Irritable bowel syndrome among High School Students, Bagdad, Iraq, 2017-2018

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Abstract:

Background: Irritable Bowel Syndrome (IBS) is a common chronic functional gastrointestinal disorder characterized by abdominal pain or discomfort and alteration in bowel habits. It is more common among adolescents and young age groups.

Objectives: to estimate the prevalence and identify potential determinants of IBS among high school students in Baghdad, Iraq, 2017.

Methods: This cross-sectional study was conducted by using multi-staging cluster probability sampling technique. All students in the sixth grade were considered eligible. Students with "red flag" symptoms were excluded. Rome III criteria questionnaire of IBS was considered to define IBS. A self-administered questionnaire used to compile socio-demographics, personal habits and certain potential determinants. IBS was further classified as mixed type (M-IBS), diarrhea predominant type (D-IBS) and constipation predominant type (C-IBS).

Result: Among 657 eligible high school students, 592 (90.1%) were enrolled. The prevalence of IBS was 29.7% (95% C.I: 29.4- 30.1%). The most common type of IBS was M-IBS (42.6%) followed by D-IBS (33.5%). Binary and logistic regression analyses revealed the following significant factors: exposure to stressful life event (OR: 3.93; 95% CI: 2.64 – 4.85), food hypersensitivity (OR: 2.89; 95% CI: 1.59 – 3.27), chronic diseases (OR: 2.22; 95% CI: 1.24 – 3.95), family history of IBS (OR: 2.04; 95% CI: 1.30 – 3.01) and female sex (OR: 1.84; 95% CI: 1.25 – 2.73). C-IBS was significantly more common among females (P=0.02)

Conclusion: IBS is a common health problem among high school students. Among the hereditary, environmental and psycho-social factors, stress was the most important determinant.

Keyword: Irritable Bowel Syndrome, High School students, Prevalence, Risk factors, Iraq.

Introduction:

Irritable bowel syndrome (IBS) is a chronic disease of large intestine causing abdominal pain and change in bowel habits in the absence of a specific organic pathology [1]. The chronic and relapsing nature of IBS has proposed diagnostic criteria which based on the occurrence rate of symptoms and their duration [2]. Altered gastrointestinal motility, visceral hypersensitivity, post-infectious reactivity, food sensitivity, dietary intakes, and intestinal inflammation have been contributed to the pathogenesis of IBS [3]. IBS is a multifactorial disorder though its causes and risk factors remain unclear. But, stress is the main factor that has marked impact on intestinal motility, sensitivity and stimulation of colon spasms among IBS patients [4]. Globally, IBS is prevalent in both developed and developing countries. It affected about 10-20% of people, with mean prevalence range from 1.1% in France and Iran to 35.5% in Mexico [5]. IBS occurs in all age groups and affects even children, but it is more prevalent in those under 25years old and then modestly declines with increasing age [6]. This may be related to the combined effects of physiological changes in adolescence period and the psychological factors related to study, work or family [7].

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IBS is considered as the second major factor associated with loss of productivity and work absenteeism. Some studies estimated that the total annual cost of IBS is up to $30 billion; $20 billion as a direct cost related to the disease diagnosis, management and treatment in addition to $10 billion in term of indirect cost defined as productivity cost and work absenteeism [8]. However; in term of loss of productivity, patients with IBS missed annually about three times as many days from school or work as people without IBS [9]. Although IBS remains a common disorder with high prevalence in adolescents and young age groups with negative impacts on patients' school, partner's life and society. [10], there is little information about IBS prevalence and risk factors in Arab countries, including Iraq. The objective of this study was to estimate the prevalence and identify the determinants of IBS among high school students in Baghdad, Iraq, 2017.

Subjects and Method:

Design and Setting: This is a cross-sectional study that was conducted on a sample of high schools students in Bagdad, Iraq. Sampling: A multi-stage cluster sample technique were be applied to select 12 high schools from a list of all high schools in Bagdad which obtained from the Ministry of Education. Then to choose students entered the study. Study population: students of the sixth grade

