

# Nourishing Hope: Managing Crohn's Disease in a Pediatric Patient through Dietary Strategies - A Case Study

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**Abstract:-** Crohn's disease (CD) is a transmural, chronic illness associated with inflammatory bowel disease. Supplementing the diet with nutrition therapy is considered a crucial element in managing pediatric CD with the potential to alleviate symptoms and may contribute to achieving remission. The objective of this observational study is to examine the impact of combining dietary intervention with medication in the pediatric case of CD, with a focus on identifying effective dietary approaches. Study explores the efficacy of dietary interventions in managing symptoms in an 11-year-old patient diagnosed with CD. Changes in symptoms were documented over the period of 12 months and markers such as Erythrocyte sedimentation rate (ESR), c-reactive protein (CRP), and Fecal calprotectin were used to measure the response to dietary modifications. The outcomes of this case report reveal a notable decrease in symptoms that align with alterations in markers after the application of targeted dietary strategies. In conclusion, the reduction in inflammation is aligned with an improvement in the patient's clinical symptoms, substantiating the hypothesis that dietary intervention can have a favorable effect on disease activity in pediatric patients with CD.

**Keywords:-** Crohn's disease, bowel disorder, dietary intervention, Markers, low carbohydrate diet.

## I. INTRODUCTION

Crohn's disease (CD) is a heterogeneous, transmural, chronic illness associated with inflammatory bowel disorder involving parts of the bowel and digestive tract [1, 2]. Crohn's disease affects about 322 per 100,000 people (about the seating capacity of the Los Angeles Memorial Coliseum) in Europe and North America; although it is less common in Asia, it roughly affects about 67.9 per 100,000 people. It has historically been more common in the developed world, with fewer cases in low prevalent regions [3]. The causative factor of CD is unknown but genetic, immunological, and environmental factors interactions are widely believed to be participants [1, 2] Genetic factors play an important role in susceptibility to CD, certain genes like NOD<sub>2</sub>, IL<sub>23</sub>R and ATG<sub>16</sub>L<sub>1</sub>, its mutations and variation have been associated with an increased likelihood of developing the disease [2]. Environmental factors, such as, diet: consuming high amounts of processed food, low fiber- high carbohydrate food, smoking, non-steroidal anti-inflammatory drugs, microbial exposure, are also thought to contribute to the development and exacerbation of CD [2,11]

Common symptoms of CD include abdominal pain, weight loss, fatigue, vomiting, bowel obstruction or loss motion with passage of blood or mucus or both [4, 5]. To evaluate the progress of the disease, screening tests such as CRP, ESR- and certain stool markers like fecal calprotectin are valuable indicators in laboratory findings [6]. Management of CD often involves medication to control inflammation, diet, lifestyle modifications and in some cases surgery [8]. Therefore, it's important for individuals diagnosed with CD to plan treatment properly and to monitor and manage disease conditions effectively.

There is no cure for CD, so the focus of treatment is on controlling inflammation [6]. Nutritional therapy, which begins by cutting down on high-protein and meat intake, seems to work more effectively than steroids in most patients [7]. In new CD patients, restricting food containing lactose and gluten through dietary changes helps prevent relapse [11]. Eating less carbs and more fiber intake facilitates smoother digestion. This hints that foods rich in gluten may contribute to the worsening of symptoms and might cause flare-ups [4, 5]. Few more studies show that nutrition therapy along with drug therapy as a support treatment seems to help prevent possible flare-ups and maintenance of remission [7, 9]. CD in children is also more extensive than in adults hence management requires consideration of various factors in treatment and diagnosis. Supplementing the diet with nutrition therapy is considered a crucial element in managing pediatric CD with the potential to alleviate symptoms and may contribute to achieving remission [10]. The objective of this present observational case study is to examine the impact of combining dietary intervention with medication in the pediatric case of CD, with a focus on identifying effective dietary approaches.

## II. CASE PRESENTATION

In September 2021, an 11-year-old boy named Mr. X visited his family physician in India, accompanied by his parents, complaining of abdominal pain. This visit followed a previous inconclusive diagnosis by another physician and was prompted by significant weight loss observed by his parents. The child had previously been admitted to a hospital where he was misdiagnosed and treated for normal stomach pain. Up until 2019, The child had been in good health, with up-to-date vaccinations.

The deterioration in his condition became evident when the child started throwing up blood. Physical examination revealed a weight of 12 kilograms (< 3 percentile) and a height of 115 centimeters (< 10 percentile). Further blood tests showed elevated levels of red blood cells (RBCs), CRP and a high ESR of 29 mm/hr. Globulin levels were elevated while Albumin levels were lower than normal. An additional test called fecal calprotectin was done which suggested a borderline value of 524 µg/mg (normal being <= 50). All these markers were strongly indicative of Inflammatory Bowel Disease (IBD). However, to obtain concrete proof, a colonoscopy procedure was suggested. A subsequent colonoscopy confirmed CD with ulceration in bowel (as shown in Fig 1).

The initial treatment involved putting the child on Mesalamine 2mg/ day along with Azathioprine 25mg/ day, as a result the child gained 12 kilograms and his condition stabilized. Hemoglobin tablets were prescribed along with his daily medicines. On medication and steroids, the child gained 10 kilograms in 2 months. The dosage of steroids was then minimized.

Despite initial progress, the response to the first-line treatment was unsatisfactory. At the 3rd month follow-up all three markers: CRP, ESR, and Fecal calprotectin level were increased to 50 mg/ dl, 35mm/ hr and 1029 µg/ mg respectively.

