

Epidemiology of Irritable Bowel Syndrome; A Systematic Review of Literature

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Abstract Irritable Bowel Syndrome (IBS) considerably represents a great public health threat to the nation. It is a “functional gastrointestinal disorder” characterized by discomfort, pain in abdomen and altered intestinal motility, during the absences of any organic disorder. Limited evidences exists in terms of occurrence and determinants, with respect to the epidemiology of IBS in Arab countries. Therefore, this study aims to systematically explore previous evidences related to the incidence, prevalence, and natural history of IBS in Arab world. A literature search was commenced on PubMed, and CINAHL databases by using relevant keywords in order to retrieve studies conducted in the Arab world concerning the epidemiology of IBS. A total of 12 studies were selected after screening 35 articles. These studies were further appraised and reviewed systematically. Of the 35 articles evaluated, seven studies included cross-sectional study design with a prevalence ranging from 8.9% to 31.8%. Studies pertaining to the prognostic markers/risk factors were solely conducted in clinical-setting. Genetic expressions of various parasite (e.g. Dientamoeba fragilis), behavioral habit (emotional stress, anxiety) and viral infections (Hepatitis C virus and Hepatitis B) were amongst the investigated factors. Evidence extracted from these studies demonstrates a potential link between IBS and stress, HBV, HCV infections and co-occurrence of tension headache. The IBS pathogenesis is not yet fully understood due to limited evidence from population-based studies. Future research are warranted in the community based settings of the Arab world in order to identify the real burden of this disease at population level, to improve treatment strategies for IBS patients, and investigate its preventable risk factors.

Keywords: Irritable Bowel Syndrome, Risk Factors, Arab, Prevalence, Epidemiology, and Incidence

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1. INTRODUCTION

Irritable bowel syndrome (IBS) has been defined in the World Gastroenterology Organization statement in 2015 as a “functional bowel disorder in which abdominal pain or discomfort is associated with defecation and/or a change in bowel habit. Sensations of discomfort (bloating), distension, and disordered defecation are commonly associated features” [1]. However, in the recent time structural abnormalities has also been explained [2].

IBS is a multifactorial disorder though its risk factors and other predicting factors are not well understood. Previous evidence suggests that disturbance in both mental and physical health can lead to IBS. Furthermore, among many other known factors, stress is the main cause that leads to stimulation of colon spasms among IBS patients [4]. Other known causative agents for this multifactorial functional disorder include both psychological, and genetic factors [2, 3]. Chronic inflammation of intestine, altered signaling, abnormal gut neuroendocrine system (NES), dietary factors, plus alteration in intestinal flora are all well-known causes of IBS [2, 3]. IBS is not only the condition of elderly it occurs in all age group and difference in frequency of subtype has not yet been seen by age group [5, 6]. Studies have shown that in 50 percent of patients, symptoms occur prior to the age of 35 years and those aged 50 and above have 50% less prevalence [7, 9]. A current meta-analysis suggest that world-wide prevalence of IBS has been reported as 10 and 25.0%. South Africa has the lowest prevalence of 4.2% and South America has the highest prevalence of 21% [8, 9]. Moreover, globally the prevalence in women is 67% higher than men. The risk of colorectal cancer is 1% greater in IBS patients as compared to the general population [9].

Recent epidemiological studies from Middle East countries demonstrated raised in the burden of IBS in the Arab world [10]. Isbister and Hubler (1998) reported that prevalence of IBS in Saudi Arabia was rare [11]. Conversely, Radhakrishnan et al reported the prevalence

in Oman to be as 1.35/100 000 person–years in the period of 8 years from 1987-1994 [12]. Al Ghamdi et al reported 20 year prevalence from the year 1983 till 2002 in Saudi Arabia and reported increase in the prevalence from 0.32 to 1.66 per 100000 person/years in the second 10 years [13]. Study from two teaching hospital of Tehran conducted by Aghazadeh et al in the era of 1992-2002 suggested that 457 patients had infective bowel disease [14].

Irritable bowel syndrome (IBS) considerably represents a great public health burden to the Arab world. Therefore, this study aims to systematically review previous evidences pertaining to the incidence, prevalence as well as natural IBS history in the Arab world (i.e. countries who are the members of the Arab League; irrespective of the Arab speaking countries). Limited evidence exists regarding the knowledge and burden about occurrence and determinants of IBS in the Arab countries. Thus, this article aims to explore and summarize IBS researches that had been undertaken in the “Arab countries” with regards to its prevalence, epidemiology, and risk factors.

