Assessment of serum B-Cell Activating Factor level as a marker of disease activity in a cohort of Egyptian patients with Inflammatory Bowel Disease

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Abstract

Background: Diagnosis of Inflammatory Bowel Disease (IBD) requires clinical examination, serology, radiology, endoscopic and histopathological data. Employment of non-invasive biomarker with high specificity and sensitivity is needed. B-Cell activating factor (BAFF) is one of the tumor necrosis factor members. Myeloid cells are the main producers of BAFF, and its function is to regulate the survival of mature B cells and their development into plasma cells that produce antibodies.

Objectives: Our objective was to assess serum B-Cell Activating Factor level as a marker of disease activity in IBD patients.

Patients and methods: 90 patients were included, 30 Crohn's disease (CD) patients, 30 Ulcerative Colitis (UC) patients and 30 healthy control subjects. BAFF level was measured in serum samples by enzyme-linked immunosorbent assay (ELISA). CD simple endoscopic score was used for Crohn's disease (SES-CD) and the Crohn's disease activity index (CDAI) and for UC Mayo score.

Results: The mean serum BAFF in CD group (8.26 ± 5.72pg/ml) and UC group (9.70 ± 8.93pg/ml) was significantly higher than in control group (3.28 ± 0.99 pg/ml) p2= 0.007, p3<0.001), and no significant difference between CD and UC group p1= 0.635. Serum BAFF correlates with inflammatory markers like Erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), fecal calprotectin (FC) in patients with active CD, active UC patients (p<0.001).

Conclusion: Serum BAFF could be utilized to evaluate disease activity in IBD patients as it correlates positively with disease activity indices in UC and CD.

Keywords: Inflammatory Bowel Disease; CD; UC; Serum BAFF.

DOI: 10.21608/SVUIJM.2025.345484.2053

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Received: 24 April, 2025.

Revised: 16 May, 2025.

Accepted: 18 May, 2025.

Published: 19 May, 2025

Cite this article as Khaled Ali Abdelatty, Moamen Ayman Fawzy, Wafaa Mohamed Hussein Elsheikh, Samar Mohamed Elfikky, Rasha Mohamed Adel Nassra, Hussein Mahmoud Hussein Saad. (2025). Assessment of serum B-Cell Activating Factor level as a marker of disease activity in a cohort of Egyptian patients with Inflammatory Bowel Disease. SVU-International Journal of Medical Sciences. Vol.8, Issue 1, pp: 1276-1287.

Introduction

Inflammatory bowel disease (IBD), an immune disease, comprises Crohn's disease (CD) and ulcerative colitis (UC), sharing some features with different pattern, in 10-15% of the cases CD cannot be differentiated from UC and this clinical behavior is called IBD type unclassified **(Malik, 2015).**

IBD has been a problem with progressively increasing incidence and prevalence around the whole world. It was exclusively found until very recently in industrialized countries of North America, Europe, Australia, and New Zealand. The most recent statistics found that prevalence is also growing in newly industrialized and developing countries in South America, Africa and Asia mirroring the increasing number of the diseased individuals over the globe **(Kaplan, 2015).**

There is no definite cause to IBD, however, it is believed that it is the result of an integration between environmental factors and unregulated immune response directed at pathogenic microorganisms or altered gut microbiota in genetically susceptible individuals **(Wang et al., 2010).**

There's no single gold standard tool in diagnosing IBD. Multiple tools are required. Diagnosis requires combination of clinical data, serology, radiology, endoscopic and histopathological data **(Margo et al., 2020).**

C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) are most commonly used **(Sturm et al., 2019).**

In the acute phase response, white blood cells (WBCs) increase and is also affected by drugs used in IBD as azathioprine and 6-mercaptopurine (decreased) and glucocorticoid (increased) **(Lichtensein et al., 2018).**

Stool markers are rapid, non-invasive, and uncomplicated methods that are widely employed to evaluate activity in patients with IBD. They include multiple ones like fecal calprotectin (FC), fecal lactoferrin, fecal neopterin **(Colombel et al., 2017).**

P-ANCAs and ASCAs are serological markers that serve as indicators for UC and CD, respectively. Their limited utility as diagnostic serologic markers for IBD mainly results from their reduced sensitivity while they can be used as prognostic markers **(McCurdy et al., 2019)**

