Incidence, Prevalence, and Clinical Epidemiology of Inflammatory Bowel Disease in the Arab World: A Systematic Review and Meta-Analysis

Mahmoud Mosli, Sameer Alawadhi, Fuad Hasan, Antoine Abou Rached, Faisal Sanai, Silvio Danese

Abstract

Objectives: Despite the recent findings of the rising incidence of inflammatory bowel disease (IBD) in Arab countries, there are limited data on the characteristics of IBD patients and the disease course in the Arab world. This systematic review aimed to investigate the incidence and epidemiology of IBD in the Arab world. Material and Methods: We conducted a systematic literature review that utilized a comprehensive search of PubMed, Cochrane Central, SCOPUS, Google Scholar, and Web of Science from their inception till August 2020. We included cross-sectional, prospective, and retrospective studies that examined the prevalence and/or epidemiological characteristics of IBD in Arab countries. Results: A total of 16 studies that examined IBD in Saudi Arabia, Egypt, Kuwait, the United Arab Emirates, Bahrain, Lebanon, and Oman were included. Generally, the included studies covered the period from the early 1990s to the late 2010s. A total of 1,627 ulcerative colitis (UC) patients and 1,588 Crohn’s disease (CD) patients were included in this systematic review. The mean age at diagnosis ranged from 24.13 to 43.6 years in adult cases and from 4.5 to 16 years in pediatric cases. In most of the included studies, the majority of patients were male. The quantitative analysis revealed a pooled incidence rate of 2.33 (95% confidence interval [CI] 1.2–3.4) per 100,000 persons per year for UC in the Arab world. Likewise, the pooled incidence rate for CD in the Arab world was 1.46 (95% CI 1.03–1.89) per 100,000 persons per year. Conclusion: There is a growing incidence of IBD in the Arab world, while IBD patients from Arab countries may present with some different characteristics, compared to their counterparts in Europe.

Introduction

Crohn’s disease (CD) and ulcerative colitis (UC) are chronic inflammatory diseases affecting the gastrointestinal tract and are collectively known as inflammatory bowel diseases (IBDs) [1–3]. UC generally affects the large intestine and rectum, whereas CD can target any part of the gut [3]. Historical data have shown that the younger demographic is more susceptible to IBD, causing...
a significant alteration in their quality of life, alongside debilitating morbidity and exacerbations [1, 3]. The etiology of IBD is not well-established; however, contemporary hypotheses implicate an interaction of environmental and immunoregulatory factors in genetically vulnerable individuals [1–4].

Western countries have been historically observed as the populations where IBD is prevalent and continues to rise, whereas the general impression is that countries in the Middle East (ME) experience a lower incidence of IBD [1, 5]. Incidence rates vary considerably depending on the region. In 2017, UC incidence rates ranged from 0.97 to 57.9 per 100,000 in Europe, 8.8 to 23.14 per 100,000 in North America, and 0.15 to 6.5 per 100,000 in Asia and the ME [5]. Nonetheless, recent trends have shown a significant rise in the incidence of IBD in ME countries, which were linked to “westernization” in lifestyle, including dietary habits in these countries [1, 2, 5–7].

Despite the recent findings of the rising incidence of IBD in Arab countries, there are limited data on the characteristics of IBD patients and the disease course in the Arab world. This systematic review aimed to investigate the incidence and epidemiology of IBD in the Arab world.

**Methods**

This present study was conducted following the recommendations provided by the meta-analysis of observational studies in epidemiology (MOOSE) statement [8] and in strict accordance with the Cochrane Handbook of Systematic Reviews [9].

**Literature Search Strategy**

We conducted a systematic literature review that utilized a comprehensive search of PubMed, Cochrane Central, SCOPUS, Google Scholar, and Web of Science from their inception till August 2020 using the following query: {((inflammatory bowel diseases [MeSH Terms]) OR (Crohn’s disease [MeSH Terms]) OR (ulcerative colitis [MeSH Terms])) AND (“Egypt” OR “Saudi Arabia” OR “United Arab Emirates” OR “Oman” OR “Qatar” OR “Bahrain” OR “Kuwait” OR “Syria” OR “Libya” OR “Iraq” OR “Tunisia” OR “Algeria” OR “Morocco” OR “Palestine” OR “Yemen” OR “Lebanon”). We also searched the bibliography of eligible studies to find relevant articles.