2. METHODOLOGY

“An electronic database search was performed to identify articles in PubMed, and CINAHL from 1984 to September 2015.” Various keywords are used for accessing pertinent data by the application of Boolean Operators ‘AND’ and ‘OR’. The search terms included “Prevalence”, “Risk”, “Epidemiology”, “Burden”, and “Risk Factors”. The screening process was essential to ensure and select only those studies for review, which were closely related to the topic, fulfilling the entire inclusion criteria for systematic review. The eligibility criteria included publications in the English language, peer reviewed journal articles, studies mainly focusing on the epidemiological impacts of IBS in the Arab world till 2015 and had used objective diagnostic criteria. “A total of 35 articles met the inclusion criteria dating back to 1984. Abstracts and titles were reviewed to scan for exclusion criteria; 27 articles were

excluded at this stage (n=12 case controls and n=15 non relevant population). Full texts were then retrieved for 8 articles after careful evaluation and reading. A flow chart for the research strategy is demonstrated in figure 1.”

Secondary research was undertaken via supplementary electronic database search such as CINAHL and Science Direct by utilizing combination of different keywords (Appendix 1). A search of local specialized journals from the Arab world were undertaken that includes Kufa Med Journal, World family medicine journal, Academic E-journals-database, and American Journal of Research Communication. A secondary research analysis examined 4 additional research articles that were not retrieved from original Pub Med search. Thus, in total 12 articles were included in the review.

