

## Belief about Medications among Sample of Iraqi Patients with Inflammatory Bowel Disease

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### Abstract

Inflammatory bowel disease includes both Crohn's disease and ulcerative colitis, is a chronic, progressive relapsing disease of gastrointestinal tract that require long-term treatment or maintenance therapy. Taking patient's beliefs about the prescribed medication in consideration had been shown to be an important factor that affects compliance of the patient in whom having positive beliefs is a prerequisite for better compliance. The aim of the current study was to investigate and assess beliefs about medicines among a sample of Iraqi patients with inflammatory bowel disease and to determine possible association between these beliefs and some patient-specific factors.

This study is a cross-sectional study carried out on 150 already diagnosed inflammatory bowel disease patients who attended the Gastroenterology and Hepatology Teaching Hospital/Medical City/Baghdad. The mean age of the patients was (31.7 ± 11.4 years). The number of ulcerative colitis patients was 74, while the number of Crohn's disease patients was 76. Belief about medicines was measured using the Arabic version of the beliefs about medicines questionnaire. The majority of the patients (58%) had strong beliefs in the necessity of treatment (specific-necessity score greater than specific-concern). For all patients (ulcerative colitis and Crohn's disease together), there was a significant inverse correlation between male gender and specific concern score. Number of infliximab doses directly correlated with specific necessity score and inversely correlated with specific concern score. Future studies should investigate how interventional approaches addressing these predictors may lead to improve beliefs about medicines among inflammatory bowel disease patients and their impact on disease control.

**Key words:** Inflammatory bowel disease, Beliefs about medicines, Beliefs about medicines questionnaire, Crohn's disease, Ulcerative colitis.

المعتقدات عن الأدوية لدى مرضى داء الامعاء الالتهابي العراقيين  
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### الخلاصة

ان مرض التهاب الامعاء والذي يضم مرضى التهاب القولون التقرحي ومرض كرون هو مرض مزمن متفاقم ومنتكس يصيب الامعاء ويحتاج الى العلاج بصورة مستمرة وعلى مدى طويل. مع الأخذ بعين الاعتبار ان معتقدات المريض حول الدواء الموصوف تعد واحدة من أهم العوامل التي تؤثر على الالتزام بالعلاج، حيث ان المعتقدات الإيجابية حول الأدوية هي شرط أساسي للالتزام بالعلاج الموصوف للمريض. الهدف من الدراسة الحالية هو فحص وتقييم المعتقدات حول الأدوية لدى مرضى التهاب الامعاء وتحديد الارتباط المحتمل بين هذا الاعتقاد وبعض العوامل الخاصة بالمريض. هذه الدراسة هي دراسة مستعرضة أجريت على 150 مريض تم تشخيصهم سابقا بمرض التهاب الامعاء (متوسط العمر 31.7 ± 11.4 سنة). عدد مرضى التهاب القولون التقرحي كان 74 مريضا اما عدد مرضى كرون فكان 76 مريضا. تم تقييم المعتقدات عن الادوية باستخدام النسخة العربية من استبيان المعتقدات عن الادوية. وكان لدى غالبية المرضى (58%) معتقدات قوية في ضرورة العلاج (نسبة ضرورة العلاج كانت أكبر من نسبة القلق من الآثار الجانبية والمستقبلية للأدوية). بالنسبة للمرضى جميعهم (مرضى التهاب القولون التقرحي ومرض كرون) وجد هناك ارتباط معنوي عكسي بين جنس الذكور وبين معيار القلق الخاص. اما عدد جرعات دواء انفليكسيماب فقد ارتبط طرديا مع معيار الحاجة الخاصة وعكسيا مع معيار القلق الخاص. يجب ان تبحث الدراسات المستقبلية كيف يمكن للتدخلات المهمة بهذه العوامل ان تحسن من المعتقدات حول الادوية لدى مرضى داء الامعاء الالتهابي وتأثير ذلك على السيطرة على المرض.

الكلمات المفتاحية: داء الامعاء الالتهابي، المعتقدات حول الادوية، استبيان المعتقدات حول الادوية، مرض كرون، التهاب القولون التقرحي.