**Eligibility Criteria and Study Selection**

We included cross-sectional, prospective, and retrospective studies that examined the prevalence and/or epidemiological characteristics of IBD in one of the following Arab countries: Egypt, KSA, UAE, Oman, Qatar, Bahrain, Kuwait, Syria, Libya, Iraq, Tunisia, Algeria, Morocco, Palestine, Yemen, and Lebanon. We excluded: (a) Studies that included patients with any other inflammatory or autoimmune diseases rather than IBD without separate analysis; (b) studies that included patients with any nationally other than the above-listed countries; (c) studies that were performed on animal models; (d) review articles; and (e) non-English articles and duplicate references.

Eligibility screening was conducted in 2 steps, each by 2 independent reviewers: (a) title and abstract screening for matching the inclusion criteria and (b) full-text screening for the complete fulfillment of the eligibility criteria. Disagreements were resolved upon the opinion of a third reviewer.

**Data Extraction**

Two independent authors extracted the data and another reviewer resolved disagreements. The extracted data included the following: (a) baseline characteristics of enrolled patients; (b) general characteristics of study design; (c) type of the patients; (d) incidence and prevalence of IBD; (e) epidemiological characteristics of the affected patients; and (f) summary of the main finding.

**Quantitative Analysis**

The incidence of IBD was pooled using a Freeman-Tukey transformation. Heterogeneity was assessed by visual inspection of the forest plots and measured by $I^2$ and $\chi^2$ tests. The $\chi^2$ test measures the existence of significant heterogeneity, while the $I^2$ quantifies the magnitude of heterogeneity in the effect size. We assessed and interpreted heterogeneity according to the recommendations in the “Cochrane Handbook of Systematic Reviews and Meta-Analysis” (chapter 9). In this handbook, an alpha level (for $\chi^2$ test) below 0.1 is considered to be significant heterogeneity, and the $I^2$ test was interpreted as follows: (0–40%: might not be important; 30–60%: may represent moderate heterogeneity; 50–90%: may represent substantial heterogeneity). We performed a sensitivity analysis to ensure that none of the included studies affected the results and to examine whether the overall effect size is statistically robust. We excluded 1 study in each scenario. We used Open-Meta (Analyst) for Windows.

**Results**

**Selection of Studies**

A total of 1,899 unique citations were retrieved from online bibliographic search and manual retrieval of references. Of them, 147 full texts were retained for a full evaluation, and 16 studies (total no. of IBD patients = 3,221) were finally included in the present systematic review and meta-analysis (Fig. 1).

**Summary Characteristics of the Included Studies**

A total of 2 case series [1, 10], 1 cross-sectional [11], 1 prospective study [12], and 12 retrospective studies [6, 13–24] were included in the present systematic review. Eight articles examined IBD in Saudi Arabia [6, 10, 14, 16–20], while the rest of the studied included patients from Egypt [1], Kuwait [11, 13, 24], the UAE [15], Bahrain [21], Lebanon [22], and Oman [12]. Generally, the included studies covered the period from the early 1990s to the late 2010s (Table 1).
Incidence and Prevalence of IBD