of the selected schools were initially considered eligible. Students with history of confirmed diagnosis of GI disease other than IBS or surgery for GI diseases were excluded. Students with alarming "red flag" symptoms: blood in stool, unexplained weight loss in last three month, bloody vomiting, fever, nocturnal symptoms, family history of colon cancer and inflammatory bowel disease or celiac disease were also excluded.[11] Data collection: Two self-administrated questionnaires were adopted. The first questionnaire was for socio-demographics characteristics; age, gender, monthly family income (classified as: low <400$, medium 400-1,200$ and high >1,200$) and current parents' status, personal habits (smoking, daily sleeping hours and daily meals), medical history of chronic diseases (Diabetes, Asthma, Migraine, Hypertension …etc.), regular medication (any medication taken on regular basis in the last six month), food hypersensitivity (allergic reaction to certain type of food causing digestive, skin, respiratory or eye manifestation), history of stressful life events (events which predict stress according to Holmes and Rahe Stress Scale; including Death of one of close relative, continuous family or economic problems, migration, causes related to study or school and others)[12] and family history of IBS[family history of first degree relative]. The second was Rome III diagnostic criteria questionnaire, which is a validated self-administrated questionnaire that consists of ten questions, each question can be answered according to a scale describing the frequency of each symptom. According to Rome III criteria, IBS is defined as a frequent abdominal pain or discomfort for at least three days per month in the last three months since six month ago, associated with two or more of the following: a) relief with defecation, 2) change in frequency of stools, 3) change in stool appearance [13]. The diagnosis of IBS was made by using the Rome III criteria as long as the patient does not have any of red flag symptoms. Thereafter; the patients were classified as having constipation predominant (IBS-C); if they had hard or lumpy stools with no loose or mushy watery stools, or diarrhea predominant (IBS-D); if they had loose or mushy watery stools with no hard or lumpy stools and mixed subtypes (IBS-M); if they had loose or mushy stools with hard or lumpy stools in the past three months [14]. In our study we depended an Arabic version questionnaire which had used previously in other Arabic studies [15, 16] after we assessed and validated it by specialists in department of Gastroenterology. Ethical and Official Approvals: Official approval was granted from the Directorates of Education in Baghdad/ Iraq Ministry of Education. Ethical approval was obtained from the Medical Research Ethics Committee/ Iraq Ministry of Health and the Scientific Research Committee in the College of Medicine, University of Baghdad. The participants were verbally informed about the objectives of study and they were not obligate to take part in the study. All names were deleted after replacing them with identification number. Data was kept confidential and used exclusively for the sake of this study.

Statistical analysis: Statistical Package for Social Sciences (SPSS) program, version 23 was used for data entry and analysis. The prevalence (and its 95% confidence interval) of IBS among high school students was calculated. Chi square and fisher's exact probability test were applied to test association of qualitative and categorical variables with IBS. Logistic regression analysis was used to identify the significant, independent and un-confounded risk factors. In the model, IBS was considered the dependent variable and all the variables that were found significant in the binary analysis were included as the independent variables.

Results:

Among the 657 interviewees, 65 (9.9%) were excluded because of alarm features or non-response, leaving a total of 592 eligible participants. The mean age (±SD) of the students was 18.05(±1.28) years, with almost equal proportions of males and females. Most of the students lived with their parents (87.2%) and 10.5% had one or both parents deceased. About half of students had average monthly family income of 400-1200$. We found that 34.1% of students were currently smokers; 70.9% were sleeping less than eight hours per day and 47.6% had irregular meals. The prevalence of IBS among high school students in Baghdad was 29.7% (176) (95% C.I: 29.4–30.1%). In table 1, the study sample was cross classified by IBS and certain socio-demographic characteristics and personal habits. The highest prevalence of IBS was among students aged 17-19 (30.3%) and the lowest prevalence was among students aged >20 years (11.3%); still no significant association was found between age group and IBS (P=0.86). On the contrary, the prevalence of IBS was 35.6% (110/309) among females compared to 23.3% (66/283) among males; the difference was statistically significant (P<0.001). The female to male ratio was: 1.5:1. There was an increased prevalence of IBS among students who had one or both parents deceased (43.5%) with a significant association between current parents' status and prevalence of IBS (P=0.04). A significant proportion of the students from low economic status (36.1%) had IBS compared to those from middle economic status (29.5%) and high economic status (26.8%), but no statistical association was demonstrated between economic status and IBS (P=0.27). Table 1 shows the highest prevalence of IBS was seen among smokers (34.2%), among students who were sleeping <8 hr. /day (31.9%), and among those who had irregular meals (33.0%); still, there was no statistical association between smoking (P=0.091), daily sleeping hours (P=0.08) and irregular meals (P=0.10) with IBS. Table 2 shows that the prevalence of IBS was significantly higher among students with history of chronic disease (40.3%) (P=0.04), family history of IBS (37.6%) (P<0.001), students having history of food hypersensitivity (54.2%) (P<0.001) and students with stressful life

