Medical Science

25(109), March, 2021

Prevalence and risk factors for irritable bowel syndrome among high school female students in northern borders region, Saudi Arabia

Entsar Owaid Alanazi[1]✉, **Wafa Owied Alshammri**[1], **Sabry Mohamed Hammad**[2], **Amal Elwan Mohammed**[3]

To Cite:
Alanazi EO, Alshammri WO, Hammad SM, Mohammed AE. Prevalence and risk factors for irritable bowel syndrome among high school female students in northern borders region, Saudi Arabia. *Medical Science*, 2021, 25(109), 556-564

Author Affiliation:
[1]Resident of family medicine, Salhia Awsat primary healt care center, Arar, KSA
[2]Professor of Public Health and Community Medicine Faculty of Medicine, Mansoura University, Egypt & Consultant of Public Health & Community Medicine, Northern Borders General health affairs, KSA
[3]Lecturer of Public Health & Community Medicine, Faculty of Medicine, Zagazig University, Egypt

✉**Corresponding author**
Resident of family medicine, Salhia Awsat primary healt care center, Arar,
KSA;
Email: entsaralsultani@gmail.com

Peer-Review History
Received: 19 January 2021
Reviewed & Revised: 21/January/2021 to 27/February/2021
Accepted: 28 February 2021
Published: March 2021

Peer-review Method
External peer-review was done through double-blind method.

ABSTRACT

Irritable bowel syndrome is one of the physicians' most common conditions and accounts for approximately 12% of primary healthcare units' visits. *Objectives*: This study aimed to assess the prevalence and risk factors of irritable bowel syndrome among high school female students in the Northern borders region, KSA. *Methods*: A cross-sectional study was carried out during the second academic semester, April 2019 to December 2019. The investigator used a self-administered questionnaire that employed Rome 4 criteria and previously tested for validity and reliability. Data collected were analyzed using SPSS version 24 using Chi-square test and Fisher exact tests for significance. *Results*: The overall prevalence of IBS among the studied group is 54.8%. School grade, marital status, Family income, Family number, Parents status ($p<0.001$) were significantly related to IBS. Lifestyle factors such as physical inactivity and poor consumption of fruits and vegetables were significantly associated with irritable bowel syndrome among adolescents. *Conclusion*: IBS is a prevalent condition that necessitates medical care. Family physicians need screening for IBS in a different setting. Raising awareness on healthy lifestyles among adolescents is highly recommended to combat IBS and other lifestyle diseases.

Keywords: irritable bowel syndrome, KSA, Rome IV

1. INTRODUCTION

Irritable bowel syndrome (IBS) is a frequent medical encounter in primary care (Lacy et al., 2017). Many cases remain undiagnosed or misdiagnosed. Irritable bowel syndrome (IBS) is a long-lasting gastrointestinal disease. The distinctive symptoms of IBS are recurrent abdominal pain, discomfort, and changes in stool habits in the absence of any organic disorders. IBS is diagnosed only clinically; There is no confirmative investigation or biomarker (Chey et al., 2015). Patients with IBS have higher health care utilization as

more frequent physician visits, more investigations, greater medication use, and increased rates of unnecessary surgery (Aziz et al., 2017). IBS imposes a significant negative impact on the quality of life and social functioning as decreased concentration, energy, vitality, and self-confidence, increasing absence rates from schools (Alhaznn, 2011). The exact etiology of IBS remains undefined. There are different explanatory mechanisms include serotonin dysregulation, subtle inflammatory bowel disorder, post-infectious IBS. New risk factors as autoimmune and atopic diseases have been linked to IBS (Talley & Holtmann, 2018). A panel of international experts in the field of functional gastrointestinal disorders developed The Rome criteria. These criteria were revised with the intent of making them clinically useful (Lacy et al., 2017). The main difference is the lack of abdominal discomfort term among the criteria for abdominal symptoms and an increased frequency of abdominal symptoms in Rome IV (Bai et al., 2017).