Six included studies reported the incidence and/or prevalence of IBD in the aforementioned countries. In the study reported by Al-Shamali et al. [13], a retrospective review of all patients presented with a confirmed diagnosis of UC in Kuwait City, a total of 346 patients were identified. The authors reported that the local incidence of UC was 2.8 per 100,000 persons per year. Another study from Kuwait reported that the incidence of pediatric IBD was 2.6 per 100,000 persons per year [24]. Al-Ghamdi et al. [19] retrieved the data of all confirmed cases with CD in a tertiary center in Riyadh, KSA, and estimated that the incidence of CD increased from 0.32 per 100,000 persons per year between 1983 and 1993 to 1.66 per 100,000 persons per year between 1994 and 2004 with a combined mean annual incidence of 0.94 per 100,000 persons per year over these 20 years. In another retrospective study from Bahrain, it was found that the average number of CD cases increased from 0.4 per 100,000 persons per year between 1984 and 2001 to 4 cases per year between 2002 and 2014. For UC, the average number of cases between 1984 and 2001 was 2, while this increased to 8 for the years 2002–2014. Overall, the prevalence of IBD was found to be 26.25 per 100,000 persons [21]. In the prospective study of IBD patients in Oman, it was reported that the incidence of UC was 1.35 per 100,000 persons per year [12]. Abdul-Baki et al. [22] collected data of IBD patients in Beirut and reported a mean annual incidence of 4.1 per 100,000 people for UC, 1.4 per 100,000 people for CD, and a total annual incidence of IBD of 5.5 per 100,000 people per year (Table 2; Fig. 2).

Quantitative Analysis

The quantitative analysis revealed that the incidence of UC in the Arab world was 2.33 (95% confidence interval 1.2–3.4; Fig. 3a) per 100,000 persons per year, the pooled estimate showed significant heterogeneity ($p < 0.001; I^2 = 83\%$). Likewise, the quantitative analysis revealed that the incidence of CD in the Arab world was 1.46 (95% confidence interval 1.03–1.89; Fig. 3b) per 100,000 persons per year, the pooled estimate showed no significant heterogeneity ($p = 0.91; I^2 = 0\%$).

Clinical Characteristics and Diagnosis of IBD Patients

A total of 1,627 UC patients and 1,588 CD patients were included in this systematic review. The full disease characteristics are presented in Tables 3 and 4. The mean age at diagnosis ranged from 24.13 to 43.6 years in adult cases and from 4.5 to 16 years in pediatric cases. In most of the included studies, the majority of patients were males (average 41–59%). The majority of patients in the included studies had no previous history of smoking.
While the prevalence of family history ranged from 1.5 to 26.1%. Only 1 study from Saudi Arabia reported the consanguinity rate, which was 32.6%. Studies reported that hematochezia, diarrhea, urgency, and tenesmus were the main presenting features of the patients. Concerning the time to diagnosis, studies in Saudi population reported that the average time to diagnosis was nearly 6 months in >90% of the patients with UC; while the study from Oman demonstrated that the average time to diagnosis was 13.2 months. The most common site of colon involvement