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## Introduction

Inflammatory bowel disease (IBD) includes both Crohn's disease (CD) and ulcerative colitis (UC), is a chronic, progressive and relapsing disease of gastrointestinal tract, that is characterized by epithelial injury and intestinal inflammation<sup>(1-4)</sup>. The exact etiology of IBD is still not fully understood, however, it is clear that many etiologic factors, including genetic susceptibility, the gut flora, and environmental exposures, are important contributors to the IBD<sup>(5)</sup>. In general, symptoms may be similar in both patients with UC or CD<sup>(6)</sup>. Symptoms vary from mild to severe during relapse which may decrease or disappear during remission<sup>(7)</sup>. Amino salicylates drugs are among the most commonly pharmacological therapy used for both inducing and maintaining of remission in patients with mild-moderate IBD<sup>(6)</sup>. Corticosteroids are used mainly as "rescue" therapy for patients experiencing flare of the disease<sup>(8)</sup>. Immunosuppressants (e.g., azathioprine) are used to maintain remission in both forms of IBD<sup>(9)</sup>. Several biological agents are currently available (e.g., infliximab) to treat IBD patients<sup>(10)</sup>. The patients usually weigh the benefits of drugs against its potential risks<sup>(11)</sup>. Accordingly, two medication beliefs categories were proposed by Horne *et al*, i.e., necessities and concerns. Patients can have concerns about the possible unwanted harmful long-term effects as well as dependence on their medication<sup>(12)</sup> whereas necessity beliefs are related to the expected beneficial effects of a drug on health<sup>(13)</sup>. Accordingly, taking patient's beliefs about the prescribed medication in consideration had been shown to an important factor that affects compliance of the patient where having positive beliefs is a prerequisite for better compliance<sup>(14-16)</sup>. To measure beliefs about medicines, the Beliefs about Medicines Questionnaire (BMQ) was developed by Horne *et al*<sup>(17)</sup>. The aim of the current study was to investigate and assess beliefs about medicines among a sample of Iraqi patients with inflammatory bowel disease and to determine possible association between this belief and some patient-specific factors.

## Patients and Method

### Patients

The current cross-sectional study was carried out on 150 already diagnosed IBD patients who attended the Gastroenterology and Hepatology Teaching Hospital/Medical City/Baghdad during September 2017 till January 2018. The mean age of the patients was (31.7 ± 11.4 years). The number of UC patients

was 74 (49.3%) while the number of CD patients was 76 (50.7%).

### Inclusion criteria

The inclusion criteria for the current study were:

- 1-IBD patients who are aged 18 years or more of either sex.
- 2-Disease duration of 6 months or more.
- 3-Patients are taking at least one drug on regular base.
- 4-Patients have not changed their drugs on the last three month.
- 5-Patients should be able to communicate effectively and willing to participate in the study.

### Exclusion criteria

The exclusion criteria for this study were:

- 1-Patient who had speech, hearing, or cognitive deficits that would affect their understanding of the questions.
- 2-Patient being on treatment for any psychological or neurological diseases.
- 3-If they were receiving no drug.
- 4-Patients providing conflicting or incomplete information also excluded.

### Method

#### The questionnaires

In the current study, belief about medicines was measured using the Arabic version<sup>(18)</sup> of the beliefs about medicines questionnaire (BMQ) developed by Horne *et al*<sup>(17)</sup> (figure-1). The BMQ includes two parts; general and specific. The specific part evaluates patients' beliefs about medications given for a specific disease and in turn, it contain two subparts; specific necessity of prescribed drugs for a particular disease (5 statements) and specific concern about the potential adverse unwanted consequences of drugs (5 statements). The general part of the BMQ is about beliefs about medicines in general and also contains two subparts, the general overuse part about the way in which drugs are prescribed by the doctors (4 statements) and the general harm part which evaluates the degree to which patients perceive drugs as harmful. Patients answered each question in subparts using a 5-point likert scale, where: 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree. Thus, points of each question are summed to give the score. Higher specific necessity scores indicate stronger personal need for the drugs. Higher specific concerns scores indicate stronger concerns about the adverse effects of the drugs. Higher scores on the general harm part indicate more negative views about drugs

as a whole while higher scores on the general overuse part indicate more negative views about

the way in which drugs are prescribed and that they are overused by doctors <sup>(18)</sup>.

