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Original article

Evaluation of Intestinal Fatty Acid Binding Protein in Treated Inflammatory Bowel Diseases Patients

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Abstract

Background: Inflammatory bowel diseases (IBD) are a heterogeneous group of chronic relapsing diseases of the gastrointestinal tract. Intestinal fatty acid- binding proteins (I-FABP) defined as circulating or urinary markers of intestinal epithelial damage in patients with acute ischemia of the small bowel. **Aim and objectives:** to evaluate I-FABP level in the follow up of two different treated IBD patients compared to healthy control . **Patients and methods:** A cross sectional study which included 60 patients with IBD; they were divided into two equal groups, one group on conventional treatment while the other group on biological treatment, plus 30 healthy control subjects, aged from 16-70 years old. All investigations were done accordingly plus measuring I-FABP level by ELISA. **Results:** I- FABP levels were significantly elevated (p <0.000) in studied IBD cases (711 ± 105 pg/mL in conventional and 730 ± 113 pg/mL in biological) compared to control group (419 ± 51 pg/mL). Common complaint was abdominal pain in conventional group (70% versus 43.3% in biological group), while diarrhea was the most common in biological group (50% versus 20% in conventional group). Colonic left sided lesions in both groups.

Conclusion: I-FABP was of high laboratory index to be add in the evaluation of IBD patients investigations as a non-invasive tool.

Keywords: Intestinal Fatty Acid Binding Protein (I-FABP); Inflammatory Bowel Diseases (IBD).

Introduction

Inflammatory bowel diseases (IBD) are a heterogeneous group of chronic relapsing diseases of the gastrointestinal tract, represented by Crohn's disease (CD), ulcerative colitis (UC), and a smaller subgroup of patients with unclassified colitis [(1)]. In Egypt, IBD appears raising, there is marked increase in the frequency in the last 5 years with the ratio of patients diagnosed with UC to patients diagnosed with CD is approximately 6:1 and the mean age at diagnosis was 27.3 years which is the golden age which affects the economy with the male: female ratio is 1:1.15 [(2)]. Although the clinical presentation of IBD in Egypt is comparable to that reported worldwide, diagnoses were found to be delayed [(3)]. There were fewer cases of CD than UC, but more mild-to-moderate disease severity [(3)]. These findings support the hypothesis of an environmental trigger for IBD development in genetically susceptible individuals [(4)]. Adequate monitoring of disease activity is of major importance for optimizing treatment strategies and preventing long-term complications [(4)]. Clinical symptoms alone are no longer acceptable as the sole indicator of disease activity but should be used in combination with objective markers that assess inflammation [(5)]. Currently, colonoscopy is regarded as the most accurate objective measure of colorectal inflammation [(6)]. Unfortunately, IBD patients are often reluctant to be re-endoscoped during follow-up because of the invasiveness of the procedure and pain sensation during colonoscopy. Thus, in clinical practice, response to medical therapy of these patients usually relies on clinical symptoms only. Even the addition of serological markers of inflammation adds little to conventional clinical scores for predicting clinical outcome [(7)]. To date, only two studies have been published on serum I-FABP in IBD patients, they showed higher levels in active UC patients compared with healthy controls [(8)], showing its potential for colonic disease, and in active disease versus remission in CD patients on the basis of clinical activity and CRP [(9)]. This study aimed to evaluate I-FABP level in treated IBD patients (biological and conventional therapy) compared to healthy control group.

Patients and methods

This was a cross sectional study which included 60 patients and 30 healthy individuals who attended Gastroenterology outpatient clinics and IBD unit of National Hepatology and Tropical Medicine Research Institute as well as Benha University hospital according to the following criteria in a period from September 2022 to March 2023. **Inclusion criteria:** Age: from 16 to 70 years old with IBD, confirmational was made by serology, endoscopy and histology. **Exclusion criteria:** Patients who underwent previous bowel resection, pregnant women, cancer colon, ischemic colitis and infectious colitis. Patients were enrolled after obtaining their informed consent and were sub-divided into 2 groups and a control group was also enrolled. Group 1 included 30 patients on conventional therapy, while group 2 included 30 patients on biological therapy

and group 3, which included 30 healthy individuals as a control group. **All eligible patients were subjected to the following:** Proper history for each patient subjected to the study, laboratory investigations (Hb level gm/dl, WBCs m/mm3, platelet count m/mm3, CRP mg/dl, ESR mm/hr), ileocolonoscopic examination and measuring plasma I-FABP levels by ELISA.

