

## SENSITIVITY AND SPECIFICITY OF FECAL CALPROTECTIN IN DIAGNOSING INFLAMMATORY BOWEL DISEASE

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### ABSTRACT

**Background and purpose:** This study aims to find out the diagnostic value of fecal calprotectin in inflammatory bowel disease and to assess the sensitivity and specificity of this test with a brief analysis of clinical symptoms and laboratory analyzes of suspected patients. **Methods and patients:** This study was conducted at Tishreen University Hospital between the end of 2018 and the beginning of 2020, and included 60 patients who had a suspicion of the presence of inflammatory bowel disease, where demographic characteristics (age, gender), clinical and laboratory data were determined, and a qualitative calprotectin investigation was conducted. patients were then referred for gastroscopy and tissue biopsies as required, to obtain a final diagnosis. **Results:** The study included (33 male, 27 female) whose ages ranged between 16 and 80 years old. the most important clinical presentation they had was abdominal pain in 82% of them and diarrhea in all its forms 68.3% of all patients, and laboratory results showed an increase in the value of CRP at 63.3% Of them with increase in ESR in 33.3% of all cases, the incidence of disease in the total sample was 70%, i.e. 42 patients of them, while 18 patients remained without the disease (30% of the sample). the sensitivity of calprotectin in detecting the disease was 88% and the specificity 89%, while the positive predictive value was 94.87%, the negative predictive value was 76.19%, and the overall accuracy of the test was 88.33%. **Conclusions:** Fecal calprotectin is an important, and non-invasive test that has good sensitivity and specificity in orienting towards the diagnosis of inflammatory bowel disease, as the test showed reliability in the ability to distinguish the presence of an inflammatory injury in the intestinal mucosa.

**KEYWORDS:** Inflammatory bowel disease, Calprotectin.

### INTRODUCTION

The prevalence of IBD has increased over the past decades, especially in Industrialized countries around the world, and because of its delusional and widespread symptoms, it began to pose a challenge Diagnostically. for that , it began the search for other indication tools, and are easy to perform for detection and follow-up the disease. Fecal calprotectin is one of the most promising ones.<sup>[1,2]</sup>

Although calprotectin may be isolated and measured in many body fluids including plasma, urine, cerebrospinal fluid, synovial fluid, and pleural fluid, it is primarily clinically beneficial to gastroenterologists by measuring fecal concentrations as a direct evidence of mucositis.<sup>[2]</sup>

Fecal calprotectin can be measured quantitatively and

qualitatively by means of an ELISA test in stool samples to detect intestinal inflammation of any pathogen. The most common sampling method is a universal tube that has a teaspoon on its cap, capable of extracting 1 gram of stool.<sup>[1,2]</sup>

### MATERIALS AND METHODS

#### Study design and data collection

This study was conducted at Tishreen University Hospital between the end of 2018 and the beginning of 2020, and included 60 patients who had a suspicion of the presence of inflammatory bowel disease, where demographic characteristics (age, gender), clinical and laboratory data were determined, and a qualitative calprotectin investigation was conducted. patients were then referred for gastroscopy and tissue biopsies as required, to obtain a final diagnosis.

**Definitions**

**Inflammatory bowel disease**

Chronic inflammatory response in which immune, environmental, and genetic factors primarily affect the gastrointestinal tract, characterized by attacks of disease followed by periods of remission.

The term refers to two diseases, Crohn’s disease and ulcerative colitis, while the remaining 10% of cases are unspecified between the two previous types and fall under the term indeterminate.

The final diagnosis of IBD is based on correlation of clinical, laboratory, endoscopic and histological data.<sup>[3]</sup>

**Calprotectin**

It is a 36-kilodalton refractory protein linked to calcium and zinc found in human neutrophils and macrophages. The name is derived from its properties of binding calcium (cal) and antimicrobial(protect) activity.<sup>[4]</sup>

Calprotectin was first isolated from human granulocytes in 1980 by Fagerhol. It forms between 30- 60% of the cellular proteins of granulocytes, as it is released from neutrophils during periods of active inflammation.<sup>[4]</sup>

**Statistical Analysis**

Statistical analysis was performed by using IBM SPSS version 20. Basic Descriptive statistics included means,

standard deviations (SD), Frequency and percentages.