	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Uncertain</b>	<b>Agree</b>	<b>Strongly agree</b>
<b>Specific necessity</b>					
1-My life would be impossible without medicine					
2-Without medicine I'll be very ill					
3-My health , at present depend on my medicine					
4-My medicine protected me from becoming worse					
5-My health in the future depends on my medicine					
<b>Specific concern</b>					
6-I sometimes worry about the long term effect of my medicine					
7-Having to take medicine scares me					
8-I sometimes worry about becoming too dependent on my medicine					
9-My medicine disrupt my life					
10-My medicines are mystery to me					
<b>General-Harm</b>					
11-People who take medicines should stop their treatment for a while every now and again					
12-Most medicines are addictive					
13-Medicines do more harm than good					
14-All medicines are poison					
<b>General-Overuse</b>					
15-Natural remedies are safer than medicines					
16-Doctors use too many medicines					
17-Doctors place too much trust on medicines					
18-If doctors had more time with their patients they would prescribe fewer medicines					

**Figure 1.** The beliefs about medicines questionnaire (BMQ) <sup>(17)</sup>.

**Study design**

**The pilot study**

A pilot study was carried out on ten IBD patients to test and optimize the Arabic words of the questionnaires used in the current study,

the data obtained from this study was not included in the major study.

**Administration of questionnaires**

The data related to the study were collected by the researcher. When the patients arrived to the hospital to receive their programmed doses of biological agent, they were asked if they accept to participate in the study, a complete explanation to the questions in the questionnaire was done and each patient spent about 5 minutes to fill the research questionnaire completely.

**Statistical analysis.**

Discrete variables presented using their number and percentage, chi square test used to analyze the discrete variable. Two samples t-test used to analyze the differences in means between two groups (if both follow normal distribution with no significant outlier). Binary logistic regression analysis was used to calculate the odd ratio (OR) and their 95% confidence intervals. Linear regression analysis performed to assess the relationship between different variables, if one or both of them follow

normal distribution Person regression used but if both did not follow normal distribution Spearman correlation will used. Negative sign indicate inverse relationship, but positive sign represent direct relationship. Statistical Package for the Social Sciences (SPSS) version 20.0.0 (Chicago, IL), MedCalc Statistical Software version 14.8.1 (MedCalc Software bvba, Ostend, Belgium; 2014), and GraphPad Prism 7.0 software package were used to make the statistical analysis, P value considered when appropriate to be significant if less than 0.05.

**Results**

Smoking was significantly higher in patients with CD compared to the UC. Also the frequency of rural was significantly higher in patients with UC compared to CD, and the rest of the variables did not show a significant difference between CD and UC as illustrated in table 1.

