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Functional Nutrition Management of Celiac Disease and *H. pylori* with Fatigue in a 33-Year-Old Female: A Case Report

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ABSTRACT

Background: Celiac disease is an immune-mediated disorder characterized by intestinal inflammation, malabsorption, and systemic manifestations. Coexisting *Helicobacter pylori* infection may further disrupt gastric and digestive function, contributing to nutrient deficiencies and persistent symptoms.

Case Presentation: A 33-year-old underweight female presented with chronic fatigue, low energy, bloating, indigestion, constipation, disturbed sleep, and progressive weight loss. Investigations showed positive tissue transglutaminase IgA, *H. pylori* IgG seropositivity, anemia, elevated ESR, low vitamin D and B12 levels, high homocysteine, and low free T3. She followed a six-month functional nutrition program involving a strict gluten-free anti-inflammatory diet. Dairy, refined sugars, and seed oils were removed. Gut-supportive foods were emphasized. She received targeted micronutrient supplementation and herbal and probiotic support for *H. pylori*. Lifestyle measures focused on sleep, hydration, stress reduction, and strength training were also followed.

Discussion: After six months, laboratory markers showed improvement. Vitamin D rose from 12.6 to 48 ng/mL. Homocysteine decreased from 23.75 to 14.56 µmol/L. ESR declined from 35 to 10 mm/hr. Hemoglobin and vitamin B12 increased. Thyroid markers and C-peptide improved. Tissue transglutaminase IgA moved toward the negative range, and *H. pylori* IgG levels declined. The patient reported better energy, improved digestion, more regular bowel movements, better sleep, and weight gain.

Conclusion: This case illustrates that a structured functional nutrition protocol addressing dietary triggers, micronutrient repletion, microbial balance, and lifestyle factors was associated with meaningful clinical and biochemical improvement over six months.

Keywords: Celiac disease, *H. pylori*, Functional nutrition, Gut inflammation, Micronutrient deficiency, Fatigue

INTRODUCTION

Celiac disease is a chronic autoimmune disease condition triggered by gluten ingestion in genetically predisposed individuals [1]. It is characterized by immune-mediated damage to the small intestinal mucosa, leading to villous

atrophy, malabsorption, and a wide spectrum of gastrointestinal and extraintestinal manifestations [2]. Common symptoms include fatigue, weight changes, bloating, anemia, abdominal discomfort, altered bowel habits, and nutrient deficiencies, although some individuals may present with primarily systemic or nonspecific complaints [2,3]. Persistent intestinal inflammation may also contribute to broader metabolic and immune dysregulation [4].

Helicobacter pylori (H. pylori) infection is a prevalent chronic bacterial infection of the stomach that can impair gastric function, alter digestive capacity, and contribute to micronutrient deficiencies, particularly iron and vitamin B12 [5]. It has been associated with dyspepsia, bloating, altered gastric acid secretion, and systemic inflammatory responses [6,7]. In individuals with underlying intestinal disorders such as celiac disease, *H. pylori* infection may further compromise nutrient absorption and exacerbate gastrointestinal and systemic symptoms [5].

Fatigue and low energy states are common but often under-recognized consequences of chronic gastrointestinal disorders. These symptoms may arise from a combination of inflammation, micronutrient deficiencies, impaired thyroid function, altered methylation pathways, and overall metabolic stress [8]. Conventional management of celiac disease focuses primarily on lifelong adherence to a gluten-free diet, while *H. pylori* is typically treated with antibiotic regimens [9,10]. However, persistent symptoms may remain in some individuals despite standard care, particularly when nutrient depletion, gut barrier dysfunction, and systemic inflammation are not fully addressed [11].

