conditions

Post-diet decision making: suggestions to be easy to digest, soft in texture due to obstructive symptoms. Simple food prep, returned home to live with mother during COVID.

CDAI: General wellbeing 2/poor, Abdominal pain 1/mild, # of liquid stools per day 4, Abdominal mass 0/none, Current complications 0/none

Description	Pre-consult Amount	Post-consult Amount	Unit
Bread, white, commercially prepared	2		Large slice
Bread, whole wheat, commercially prepared		2	Medium slice
Turkey lunchmeat, white meat	3	3	Medium slice - each 1 oz
Mayonnaise, store bought	1	1	Tbsp
Lettuce, iceberg	0.25		Cup, chopped
Tomato, red, raw	0.5		Large - 3” diameter
Ginger ale	1		Small can - 8 fl oz
Rold Gold pretzels, tiny twists	2		Bag - single serving - 1 oz each
Pizza, homemade or restaurant, cheese, thin crust	0.5		Pizza 14” diameter
Potato chips, salted	2		Bag - single serving - 1 oz each
Oatmeal, regular or quick cooking, dry		1	Cup
Banana, fresh		1	Medium - 7” to 7-7/8” long
Peanut butter, natural, unsalted		2	Tbsp
Carrots, cooked from frozen		1	Cup, sliced
Olive oil		1	Tsp
Strawberries, raw		1	Cup, halves
Yoplait, lactose free yogurt, vanilla		1	Cup
Brown rice, steamed		1	Cup
String beans, cooked from fresh		2	Cup, cut pieces
Olive oil		1	Tsp
Peppers, sweet, red, cooked, boiled, drained without salt		2	Small
Cheese, cheddar		2	Oz
Salmon, Atlantic, wild, cooked		4	Oz
Tap water	10	10	Cup

Table 3: Reported pre-consultation diet and recommended post-consultation diet for Subject 2.

Patient Evaluation:

Disease location: Ileocolonic, anal fissure, Obstruction requiring hospitalization

Biologic: No

H/o Eating disorder

Vitamin Deficiencies: B12

Restrictions/Preferences: Vegetarian, Gluten and lactose-free

Post diet decision making: To use current foods consumed and prioritize vegetarian proteins as overall protein was lacking. Did not institute too many changes and wanted to gain trust and increase likelihood of compliance. Textures required to be soft and easy to digest due to obstruction.

CDAI: General wellbeing 1/very poor, Abdominal pain 2/moderate, # of liquid stools per day 2, Abdominal mass 0/none, Current complications 2 obstruction, stricture

Description	Pre-consult Amount	Post-consult Amount	Unit
Kashi, gluten free, original waffles	2	1	Serving size 2 waffles
Butter, salted	1	1	Tbsp
Banana, fresh	1	1	Medium - 7” to 7 7/8” long
Tomato soup, ready-to-serve can	1	1	Cup
Saltine cracker, soda cracker	4	4	Each - 2” square
Ricotta cheese, part skim milk	0.5	1	Cup
Baked potato, with cheese, skin not eaten	1	1	Medium
Kellogg’s Crispix cereal, original	1	1	1.33 cups
Soy milk, plain or original, unsweetened, ready-to-drink, fortified	1	2	Cup
Peanut butter, natural, unsalted	2	2	Tbsp
Naked juice, fruit juice smoothie, blue machine	0.5	0.5	8 fl oz
Tofu, raw (not Silken), cooked, firm		0.5	Block - 7” × 1 9/16” × 1 5/8”
Baby spinach, raw		1	Cup, cut pieces
Tap water	8	8	Cup

Table 4: Reported pre-consultation diet and recommended post-consultation diet for Subject 3.

Patient Evaluation:

Disease location: Ileal Crohn’s- ileal perforation, s/p bowel rsx, PMHX: OLT

Biologic: No

Vitamin Deficiencies: Vitamin D

Highly selective eater, low variety

Restrictions/Preferences: Only eats in restaurants for lunch and dinner and will not cook. Foods at home are prepared and pre-cut.

Post-diet decision making: Priority placed on 1 suggested modification: swapping out proteins from red meat to poultry. Pt trust was needed and observation of compliance will drive next recommendation.