The first line of treatment (medicines and steroids) did not give good results. Consequently, a new approach was recommended by Physician involving the elimination of a high-fiber diet, gluten, and dairy products. Prebiotic and probiotic-rich foods, along with daily vegetable soup, were incorporated. This strict dietary regimen, combined with continued medication, led to a significant improvement, reducing CRP to 15mg/ dl, ESR to 25mm/ hr and fecal calprotectin to 543 µg/ mg after 3 months.

The parents continued a modified dietary plan that gradually reintroduced gluten, dairy products, and fiber over the next three months, along with meat in the child meal. However, this led to an increase in infection markers with CRP rising by 5 mg/ dl and ESR by 10 mm/hr.

Susceptibility to dietary changes potentially influenced further bowel infection. Achieving a balance between medicine treatment and a restrictive diet provides crucial in maintaining control without flare-ups. Follow-up blood tests showed CRP, ESR and fecal calprotectin values of 10 mg/ dl, 5mm/ hr and 54 µg/ mg respectively. Another colonoscopy revealed reduced ulceration in the bowel (shown in Fig 2), indicating successful management of the infection. Table1 showing quarterly Presentation of all three Marker Values with Corresponding Dietary Regimen.

### III. RESULT AND DISCUSSION

In this case report, we explore the significance of incorporating dietary intervention as a supportive therapy coupled with medicinal treatment for an individual with Crohn's disease. Crohn's disease (CD) is a persistent inflammatory bowel disorder that can involve any part of the

gastrointestinal tract [1]. CD results in bowel ulcerations and heightened sensitivity to high-fiber and gluten-rich food [3]. Various supportive studies showed, diet has been suggested to ameliorate gastrointestinal symptoms in CD patients [3,6]. The case study looks into a dietary regimen for a teenage boy with Crohn's disease, illustrating its role as a supportive therapy in combination with medication to manage inflammation and stabilize the patient.

The positive impacts from incorporating prebiotics and probiotics in diet, extends beyond a sense of ease to include an enhanced immune response. This new intervention approach exhibited positive responses on infection and inflammation, bestowed to weight gain. Nutritional intervention has been tailored to minimize infection rates and promote gut healing [8]. CD patients are often triggered from new diets rich in carbohydrates, leading to elevated fecal calprotectin level, as observed in the child [4].

The complete elimination of fiber-rich foods substantially reduced the CD markers (CRP and ESR), possibly linked to the introduced supplemental diets in the second experiment, involving the total eradication of fiber-rich foods.

In few preceding studies on pediatric CD have reported remission or reduced CD marker value through similar dietary interventions as evidenced by CRP, ESR, and fecal cal protect in values in present case [11].

Many researchers have hypothesized that nutritional intervention as a supplementary protocol has led to positive immune responses [9]. This available evidence indicates that a well-planned dietary regime has a therapeutic role in the management of Crohn's disease when there is a need to improve the inflammation levels of patients with Crohn's as an addition to primary drug therapy.

Different dietary protocols during each of the 3 months suggest a different response in the infection rates.

The primary benefits of a dietary regimen in CD are closely tied to improvements in nutritional status and reduced infection rates. The child's health trajectory, whether progressing or deteriorating, is observed through markers like CRP and ESR, with changes observed every three months serving as conclusive evidence for the hypothesis.

### IV. CONCLUSION

This study implies that the reduction in inflammation is aligned with an improvement in the patient's clinical symptoms, substantiating the hypothesis that dietary intervention can have a favorable effect on disease activity in pediatric patients with CD.

The key take away from this case report is that nutritional balance along with medicinal therapy is best prescribed for pediatric Crohn's disease, not only to bring the inflammation down but also to influence long-term remission.

Although a case report suggests favorable outcomes with proper dietary intervention, it is imperative to conduct a double-blind randomized controlled trial (RCT) with a larger sample size to validate and confirm these promising results.

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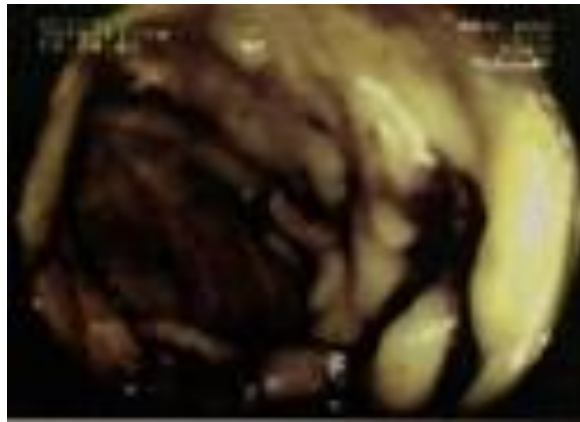


Fig. 1: Colonoscopy finding- Bowel Ulcerations prior to initiation of treatment plan.



Fig. 2: Result of 12-Month follow-up Colonoscopy: Showing reduced Bowel Ulceration.

Table 1: Showing Quarterly Presentation of all three Marker Values with Corresponding Dietary Regimen

<b>Time</b>	<b>ESR (mm/hr)</b>	<b>CRP (mg/dL)</b>	<b>Fecal calprotectin(<math>\mu</math>g/mg)</b>	<b>Diet followed</b>
At zero month	29	10	524	Regular diet no dietary intervention
At 3 <sup>rd</sup> month	35	50	1029	Only medicines and steroid treatments
At 6 <sup>th</sup> month	25	15	543	Complete eradication of high fiber, gluten, and lactose along with medicines treatment
At 9 <sup>th</sup> month	35	20	603	Introduction of slight amounts of high fiber food (which consisted approximately 200 grams of gluten and 200 ml dairy) along with medicines
At 12 <sup>th</sup> month	5	10	54	Eliminated high -fiber foods and incorporated 50 grams of gluten and 50 ml of dairy into diet, along with regular medication