Colonoscopy: In patients with clinical presentations suggestive of IBD, the initial evaluation should include a colonoscopy with intubation and examination of the terminal ileum [(10)]**.**

Ethical approval: consent of Benha Faculty of Medicine's research ethics committee authorizing the project was obtained {M.S.15.8.2022}.

Statistical Analysis

All data were collected, tabulated and statistically analyzed using SPSS 22.0 for windows. Data were tested for normal distribution using the Shapiro Walk test. Qualitative data were represented as frequencies and relative percentages. Chi square test ($\chi 2$) and Fisher exact was used to calculate difference between qualitative variables as indicated. Quantitative data were expressed as mean ± SD (Standard deviation) for parametric and median and range for non-parametric data. Independent T test and Mann Whitney test were used to calculate difference between quantitative variables in two groups for parametric and non-parametric variables respectively. Repeated measures ANOVA test was used to compares means across one or more variables that are based on repeated observations of normally distributed variables. While Friedman test was used for non- normally distributed variables. All statistical comparisons were two tailed with significance level of *p*- value ≤ 0.05 indicates significant, *p* <0.001 indicates highly significant difference while, *p*> 0.05 indicates non-significant difference.

Results

This cross sectional study was done on 90 subjects; their age ranged from 33.68 ± SD 8.5 years old. They were divided into 3 groups: Group 1: Thirty patients diagnosed with IBD under conventional therapy with a mean age 32.62 years old. Group 2: Thirty patients diagnosed as IBD under biological therapy, with a mean age 31.06 years old. Group 3 (Control group): Thirty individuals, with a mean age 37.36 years old.

Table (1) in IBD cases, the most predominant symptoms were abdominal pain in 56.67% then diarrhea 35%. The patients in biological group were significantly complaining from more times of diarrhea and less abdominal pain compared to patients in conventional group complaining from more abdominal pain and less times of diarrhea (*p*=0.032) with no significant differences between studied groups regarding to other clinical characteristics (*p*>0.05). 78.3% of the IBD patients had left sided colitis. Table (2) patients in biological group were significantly complaining from lower levels of Hb (11.54 ± 1.73 g/dL) and higher number of platelets (361.10±107.65 x 10^3) compared to patients in conventional group, with higher Hb (12.16 ± 1.77 g/dL) and lower number of platelets (298.9 ± 98.87 x

10^3) (p=0.024 and p=0.006 respectively). No significant differences was detected between studied groups regarding to other laboratory findings (p>0.05). Table (3), plasma FABP levels were significantly elevated in studied cases (711 ± 105 pg/mL in conventional and 730 ± 113 pg/mL in biological) compared to control group 419 ± 51 pg/mL (p=0.000). With no significant differences between conventional and biological group.

Table (1): Disease characteristics in IBD patients.

Groups Variables	Conventional group (n=30)	Biological group (n=30)	Test of significance	*p* value
Complaint				
Abdominal pain	21(70%)	13(43.3%)	FET =7.94	0.032*
Diarrhea	6(20%)	15(50%)		
Tenesmus	1(3.3%)	0(0%)		
Urgency	2 (6.7%)	1(3.3%)		
Constipation	0(0%)	1(3.3%)		
Extent				
Left-sided	22(73.3%)	25(83.3%)	FET=6.52	0.12
Terminal ileum	0(0%)	2(6.7%)		
Ileocecal	1(3.3%)	0(0%)		
Ileocecal and ascending	0(0%)	1(3.3%)		
Extensive	6(20%)	2(6.7%)		
Pancolitis	1(3.3%)	0(0%)		
Complication				
Yes	1(3.3%)	0 (0%)	0.000	1.000
No	29 (96.7%)	30 (100%)		
Mayo score				
0 (Normal)	7(24.1%)	7(25.9%)	FET=2.23	0.57
1 (Mild)	14(48.3%)	15(55.6%)		
2 (Moderate)	8(27.6%)	4(14.8%)		
3 (Severe)	0(0%)	1(3.7%)		