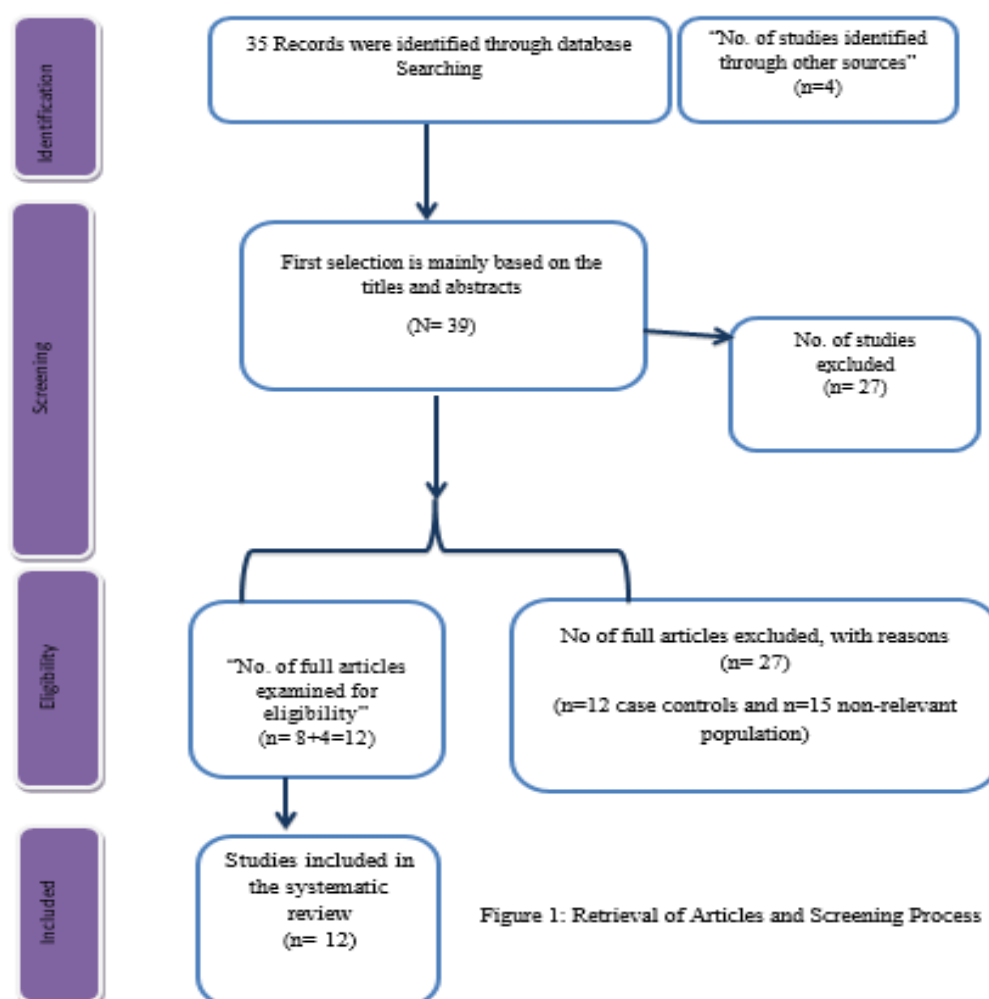


Figure 1: Retrieval of Articles and Screening Process

3. RESULTS

The selected studies were classified into two groups; 1; Articles related to the prevalence of IBS in the Arab world and 2; Articles related to the risk factors of IBS. As the aim of our study mainly focused on the prevalence, epidemiology, and risk factors of IBS, therefore, articles related to the control and prevention were excluded.

3.1 Prevalence studies

Seven studies reported the prevalence of IBS; six were conducted in Saudi Arabia and one in Palestine. These studies were conducted in the year 1984, 2009, 2010, 2011 and 2012. All the included studies were cross-sectional in nature and sample size ranged from 75 to 1747. Al Freihi et al used sigmoidoscopy and biops; while, Alhazmi and Ashaalan used the Rome II criteria, and the rest of them used Rome III criteria. Alhazmi, Alturki et al and Ibrahim et al conducted study on secondary school and university students while the rests of the studies were conducted with adults and elderly population.

Alhazmi (2011) reported the prevalence of IBS as 8.9% and 9.2%. However, a clear trend between KSA studies reporting IBS prevalence has not been firmly established. Out of 1747 patients, 37.9% had abdominal pain and discomfort and 32.2% reported incomplete rectal evacuation after defecation [15]. On the other hand, Al-Turki et al (2011) recruited 1237 participants, 14.2% were diagnosed with IBS among which 18.4% were female and 9.3% were males. A significant association between IBS and gastroenteritis, psychological stress, and pelvic surgery was also reported [16]. Ibrahim et al (2012) reported 31.8% prevalence of IBS. Main predictors for IBS were presence of “emotional stress”, “female gender morbid anxiety”, “living away from the family in a school dormitory”, as well as “higher academic year” were the key predictors of IBS [11].”

Al-Freihi, et al. (1984) prospectively recruited 288 patients with significant complaints and physical signs for lower GIT problems. In 44.5% of patients, sigmoidoscopy, rectal and/or colonic biopsies did not reveal any pathological abnormalities. Twenty eight percent were found to have either “mild to moderate” non-specific proctitis or colitis. In 4% Ulcerative colitis and in 1.5% colorectal carcinoma were detected. [18]

Al Freihi et al. (2010) reported prevalence of IBS as 26.7%. Most of the IBS cases were under the age of 45 years. Sixty five percent having IBS had consulted the doctor. Among IBS patients, 45% reported awakening from sleep with abdominal pain. While 30% reported loss of appetite, 25.0% reported weight loss, 15% reported bloody stool whereas 65% of patients with IBS reported psychological upset. Thirty percent IBS patients reported absence from work. Symptoms were exaggerated with work and home stressful situation in 80% of cases [18].

Unlike Al Freihi et al., Alharthi in 2013 documented the prevalence of IBS among adult both male and female. Among 1061 participants, 121 subjects met “Rome II Criteria”. “The prevalence of IBS was 11.40% with a significant difference between female [14.2%] and male [8.5%] subjects with p value < 0.05 . The prevalence was significantly higher among the age group of 30- 39 years. The predictors for IBS were fatigue, backache, insomnia, anger and withdrawal from social activities.” All of these were significantly associated with IBS with a p value < 0.05 [19]. In Palestine, a population based cross-sectional study was conducted among 1352 middle aged and elderly resident by Rumsey et al in 2012. The overall prevalence of IBS was 30%. In comparison to urban residents, IBS were significantly more prevalent in refugee camps and villages OR: 1.68 95% CI: 1.14–2.40 and OR: 1.33, 95% CI: 1.02–1.72 respectively. Mixed IBS and IBS with constipation were more common in women [20].