Serum B-cell activating factor (BAFF), a peptide glycoprotein consisting of 285 amino acids that is glycosylated at location 124. Predominantly, it is generated by myeloid cells (monocytes, macrophages, dendritic cells and neutrophils) and is a member of the tumor necrosis factor (TNF) superfamily **(Kumric et al., 2021).** BAFF has been found to be as a cytokine that primarily impacts T and B cells. It regulates the secretion of numerous costimulatory molecules, activates proinflammatory cytokine secretion, and enhances the survival of human cells like monocytes **(Chu et al., 2007).** Increased serum level of BAFF elevates serum antibody levels and enhances B-cell proliferation **(Chang et al., 2006).**

In addition to its involvement in disease flares, BAFF is also present in the pathogenetic substrate of IBD. BAFF's involvement in the pathogenesis of IBD was detected after the identification of increased levels of BAFF mRNA and BAFF protein in colonic biopsies obtained from IBD patients. Moreover, Mononuclear cells of the lamina propria exhibited a preponderance of BAFF in inflamed

regions of the UC mucosa **(Deccenko et al., 2010).**

Patients and methods

Subjects

It was a prospective study including 90 patients who were recruited from the IBD clinic in Alexandria Main University Hospital (AMUH) from May 2023 to May 2024, blood and stool samples were collected.

The Sample Size was calculated at The Medical Research Institute (MRI) in Alexandria to be at least 72.

Patients were categorized as follows: Group I: included sixty patients diagnosed with IBD based on clinical, laboratory, endoscopic and histopathological examination and were divided into 2 subgroups: Group Ia: included 30 CD patients; Group Ib: included 30 UC patients. Both groups were further subdivided according to Montreal classification of severity to S1, S2 and S3. Group II: was a control group that included 30 age and sex matched normal subjects.

All participants were required to provide written informed consent. Adult patients of both sex, who can give consent either by themselves or by their guardians with CD or UC according to ECCO criteria of diagnosis were included while the exclusion criteria were patients on corticosteroid therapy for the past three months, gastrointestinal malignancy, autoimmune diseases as rheumatoid arthritis, type 1 DM, coronary artery disease, pregnancy, severe burn, sepsis, chronic renal and liver diseases, refusal to be involved in the study.

Ethical approval code: 0107200, where the study was conducted in a way that respects the rights and dignity of the included patients. All procedures performed in the study involving human participants followed the ethical standards of the institutional research committee (Medical Research Ethics Committee of Alexandria Faculty of Medicine, Egypt).An informed written consent was obtained from each patient before inclusion in the study.

Clinical Procedures

Each individual patient underwent the following:

1. Detailed history taking with emphasis on: symptoms of gastrointestinal diseases as abdominal pain, diarrhea, weight loss and gastrointestinal bleeding.
2. Systemic physical examination, including

a) Abdominal exam that focuses on gastrointestinal disease signs as peri-anal fistula, palpable masses or organs, tenderness

b) Extra-intestinal manifestations of IBD (pyoderma gangrenosum, pleuritis, arthritis, uveitis, erythema nodosum, spondyloarthropathies and ankylosing spondylitis).

3. Laboratory investigations included:
   a. Complete blood picture (CBC)
   b. Inflammatory markers (Quantitative CRP and ESR)
   c. Liver Enzymes (AST, ALT) and Albumin.
   d. d)Renal function tests (Urea and Creatinine)
   e. Quantitative assessment of fecal Calprotectin (FC) according to the manufactures instruction using indirect double antibody technique enzyme linked immune assay (ELISA) kits No. ORG 580 from Orgentec diagnostika (GmbH-Germany). Measuring range: 15-1000 µg/g; normal range: < 50 µg/g; slightly elevated 50-200 µg/g; significantly elevated: > 200 µg/g. Precision: intra-assay: CV< 3.7% and inter-assay: CV <11.6%.
   f. Quantitative determination of BAFF using human B cell

activation factor ELISA kit, cat. No E6530Hu Bioassay Technology Lab (BT LAB-China). Based on double antibody technique assay. The detection limits: Sensitivity: 0.048ng/ml. Precision: intra-assay: CV<8% and inter-assay: CV<10%.