**Table 1. Comparison of socio-demographic between both types of IBD**

Variables	Ulcerative colitis	Crohn's disease	p-value
<b>Number</b>	74	76	-
<b>Age (years), mean <math>\pm</math> SD</b>	32.2 $\pm$ 10.9	31.2 $\pm$ 12.0	0.602 <sup>a</sup>
<b>&lt;20 years</b>	9 (12.2%)	12 (15.8%)	0.877 <sup>b</sup>
<b>20 – 29 years</b>	26 (35.1%)	28 (36.8%)	
<b>30 – 39 years</b>	23 (31.1%)	18 (23.7%)	
<b>40 – 49 years</b>	9 (12.2%)	10 (13.2%)	
<b>50 – 60 years</b>	7 (9.5%)	8 (10.5%)	
<b>Gender, no. (%)</b>			
<b>Female</b>	34 (45.9%)	30 (39.5%)	0.509 <sup>b</sup>
<b>Male</b>	40 (54.1%)	46 (60.5%)	
<b>Social status, no. (%)</b>			
<b>Single</b>	29 (39.2%)	42 (55.3%)	0.052 <sup>c</sup>
<b>Married</b>	45 (60.8%)	34 (44.7%)	
<b>Education level, no. (%)</b>			
<b>Illiterate</b>	1 (1.4%)	1 (1.3%)	0.902 <sup>d</sup>
<b>Primary</b>	16 (21.6%)	14 (18.4%)	
<b>Secondary</b>	28 (37.8%)	27 (35.5%)	
<b>College</b>	29 (39.2%)	34 (44.7%)	
<b>Residence, no. (%)</b>			
<b>Urban</b>	58 (78.4%)	71 (93.4%)	<b>0.008<sup>b</sup></b>
<b>Rural</b>	16 (21.6%)	5 (6.6%)	
<b>Smoking, no. (%)</b>	3 (4.1%)	11 (14.5%)	<b>0.028<sup>b</sup></b>
<b>Drinker, no. (%)</b>	0 (0%)	1 (1.3%)	1.0 <sup>c</sup>
<b>a: independent t-test, b: chi-square test, c: Fisher exact test, d: Fisher-Freeman-Halton exact test</b>			

The duration of disease was significantly longer in patients with UC compared to CD, the frequency of patients with active disease was significantly higher in patients with UC, the frequency of patients had surgical treatment was higher in patients with CD, and the

frequency of patients treated in out-patients setting was higher in the CD as illustrated in table 2.

The total score with the sub-scores of patients believes for all patients are shown in table 3 as well as figure 1.

Table 2. Comparison of disease characteristics between both types of IBD

Variables	Ulcerative colitis	Crohn's disease	p-value
Disease duration (years), mean ± SD	5.88 ± 4.66	4.16 ± 3.98	0.017 <sup>a</sup>
Disease activity, no. (%)			
Remission	43 (58.1%)	60 (78.9%)	0.006 <sup>b</sup>
Active	31 (41.9%)	16 (21.1%)	
Surgical treatment, no. (%)	6 (8.1%)	19 (25.0%)	0.006 <sup>b</sup>
The Number of chronic drugs, no. (%)			
Single medication	31 (41.9%)	32 (42.1%)	0.979 <sup>b</sup>
Multiple medications	43 (58.1%)	44 (57.9%)	
The Number of chronic diseases, no. (%)			
No disease	71 (95.9%)	71 (93.4%)	0.609 <sup>c</sup>
Single disease	3 (4.1%)	3 (3.9%)	
Multiple disease	0 (0.0%)	2 (2.6%)	
Admission, no. (%)			
In-patients	17 (23.0%)	5 (6.6%)	0.005 <sup>b</sup>
Out-patients	57 (77.0%)	71 (93.4%)	
Doses of infliximab, mean ± SD	7.15 ± 6.53	7.95 ± 6.39	0.450 <sup>a</sup>

a: independent t-test, b: chi-square test, c: Fisher-Freeman-Halton exact test

The total score with the sub-scores of patients believes for all patients are shown in table 3 as well as figure 1.

Table 3. Patients believes scores for all patients

Variables	Value
Patients believes	
Specific necessity score, mean ± SD (range)	19.23 ± 5.21 (5 - 25)
Specific concern score, mean ± SD (range)	14.95 ± 6.60 (5 - 25)
General harm score, mean ± SD (range)	9.90 ± 3.35 (4 - 20)
General overuse score, mean ± SD (range)	10.22 ± 3.30 (4 - 18)
Total score, mean ± SD (range)	54.30 ± 9.61 (31 - 80)

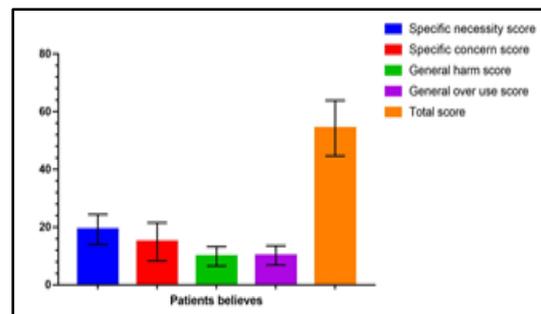


Figure 1. Belief about medications for all patients

Regarding the components of BMQ, all the components are not statistically different between CD and UC, as illustrated in table 4.