3.2 Risk factor studies

Total five studies were related to risk factors associated with IBS. The studies were conducted in Egypt, Kuwait, and Iraq. The studies were conducted in the era of 2008 in Kuwait, 2008 and 2009 in Egypt and 2012 in Iraq. The sample size varied in all studies based on the study design. Four studies were case control and one conducted by Hyder (2012) included cross-sectional controlled comparative design. Panicker et al. and Abdulmajeed et al. used Rome II criteria; Fouad et al used Rome III criteria along with liver biopsy; Hussein et al used HRM for IBS diagnosis; Hyder used type II and III Rome criteria [Table 1].

Panicker et al. (2008) explored the association between IBS and clinically diagnosed asthma among 138 patients. These were compared with 145 non-asthmatic and healthy controls. In both cases and control, frequency of IBS in females was higher (74.7%cases vs. 57.4%control). Non-smokers were known to be more affected by IBS (77% of controls and 78% of cases) [22]. Eman M. Hussein et al. (2008) studied the genetic variability of numerous different clinical isolates of *D. fragilis*. Four types of profile were associated with the type of diarrhea in IBS patients [23]. Abdulmajeed et al. (2009) reported that among 117 individuals (40 suffering from IBS and 77 without IBS) 37.5% had “IBS-C”, 52.5% of them had “IBS-A”, and 10% had “IBS-D”. Of total 48.72% of IBS [+] were in age group 40-49. The IBS [+] prevalence was significantly higher in females 41.1% as compared to males with “p value <0.05”. A significant association exists between psychological stress and IBS with p value <0.05 [24]. In other case control study conducted in clinic by Yasser M Fouad et al in 2009 explored the role of HCV in relation to IBS patients. Patients suffering from “chronic HCV” had higher patients with IBS [66%] as compared to the normal controls or patients with chronic HBV with p value <0.001 for both. Moreover, prevalence was 91% times higher in females with significant p value <0.001 [25]. Hayder (2012) explored the potential association between TTH (Tension Type headache) and IBS. There was significantly a higher

prevalence of IBS among TTH group [79.7%] versus healthy control group [10%] with p value <0.001. IBS was more common among women in both TTH group and control (62.7% and 52.4% respectively) but does not differ statistically [26].

Summary of all the studies included in the systematic review						
Author	Place and year	Study design and Sample size	Age of participants	Gender	Diagnosis of IBS	Findings
Prevalence						
Al-Freihi HM et al (15)	Saudi Arabia 1984	Prospective study, 288	-	-	Sigmoidoscopy and rectal and/or colonic biopsies	In 128 patients no pathological abnormalities were revealed. 81 patients (28%) have mild to moderate non-specific colitis or proctitis. In another 49 patients (17%) the diagnosis of schistosomiasis mansoni was made. Ulcerative colitis and colorectal carcinoma: 11 (4%) and 4 (1.5%) patients respectively.
Alhazmi AH (12)	Saudi Arabia 2009	A cross sectional, 1747	15-23 years	Male	Manning and Rome II	Prevalence of IBS :8.9% and 9.2% according to Manning and Rome II criteria respectively Common symptom: abdominal pain or discomfort in 37.9% feeling of incomplete rectal evacuation after defecation in 32.2% Recurrent abdominal pain or discomfort caused increase in rates of absence from schools (p < 0.05). Significant association between family size and clusters of symptoms compatible with IBS (p < 0.045).
Alfetni A et al (16)	Saudi Arabia 2010	Cross-sectional, 75	26->/=45	Male	Rome III Criteria	IBS: 20 out of 75 participants (26.7%). Symptom: diarrhea (25.0%), constipation (25.0%) and alternating symptoms (50.0%). 65.5% consulted a physician. IBS was significantly