| First author               | Year of publication | Study period | Country       | City         | Study design                        | Population                          | Total cases | IBD cases, n |
|----------------------------|---------------------|--------------|---------------|--------------|-------------------------------------|-------------------------------------|-------------|--------------|
| Hossain et al. [10]        | 1991                | NR           | Saudi Arabia  | Riyadh       | Case series                         | Adults with CD                      | 7           | 7            |
| Al-Shamali et al. [13]     | 2003                | 14 years     | Kuwait        | Kuwait City  | Retrospective case studies          | Al-Madinah patients who underwent lower gastrointestinal endoscopies | 1,182       | 111          |
| Khan et al. [17]           | 1996                | 5 years      | Saudi Arabia  | Al-Madinah   | Retrospective case studies          | Patients who presented for gastrointestinal consultations or interventions  | 24,156      | 157 (135 with UC/22 with IBD) |
| Esmat et al. [1]           | 2014                | 15 years     | Egypt         | Cairo        | Case series                         | Patients who presented for gastrointestinal consultations or interventions  | 24,156      | 157 (135 with UC/22 with IBD) |
| Alharbi et al. [18]        | 2014                | 4 years      | Saudi Arabia  | Riyadh       | Retrospective case studies          | UC patients attending 4 gastroenterology centers                           | 24,156      | 157 (135 with UC/22 with IBD) |
| Siddique et al. [11]       | 2014                | 6 months     | Kuwait        | Kuwait City  | Cross-sectional medical record-based descriptive study | All Arab UC patients in Kuwait | 214         | 182          |
| Aljebreen et al. [6]       | 2013                | 3.5 years    | Saudi Arabia  | Riyadh       | Retrospective data-registry based study | CD patients in 4 tertiary care gastroenterology centers | 24,156      | 157 (135 with UC/22 with IBD) |
| Al-Ghamdi et al. [19]      | 2004                | 20 years     | Saudi Arabia  | Riyadh       | Retrospective study                 | All patients attending a gastroenterology unit with a diagnosis of CD.     | 24,156      | 157 (135 with UC/22 with IBD) |
| Al Fadda et al. [2, 20]    | 2012                | 39 years     | Saudi Arabia  | Riyadh       | Retrospective study                 | All cases of IBD from a tertiary care hospital                             | 24,156      | 157 (135 with UC/22 with IBD) |
| Abdul-Baki et al. [22]     | 2007                | 4 years      | Lebanon       | Beirut       | Retrospective study                 | IBD patients in Beirut                                                        | 24,156      | 157 (135 with UC/22 with IBD) |
| Radhakrishnan et al. [12]  | 1997                | 8 years      | Oman          | Muscat       | Prospective study                   | IBD patients in Oman                                                         | 24,156      | 157 (135 with UC/22 with IBD) |
| Al-Mofarreh and Al-Moleh [16] | 2013           | 17 years     | Saudi Arabia  | Riyadh       | Retrospective study                 | IBD patients presenting at a gastroenterology polyclinic between January 1993 and December 2009 | 43,500      | 693 (238 with UC/455 with CD) |
| Al-Qabandi et al. [24]     | 2011                | 10 years     | Kuwait        | Kuwait City  | Retrospective study                 | Children referred to pediatric gastroenterology and hepatology unit in Kuwait | 24,156      | 157 (135 with UC/22 with IBD) |
| El Mouzan et al. [14]      | 2012                | 17 years     | Saudi Arabia  | Riyadh       | Retrospective study                 | Children below 18 years presenting at 2 pediatric gastroenterology centers | 24,156      | 157 (135 with UC/22 with IBD) |
| Al Awar et al. [15]        | 2004                | 8 years      | The UAE       | Dubai        | Retrospective study                 | Pediatric cases with IBD in Dubai                                             | 24,156      | 157 (135 with UC/22 with IBD) |

IBD, inflammatory bowel disease; CD, Crohn’s disease; UC, ulcerative colitis; IC, indeterminate colitis; UAE, United Arab Emirates.

Table 1. Summary characteristics of the included studies
among the included studies was the left colon. Concerning disease severity and extent, ulcerative proctitis accounted for 6.9–27.3% of the cases, while pancolitis accounted for 10–45% of the cases. The proportion of patients with pancolitis was notably higher among patients from Kuwait, Lebanon, and Saudi Arabia. The majority of patients had mild/moderate severity of the disease. The protocol of IBD diagnosis was consistent across the included studies and composed mainly of endoscopy and biopsy. The extent of colon involvement was variable across the included studies.

**Treatment and Disease Outcomes**

The included studies reported similar treatment patterns, with the majority of patients receiving aminosalicylates or corticosteroids (alone or in combination) (Table 5). For example, a study from Saudi Arabia reported that 85.2% of the patients were responsive to corticosteroids, while 7% were corticosteroid-dependent, and 6.2% did not respond to corticosteroid treatment. Immunomodulators were used the least, and in all studies, few patients received anti-TNFα drugs. Hospitalization rates were reported for 3 studies and were generally considered to be high (Kuwait: 44.5%; Saudi Arabia: 47%; and Kuwait: 71%).

Rates of UC-related surgery varied between 2.7 and 20% among the included studies. Total colectomy rates in Egypt were 2.9%. Among patients with UC in Bahrain, younger age correlated positively with the need for surgical intervention, anemia, and gastrointestinal complications. On the other hand, among Egyptian patients with UC, there was no correlation between extraintestinal manifestations and presence and UC severity. Among the included studies, 1 case of colorectal cancer was reported in Egypt, 9 patients in Saudi Arabia, and 2 cases from Lebanon.