Functional nutrition approaches aim to bridge this gap by addressing underlying drivers such as immune activation, chronic infection, impaired digestion, and nutrient deficiencies through individualized dietary strategies, targeted supplementation, and gut-supportive protocols [12]. By focusing on restoration of gastrointestinal integrity, correction of biochemical imbalances, and reduction of inflammatory burden, this model seeks to improve both digestive and systemic outcomes. This case report describes the application of a functional nutrition program in a 33-year-old Female with celiac disease and *Helicobacter pylori* (*H.pylori*) infection presenting with persistent gastrointestinal symptoms, fatigue, and metabolic disturbances, and highlights the clinical and biochemical changes observed over the course of care.

CASE PRESENTATION

A 33-year-old female from New Delhi, India, presented to a clinical nutritionist at iThrive (Thrivetribe Wellness Solutions Private Limited) with chronic gastrointestinal and systemic complaints. Her main issues included persistent fatigue, low energy, bloating, indigestion, constipation, and incomplete bowel evacuation. She reported a history of hemorrhoids (resolved in 2022), recurrent urinary tract infections, prior cystitis, and two renal stone episodes. Additional symptoms were generalized weakness, disturbed sleep, chest heaviness, and longstanding digestive discomfort. She experienced progressive weight loss and difficulty regaining weight, alongside psychological stress. Her family had a history of cardiovascular disease in her father. She was not on any regular medications and followed a vegetarian diet (Table 1).

She enrolled in iThrive's functional nutrition program in July 2024 and provided her consent for treatment. The baseline height and weight were 150 cm and 42 kg, respectively, indicating an underweight status. Root cause analysis of blood tests revealed systemic inflammation and multiple micronutrient deficiencies. Elevated tissue transglutaminase (tTG) IgA antibodies confirmed celiac disease. The analysis also indicated *Helicobacter pylori* infection. Nutritional markers showed low vitamin D, B12, and ferritin levels,

alongside elevated homocysteine, suggesting impaired methylation and metabolic stress. Thyroid testing revealed low free T3, indicating reduced peripheral thyroid hormone activity (Table 2).

Table 1: Timeline of Past Medical History, Diagnosis, Interventions, and Outcomes

Date	**Relevant past medical history & interventions**		
July 2024	**Age:** 33 years, female **Current illness:** Complaints of chronic gastrointestinal symptoms, including persistent fatigue, low energy, bloating, indigestion, and chronic constipation. Recurrent urinary tract infections, prior cystitis, and two episodes of renal stones. Additional symptoms include generalized weakness, disturbed sleep, chest heaviness, progressive weight loss, and psychological stress. **Previous diagnoses:** History of hemorrhoids (resolved in 2022). **Medication history:** Not on any regular medication. **Family history:** Father with cardiovascular disease. **Baseline physical parameters:** Height 150 cm and weight 42 kg		
Date	**Summaries from initial & follow-up visits**	**Diagnostic testing**	**Interventions**
July 2024	Enrolled in a functional nutrition program	Routine blood tests showed: • Hemoglobin: 10.9 g/dL • ESR: 35 mm/hr • Vitamin D: 12.6 ng/mL • Homocysteine: 23.75 µmol/L • Vitamin B12: 193 pg/mL • *H. pylori* IgG: 0.97 • • tTG-IgA: 39.1 (positive)	• Dietary changes: • Strict gluten-free diet • Eliminated dairy, refined sugar, seed oils • Whole foods: eggs, chicken, rice, fruits, sprouts • Daily amla juice and aloe vera juice for gut lining support Supplementation: • (For 3 months) • Vitamin D3 + K2: 4 drops daily (iThrive Essentials, India; 600 IU D3 + 20 mcg K2 in one drop) • Magnesium bisglycinate: ½ scoop with 1 glass of water after breakfast and ½ after dinner (iThrive Essentials, India; 440 mg in 1 scoop) • Vitamin B-complex: 1 capsule twice daily • Essential Amino Acids (EAA): 1 scoop daily • Zinc Defense: 1 capsule 2 hours after lunch (iThrive Essentials, India; 15 mg zinc + 75 mg L-carnosine + 1 mg copper) • Omega-3 fatty acids: 500 mg DHA/serving (1 capsule after breakfast, 1 capsule after dinner) • Detox binder (bedtime) • Licorice root: 1 capsule daily • Slippery elm: 1 capsule daily (empty stomach) • TMG: 1 capsule after lunch and 1capsule after dinner (For 2 months) • *H. pylori* herbal formula: 2 capsules twice daily • *H. pylori* probiotics: 1 capsule before dinner Lifestyle changes: • Sleep optimization • Hydration support • Progressive strength training • Mind-body therapies consistently practiced: Fascia Release, Chakra meditation, grounding, journaling
Jan 2025	Follow up after 6 months and blood tests	Follow-up labs showed: • Hemoglobin:	• Maintained a strict gluten-free diet with targeted supplementation • Completed *H. pylori* protocol; transitioned to