						associated with psychological distress.
Alturki Y et al (13)	Saudi Arabia 2010	Cross sectional, 1237	Students	561 (45.4%) males and 676 (54.6%) females	Rome III Criteria	175 (14.2%) were diagnosed with IBS. 9.3%: males 18.4%: female. 66.9% use medications for relieving their symptoms. Significant relation- ship between IBS and psychological stresses, gastroenteritis, and pelvic surgery. No relationship between IBS and smoking or irregular eating.
Ashaalan L (17)	Saudi Arab 2011	Cross-sectional, 1061	20-59 Years	532 females (50.14%) and 529 males (49.86%).	Rome II	121 subjects met Rome II Criteria. Prevalence of IBS: 11.40% with a significant difference between female and male subjects, (females 14.28%, males 8.51%, $P < 0.05$). The difference in IBS prevalence by marital status was not significant. The relationship between IBS and fatigue, backache, insomnia, anger and withdrawal from social activities was statistically significant (all $P < 0.05$), while the association with headache, inability to concentrate and loss of sex drive was not significant (all $P > 0.05$).
Ibahrin NK et al (14)	Saudi Arabia 2012	Cross-sectional, 597	Mean age 21.68 SD:1.77	297 female 300male	Rome III Criteria ,the Standardized Hospital Anxiety and Depression Scale Were also used	Prevalence of IBS: 31.8%. Predictors of IBS were female gender (aOR=2.89; 95.0% CI: 1.65-5.05). Presence of Morbid anxiety (aOR=2.44; 95.0% CI: 1.30-4.55). Living in a school dormitory, emotional stress during 6 months preceding the study, and the academic year were related with IBS
Qumseya BJ et al (18)	Palestine 2012	Cross-sectional, 1352	At least 50 years	-	Rome III	Prevalence of IBS: 30% Predictors of IBS: living in refugee camps

(OR) 1.68 (95% (CI) 1.14–2.40), $P=0.005$) and in villages (OR 1.33 (1.02–1.72), $P=0.033$) IBS, IBS with constipation, and IBS-M were more common in women than in men ($P<0.05$).

Risk factors

Panicker R et al (19)	Kuwait 2008	Case control study 138(asthma, diagnosed clinically and by spirometry) 145(healthy, non-asthmatic controls matched for age, gender and nationality)	20-65 Years	Rome II criteria	39.13% of asthmatics had IBS as compared to 7.93% controls ($P < 0.001$). Higher proportion of females with IBS were in cases and controls (74%, 61.54%). IBS in 87% cases using inhalers, and in 13% with additional oral theophylline ($P < 0.001$). 66.6% cases, had IBS with relatively short duration of asthma (1-5 years, $P < 0.000$). Predominant symptoms of IBS in asthmatics were abdominal discomfort or distension (64.8% vs. 11.5%), ($P < 0.000$, OR = 14.1; 95%CI: 3.748-53.209), bloated feeling of abdomen (74.1% vs. 34.62% ($P < 0.001$, OR = 5.38; 95%CI:1.96-14.84)), increased frequency of stools (63%, $P < 0.006$).
Hussein EM et al (20)	Egypt 2008	Case control study 30 fecal samples	>18years	HRM	HRM proved that four profiles (subtypes) were present as detecting by scanning Mutation. One of these profiles (profile 1) was predominant (50%). Profile 2 was present on 20%. Profiles 3 and 4 were present on 16.7% and 13.4%, respectively. patients having profile 1 (73.4%) and profile 4 (75%) had chronic intermittent diarrhea. All of the patients having

						profile 2 had acute diarrhea while all of the patients having profile 3 had diarrhea alternating with Constipation.
Abdulmajeed A et al (21)	Egypt 2009	Case control 117 (40 with IBS and 77 without)	18-65 years	78 females, 39 males	Rome II	Prevalence of IBS: 34.2%. 10% were IBS-Diarrhea, 37.5% were IBS-Constipation and 52.5% were alternators. There is statistical insignificant relationship between IBS (+) and age while it was a significant relation regarding gender (more common among women 80%). There is statistical significance relationship between IBS (+) on one hand and marital status and occupational status on the other hand. Patients with IBS had statistically significant lower scores for all IBS- QOL domains compared with the control group.
Fouad YM et al (22)	Egypt 2009	Case Control 258 patients with chronic hepatitis C, 36 patients with chronic hepatitis B, and 160 healthy volunteers	18-65 years	316 males	Rome III Liver biopsy done	The percentage of patients with IBS was significantly higher in patients with chronic HCV (66%, 170/258) than chronic hepatitis B virus (HBV; 22%, 8/36) and normal controls (18%, 28/160 patients; $P < 0.001$ and $P < 0.001$, respectively). There was no significant difference between chronic HBV and normal controls. In chronic HCV patients, IBS with constipation was the predominant type (51%, 86/170) followed by mixed IBS (73/170, 43%). In patients with chronic HCV, the percentage of females with IBS (91%) was significantly higher than those without IBS (9%; $P < 0.001$) A multivariate regression