Only one included reported the impact of IBD on quality of life (QoL). Patients from Lebanon reported a moderately severe impact on QoL, as measured by the IBD QoL questionnaire.

**Discussion**

Although many recent reports highlighted a notable increase in the incidence of IBD in different parts of the Arab world, there is no published high-quality evidence...
Table 3. IBD characteristics among the included studies

| Study                        | Patients with IBD, n | Mean age (SD) | Age at diagnosis, years | Male, % | Risk factors, % | Time to diagnosis, months |
|------------------------------|----------------------|---------------|-------------------------|---------|----------------|--------------------------|
|                              | UC       | CD       | UC       | CD       | smoking | family history | UC       | CD       | smoking | family history | UC       | CD       | smoking | family history | UC       | CD       | smoking | family history |
| Hossain et al. [10]          | – 7      | 32.4 (7.1)| 32.4 (7.1)| 57.1     | 11.4    | 15.0 | –             |
| Al-Shamali et al. [13]       | 90 – 45  | 43.6     | 52.0 | – – | –     | 1.4 | 15.0 | –             |
| Khan et al. [17]             | 111 – 36.5| –       | 58.7 | – – | –     | 1.4 | 15.0 | –             |
| Al-Shamali et al. [13]       | 90 – 45  | 43.6     | 52.0 | – – | –     | 1.4 | 15.0 | –             |
| Khan et al. [17]             | 111 – 36.5| –       | 58.7 | – – | –     | 1.4 | 15.0 | –             |
| Esmat et al. [1]             | 135 – 22 | CD: 29.7/UC: 27.3 | Male to female ratio: 1:1.15 in UC/2:6:1 in CD | – – | –     | 1.4 | 15.0 | –             |
| Achharbi et al. [18]         | 394 – 30.1| 30.2    | 51.0 | 7.8 | 7.0 | –             |
| Siddique et al. [11]         | 182 – 36.5| 28.5    | 50.0 | 14.8 | 14.3 | –             |
| Aljebreen et al. [6]         | – 497    | – 25    | 58.6 | – – | –     | 1.4 | 15.0 | –             |
| Al-Ghamdi et al. [19]        | – 77     | 25.3    | 42.9 | – – | –     | 1.4 | 15.0 | –             |
| Al Fadda et al. [2, 20]      | 115 – 197| 25.5    | 48.7 | 18.8 | 11.1 | –             |
| Abdalla et al. [21]          | 123 – 61 | –       | 20.1 | 13.9 | – 13.2 | –             |
| Abdul-Baki et al. [22]       | 16 – 8   | –UC: 24.13/UC: 28.35/IBD total: 27.03 | Male to female ratio: 1:1.5:1 in UC/2:6:1 in CD | – 9.0 | 6 in 92% | –             |
| Al-Mofarreh and Al-Mofleh [16]| 238 – 455| – UC: 34/CD: 27 | – | 9.0 | 6 in 92% | –             |
| Al-Qabandi et al. [24]       | 36 – 92  | – 10.3  | 47 (n = 61) | – 31.0 | –     | –             |
| El Mouzan et al. [14]        | 71 – 147 | – Median ages– | UC: 15.00/CD: 16.00 | – | – | –             |
| Al Awar et al. [15]          | 8 – 3    | – IBD: 6.5/UC: 4.5/CD: 10 | 4170.0 | – | – | –             |

IBD, inflammatory bowel disease; CD, Crohn’s disease; UC, ulcerative colitis; SD, standard deviation.