Sensitivity: the extent to which the test revealed disease states in the studied sample.

Specificity: the extent to which the test excludes disease cases in the studied sample.

Positive predictive value: The possibility that the person has a true disease and the test result is positive.

Negative predictive value: The possibility that the person is free of disease and the test result is negative.

**RESULTS**

The research included 60 adult patients (33 males and 27 females) went to Tishreen University Hospital from the December 2018 until the January 2020, who had clinical suspicion one of the types of inflammatory bowel disease.

The patients were subjected to a clinical examination and routine lab tests, and their qualitative stool calprotectin was performed to give a (positive) or (negative) result, and then they were referred for upper or lower digestive endoscopy with biopsies and histological study to make the final diagnosis.

The ages ranged between (16) years and (80) years, with median of (35) years.

**Table (1): Clinical symptoms directed towards the presence of inflammatory bowel disease. Note that the patient may pretend to have more than one symptom.**

Symptoms	Number	Prec.
Abdominal pain	49	81.6%
Chronic diarrhea	41	68.3%
GI Bleeding	18	30%
Fever	29	48.3%
Weight lose	37	61.6%
Vomiting	11	18.3%

**Table (2): Lab results that directed towards the presence of inflammatory bowel disease. Note that the patient may pretend to have more than one abnormal lab result.**

Lab result	Number	Prec.
WBC (More than 10000 / ml)	24	40%
CRP (More than 6mg/dl )	38	63.3%
Elevated ESR	20	33.3%

**Table (3): Calprotectin results in the studied groups.**

Fecal calprotectin	All the sample n = 60 (100%)	IBD Group n = 42 (70 %)	None – IBD Group n = 18 (30 %)
Positive	39 (65 %)	37 (88.10 %)	2 (11.11%)
Negative	21 (35 %)	5 (11.90 %)	16 (88.89%)

Concluding from the previous table, the sensitivity of calprotectin is 88.10% and The specificity of calprotectin is 88.89%. Positive predictive value PPV = 94.87% and Negative predictive value NPV = 76.19%. Positive likelihood ratio (LR +) = 7.93 and Negative likelihood ratio (LR-) = 0.13. The overall accuracy of the test is

88.33%.

**DISCUSSION**

This research was conducted to study the diagnostic value of fecal calprotectin as an easy and non-invasive

method in patients with inflammatory bowel disease.

It is important to know the true link between clinical suspicion, endoscopic data, and stool calprotectin in diagnosing the disease, and this determines the extent of our understanding of the symptoms, the mechanism of the disease, and later the treatment methods.

Clinical suspicion alone was able to give a correct result and expectation of the existence of the disease in about 70% of the cases, which is an important percentage that confirms the existence of sufficient experience and perception of the clinical trials of the disease.

There is a difference between international studies on the sensitivity and specificity of calprotectin. In general, the results of our study reflect an acceptable average value in terms of sensitivity and specificity (88.10% and 88.89%, respectively).

In comparison with the previous studies, Erbayrak *et al* (2009) found that fecal calprotectin has 100% sensitivity, and 94% specificity in diagnosing IBD.<sup>[5]</sup> vanRheenen *et al* (2009) found that fecal calprotectin has 93% sensitivity, and 96% specificity in diagnosing IBD.<sup>[6]</sup> Von Roon *et al* (2006) found that fecal calprotectin has 95% sensitivity, and 95% specificity in diagnosing IBD.<sup>[7]</sup> Carroccio *et al* (2000) found that fecal calprotectin has 64% sensitivity, and 80% specificity in diagnosing IBD.<sup>[8]</sup> Geert D'Haens *et al* (2011) found that fecal calprotectin has 71% sensitivity, and 79.5% specificity in diagnosing IBD.<sup>[9]</sup>

## CONCLUSION

Fecal calprotectin is an important, and non-invasive test that has good sensitivity and specificity in orienting towards the diagnosis of inflammatory bowel disease.

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