4. All patients underwent ileocolonoscopy; endoscopic lesions were documented and tissue specimens were collected from inflammatory lesions mainly (granularity, aphthous and large ulcers, pseuopolyps) for histopathology analysis to validate the diagnosis and evaluate the disease's activity.
5. Assessment of disease activity:

- The SES-CD endoscopic assessment of Crohn's Disease (CD) patients varies based on the number and size of ulcers, affected areas, and stricture in the five colonic segments (rectum, left colon, transverse colon, right colon, and ileum). Patients in remission have scores 0-2, score 3-6 is mild endoscopic activity, Score of 7-15 is of moderate endoscopic activity and score of more than 15 is of severe endoscopic activity). The Crohn's Disease Activity Index (CDAI) is used to assess patients' clinical symptoms, including fluid stool, abdominal pain, general wellbeing, complications (arthritis, arthralgia, erythema nodosum, pyoderma gangrenosum, aphthous ulcerations, anal fissure, anal abscess, fever more than 37 degrees in the past week and intestinal obstruction), opiates use, abdominal masses, and deviation from normal hematocrit and weight. The scoring scales are: inactive (<150), mild (150 – 220), moderate (> 220 - 450), and severe (> 450) **(Sturm et al., 2019).**
- The Mayo score is used as clinical and endoscopic tool for assessing UC patients, ranging from 0-12, based on factors such as stool frequency, rectal bleeding, endoscopic findings, and physician global assessment, with scores ranging from 0-3 **(Sturm et al., 2019).**

Statistical analysis

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. The Shapiro-Walk test was used to verify the normality of the data. Quantitative data were described using range (minimum and maximum), mean, standard deviation, median and interquartile range (IQR). One-way analysis of variance (ANOVA) and post-hoc tests were applied when appropriate. To compare qualitative variables, the Chi-Square was applied when appropriate. To evaluate correlations between various quantitative variables, the Pearson Correlation Coefficient was utilized. P 0.05 or less is considered significant. Receiver operating characteristic curve (ROC): It is generated by plotting sensitivity (TP) on Y axis versus 1-specificity (FP) on X axis at different cut off values. The area under the ROC curve denotes the diagnostic performance of the test. Area more than 50% gives acceptable performance and area about 100% is the best performance for the test. The ROC curve allows also a comparison of performance between two tests.

Results

The current study analyzed sixty patients with inflammatory bowel disease, allocated into two subgroups, and thirty subjects as a control group. Thirty-one males and fifty-nine females were included. The age in group Ia (CD) ranged from 22 to 55 years, with mean ± SD of 36.17 ± 9.25 years while in group Ib (UC) ranged

from 20 to 55 years, with mean ± SD of 36.40 ± 10.59 years. The age in group II (control) ranged from 27 to 41 years, with mean ± SD of 33.57 ± 4.64 years, with no statistically significant difference existing between the two groups. Anal fistula was significantly higher in group Ia when compared with group Ib. There was no significant difference between group Ia and group Ib regarding weight loss, tenderness, palpable mass, organomegaly, and EIM. The descriptive classification of the included CD and UC patients were illustrated in **(Tables 1-3**).

Table 1. CD descriptive classification based on CDAI in group Ia (n = 30)

CDAI	No.	%
Inactive (<150)	7	23.3
Mild (150 – 220)	7	23.3
Moderate (>220- 450)	8	26.8
Severe (>450)	8	26.7
Min. – Max.	110.0 – 595.0	
Mean ± SD.	299.47 ± 162.86	
Median (IQR)	316.50 (150.0 – 455.0)	

Table 2. CD descriptive classification based on SES–CD in group Ia (n = 30)

SES –CD	No.	%
Inactive (0 - 2)	7	23.3
Mild (3 - 6)	7	23.3
Moderate (7 - 15)	11	36.7
Severe (>16)	5	16.7
Min. – Max.	0.0 – 20.0	
Mean ± SD.	7.40 ± 5.49	
Median (IQR)	7.0 (5.0 – 8.0)	

Table 3. UC descriptive classification based on MAYO SCORE in group Ib (n = 30)

MAYO score	No.	%
Inactive (≤2)	6	20.0
Mild (3 - 5)	7	23.3
Moderate (6 - 10)	10	33.3
Severe (11 - 12)	7	23.3
Min. – Max.	1.0 – 12.0	
Mean ± SD.	6.17 ± 3.54	
Median (IQR)	6.0 (3.0 – 8.0)	