In a study in northern borders region university students, the overall prevalence of IBS according to Rome III criteria in northern border University was (32.5%). The disease prevalence was 33.6% in females and 30.9% in males among the study participants (El-Fetoh et al., 2016). In a study in Najran, the prevalence of IBS among Saudi Male Secondary School Students is high (Alshahrani, 2020). There are many studies done in the Kingdom of Saudi Arabia (KSA) to assess IBS prevalence. However, the magnitude of the IBS problem among female secondary school students in the northern borders region was not assessed before. This study aims to assess the prevalence and risk factors of IBS among this group.

2. SUBJECTS AND METHODS

A cross-sectional study will be conducted during the period from April 2019 to December 2019 at female secondary schools in Arar city. All-female secondary school students in Arar city. Students diagnosed with gastrointestinal (GI) diseases other than IBS. Students with the following conditions were excluded from the study.

Students with a history of surgery for GI disease, Students with alarming "red flag" symptoms, Blood in stool, Unexplained weight loss in the last three months, Bloody vomiting, Fever, Nocturnal symptom, Family history of colon cancer, Inflammatory bowel disease or celiac disease.

The sample size of this study is calculated by using the formula: $n= P (1-P) * Z_{\alpha}^2 / d^2$, (Charan & Biswas, 2013) assuming $Z_{\alpha} = 1.96$, $d= 0.05$, P is the expected prevalence of IBS in female secondary school students = 17.5% according to National survey study conducted in Saudi Arabia (Alzahrani et al., 2018). The sample size was calculated at 222. It was increased to 250 to compensate for nonresponses and incomplete forms. According to the northern border general director of education, there are 18 female secondary schools in Arar city, with 4180 students. Firstly, three schools were selected randomly. Secondly, 85 students from each school and then one class from each grade randomly.

Each participant completed an Arabic Predesigned questionnaire covering the following items: Socio-demographics characteristics such as age, marital status, average family income per month, and parent's status; personal habits such as daily sleeping hours and physical activity, smoking and eating habits, and medical history of chronic diseases; Food hypersensitivity, history of exposure to stress, Family history of IBS; Rome IV diagnostic criteria questionnaire. According to Rome IV criteria, IBS is defined as recurrent abdominal pain at least one day/week in the last three months associated with two or more of the following criteria: Related to defecation, or Associated with a change in the frequency of stool, or associated with a change in the form (appearance) of stool. Symptom onset should occur at least six months before diagnosis, and symptoms should be present during the last three months. The IBS diagnosis was made by using the Rome IV criteria as long as the patient does not have any red flag symptoms (Lacy et al., 2017). The Rome IV criteria' sensitivity and specificity are 62.7% and 97.1%, respectively (Palsson et al., 2017).

A panel of three experts revised the questionnaire for validity. A Pilot study was conducted on 20 female secondary school students to test the questionnaire's clarity and relevance, the time needed to answer all questions, and test reliability. There were no modifications, and they were included in the analysis. Written informed consent was taken from all study Participants. They were assured them that the Confidentiality of their data would be maintained during the study. Research clearance and approval were obtained from the ethical research committee of Northern Borders General Health Affairs. Also, it was taken from the administration of Northern borders General directorate of education.

All data were collected, tabulated, and statistically analyzed using SPSS 24.0 for windows (SPSS Inc., Chicago, IL, USA). Quantitative data were expressed as the mean ± SD & (range), and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Percent of categorical variables were compared using the Chi-square test or Fisher exact test when appropriate. Mann-Whitney U was used to the compared median of the variable of two groups not normally distributed. All tests were two-sided. P-value < 0.05 was considered statistically significant (S), and p-value ≥ 0.05 was considered statistically insignificant (NS).