FET:Fisher Exact Test; *: Significant difference (p<0.05)

Table (2): Laboratory findings in IBD patients:

Variables	Conventional group (n=30)	Biological group (n=30)	Test of significance	*p* value
HB (g/dL)				
Range	7.2 – 14.9	8.3 – 14.1	t =2.34	0.024*
Mean ± SD	12.16 ± 1.77	11.54 ± 1.73		
WBCs (x10^3/cmm)				
Range	3 - 12	3.2 -10	t =0.30	0.76
Mean ± SD	6.76 ± 2.45	6.23 ± 1.77		
PLT (x10^3/cmm)				
Range	112 -573	133 - 620	t =2.89	0.006**
Mean ± SD	298.9 ± 98.87	361.10 ± 107.65		
CRP (mg/L)				
Range	2.9 - 70	0.5 - 140	t =0.96	0.34
Mean ± SD	14.97 ± 5.59	21.13 ± 7.81		
ESR (/mm)				
Range	6 – 9	8 - 80	t = 1.1	0.27
Mean ± SD	21.16 ± 19.09	23.10 ± 15.27		

*Significant(p<0.05); ** highly significant (p<0.001); HB: Hemoglobin; WBC: White blood cells; PLT: Platelets; CRP:C reactive Protein; ESR: Erythrocyte Sedimentation Rate

Table (3): plasma FABP level in all study participants:

Groups / Variables	Conventional group (n=30)	Biological group (n=30)	Control group (n=30)	test	*p* value
Plasma FABP (pg/mL)					
Range	460 -870	530 -950	360 -540	F =	0.000**
Mean ± SD	711 ± 105	730 ± 113	419 ± 51	103.35	

** highly significant: (p<0.001); FABP:Fatty Acid Binding Protein; Pg/ml=pico-gram / ml.(Youden index (J)).

Discussion

Inflammatory Bowel disease (IBD) emerged as a health problem in Egypt and worldwide . Till now there is no novel biomarker to be used as a diagnostic marker for follow up especially at era of growing up IBD at Egypt. So, this current study aimed to evaluate I-FABP level in 2 groups of treated IBD patients (biological and conventional therapy) compared to healthy control group. The present studyincluded 60 IBD patients; they were divided into two equal groups according to conventional or

biological treatment. These groups were compared with 30 control subjects with mean age of 37.36+9.6 years**.** This agrees with previouds studies[3,11], but disagree with others [2,12]**.** As regard disease extent, 78.3% of the IBD patients were left sided colitis. This agrees with the study which reported that the predominance of left sided colitis in 75.6% of the UC group[12]**.** Intestinal Fatty Acid Binding Protein (I-FABP) is considered one of the factors associated with etiopathogenesis of IBD as it can be released into the circulation as soon as the cell membrane integrity is compromised [14]**.** The results of our study revealed that plasma FABP levels were significantly elevated in studied cases (711 ± 105 pg/mL in conventional and 730 ± 113 pg/mL in biological) compared to control group 419 ± 51 pg/mL. With no significant differences when conventional compared to biological group. Also, plasma or urinary I-FABP did not differ in patients with ulcerative colitis from Controls (plasma I-FABP, ulcerative colitis: 1309 ug/mL vs controls: 938 ug/mL [616, 1140], p = 0.301, that disagree with our results [14].

So the evaluation and diagnostic value of plasma FABP level in IBD patients in the present study proved valuable to be used.

Conclusion

I-FABP was of high laboratory index to be add in the evaluation of IBD patients investigations as non-invasive tool.

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