ISSN No:-2456-2165

The Relationship of Fecal Calprotectin in Inflammatory Bowel Disease and its Difference from Crohn's Disease

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Abstract:- Calprotectin makes approximately 60% of the cytosolic protein in neutrophils, which are found throughout the human body, and to a smaller extent in monocytes and macrophages. The primary fluids that contain these cells include plasma, urine, feces, saliva, and cerebrospinal fluid. Calcprotectin affects a wide range of physiological processes, such as inflammation, apoptosis, cancer, immunological regulation, and cell differentiation. Calprotectin is regarded as a positive acute phase protein and is involved in inflammation.When distinguishing between organic and functional causes of gastrointestinal illness through symptoms or clinical examination is challenging, faecal calprotectin can be helpful. In clinical practice, it is employed to distinguish between irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD), as the latter has a distinct pathophysiology despite sharing many of the same signs and symptoms. IBD is classified as an organic disease because it affects the intestinal wall, while IBS is classified as a functional condition because it affects gut motility. Faecal calprotectin also has the useful property of being a good marker of mucosal healing or inflammatory recurrence when its levels vary.Faecal calprotectin can therefore be used to monitor IBD patients and identify those who are at risk of relapsing. Fecal calprotectin is strongly associated with ulcerative colitis but weakly with Crohn's disease, where the difference was diagnosed in terms of laboratory parameters and symptoms. Both diseases are considered among the most current health problems for children and adolescents, as they are found in larger numbers among these ages than among adults.

Keywords:- *Inflammatory Bowel Disease – Crohn's Disease - Fecal Calprotectin.*

I. INTRODUCTION

Crohn's disease (CD) [MIM: 266600] and ulcerative colitis (UC) [MIM: 191390], two inflammatory bowel diseases with unclear etiologies that damage the intestines, make up the majority of inflammatory bowel disease (IBD). Constipation, diarrhea, and rectal bleeding are frequent clinical symptoms associated with chronic abdominal pain[1].

Patients with IBD have higher fecal calprotectin levels, which aids in diagnosing the condition. Our analysis leads to the conclusion that the most reliable marker for intestinal inflammation is calprotectin. Our findings support the conclusion that faecal calprotectin is the most effective measure for intestinal inflammation currently available, as well as these previously published data. However, as the results were only slightly different from the group as a whole, we are unable to definitively conclude that faecal calprotectin tests are less trustworthy in individuals with UC based on our data. Numerous research on the usefulness of calprotectin as a diagnostic tool for IBD have been reported [2, 3] .

Colonoscopy is now the gold standard for determining the intestinal mucosa's inflammatory condition and is thought to be the most accurate diagnostic technique. As a result, various endoscopic scoring systems have emerged to measure endoscopic activity in inflammatory bowel disease. Colonoscopy is unquestionably helpful, but it also has many drawbacks, like being intrusive, costly, time-consuming, and painful. Furthermore, a colonoscopy may have some unfavorable outcomes that could be harmful to the patient's health. Consequently, a precise and easily available laboratory biomarker representing intestinal mucosal inflammation would be advantageous to both physicians and patients[4].

Although helpful and frequently employed in the therapeutic management of IBD, conventional biomarkers like ESR, CRP, and blood leukocyte count convey broad patient responses rather than intestinal inflammation specifically. Conversely, FC serves as a stand-in marker for the state of the intestinal mucosa. Thus, it could be crucial if this test could accurately differentiate between diseases that are active and those that are not. This would be particularly relevant for IBD patients receiving treatment, since it might greatly assist the physician in making critical therapeutic decisions[5].

- *Calprotectin*

Is a calcium- and zinc-binding protein of the S-100 protein family that was initially isolated from blood leucocytes. It is also referred to by the names MRP8/14 and S100A8/A9[6]. It is an oligomer with a total molecular mass of roughly 36.5 kDa made up of two light (11 kDa) and one heavy (13 kDa subunit[7]. S100A8 and S100A9, the genes

encoding the calprotectin subunits, are found on chromosome 1q21[8]. MRP8 is thought to be the active component, and MRP14 stops MRP8 from degrading too soon[9].

➢ *Crohn's Disease (CD)*

The gastrointestinal tract is impacted by Crohn's disease (CD), an idiopathic inflammatory illness that is progressive and chronic. Complications include strictures, fistulas, abscesses resulting in loss of intestinal function, and perhaps intestinal excision might arise from it[10]. After being diagnosed with CD, almost half of the patients need an intestinal resection, and one-third require another procedure within the following ten years [11]. The necessity for efficient ways to track disease activity in the postoperative context is highlighted by the fact that early detection of disease recurrence is essential for predicting the ensuing clinical course[12].