CDAI: General wellbeing 2/poor, Abdominal pain 1/mild, # of liquid stools per day 0, Abdominal mass 1/dubious, Current complications 0/ none

Description	Pre-consult Amount	Post-consult Amount	Unit
Kellogg’s Froot Loops	1		Cup, whole pieces
Eggs, cooked	3	3	Medium
Potatoes, pan fried	1	1	Cup, chopped
Cantaloupe, fresh	1	1	Cup, cubed
Hamburger or ground beef, 80% lean	4		Oz
Hamburger bun, white	1		Small - 2 ¾” diameter

French fries, cooked from frozen	1		Order - from a restaurant
Chips ahoy, chewy chocolate chip cookies	6		Each
Chicken, broiler or fryers, breast skinless, boneless, meat only, cooked, grilled		2	3 oz
Sweet potato, baked		1	Medium - 2” × 5”
Cereals ready-to-eat, general mills, cheerios		1	Cup (1 NLEA serving)
Milk, 1% fat, lowfat		1	Cup
Broccoli, cooked from frozen		1	Cup, chopped
Almond butter, unsalted		2	Tbsp
Bananas, raw		1	Medium - 7” to 7 7/8” long
Rice cake		2	Regular - 4” diameter
Boost, nutritional energy drink, high protein		1	Bottle

Table 5: Reported pre-consultation diet and recommended post-consultation diet for Subject 4.

Patient Evaulation:

Disease location: Ileal Crohn’s, perianal fistulas

Biologic: Yes

Vitamin deficiencies: Vitamin D

Restrictions/Preferences: none

Post-Diet decision making: introduction to minimally processed foods/anti-inflammatory, easy to prepare due to work/school schedule and easy to digest.

CDAI: General wellbeing 0/very well, Abdominal pain 0/none, # of liquid stools per day 4, Abdominal mass 0/none, Current complications 6/ new fistula +1

Description	Pre-consult Amount	Post-consult Amount	Unit
Fried rice, pork	2		Cup
M & M’s Plain	1		Regular package each 1.69 oz
Coke	1		Can each 12 fl oz
Bagel, plain, enriched	1	1	Large - 4 ¼” to 4 ¾” diameter
Scrambled egg, plain	1	1	Medium egg used - 1 whole egg or 2 egg whites
Kraft, deli deluxe, American cheese, pasteurized processed	1		Slice
Bacon, pork	2		Slice - 6” long
Hot dog, plain	1		Regular - 10 per lb
Hot dog bun, white	1		Regular - 6” × 2” × 1 ½ “
Applesauce, unsweetened		1	Cup
Mayonnaise, low fat		1	Tbsp
Rice cake		2	Regular - 4” diameter
Carrots, cooked from frozen		1	Cup
Greek yogurt, plain, nonfat		1	Cup
Bananas, raw		1	Medium 7” to 7 7/8” long
Chicken, broiler or fryer, breast skinless, boneless, meat only		1.5	3 oz
Sweet potato, baked		1	Medium - 2” diameter × 5 “
Spinach, cooked from fresh		0.5	Cup, chopped
Strawberries, raw		1	Cup, halved
Butter, salted		1	Tsp
Olive oil		1	Tsp
Salmon, canned, pink, drained		3	Oz

Table 6: Reported pre-consultation diet and recommended post-consultation diet for Subject 5.

Patient Evaluation:			
Disease Location: Crohn's ileocolitis. + weight loss			
Biologic: Yes			
Vitamin Deficiencies: Vitamin D, low Ferritin			
Restrictions/Preferences: Kosher			
Post-diet decision making: Kosher meal planning, easy to prep due to new living situation. Focus placed on weight gaining strategies and overall nutrition.			
CDAI: General wellbeing 1/slightly below avg, Abdominal pain 0/none, # of liquid stools per day 3, Abdominal mass 0/none, Current complications 0/ none			
Description	**Pre-consult Amount**	**Post-consult Amount**	**Unit**
Banana, fresh	1	1	Medium - 7" to 7 7/8" long
Oatmeal, quick cooking	1	1	Cup
Almond butter, unsalted	1	1	Tbsp
Pastrami, beef	3		Oz
Eggs, cooked	1	1	Medium
Saltine cracker, soda cracker	4		Each - 2: Square
Sweet potato, baked		1	Medium- 2" diameter × 5"
Margarine, unknown type		1	Tbsp
Rice, brown, long-grain, cooked		1	Cup
Broccoli, cooked from fresh		1	Cup, chopped
Mango, fresh		0.5	Each
String beans, cooked from frozen		1	Cup, cut pieces
Olive oil		1	Tbsp
Chicken thigh, skin removed before eating		2	Small
Roast beef, sirloin tip, no visible fat eaten		3	Oz
Yoplait, lactose free yogurt, vanilla		1	Cup