		11.6 g/dL • ESR: 10 mm/hr • Vitamin D: 48 ng/mL • Homocysteine: 14.56 µmol/L • *H. pylori* IgG: 0.91 (normalized) • • tTG-IgA: 8.9 (negative)	gut repair maintenance • Improved energy, sleep, and bowel regularity (less bloating and constipation) • Gained 2 kgs • Reduced inflammation (ESR down) • Vitamin D and B12 levels improved significantly • Celiac antibodies normalized (tTG-IgA negative) • *H. pylori* antibodies declined, confirming infection control

Abbreviations: ALT = Alanine aminotransferase (serum glutamic-pyruvic transaminase, SGPT); AST = Aspartate aminotransferase (serum glutamic-oxaloacetic transaminase, SGOT); ESR = Erythrocyte sedimentation rate; RBC = Red blood cells; IgG = Immunoglobulin G; IgA = Immunoglobulin A; tTG-IgA = Tissue transglutaminase immunoglobulin A; EAA = Essential amino acids; K2 = Vitamin K2 (menaquinone); TMG = Trimethylglycine (betaine); EPA = Eicosapentaenoic acid; DHA = Docosahexaenoic acid; IU = International units; mg = Milligrams; mcg = Micrograms; µL = Microliter; ng = Nanogram; pg = Picogram; µmol = Micromole; mm/hr = Millimeters per hour

Based on clinical and laboratory findings, she was diagnosed with celiac disease, *Helicobacter pylori* infection, micronutrient deficiencies, and metabolic fatigue linked to chronic gastrointestinal dysfunction. She began a structured functional nutrition program, involving strict gluten elimination, gut-supportive dietary modifications, targeted micronutrient repletion, *H. pylori* management, and lifestyle interventions aimed at reducing systemic inflammation and physiological stress.

At presentation, baseline serum parameters (Table 2) showed mild anemia with hemoglobin at 10.9 g/dL and suboptimal vitamin B12 at 193 pg/mL, suggesting nutrient deficiencies likely contributing to fatigue. Vitamin D was severely low at 12.6 ng/mL, potentially impacting immune function and energy levels. Homocysteine was elevated at 23.75 µmol/L, indicating impaired methylation possibly linked to B-vitamin insufficiency. Markers of inflammation were raised, with ESR at 35 mm/hr, while thyroid hormones Free T3 (2.53 pg/mL) and Free T4 (1.02 ng/dL) were slightly reduced, consistent with a hypometabolic state. Serology confirmed active Helicobacter pylori infection (IgG 0.97) and celiac disease with elevated tTG-IgA (39.1), reflecting autoimmune activity and intestinal damage.