The mean CRP in group Ia and group Ib cases was significantly higher than that in group II (p2 = 0.027 and p3 = 0.007). The mean ESR was significantly elevated in group Ib and in group Ia compared to the mean ESR in group II (p2 < 0.001, p3 < 0.001), (**Table.4**). The mean albumin in group Ia cases and in group Ib cases were significantly lower compared to group II and no significant difference, (**Table.5**). The mean FC values were significantly higher in group Ia and group Ib compared to group II (p2 < 0.001, p3< 0.001). Group Ib had a significantly higher mean FC than group Ia, (**Table.6**). The mean serum BAFF in group Ia (8.26 ± 5.72pg/ml)

and in group Ib (9.70 ± 8.93pg/ml) was significantly higher than in group II (3.28 ± 0.99 pg/ml) p2= 0.007, p3 < 0.001). However, the mean BAFF level in group Ia and in group Ib showed no statistically significant difference p1= 0.635, (**Table.7**).

Table 4. Comparison between the three studied groups regarding inflammatory markers

Inflammatory markers	Crohn`s Group Ia (n = 30)	UC Group Ib (n = 30)	Control Group II (n = 30)	F	P
CRP (mg/l)					
Min. – Max.	0.60 – 74.00	0.50 – 60.00	0.80 – 2.60	5.581	0.005
Mean ± SD.	11.56 ± 19.03	13.21 ± 14.09	2.27 ± 0.53		
Median (IQR)	3.50 (2.5 – 10)	8.10 (3 – 18)	2.50 (2.3 – 2.6)		
Sig. bet. grps.	p1 = 0.886, p2 = 0.027*, p3 = 0.007*				
ESR (mm/hr)					
Min. – Max.	5.00 – 112.0	5.0 – 90.0	1.40 – 6.0	27.772	<0.001
Mean ± SD.	33.39 ± 30.64	46.97 ± 26.80	2.81 ± 1.10		
Median (IQR)	20 (10 – 45)	49.0 (25 – 49)	2.45 (2 – 3)		
Sig. bet. grps.	p1 = 0.071, p2 < 0.001*, p3 < 0.001*				

*: significant; F: One-way ANOVA test, Pair-wise comparison bet. each 2 groups were done using Post Hoc Test (Tukey); p1: p value for comparing between group Ia and Ib; p2: p value for comparing between group Ia and II; p3: p value for comparing between group Ib and II; IQR: Inter quartile range; SD: Standard deviation

Table 5. Comparison between the three studied groups regarding S. albumin

Serum albumin	Group Ia (n = 30)	Group Ib (n = 30)	Group II (n = 30)	F	p
Min. – Max.	2.22 – 4.12	2.90 – 4.20	3.50 – 4.80	22.697	< 0.001*
Mean ± SD.	3.30 ± 0.44	3.45 ± 0.36	3.94 ± 0.34		
Median (IQR)	3.32 (3.02 – 3.62)	3.50 (3.10 – 3.80)	3.90 (3.70 – 4.20)		
Sig. bet. grps.	$p_1 = 0.259$, $p_2 < 0.001$*, $p_3 < 0.001$*				

*: significant; F: One-way ANOVA test, Pair-wise comparison bet. each 2 groups were done using Post Hoc Test (Tukey); p1: p value for comparing between group Ia and Ib; p2: p value for comparing between group Ia and II; p3: p value for comparing between group Ib and II; IQR: Inter quartile range; SD: Standard deviation

Table 6. Comparison between the three studied groups regarding fecal calprotectin

Fecal calprotectin	Group Ia (n = 30)	Group Ib (n = 30)	Group II (n = 30)	F	p
Min. – Max.	19.0 – 620.0	26.0 – 940.0	15.0 – 75.0	51.603	<0.001
Mean ± SD.	301.0 ± 154.7	478.3 ± 249.1	36.43 ± 15.90		
Median (IQR)	299.5 (199.0 – 420.0)	447.5 (280.0 – 680.0)	35.0 (25.0 – 45.0)		
Sig. bet. grps.	$p_1 < 0.001$*, $p_2 < 0.001$*, $p_3 < 0.001$*				

*: significant; F: One-way ANOVA test, Pair-wise comparison bet. each 2 groups were done using Post Hoc Test (Tukey); p1: p value for comparing between group Ia and Ib; p2: p value for comparing between group Ia and II; p3: p value for comparing between group Ib and II; IQR: Inter quartile range; SD: Standard deviation