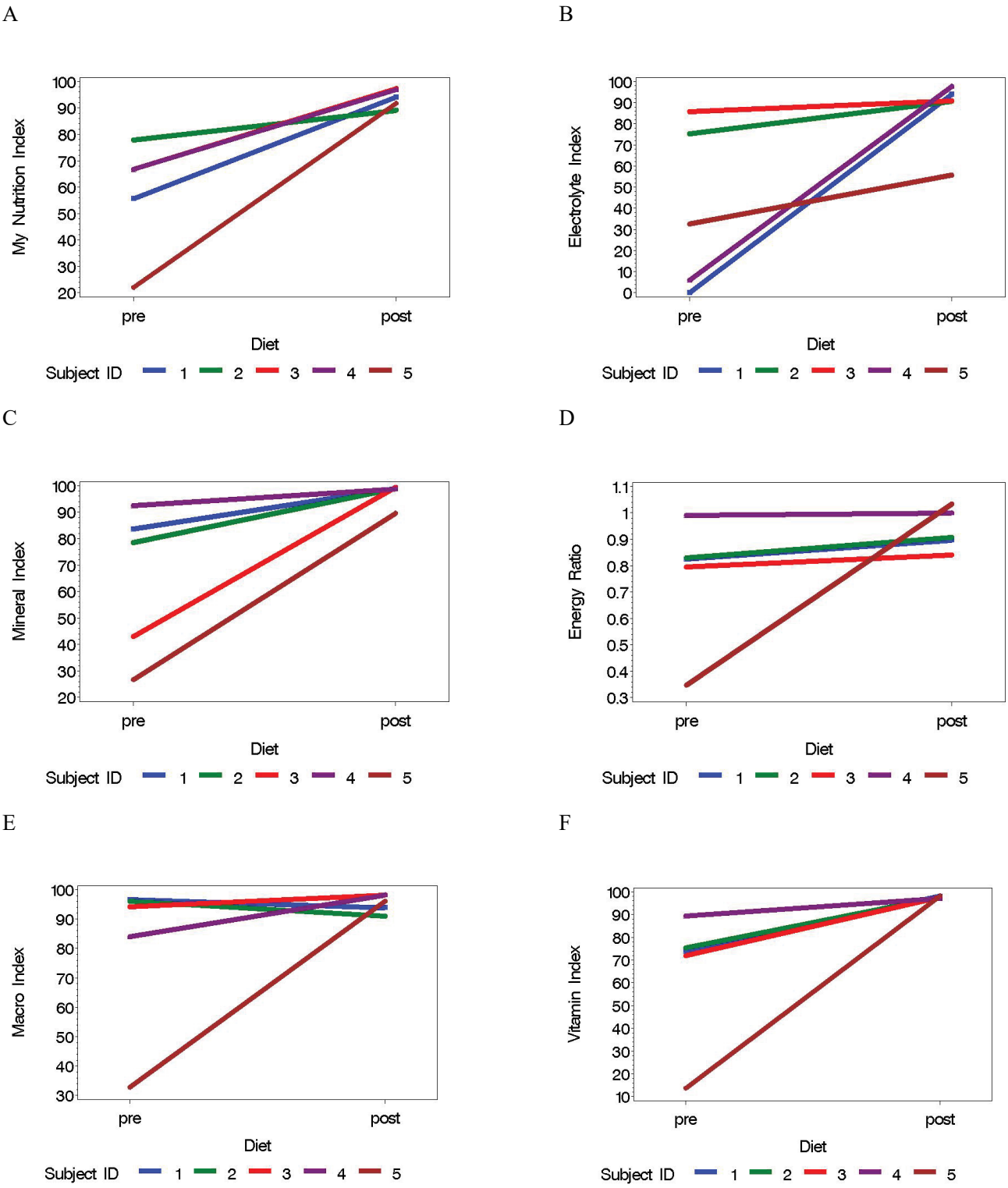

Figure 1: Dietary indices from pre- and post-assessment diets for the five subjects: A) My Nutrition Index; B) Electrolyte Index; C) Mineral Index; D) Energy Ratio; E) Macro Index; and F) Vitamin Index.

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Conflict of Interest Disclosures

The authors have no conflict of interests to disclose.

Author Contributions

CG and LK conceived of the study, LM collected the data, CG calculated the indices. CG and LK wrote the first draft with contributions from LM. All authors reviewed and commented on subsequent drafts of the manuscript.

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