						analysis revealed a significant association between sex, fibrosis score, and IBS.
Hayder K (23)	Iraq 2012	Cross Sectional Controlled 360 TTH patients Age and gender matched 200 controlled individuals	15-60 years	Case: 200 female and 160 male Control: 116 female and 84 male	Rome II and III Criteria	There was significant high prevalence of IBS among TTH group versus control healthy group (79.7%, 10% respectively; p value<0.001) with very high significant prevalence among chronic TTH versus episodic TTH (93.3%, 72.9% respectively; p value=<0.001). The prevalence of IBS among sex and gender differences were not significant statistically .

Table 1: IBS: Irritable Bowel Syndrome, TTH : tension type headache, OR: Odds ratio, aOR: Adjusted odds ratio, CI: Confidence Interval, HCV: Hepatitis C, HBV: Hepatitis B, HRM: High-resolution melting-curve

4. DISCUSSION

This systematic review of literature has demonstrated that the “prevalence estimates for IBS in the Arab countries ranging from 8.9% to 79.7%.” As most of the studies were conducted in KSA only generalizability of the findings to all Arab nations would be questionable.” This wide range of prevalence might be due to varied IBS definitions used rather than the true difference in the prevalence. Moreover, different nature of underline population might have resulted in such a wide variation. Nevertheless, most of the cross-sectional studies reported the range of prevalence of IBS in between 8.9% to 31.8%, and this evaluation is consistent with manifold of non-Arab IBS studies summarized in aforementioned review articles [2].

The associated factors related to high prevalence of IBS, highlighted by the review were; gender, stress, living away from the family, D. fragilis, marital status, occupational

status, HCV, asthma, and tension type headache. Unlike clinical studies, population-based studies are incapable to show “4:1 female to male predominance ratio.” Relatively, in community settings, such a ratio ranges from 1:1 to 2:1. The fundamental motive behind these gender differences are still not clear. The predominance ratio reported by both types of study; that is higher in female than male is often associated with the criteria and definition used to define IBS or could be because of difference in culture norms. Moreover, difference in health seeking behavior and true biological difference might be one of the explanations behind this imbalance ratio among gender. Studies conducted world-wide also reported high prevalence among females than males [26-28].

No statistical significant difference was reported in terms of age difference and prevalence of IBS but it is apparent that IBS is a disease of all ages as different studies have reported the prevalence in different age group population such as Alhazmi whose study was conducted in age group of 15- 23 years; Alfetni et al conducted study in age group of 26-45 and above; and Alharthi conducted the study on 20-59 years old [15, 18-19]. As reported by other study IBS occurs in all age group including children and elderly [29-30].

Other key verdicts from this review was the relationship of IBS with the stress. Al Freihi et al, Al Turki et al, Al harthi, and Ibrahim et al, all reported the association of IBS with stress [16-19]. As IBS is considered a biopsychological disorder in which stress can lead to bowel irregularities, studies conducted world-wide showed significant relationship between IBS and stress [31-36]. Furthermore studies had documented the role of social ties and IBS [36]. Our findings are also consistent with the findings of aforementioned studies. As reported by Alhazmi, significant relationship exists between family size, and clusters of symptoms are compatible with IBS [15]. Moreover, Al harthi reported significant association between IBS and social activities [19]. Conversely, Ibrahim et al also reported association between living in a school dormitory and IBS [17]. These research articles demonstrated that

patients having psychological stress had higher IBS prevalence, additionally so with the presence of emotional stress; anxiety and living away from the family were the key IBS predictors.

Additionally, patients with TTH have noteworthy associations with IBS as comorbid disorder. Strength of this relationship suggests a common pathophysiologic mechanism but this cause and effect relationship needs to be studied in future studies [25]. Furthermore, association of IBS with HCV was also documented in one of the studies, and [24] this association was reported internationally by other studies and the pathophysiology is complex although it may be due to the infectious changes, motor changes or psychological causes that relate these two with each other [37-38]. The association with asthma was also reported in one of the studies [21] and this finding is also consistent with the findings of other studies [39-41]. The pathophysiological is under discourse but various hypothesis regarding the role of inflammation and role of autonomic nervous system relates asthma to IBS [39-43].