events (44.6%) (P<0.001), but there was no significant association between history of regular medication and IBS (P=0.43). Logistic regression analysis was applied, and the results as demonstrated in table 3 showed that the following were the factors that significantly predict the occurrence of IBS in the study population: having stressful life event (P<0.001), food hypersensitivity (P<0.001), chronic health problem (P=0.01), family history of IBS (P<0.001) and female sex (P=0.01). In table 4, we noticed that Diarrhea predominant IBS (IBS-D) constituted 33.5% (59/176), Constipation predominant IBS (IBS-C) constituted 23.9% (42/176), and the remaining 42.6% (75/176) were of mixed type (IBS-M). The proportion of IBS-C constituted 29.4% of female IBS students compared to 14.9% among males IBS students, while the proportion of IBS-D was seen in 44.8% among males IBS students compared to 26.6% among females IBS students (P=0.02).

Table1: Distribution of the study group by IBS and certain demographic characteristics

Socio-demographic	Total (n=592)		IBS (n=176)			No IBS (n=416)		P- Value
Variables	No	%	No	No	%	No	%	
Age (Year)								
< 17	19	3.2	19	5	26.3	14	3.2	
17 - 19	501	84.7	502	152	30.3	350	84.7	0.86
≥ 20	72	12.1	72	20	11.3	52	72.2	
Sex								
Male	283	49.5	283	66	23.3	217	76.7	<0.001
Female	309	505	309	110	35.6	199	64.4	
Parents' status								
Live together	508	85.8	508	143	28.1	365	71.9	
Separated	22	3.7	22	6	27.3	16	72.7	0.04
Death of one or Both	62	10.5	62	27	43.5	35	56.5	
Monthly income								
< 400 $	97	16.4	97	35	36.1	62	63.9	
400 $-1,200 $	305	51.5	305	90	29.5	215	70.5	0.27
>1,200 $	190	32.1	190	51	26.8	139	73.2	
Smoking								
Smoker	202	34.1	202	69	34.2	133	65.8	0.09
Non smoker	390	65.9	390	107	27.4	283	72.6	
Sleeping hours								
< 8 hrs.	420	7.9	420	134	31.9	286	68.1	0.08
≥ 8 hrs.	172	29.1	172	42	24.4	130	75.6	
Regular meals								
No	382	47.6	282	93	33.0	189	67.0	0.10
Yes	310	52.4	310	83	26.8	227	73.2	

Table 2: Distribution of the study group by certain potential risk factors

Variables	Positive IBS		Negative IBS		Total		P-value
	No	%	No	%	No	%	
Chronic health problems							
Yes	29	40.3	43	59.7	72	12.2	
No	147	28.3	373	71.7	520	87.8	0.04
Regular medication							
Yes	12	36.4	21	63.6	33	5.6	
No	164	29.3	395	70.7	559	94.4	0.43
Family history of IBS							
Positive	94	37.6	156	62.4	250	42.2	
Negative	82	24.0	260	76.0	342	57.8	<0.001
Food hypersensitivity							
Positive	32	54.2	27	45.8	59	10.0	
Negative	144	27.0	389	73.0	533	90.0	<0.001
Stressful life events							
Present	124	44.6	154	55.4	278	47.0	
Absent	52	16.6	262	83.4	314	53.0	<0.001

Table 3: Significant risk factors of IBS as demonstrated by logistic regression analysis

Variables	Odd's Ratio	95% C.I for	P-Value
Stressful life event	3.928	2.637 – 4.853	<0.001
Food hypersensitivity	2.894	1.588 – 3.274	<0.001
Chronic health problems	2.217	1.244 – 3.950	0.01
Family history of IBS	2.040	1.298 – 3.009	<0.001
Gender	1.843	1.245 – 2.730	0.01

Table 4: Distribution of IBS group by IBS type and sex

Sex	IBS								P-value
	Cons-tipation IBS		Diarrhea IBS		Mixed IBS		Total		
	No	%	No	%	No	%	No	%	
Male	10	14.9	30	44.8	27	40.3	67	38.1	
Female	32	29.4	29	26.6	48	44.0	109	61.9	
Total	42	23.9	59	33.5	75	42.6	176	100	0.02

Discussion:

IBS is a common chronic gastrointestinal disorder and determining its prevalence is important for health economies, burden of disease and allocation of healthcare resources [9]. In this study, around 30% of high school students had IBS; this is very close to the reported prevalence from a study involving the general population in one governorate in Iraq [17]. The reported prevalence in this study is higher than the rates reported from Europe, Africa and many Asian countries [18, 19, and 20]. Still, it is close to the rates reported in studies from Middle Eastern countries [16, 21]. This variation may be explained by social, environmental and genetics factors and dietary habit which differ from one geographical area to another [6]. While, many studies reported inverse relationship between age and the rate of IBS [18, 20], such association was difficult to demonstrate in this study, as the age range of the studied sample was extremely narrow. Similar finding was reported in Saudi Arabia in a study on adolescent aged 15-23 years [15]. The higher prevalence of IBS reported among females had been demonstrated by other studies [4, 5]. In this study, females had almost twice the odds of having IBS after controlling of potential confounders. This may be related to hormonal factors, psychosocial factors and sex differences in stress response and autonomic response that may influence gastrointestinal motility and visceral hypersensitivity [22]. The study revealed a significant effect of exposure to stressful life event on prevalence of IBS, and this is concordant with other studies that demonstrated the role of psychological factors on IBS occurrence [23, 24]. The physiological changes of adolescence and inadequate experience to deal with life stresses make the students more sensitive and less resilient to family problems, financial difficulties, sexual abuse and study or work stress [7]. In Iraq, the marks achieved by the students at the end of the 12^{th} year is the only factor that decides the type and rank of academic studies; a factor that makes the students and their families under a considerable stress. Having food allergy was another factor associated with increased odds of having IBS. While studies conducted in Lagos [18] and Lebanon [25] revealed similar finding, another study denied such association. [26]. Food may activate an immunoreaction in the gut that induces IBS by a similar pathophysiological mechanism of atopic conditions [20]. In this study, we identified a familial role of IBS, in term of positive family history. A similar finding was reported by other studies. [26, 27]. IBS represents a complex genetic disorder which interact with several environmental factors, resulting in the disruption of intestinal function. [27] While history of chronic diseases was a significant factor for IBS, regular use of medication was found non-significant factor. The findings from other studies were controversial, as some studies found chronic diseases a significant independent risk factor of IBS [26, 28], other studies did not support such association. [21, 24]. Similarly, some studies demonstrated a significant association between regular medication intake and IBS [28, 29], another study did not find such association [30]. The role of the parents' status whether living together, separated or deceased is not clear. On univariate analysis it was statistically significant and the proportion of IBS among students with one or both deceased parents was almost double those who lived with their parents together. Yet, in logistic regression analysis this factor was found not significant. Other studies also showed uncertain results [22, 30], although, another study considered it as a risk factor and explained that on the basis of having both parents living together may entitle more emotional stability, care and support to the adolescents and better cope with life stresses. [15]. This study revealed a lack of association between the monthly family income and IBS, which is consistent with a study in Saudi Arabia [16]. Other studies demonstrated that individuals with high family income can cope better with stressful life events [25, 30]. The three studied personal habits: smoking, irregular meals and sleeping hours were found non-significant determinants. The reviewed studies demonstrated controversial results. While some support smoking [29] as a risk factor, others did not [30, 31]. Also, irregular meals were considered significant risk factor in one study [22], while others considered it not a risk factor [21, 31]. On a similar scale, sleeping less than 8 hr./ day was considered as a significant risk factor for IBS in some studies [23, 29] others did not support that [24, 26, 30]. Different study methods, definitions of variables and sample sizes might be behind these variations. The mixed type was the most prevalent type of IBS and the significant association between sex and IBS type is also demonstrated by other studies. [18] [23, 30]. In this study, data were fully obtained through the self-administered questionnaire, and considering the sensitivity of adolescents that may affect their responses, misclassification can't be ruled out. Also, as this is a cross sectional study, the temporal relationship between the identified determinants and IBS can't be demonstrated with confidence; hence causal association can't be inferred. We can conclude that

IBS is a common disorder among adolescents in Iraq particularly females. Hereditary, environmental, psychosocial factors play an important role in the conception of the disease and stress was the most important modified risk factor affecting its prevalence.

Authors' Contributions:

Dr. Hanaa F. Hazaa; Master student; Data collection, analysis and discussion

Dr. Faris H. Lami* MBChB, PhD, FFPH Supervisor

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