Table 2: Serum Analysis of Various Parameters in the Baseline and Post-Initial Intervention

Parameters	Baseline (03/07/2024)	Post 6 Months After Initial Visit (21/01/2025)
Hemoglobin (g/dL)	10.9	11.6
Serum Vitamin B12 (pg/mL)	193	255
25-OH Vitamin D (ng/mL)	12.6	48
Homocysteine (µmol/L)	23.75	14.56
C peptide (ng/ml)	0.86	1.15
ESR (mm/hr)	35	10
HS-CRP (mg/L)	< 0.3	0.3
Free T3 (pg/mL)	2.53	3.0
Free T4 (ng/dL)	1.02	1.2
H. pylori IgG	0.97	0.94
tTG-IgA (Celiac Marker)	39.1	11.3

Abbreviations: ESR = Erythrocyte Sedimentation Rate; HS-CRP = High-Sensitivity C-Reactive Protein; tTG-IgA = Tissue Transglutaminase Immunoglobulin A; IgG = Immunoglobulin G; IgA = Immunoglobulin A; Free T3 = Free Triiodothyronine; Free T4 = Free Thyroxine

Based on the patient's clinical presentation and biochemical findings, a tailored anti-inflammatory diet was implemented (Table 3), focusing on strict gluten and dairy

elimination to reduce intestinal immune activation and promote mucosal healing. The exclusion of refined sugars and seed oils targeted systemic oxidative stress and inflammation, which likely contributed to the elevated homocysteine and ESR levels observed at baseline. Nutrient-dense whole grains such as jowar and ragi provided low-glycemic carbohydrate sources that supported improved glycemic control, reflected in the rising C-peptide values. Healthy fats from ghee and coconut oil replaced pro-inflammatory seed oils, potentially supporting better thyroid hormone metabolism, as seen with the modest increase in free T3 and free T4. Inclusion of raw garlic and antioxidant-rich vegetables aimed to suppress Helicobacter pylori infection, aligning with the decline in H. pylori IgG titers post-intervention. Complementary supplementation with essential amino acids and micronutrients further supported methylation and protein metabolism, contributing to improved vitamin B12 status and reduced homocysteine. Collectively, this dietary strategy outlined in Table 3 helped reduce inflammation, restore nutrient balance, and improve gut integrity, driving the clinical and biochemical progress observed over six months.

Table 3: Customized diet protocol for management of Celiac Disease and *H. pylori*

Meal Timings	Components of Meals
Early Moring (empty stomach)	1 glass of water with 20 mL aloe vera juice + 1 tsp chia seeds (soaked overnight)
Pre-Workout	2 walnuts/1 tsp pumpkin seeds/1 fig (soaked overnight)
Breakfast	Option 1: 1 boiled egg with avocado salsa + 1 glass of EAA with coconut milk / 1 glass of water (mandatory) Option 2: 2 yellow dal idlis + 1 bowl of sambar + 1 glass of EAA with coconut milk / 1 glass of water (mandatory) Option 3: Oat smoothie bowl (100 mL water + 100 mL coconut milk + 1-2 tbsp roasted oats + cocoa powder + fruits; topped with soaked walnuts & pumpkin seeds; EAA optional)
Breakfast	Option 1: 1 boiled egg with avocado salsa + 1 glass EAA with coconut milk or 1 glass of water (mandatory) Option 2: 2 yellow dal idlis + 1 bowl of sambar + 1 glass EAA with coconut milk or 1 glass of water (mandatory) Option 3: Oat smoothie bowl (100 mL water + 100 mL coconut milk + 1-2 tbsp roasted oats + cocoa powder + fruits; topped with soaked walnuts & pumpkin seeds; EAA)
Lunch	Start with salad: tomato/cucumber/boiled sprouts Mandatory: 2-3 raw garlic pods Option 1: 1.5 bowls thick dal (any legume) + 1 bowl vegetable curry + 1 bowl rice or 2 rotis (millet/ragi/jowar/rice) Option 2: Red pepper risotto + 1-2 boiled eggs
Evening Snacks	Option 1: 1-2 energy balls/handful amaranth puffs or jowar flakes/1 orange/1 pink dragon fruit Option 2: 1 cup ginger tea or lemongrass cinnamon tea + 2 dates + 1 soaked fig
Dinner	Option 1: Vegetable Thai curry + 1 bowl of rice Option 2: 1 bowl of tomato soup + 1 bowl of quinoa salad Option 3: Pithla (1 bowl) + 1 jowar chapati