Table 7. Comparison between the three studied groups regarding serum BAFF

BAFF	Group Ia (n = 30)	Group Ib (n = 30)	Group II (n = 30)	F	P
Min. – Max.	3.10 – 28.00	1.50 – 26.70	1.60 – 5.10	9.001*	<0.001
Mean ± SD.	8.26 ± 5.72	9.70 ± 8.93	3.28 ± 0.99		
Median (IQR)	6.40 (5.2 – 7.5)	4.80 (4.0 – 19.90)	3.30 (2.70 – 4.0)		
Sig. bet. grps.	p1= 0.635, p2= 0.007, p3<0.001				

The serum BAFF correlates with inflammatory markers (FC, CRP, ESR) in active CD patient ($p < 0.001$). It was also found that the serum BAFF correlated with inflammatory markers (FC, CRP, ESR) in active UC patients ($p < 0.001$). Also, this table showed that serum albumin negatively correlated with disease activity ($p < 0.001$), (**Table.8, Fig. 1,2**).

Table 8. Correlation between BAFF and different parameters in each group

Variables	BAFF			
	Group Ia (n = 30)		Group Ib (n = 30)	
	r	P	r	P
CRP	0.593	0.001	0.623	<0.001
ESR	0.830	<0.001	0.760	<0.001
Serum albumin	-0.699	<0.001	-0.608	<0.001
Fecal calprotectin	0.770	<0.001	0.875	<0.001
CDAI	0.704	< 0.001	-	-
SES -CD	0.660	<0.001	-	-
MAYO score	-	-	0.925	<0.001

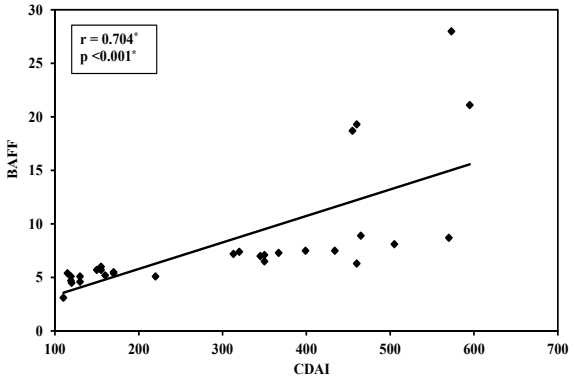

Fig. 1. Correlation between BAFF and CDAI in group Ia

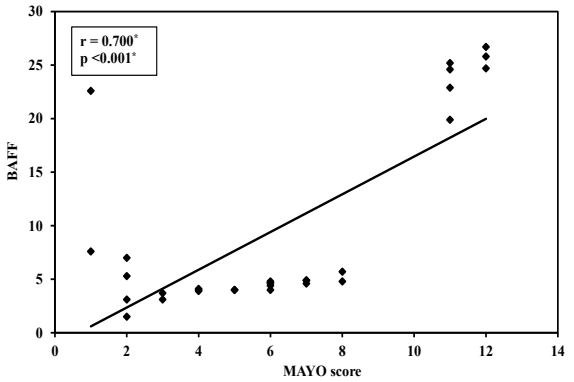

Fig.2. Correlation between BAFF and MAYO score in group Ib

Regarding ROC curve, serum BAFF could significantly discriminate CD patients from control group at cut off value > 4.9 (ng/ml) with a sensitivity, specificity, PPV as well as NPV was 86.67%, 96.67%, 96.3% and 87.9%, respectively ($p < 0.001$), (**Table.9, Fig.3**).

Table 9. ROC curve characteristics of BAFF to discriminate Crohn`s patients (n = 30) from control (n = 30) (group Ia vs II)

Variable	AUC	p	95% C. I	Cut off#	Sensitivity	Specificity	PPV	NPV
BAFF	0.967	< 0.001*	0.926 – 1.008	> 4.9 (ng/ml)	86.67	96.67	96.3	87.9

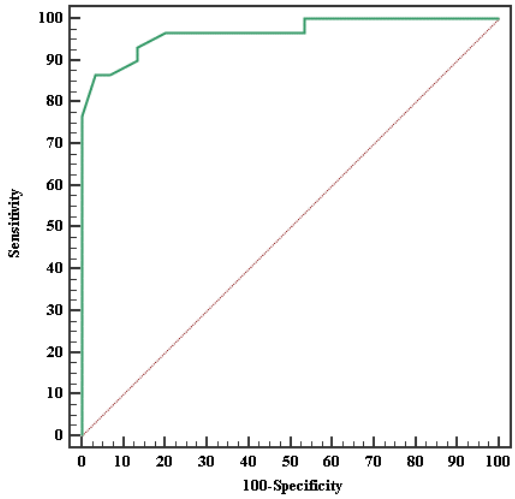

Fig.3. ROC curve for BAFF to discriminate Crohn`s patients from control

BAFF can significantly discriminate UC patients from control at cut off value >3.7 ng/ml, with a sensitivity, specificity, PPV as well as NPV was 86.67%, 73.33%, 76.5% and 84.6% respectively ($p < 0.001$), (**Table.10, Fig.4**).