Table 4. Patients believes scores for each disease

Variables	Ulcerative colitis	Crohn's disease	p-value
Number	74	76	-
Patients believes			
Specific necessity score, mean ± SD	19.58 ± 4.87	18.89 ± 5.53	0.421 <sup>a</sup>
Specific concern score, mean ± SD	15.30 ± 6.63	14.61 ± 6.59	0.523 <sup>a</sup>
General harm score, mean ± SD	9.81 ± 3.06	9.99 ± 3.62	0.748 <sup>a</sup>
General overuse score, mean ± SD	9.69 ± 3.10	10.74 ± 3.43	0.052 <sup>a</sup>
Total score, mean ± SD	54.38 ± 10.14	54.22 ± 9.13	0.922 <sup>a</sup>

a: independent t-test, b: chi square test

The majority of the patients (58%) had strong beliefs in the necessity of treatment (scores BMQ specific-necessity greater than score BMQ specific-concern). However, (22%) of the patients reported strong concerns about the treatment (scores BMQ specific-concern greater than score BMQ specific-necessity). The remaining of the patients (20%), have equal scores for BMQ specific-necessity and specific-concern scores (Table 5) suggests that they have an equal agreement on both concept of the subpart where they share the same score. There was significant inverse correlation between gender (male vs. female) and specific concern score, while significant direct correlation was present between smoking and general overuse score, number of infliximab doses directly

correlated with specific necessity score and inversely correlated with specific concern score, number of drugs used directly correlated with both specific concern and general harm scores for all patients as illustrated in table 6.

**Table 5. BMQ necessity-concern differential**

Necessity – concern differential	N	Percentage
Necessity > concern	87	58.0
Concern > necessity	33	22.0
Necessity = concern	30	20.0

**Table 6. Linear regression analysis between BMQ components and other variables for all patients**

Variables	Specific necessity		Specific concern		General harm		General-Overuse	
	r	P-value	r	P-value	r	P-value	r	P-value
<b>Gender</b>	0.127	0.121	-0.198	0.015	-0.058	0.479	0.082	0.317
<b>Age</b>	0.075	0.362	0.051	0.536	-0.052	0.525	-0.020	0.812
<b>Disease duration</b>	0.065	0.428	-0.041	0.619	-0.092	0.263	-0.066	0.419
<b>Disease (CD vs. UC)</b>	-0.066	0.421	-0.053	0.523	0.026	0.748	0.159	0.052
<b>Disease activity</b>	-0.047	0.568	0.093	0.258	-0.010	0.904	-0.080	0.330
<b>Social status (married)</b>	0.089	0.279	0.021	0.801	-0.016	0.842	0.003	0.976
<b>Education level</b>	-0.091	0.266	-0.018	0.823	-0.103	0.210	-0.080	0.332
<b>Residence(rural)</b>	-0.011	0.896	-0.043	0.597	-0.051	0.533	0.014	0.866
<b>Smoking</b>	0.003	0.969	-0.140	0.087	-0.107	0.192	0.201	0.013
<b>Surgical Treatment</b>	-0.103	0.210	0.091	0.270	-0.083	0.312	0.052	0.530
<b>Number of drugs used</b>	-0.053	0.521	0.199	0.014	0.218	0.007	0.107	0.194
<b>Number of chronic disease</b>	-0.053	0.518	0.094	0.254	0.067	0.415	0.046	0.574
<b>Place of management (out-patients)</b>	-0.094	0.253	-0.009	0.912	-0.075	0.364	-0.041	0.618
<b>Doses of infliximab</b>	0.188	0.021	-0.214	0.008	-0.146	0.075	0.015	0.855

The number of drugs used was directly correlated with specific concern score also number of chronic diseases directly correlated

with general overuse score in UC patients, as illustrated in table 7.