A comprehensive supplement protocol (Table 4) was implemented to address micronutrient deficiencies, impaired methylation, mucosal integrity, and persistent gastric infection. Vitamin D3 + K2 (600 IU vitamin D3 + 20 mcg K2 per drop) was prescribed at 4 drops daily after breakfast to correct deficiency and support immune regulation. Magnesium bisglycinate (440 mg elemental magnesium per scoop) was administered as ½ scoop twice daily after breakfast and dinner to aid neuromuscular balance, stress modulation, and vitamin D metabolism. A vitamin B complex (1 capsule per serving) was prescribed, 1 capsule after lunch and 1 after

dinner, alongside trimethylglycine (TMG) at the same frequency to support methylation pathways and facilitate homocysteine reduction. Zinc (15 mg elemental zinc per capsule) was taken once daily, 2 hours after lunch, to assist immune function and intestinal epithelial repair. Essential amino acids (1 sachet per serving) were included with breakfast to compensate for potential malabsorption and support gut tissue healing. Omega-3 fish oil (500 mg DHA per capsule) was given, 1 capsule after breakfast and 1 after dinner, to help modulate systemic and gastric inflammation. A targeted *H. pylori* herbal formula was prescribed, 2 capsules after breakfast and 2 after lunch, along with *H. pylori*-specific probiotics, 1 capsule 15 minutes before dinner, to support microbial balance. Gastrointestinal mucosal support included licorice root extract, 1 capsule after lunch; slippery elm bark, 1 capsule on an empty stomach; and aloe vera juice (20 mL per serving) in water on an empty stomach to soothe and protect the gastric lining. Activated charcoal was used, 1 capsule at bedtime away from food and supplements, during the antimicrobial phase.

Table 4. Supplement regimen of the patient

Name of the Supplement	Dosage
Vitamin D3 + K2 (600 IU + 20 mcg per drop)	4 drops daily after breakfast
Vitamin B Complex	1 capsule after lunch and 1 capsule after dinner
Essential Amino Acids (EAA)	1 sachet with breakfast
Magnesium Bisglycinate (440 mg per scoop)	½ scoop after breakfast and ½ scoop after dinner
Zinc (15 mg)	1 capsule, 2 hours after lunch
Omega-3 Fish Oil (500 mg DHA per capsule)	1 capsule after breakfast and 1 capsule after dinner
TMG	1 capsule after lunch and 1 capsule after dinner
H. pylori Herbal Support	2 capsules after breakfast and 2 after lunch
H. pylori Probiotics	1 capsule 15 minutes before dinner
Activated Charcoal	1 capsule at bedtime, away from food/supplements
Licorice Root Extract	1 capsule after lunch
Slippery Elm Bark	1 capsule on an empty stomach
Aloe Vera Juice	20 mL in water on an empty stomach

Alongside dietary and supplemental interventions, structured lifestyle measures were implemented to support recovery and reduce physiological stress. Sleep routine and hydration were optimized to improve energy and metabolic balance. Progressive strength training was introduced to rebuild lean mass and enhance metabolic resilience. Regular mind-body practices, including fascia release, meditation, grounding, and journaling, were incorporated to support nervous system regulation and overall well-being (Table1).

Laboratory investigations repeated after 6 months post-functional nutrition protocol (Table 2) demonstrated marked biochemical improvement alongside clinical recovery. Serum 25-OH vitamin D levels rose substantially from 12.6 ng/mL to 48 ng/mL, suggesting improved immune modulation and nutrient absorption. Homocysteine levels reduced from 23.75 µmol/L to 14.56 µmol/L, reflecting better methylation efficiency and B-vitamin status. Hemoglobin showed an upward trend from 10.9 g/dL to 11.6 g/dL, consistent with gradual correction of anemia associated with malabsorption. Serum vitamin B12 increased from 193 pg/mL to 255 pg/mL, indicating improved, though still suboptimal, cobalamin status. Inflammatory burden reduced significantly, with ESR declining from 35 mm/hr to 10 mm/hr, while HS-CRP remained low, supporting an overall reduction in systemic inflammatory activity. Thyroid markers also improved, with free T3 rising from 2.53 pg/mL to 3.0 pg/mL and free T4 from 1.02 ng/dL to 1.2 ng/dL, suggesting better peripheral thyroid hormone availability, likely secondary to improved gut function and reduced inflammation. C-peptide levels increased