3. RESULTS

The study included 230 adolescent, the mean age of all studied adolescent was 16.95±0.88 years and ranged from (15—18) years, where 77 students were first-grade secondary school (33.5%), 70 of them were second grade (30.4%), and 83 of them were third grade (36.1%). Only 10% of studied students were married, about two-thirds (66.5%) had enough income, slightly more than one half (50.4%) had family members from 5 to 10 individuals. Table 1 defined a statistically significant relationship between irritable bowel syndrome among studied adolescents and their age, school grade, marital status, Family income, Family number, and parents status (p<0. 001). It was evident that third-grade students, married, who had not enough income, with family number more than ten living with divorced parents usually complaint from irritable bowel syndrome.

Table 1 Relation between irritable bowel syndrome among studied adolescent and their socio demographic characteristics, (n.230).

Variables	Studied group				n.	%	χ^2	p-value
	IBS present (n.126)		Absent (n.104)					
	No.	%	No.	%				
Age per years								
15 years old	0	0	6	100.0	6	2.6		
16 years old	18	23.7	58	76.3	76	33.0	90.3	<0.001
17 years old	35	48.6	37	51.4	72	31.3		
18 years old	73	96.1	3	3.9	76	33.0		
Secondary school grade								
first grade	15	19.5	62	80.5	77	33.5	99.8	<0.001
second grade	31	44.3	39	55.7	70	30.4		
third grade	80	96.4	3	3.6	83	36.1		
Marital status								
Single	106	51.2	101	48.8	207	90.0	10.6	0.001
Married	20	87.0	3	13.0	23	10.0		
Family income								
enough	78	51.0	75	49.0	153	66.5		
not enough	48	88.9	6	11.1	54	23.5	54.1	<0.001
enough and more	0	0	23	100.0	23	10.0		
Family number								
less than 5	11	22.9	37	77.1	48	20.9		
5-10	67	57.8	49	42.2	116	50.4	28.7	<0.001
10+	48	72.7	18	27.3	66	28.7		
Parents status								
live together	77	44.8	95	55.2	172	74.8	29.3	<0.001
divorced	32	91.4	3	8.6	35	15.2		
one of them is dead	17	73.9	6	26.1	23	10.0		

χ 2 Chi square test significant p<0.05

Table 2 defined a statistically significant relationship between irritable bowel syndrome and their lifestyle characteristics among studied adolescents. Explicitly; being physically inactive, eating more than three meals per day, low consumption of fruits and vegetables, eating fast food, eating Spicy food, frequently take a soft drink, sleeping less than 8 hours daily (p<0. 001). Protective lifestyle characteristics included consuming fruits and vegetables, sleeping 8 hours daily, eating three meals per day, and always practicing sport activities.

Table 3 showed a statistically significant relationship between irritable bowel syndrome among studied adolescents and their medical History of Chronic disease p=0.035, Painful event p=0.042. Family history of IBS p=<0.001 and Abdominal surgery p=0.008. Table 4 showed a statistically significant relationship between irritable bowel syndrome among studied adolescent and their studying hours p<0.001, Monthly days absentees p<0.001. Achievement level p=<0.001. It apparent adolescents with irritable bowel

syndrome studying more hours, absent more days, achievement fair achievement level compared to healthy students. Fig (1) Illustrates the prevalence of irritable bowel syndrome according to Rome's diagnostic Criteria was 54.8% among studied adolescent students.

Table 2 Relation between irritable bowel syndrome among studied adolescent and their lifestyle characteristics, (N=230).