**Fig. 3.** Pooled estimates of the incidence of UC (a) and CD (b). IBD, inflammatory bowel disease; UC, ulcerative colitis; CD, Crohn’s disease.
| Study                        | Method of diagnosis                                                                 | Extent of the disease in the colon | Disease severity, % |
|------------------------------|-------------------------------------------------------------------------------------|-----------------------------------|---------------------|
|                             |                                                                                     | proctitis | proctosigmoiditis | left-sided colitis | pancolitis | remission | mild | moderate | severe |
| Hossain et al. [10]          | Biopsy                                                                              | –         | –                 | –                 | –         | –         | 55   | 36       | 9      |
| Al-Shamali et al. [13]       | Histopathology, colonoscopy, clinical                                               | 20% (n = 18) | 21% (n = 19) | 14% (n = 13) | 45% (n = 40) | –         | 44   | 46       | 10     |
| Khan et al. [17]             | Lower gastrointestinal endoscopy                                                    | 22.5% (n = 18) | 30% (n = 24) | 27.5% (n = 22) | –         | –         | –     | –        | –      |
| Esmat et al. [1]             | Clinical, laboratory, endoscopic, histological, and/or radiological criteria        | n = 25   | –                 | n = 88           | n = 22     | –         | –     | –        | –      |
| Alharbi et al. [18]          | Standard clinical, endoscopic, radiological, and pathological criteria              | 22%       | –                 | 0.353            | –         | 51        | 20   | 18       | 11     |
| Siddique et al. [11]         | Clinical grounds, colonoscopy, biopsy, and negative stool examination              | 18.7% (n = 34) | –                 | 36.8% (n = 67) | –         | 71        | 28   | 10       | –      |
| Al-Jebreen et al. [6]        | Full colonoscopy and biopsy (when not precluded by stenosis)                      | –         | –                 | –                 | –         | –         | –     | –        | –      |
| Al-Ghamdi et al. [19]        | History, colonoscopic findings, colonic biopsies, small bowel enema, and CT scan of abdomen | –         | –                 | –                 | –         | –         | –     | –        | –      |
| Al Fadda et al. [2, 20]      | Colonoscopic findings, colonic biopsies, small bowel enema, and CT scan of abdomen | 6.9% (n = 8) | 13.9% (n = 16) | 35.7% (n = 41) | 43.5% (n = 50) | –         | –     | –        | –      |
| Abdul et al. [21]            | Clinical history and examination, inflammatory markers such as ESR and CRP, endoscopy, and biopsy confirmation | IBD: 21%/CD: 5%/UC: 30% | IBD: 12%/CD: 2%/UC: 17% | IBD: 34%/CD: 10%/UC: 47% | –         | –         | –     | –        | –      |
| Abdul-Baki et al. [22]       | Computerized search was conducted for records carrying the diagnosis of IBD, UC, or CD | UC: 27.3% | UC: 27.3% | UC: 45.5%     | –         | –         | –     | –        | –      |
| Radhakrishnan et al. [12]    | Chronic diarrhea, endoscopy, and histology                                          | 8% (n = 9) | 29% (n = 31) | 18% (n = 19) | –         | –         | –     | –        | –      |
| Al-Mofarreh and Al-Mofleh [16]| Endoscopy/positive histopathology                                                   | –         | –                 | –                 | –         | –         | –     | –        | –      |
| Al-Qabandi et al. [24]       | Clinical presentation + biochemical, radiological, endoscopic, and histopathological examinations | 0.03       | –                 | 0.33              | 0.64      | –         | –     | –        | –      |
| El Mouzan et al. [14]        | Clinical, laboratory, imaging, endoscopic, and histopathology                     | –         | –                 | –                 | –         | –         | –     | –        | –      |
| Al Awar et al. [15]          | –                                     | –         | –                 | –                 | –         | –         | –     | –        | –      |

IBD, inflammatory bowel disease; CD, Crohn’s disease; UC, ulcerative colitis; CT, computed tomography; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein.
so far that attempted to examine the epidemiology of IBD in this part of the world. In the present systematic review, we found that the incidence of IBD is increasing exponentially in most of the Arab countries; our pooled estimates revealed that the incidence of UC and CD is approximating 2.33 and 1.46 per 100,000 persons per year, respectively. The highest incidence of IBD appears to be in Kuwait and KSA. On the other hand, the majority of IBD cases are diagnosed in young people, with a male preponderance. However, diagnostic modalities, the extent of the disease, and response to treatment appear to be similar to Western countries.