Table 7. Linear regression analysis between BMQ components and other variables for UC patients

Variables	Specific necessity		Specific concern		General harm		General-Overuse	
	r	P-value	r	P-value	r	P-value	r	P-value
Gender	0.105	0.372	-0.172	0.142	-0.039	0.738	0.101	0.393
Age	0.086	0.466	-0.085	0.474	-0.044	0.708	0.031	0.791
Disease duration	0.105	0.374	-0.053	0.654	-0.148	0.209	0.008	0.948
Disease activity	-0.176	0.134	0.120	0.310	-0.001	0.992	-0.039	0.743
Social status (married)	-0.012	0.917	0.028	0.814	0.050	0.671	0.072	0.543
Education level	-0.029	0.804	-0.019	0.875	-0.055	0.641	-0.085	0.469
Residence (rural)	-0.151	0.198	0.046	0.697	0.022	0.853	0.096	0.418
Smoking	0.004	0.975	-0.176	0.134	-0.077	0.513	-0.046	0.697
Surgical Treatment	-0.025	0.829	-0.081	0.492	0.035	0.769	-0.083	0.484
Number of drugs used	0.116	0.327	0.255	0.028	0.019	0.874	0.086	0.467
Number of chronic disease	0.160	0.174	0.095	0.422	-0.010	0.934	0.243	0.037
Place of management (out-patients)	-0.087	0.460	-0.044	0.712	-0.203	0.083	-0.034	0.772
Doses of infliximab	0.166	0.158	-0.131	0.267	-0.017	0.885	-0.007	0.952

Residence (rural) inversely correlated with specific concern score, smoking was directly correlated with general overuse score, number of drugs used directly correlated with general

harm score, number of infliximab doses inversely correlated with both specific concern and general harm scores in CD patients as illustrated in table 8.

Table 8. Linear regression analysis between BMQ components and other variables for CD patients

Variables	Specific necessity		Specific concern		General harm		General-Overuse	
	r	P-value	r	P-value	r	P-value	r	P-value
Gender	0.156	0.178	-0.217	0.059	-0.078	0.504	0.048	0.679
Age	0.062	0.597	0.168	0.146	-0.057	0.627	-0.049	0.676
Disease duration	0.003	0.980	-0.052	0.657	-0.034	0.772	-0.083	0.477
Disease activity	0.051	0.662	0.041	0.725	-0.007	0.952	-0.055	0.638
Social status (married)	0.157	0.176	-0.002	0.984	-0.063	0.589	-0.008	0.944
Education level	-0.139	0.230	-0.012	0.915	-0.147	0.206	-0.094	0.420
Residence(rural)	0.150	0.196	-0.227	0.048	-0.147	0.206	-0.011	0.927
Smoking	0.021	0.854	-0.118	0.310	-0.134	0.249	0.295	0.010
Surgical Treatment	-0.127	0.273	0.225	0.051	-0.159	0.171	0.071	0.540
Number of drugs used	-0.166	0.152	0.162	0.161	0.352	0.002	0.111	0.341
Number of chronic disease	-0.144	0.213	0.108	0.355	0.100	0.389	-0.064	0.580
Place of management (out-patients)	-0.082	0.479	0.081	0.485	0.073	0.531	-0.161	0.165
Doses of infliximab	0.217	0.060	-0.293	0.010	-0.259	0.024	0.016	0.888

## Discussion

Inflammatory bowel diseases, are chronic gastrointestinal conditions characterized by alternating episodes of symptom exacerbation and periods of general well-being. As in the majority of other chronic illnesses, lifelong therapy is required<sup>(19)</sup>. It is a worldwide health-care problem with a continually increasing incidence<sup>(20)</sup>. Regarding socio-demographic characteristics of patients involved in the current study, smoking was significantly higher in patients with CD (14.5%) compared to the UC (4.1%). Approximate to this result was found in study by (C. De Bie *et al.*, 2015) where more CD patients were active smokers compared to UC (40% vs. 17%)<sup>(21)</sup>. Smoking was found to increase the risk of developing CD but not UC<sup>(22)</sup>. In addition, the frequency of rural UC patients (21.6%) was significantly higher compared to rural CD patients (6.6%) and this is in agreement with study by (Alireza T. S *et al.* 2013) where frequency of rural patients was higher in UC (13.6%) than CD (8.3%)<sup>(23)</sup>.