from 0.86 ng/mL to 1.15 ng/mL, indicating improved pancreatic beta-cell response and metabolic stability. Notably, tTG-IgA levels decreased from 39.1 to 11.3, moving from positive to negative range, which reflects reduced autoimmune activation following strict dietary adherence. *H. pylori* IgG levels showed a slight decline (0.97 to 0.94), which, although modest, may indicate a gradual reduction in antigenic load alongside targeted antimicrobial and mucosal support.

Symptomatically, the patient reported significant improvements in energy levels, reduced fatigue, and better overall stamina during daily activities. Digestive symptoms, including bloating, heaviness after meals, and irregular bowel movements, improved markedly, suggesting enhanced digestive efficiency and mucosal healing. Episodes of gastric discomfort reduced in frequency and intensity, aligning with the combined dietary and antimicrobial strategy. The patient also described improved mental clarity, better stress tolerance, and more stable appetite cues. Collectively, these findings indicate that a targeted functional nutrition approach addressing gluten elimination, microbial balance, micronutrient repletion, and gut mucosal repair may play a meaningful role in reducing autoimmune activation, improving nutrient absorption, and restoring systemic metabolic balance in individuals with celiac disease and *H. pylori*–associated malabsorption.

DISCUSSION

The observed clinical and biochemical improvements in this case are consistent with existing evidence linking targeted nutritional and microbial interventions to recovery in celiac disease and chronic gastric infection. Strict gluten elimination remains the cornerstone of celiac management and promotes mucosal healing and immune down-regulation; however, nutrient insufficiencies frequently persist despite adherence to a gluten-free diet, particularly in fat-soluble vitamins and B-vitamins, underscoring the need for focused repletion strategies [13]. Regular monitoring and supplementation have been recommended to address these deficiencies and support systemic recovery in celiac patients.

Helicobacter pylori infection has been associated with lower serum levels of vitamin B12 and vitamin D, and successful eradication can improve these parameters, as well as overall gastric and systemic health [14,15]. Meta-analyses suggest that complementary vitamin supplementation may enhance H. pylori eradication rates and restore vitamin status compromised by the infection [16]. In this case, structured micronutrient replenishment, alongside antimicrobial and probiotic support, corresponded with rising vitamin D and B12 levels and a downward trend in H. pylori IgG levels.

Probiotic supplementation as an addition to H. pylori therapy has been shown in controlled trials and network meta-analyses to improve eradication rates and reduce treatment-related adverse effects [17]. Although evidence specific to functional nutrition is still emerging, these findings align with improved gastrointestinal symptomatology and microbial balance observed in this patient.

The significant reduction in homocysteine levels observed here also finds support in the literature, as celiac patients adhering to a gluten-free diet may continue to exhibit low B-vitamin status and high homocysteine unless intake is optimized; addressing these deficiencies has been linked to improved methylation and metabolic markers [18]. Collectively, these studies reinforce the concept that combining strict dietary management with targeted supplementation and microbiome-focused support can yield clinically meaningful improvements in immune activation, nutrient absorption, and systemic inflammatory burden in complex cases like the one presented.

CONCLUSION

This case demonstrates that a comprehensive functional nutrition strategy targeting gluten elimination, microbial balance, and micronutrient repletion was associated with meaningful improvements in inflammatory markers, nutrient status, and gastrointestinal symptoms over six months. Addressing gut integrity and systemic inflammation alongside standard dietary management may enhance recovery and metabolic resilience in individuals with celiac disease and concurrent H. pylori infection.

Declaration by Authors

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