Table 10. ROC curve characteristics of BAFF to discriminate UC patients (n = 30) from control (n = 30) (group Ib vs II)

Variable	AUC	p	95% C. I	Cut off#	Sensitivity	Specificity	PPV	NPV
BAFF	0.844	<0.001*	0.744 – 0.945	> 3.7 (ng/ml)	86.67	73.33	76.5	84.6

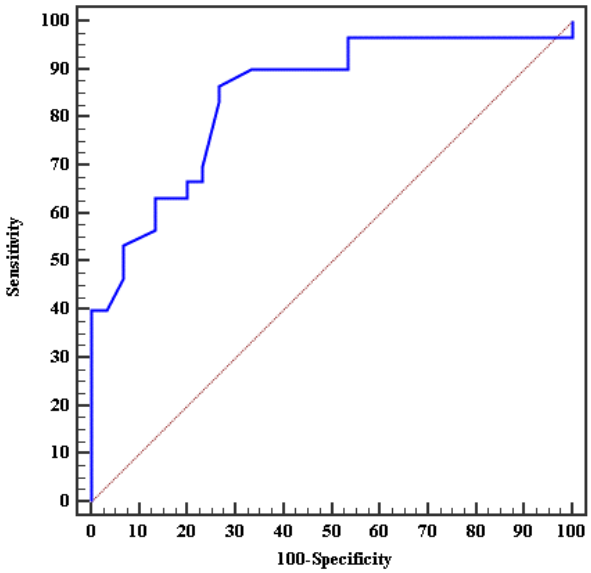

Fig.4. ROC curve for BAFF to discriminate UC patients from control

Discussion

IBD is a chronic, remitting and relapsing disease process characterized by immune-mediated inflammation of the gastrointestinal mucosa, it comprises two main diseases: UC and CD. Clinical manifestations include chronic diarrhea, constipation, abdominal pain, GIT bleeding, fatigue, weight loss **(Malik, 2015).**

IBD's exact etiology remains unknown, however, the prevailing theory suggests that it is the result of an interaction between environmental factors and dysregulated immune response directed at pathogenic microorganisms or altered gut microbiota in genetically susceptible individuals **(Wang et al., 2010).**

The current study revealed that group Ia and group Ib exhibited significantly elevated levels of CRP and ESR in comparison to group II (P = 0.005 and p <0.001, respectively), but a comparison of group Ia and group Ib in terms of mean CRP and ESR revealed no statistically significant difference (p=0.886 & P=0.071respectively) , these findings coincides with Chang et al., study which found IBD activity is positively correlated with ESR , CRP, and this correlation is statistically significant .

The current findings revealed that FC levels were observed to be considerably greater in both group Ia and group Ib than in control subjects (P<0.001), Concurring with the findings of a recent study, **Kumric et al. (2021)** reported that the FC value of the control group was below the predetermined cut-off point. (50 mg/kg) so, colorectal inflammation is strongly correlated with FC. A study conducted in 2007 revealed comparable findings, indicating that patients with active inflammation of UC or CD had significantly elevated levels of Calprotectin in comparison to patients with IBS or inactive inflammation. (all P < 0.05).

Additionally, the present investigation revealed a statistically significant difference in FC levels between groups Ia and Ib, with group Ib having higher levels than group Ia (p<0.001) which was in line with what was reported in 2018 where 72 patients with IBD were included, consisting of (14 with isolated small intestinal CD, 23 with colonic CD, and 35 with UC). It showed that higher levels of Calprotectin were found in UC cases

and Colonic CD cases while lower levels where found in small intestine CD.

Additionally, the current investigation unveiled that group Ia and group Ib exhibited a significantly elevated serum BAFF in comparison to group II ($p<0.001$) and it also revealed that significant difference did not exist between group Ib and group Ia ($p= 0.635$).