The strengths of the current review are determined to the best of our knowledge. This is the most recent review that compiles all the studies related to IBS in the Arab region. We have included studies from different region of Middle East to provide true estimates of IBS. Secondly, different sorts of risk factors are highlighted that were found to be associated with IBS in the Middle East. Thirdly, local databases were also reviewed in order to reduce the chances of missing any important articles. The primary limitation of this study includes limiting the search for studies in English, however, majority of the studies conducted in Arab World by universities and research institutes are not in English language. There lies a possibility of missing few articles as some of the important databases were not searched. However, local journal articles were reviewed to obtain information restricted to an explicit geographical area. Publication bias, refers to as a tendency for manuscript publishing with positive findings was a potential limitation. However, our results are not highly sensitive to or

affected by publication bias. Majority of the studies conducted in Saudi Arabia enclosed a cross sectional research design with an aim of characterizing patients diagnosed with IBS with regards to the accompanied factors with limited “follow-up data” available aiming to explore the consequence, burden, and prognosis of these conditions with regards to health care service and in community based settings. Studies have highlighted the prevalence of IBS in middle and high school age individuals thus, it is important to begin data collection at birth in order to estimate the true incident at early stage. Timely collection of data, proper objective tool with standard definition along with population based samples and proper follow ups are needed for upcoming epidemiological studies for estimating the true burden in our region.

Given the comparative limited amount of data, this review reinforces the need for suitably designed studies to elucidate IBS epidemiology. There is a clear requirement for a “prospective cohort study” to determine the meticulous “incidence” and “natural history of IBS”. Furthermore, health care and individual financial burden from IBS should be evaluated to form strategies for prevention at primary level and for early diagnosis and treatment.

5. CONCLUSION

The prevalence of IBS in the Arab region ranged from 8.9% to 31.8% and this prevalence is comparable to the other developed countries. Genetic expressions of various parasite (e.g. *Dientamoeba fragilis*), behavioral habit (emotional stress, anxiety), and viral infections (Hepatitis C virus and Hepatitis B virus) were amongst the investigated factors. However, limited evidence exists on the population-based data. Future research in the Arab world are needed in community based setting in order to identify the real burden of this disease at population level and to improve treatment strategies for IBS patients and prevent its risk factors. Nevertheless, implementation of health education campaigns for public is

highly recommended to understand the epidemiology, risk factors, and impact of IBS in the Arab countries.

6. ACKNOWLEDGEMENTS

I offer my sincerest gratitude to the library facilities of KSAU-HS, who had supported me with different library resources, proper guidance as well as services to perform this study and acquire unlimited information on the subject area.

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Appendix 1- keywords used

“Keywords used in Pub-Med have advanced search and secondary research to identify articles. Keywords covered three categories: Disease of interest, Epidemiological terms and geographical locations. Boolean phrase (AND) was used to link all three categories of key words”.

Distribution	AND	Algeria
OR		OR
Epidemiology		Bahrain
OR		OR
Incidence		Comoros
OR		OR
Prevalence		Djibouti
OR		OR
Prognosis		Egypt
OR		OR
Rate		Emirate
OR		OR
Trend		Iraq
OR		OR
Risk		Jordan
OR		OR
Factors		Kuwait
OR		OR
Odds		Lebanon
OR		OR
Diagnosis		Libya

OR	AND	OR
Pattern		Mauritania
OR		OR
Irritable bowel syndrome		Morocco
OR		OR
IBS		Palestine
OR		OR
Spastic Colon		Qatar
OR		OR
Mucous Colitis		Saudi
OR		OR
mobility of the intestines		Somalia
OR		OR
Digestive disorder		Sudan
OR		OR
Spastic Bowel syndrome		Syria
OR		OR
Irritable colon		Tunisia
OR		OR
Functional Bowel Disease		Yemen
OR		OR
Disease		Oman

Database Search

PubMed - www.pubmed.gov

National Digestive Diseases Information Clearinghouse:

<http://www.digestive.niddk.nih.gov>.

Academic journal www.ebscohost.com/academic/e-journals-database

World family medicine journal. www.mejfm.com

Kufa Med .Journal www.iasj.net/iasj

American Journal of Research Communication. www.usa-journals.com