➢ *Faecal Calprotectin in IBD*

Crohn's disease and ulcerative colitis are the two main types of inflammatory bowel diseases (IBDs), which are chronic illnesses caused by inflammation of the intestinal wall that cause diarrhea, abdominal pain, exhaustion, and weight loss. The disease course of IBDs is unpredictable, replete with remissions and complicated by relapses that require long-term medication and, occasionally, surgery. The incidence of IBDs is rising in both adults and children[13, 14].

Crohn's disease (CD), ulcerative colitis (UC), and inflammatory bowel disorders (IBD) are idiopathic, chronic intestinal inflammatory diseases that are lifelong and marked by recurring relapses and periods of remission[15]. These relapse episodes are usually unpredictably occurring and lack obvious triggers. A portion of patients experience ongoing symptoms without experiencing full clinical remissions [16].

For patients with UC and CD, the primary objectives of medical therapy are to effectively and persistently decrease intestinal inflammation and to elicit and prolong clinical remission. [17].

Changes in maintenance medication during symptomatic remission may be warranted if patients with ongoing intestinal inflammation or those at a significant risk of relapse are identified during clinical remission and are not represented by other objective data[18].

IBD is diagnosed and tracked using clinical, endoscopic, and radiographic criteria[19]. Predicting relapse in patients in symptomatic remission before subjective symptoms appear is one of the most difficult tasks in the management of IBD. The best course of action would be to avoid using invasive procedures like colonoscopies, which have the ability to identify even minute levels of mucosal inflammation that seem to indicate relapse. Treatment plans that solely focus on the clinical symptoms that are now present have not been able to change how IBD develops[20].

➢ *Search Methods*

A systematic search was conducted Research Gate, MDPI, JGH and JCC Database in January 2022, April 2024, May 2018 in April, 2019 using Search terms: "Inflammatory bowel disease − Crohn's disease − ulcerative colitis − fecal calprotectin – diagnostic accuracy+ Crohn's disease; Ulcerative Colitis; Faecal Calprotectin; Endoscopy; Diagnosis; Biomarker ; C-reactive protein; bowel resection; disease location+ Crohn's colitis, endoscopy remission,, isolated small intestinal Crohn's disease, ulcerative colitis + Faecal calprotectin; variability.

Reviews were searched, studied, and the conclusions we reached in this article were published in English.

➢ *Serological Markers*

The work was conducted in the Research Geat database to study the comparison between Crohn's disease and ulcerative colitis, and both Crp and ESR were taken into account. A clear significant increase was observed in people with ulcerative colitis, and this indicates that ulcerative colon is caused by infections, while Crohn's disease is not. It is related to the infections that appear on the patient. Disease activity was also studied index, as they noticed an increase in people with Crohn's disease, and it is considered a vital indicator of Crohn's disease. As for Fecal calprotectin, it was studied as an indicator in people with ulcerative colitis because there was a clear increase in them. In terms of the similarity of symptoms, there was a clear similarity in terms of diarrhea and abdominal pain. It was noted that people with ulcerative colitis suffer from severe or minimal bleeding depending on the development of the condition.

II. CONCLUSION

The most accurate indicator of mucosal inflammation in IBD, fecal calprotectin can also be used to distinguish IBD from IBS. It gauges the severity of the illness and tracks how well a treatment is working[21].

It works well as a biomarker for IBD whether combined or used alone with the disease activity indices (UCAI, CDAI). In assessing endoscopic IBD activity, FC is a very sensitive diagnostic technique, according to the findings of this systematic review and meta-analysis. When compared to CD, it seems to be more accurate in UC at the 50 μg/g cut-off level[22]. Large-scale prospective studies with careful design are necessary to address some of the constraints brought up by the high variability observed and further assess the utility of this biomarker in clinical practice. One biomarker for the identification and treatment of inflammatory bowel illness is fecal calprotectin[23].

The laboratory frequently uses immunoassays to test faecal calprotectin. In clinical settings, POC testing for faecal calprotectin is also gaining popularity [24]. There isn't currently a reference method or reference preparation for measuring calprotectin in the feces. For standardized cut-off values and traceable test results, faecal calprotectin assay standardization is required[25].

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