McCurdy et al. (2019) found in a study involving 78 UC patients, 37 CD patients, and 44 healthy controls, the median (25th–75th percentile) serum BAFF concentration (pg/ml) for CD patients was 1430 (1105-1624), for UC patients it was 1472 (1018–1772), and for healthy controls it was 977 (482–1345).

Comparing healthy controls to patients with CD and UC, serum BAFF concentrations were found to be significantly elevated; however, no statistically significant differences were observed between the two patient groups, which is consistent with the present findings.

Consistent with the present findings, **Kumric et al. (2021)** that a study included 112 CD patients and 164 healthy controls, Prior to treatment, the serum BAFF concentration of CD patients (472.86 ± 223.60 pg/ml) was greater than that of controls (128.16 ± 70.10 pg/ml) which is consistent with the current findings. ($p= 0.007$). Also, in 2019, Sturm A et al reported that active UC patients had significantly elevated levels of BAFF and FC as compared with inactive UC patients and this consistent with the current results. And this suggested that BAFF could be a potential biomarker for monitoring IBD activity.

Contrary to the current findings, **Colombel. (2017)** discovered no differences in serum BAFF levels among the healthy, IBD, and IBS groups, however, fecal BAFF was found to be significantly greater in the IBD group compared to the IBS and healthy groups. In addition, UC pediatric patients had higher BAFF levels than CD patients across different types of IBD; this may be attributed to the inclusion of only mild cases of IBD and the difference in sample size.

According to the current study, the serum BAFF correlates with inflammatory markers (CRP, ESR, FC) ($p <0.001$) in group Ia and in group Ib ($p<0.001$) and this coincides with a **Kaplan et al. (2021)**, study which reported that there was positive correlation between serum BAFF, clinical disease activity and CRP.

It was also found that the serum BAFF correlates with activity index in patients with IBD, CDAI, SES-CD in group Ia and Mayo Score in group Ib ($p<0.001$), **Malik et al. (2015)** , found that BAFF level in comparison to calprotectin showed greater correlation with endoscopic inflammatory score as not only in UC (correlation coefficient [r] = 0.69, $p < 0.0001$ vs. $r = 0.58$, $p < 0.0001$), but also in CD ($r = 0.58$, $p < 0.0001$ vs. $r = 0.52$, $p = 0.0003$).

In addition, **Chang et al. (2006)** discovered that serum BAFF levels and the Mayo score in UC patients correlated positively ($r= 0.425$, $p = 0.017$) which coincides with our results.

On the other hand, another study reveal= 0.425 CDAI in CD patients did not significantly correlate with either fecal BAFF or calprotectin, but it was found that both BAFF and FCP positively correlated with Mayo score in UC patients ($r = 0.415$ and 0.365, respectively) and this was consistent with the current results.

The sensitivity of BAFF to discriminate CD patients was 86.67% in comparison to specificity 96.67 at cut off value 4.9 as shown in table (9). On the other hand, the BAFF exhibits

less specificity in UC patients of value 73.33% at the same sensitivity level of 86.67% with cut off value 3.7 to differentiate UC patients.

Our study was limited by the number of collected patients and the duration of the study and the gap (about 2 weeks) between the clinical, lab, endoscopic and histopathological examinations to be correlated at a single certain point of time to validate our BAFF with as a reliable IBD marker. This need further studies to include more patients for longer durations in the future for better statically results regarding sensitivity and specificity.

Conclusion

In conclusion, serum BAFF could be utilized to evaluate disease activity in IBD patients with high specificity and sensitivity since it correlates strongly with markers of disease activity. Therefore, its assessment provides a valuable biomarker that may be utilized to identify and follow up the level of mucosal affection in IBD.

List of abbreviations:

CD: Crohns Disease
UC: Ulcerative Colitis
FC: Fecal Calprotectin
CRP: C Reactive protein
SCCAI: Simple Clinical Colitis Activity Index

Acknowledgments: Authors are grateful to the Internal medicine department, gastroenterology and endoscopy unit Alexandria faculty of medicine and the Diagnostic radiology department, Alexandria Main University Hospital.

Author Contributions: All authors contributed to the study conception and design. All authors performed material preparation, data collection, and analysis. All authors wrote the draft of the manuscript, read, and approved the final manuscript.

Competing interests: The authors declare that they have no competing interests.

Funding: No funding received to perform the study.

Availability of data and material: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request

Consent to publication: Not applicable

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