Prior to 1982, IBD was viewed as a rare condition in the ME, particularly in the KSA and Morocco [2]. This view was challenged in 1984 when a 6-year study on the epidemiology and incidence of IBD in the ME was conducted in Kuwait, reporting 91 patients with UC and 17 patients with CD [2, 4]. Further studies spanning the 1990s and 2000s in the KSA, Kuwait, Oman, and Egypt have since confirmed increasing annual rates of IBD [1, 2, 4, 12]. In Egypt, a 15-year case series study from 1995 to 2009 featuring 24,156 patients referred to a gastroenterology center found 135 UC patients and 22 CD patients, with a ratio of 6:1 for UC to CD etiologies [1]. Notably, more recent reports confirmed the significant rise in the incidence of IBD in Arab countries; for example, Al-Ghamdi et al. [19] retrieved the data of all confirmed cases with CD in a tertiary center in Riyadh City of KSA; it was found that the incidence of CD increased from 0.32 per 100,000 persons per year in the period of 1983–1993 to 1.66 per 100,000 persons per year in the period of 1994–2004 with a total mean annual incidence of 0.94 per 100,000 persons per year over these 20 years. In the present systematic review and meta-analysis, we confirmed that the incidence of UC and CD is approximating 2.33 and 1.46 per 100,000 persons per year, respectively. Many factors can contribute to this significant rise of IBD incidence, the increased “westernization” of a country is linked to subsequent increases in IBD incidence [1, 5–7, 20] Another important factor to consider in the epidemiology of IBD is consanguinity [3], especially in the ME where consanguinity can be prevalent in some cultures [3, 7]. The links between IBD and consanguinity are reinforced when considering the familial clusters of IBD, in addition to the 10-fold increase in IBD susceptibility seen in individuals with first-degree relative to IBD [3]. A study of 600 women from the KSA demonstrated a parental IBD consanguinity of 30% [3]. Nevertheless, current literature examining the influence of consanguinity on IBD prevalence in the ME have conflicting conclusions [3, 7], which merits further studies in this area.

The gender preponderance (higher number of males) observed among the IBD patients from Arab countries contrasts with studies of the adult IBD population, where there are a slightly greater proportion of females with IBD in studies from Iran [25] and Sri Lanka [26], while studies in Japan [27], Korea [28], and other Asian countries [29] have shown a similar incidence in males and females.

Although the present systematic review is one of the few high-quality evidence about the IBD situation in the Arab world, there are some limitations that must be considered when assessing our findings. Our findings were based on data from 7 Arab countries only, with half of the report from KSA; thus, the generalizability of our findings in all Arab world countries is limited. In addition, only 1 study assessed the pediatric IBD, and thus, further studies are warranted to examine pediatric IBD in Arab countries. The small sample size and potential confounders may have either overestimated or underestimated the incidence of IBD as well.

Table 5. Treatment characteristics among the included studies

| Study                  | Aminosalicylates, % | Corticosteroids, % | Immunosuppressors, % | Anti-TNFα, % | Hospitalization, % | Surgery, % |
|------------------------|---------------------|--------------------|----------------------|--------------|--------------------|------------|
| Al-Shamali et al. [13] | 93                  | 60.0               | 68.0                 | –            | –                  | –          |
| Alharbi et al. [18]    | 100                 | 73.6               | 37.9                 | 4.9          | 44.5               | 3.8        |
| Siddique et al. [11]   | 100                 | 59.0               | 11.1                 | –            | 71.0               | –          |
| Al Fadda et al. [2, 20] | 62                  | 62.5               | 17.5                 | 8.3          | –                  | 5.8        |
| Abdulla et al. [21]    | 86                  | 69.0               | 33.0                 | 4.0          | 47.0               | 20.0       |

TNFα, tumor necrosis factor alpha.
Conclusion

In conclusion, there is a growing incidence of IBD in the Arab world, while IBD patients from Arab countries may present with peculiar characteristics, compared to their counterparts in Europe. A deeper investigation into the variety of factors governing the incidence of IBD in the Arab world is warranted, especially when taking into account the increasing rate of IBD, alongside the peculiar socioeconomic variables in the local population.

Conflict of Interest Statement

All authors declared that they have no proprietary interests in the products described in the article.

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