The rest of the socio-demographic variables did not show a significant difference between CD and UC as illustrated in table 1. With respect to disease characteristics, the duration of disease was significantly longer in patients with UC ( $5.88 \pm 4.66$  years) compared to CD ( $4.16 \pm 3.98$  years) which approximate the results reported by (I lhami Y. *et al.*, 2009) study in Turkey where UC duration was longer than CD<sup>(24)</sup>. This may be due to that it takes longer to diagnose CD than UC<sup>(25)</sup>. The frequency of patients with active disease (relapsed) was significantly higher in patients with UC than in CD patients (41.9% vs. 21.1%) respectively. This result came opposite to that of (Weigert *et al.*, 2010) in which the frequency of patients with active disease was (38.7%) for UC and (64%) for CD patients<sup>(26)</sup>. The frequency of patients had surgical treatment was higher in patients with CD 25% compared with 8.1% for UC patients which is consistent with the result of other studies (Ozin *et al.* 2009), that found surgical interventions were more common in CD<sup>(25)</sup>. In addition, frequency of patients treated in out-patients setting was higher in CD patients which means that patients with CD may undergo less relapses or any other causes that lead to hospitalization and then CD patients usually treated as outpatients more than UC patients.

Regarding the components of BMQ, all the components are not statistically different between CD and UC. The majority of the patients (58%) had strong beliefs in the necessity of their IBD treatment ( scores BMQ specific - necessity greater than score BMQ

Specific-concern). This result came approximate to another study (Horne *et al* 2008) which state that (48%) of IBD patients were (high necessity, low concerns)<sup>(27)</sup>. In its simplest form, where necessity beliefs outweigh concerns, the patient is likely to be adherent. In the present study (22%) of the patients reported strong concerns about the treatment (scores BMQ specific-concern greater than score BMQ specific-necessity). This group of patients was worried about the adverse effect of their prescribed IBD medications. These concerns about long-term effects of using IBD medications should be assessed and reduced by healthcare providers to improve medication intake. The current study showed that there was a significant inverse correlation between gender (male vs. female) and specific concern score that mean male patients have less specific concern about IBD medications than female patients. Other studies did not show any significant association between gender and BMQ sub scores<sup>(28, 29)</sup>. In the present study, significant direct correlation was present between smoking and general overuse score. Smoking has seldom been studied to determine the association with BMQ sub scores (over use). Also, results of current study showed that the number of infliximab doses directly correlated with specific necessity score and inversely correlated with specific concern score (as number of infliximab doses increase the specific necessity score will increase and specific concern score will decrease). This result may be due to that biological agents are associated with a normalization in quality of life (QOL) for IBD patients<sup>(30)</sup>, and this will increase the belief of patients about the specific necessity of infliximab. The number of drugs used directly correlated with both specific concern and general harm scores for all patients (table 6), this result similar to the result of (Konstantina Tsianou 2016), where the number of drugs used correlated positively with the general harm sub score<sup>(29)</sup>. A possible explanation of this result is that patients using high number of drugs surely will have high concerns about these drugs. In the current study, the number of chronic diseases directly correlated with general overuse score in UC patients (table-7); however, other study found that the number of chronic conditions did not correlate with any of the BMQ subs score<sup>(28)</sup>. It seems that accumulation of diseases and/or medicines, has a positive impact on concern<sup>(31)</sup>. Also the present study found that residence in rural areas in patients with CD inversely correlated with specific concern score that mean that patients who live in rural areas have less

concern about their medication than patients who live in urban areas. A possible explanation could be lack of adequate education and/or lack of information to assist a greater understanding of medicines and their effects<sup>(31)</sup>.

### Conclusions

The majority (58%) of Iraqi IBD patients sample had strong beliefs in the necessity of their IBD treatment where the medication-necessity score was greater than medication-concern score with male patients had less specific concern about IBD medications than female patients.

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