Variables	Studied group				n.	%	χ^2	p-value
	IBS present (n.126)		Absent (n.104)					
	No.	%	No.	%				
smoking								
no	118	54.1	100	45.9	218	94.8	0.39	0.72
yes	8	66.7	4	33.3	12	5.2		
practice Sport activities								
always	0	0	19	100.0	19	8.3	46.9	<0.001
sometimes	15	30.6	34	69.4	49	21.3		
rarely	85	68.0	40	32.0	125	54.3		
not	26	70.3	11	29.7	37	16.1		
Eating fast food								
not	0	0	20	100.0	20	8.7		
once	36	46.8	41	53.2	77	33.5	71.7	<0.001
2-3	57	70.4	24	29.6	81	35.2		
4-5	23	63.9	13	36.1	36	15.7		
5+	10	62.5	6	37.5	16	7.0		
soft drink								
Not	4	18.2	18	81.8	22	9.6		
Once	39	45.3	47	54.7	86	37.4	76.7	<0.001
2-3	80	84.2	15	15.8	95	41.3		
4-5	3	33.3	6	66.7	9	3.9		
5+	0	0	18	100.0	18	7.8		
Energy drink								
not	71	54.2	60	45.8	131	57.0	11.9	0.003
once	52	63.4	30	36.6	82	35.7		
2-3	3	17.6	14	82.4	17	7.4		
Spicy food								
no	10	19.2	42	80.8	52	22.6	34.3	<0.001
yes	116	65.2	62	34.8	178	77.4		
Number of meals per day								
less than 3	9	30.0	21	70.0	30	13.0		
3	19	27.5	50	72.5	69	30.0	49.3	<0.001
3+	98	74.8	33	25.2	131	57.0		
Eat fruits and vegetables								
no	114	66.3	58	33.7	172	74.8	36.4	<0.001
yes	12	20.7	46	79.3	58	25.2		
Sleeping hours								
less than 8	88	85.4	15	14.6	103	44.8		
8hours	5	8.3	55	91.7	60	26.1	53.9	<0.001
8+	33	49.3	34	50.7	67	29.1		

χ 2 Chi square test significant p<0.05

Table 3 Relation between irritable bowel syndrome among studied adolescent and their medical history, (N=230).

Variables	Studied group				n.	%	χ^2	p-value
	IBS present (n.126)		Absent (n.104)					
	No.	%	No.	%				
Analgesic								
no	123	54.2	104	45.8	227	98.7	f	0.25
yes	3	100.0	0	0	3	1.3		
Antibiotic Drug								
no	121	53.8	104	46.2	225	97.8	f	0.065
yes	5	100.0	0	0	5	2.2		
Traveler Diarrhea								
no	123	54.2	104	45.8	227	98.7	f	0.25
yes	3	100.0	0	0	3	1.3		
Chronic disease								
no	108	52.4	98	47.6	206	89.6	4.4	0.035
yes	18	75.0	6	25.0	24	10.4		
Painful event								
no	80	50.3	79	49.7	159	69.1	4.1	0.042
yes	46	64.8	25	35.2	71	30.9		
Family history of IBS								
no	45	36.6	78	63.4	123	53.5	35.3	<0.001
yes	81	75.7	26	24.3	107	46.5		
Food allergy								
no	126	54.8	104	45.2	230	100.0		
Abdominal surgery								
no	126	56.3	98	43.8	224	97.4	f	0.008
yes	0	0	6	100.0	6	2.6		
GI diseases								
no	126	54.8	104	45.2	230	100.0		

χ 2 Chi square test of significant f=Fisher exact test significant p<0.05

Table 4 Effect of irritable bowel syndrome on studied adolescent achievement (N=230).

	Studied groups				n.	%	χ^2	p-value
	IBS present (n.126)		Absent (n.104)					
	No.	%	No.	%				
Studying hours								
less than 2	3	2.4	27	26.0	30	13.0		
2-4 hours	23	18.3	25	24.0	48	20.9	53.9	<0.001
4-6 hours	56	44.4	49	47.1	105	45.7		
6+	44	34.9	3	2.9	47	20.4		
Monthly days absentees	2(0-4)		1(0-5)				U=5.9	<0.001
Achievement								
Excellent	50	39.7	39	37.5	89	38.7		
Very good	49	38.9	49	47.1	98	42.6	22.8	<0.001
Good	27	21.4	6	5.8	33	14.3		
Pass	0	0	10	9.6	10	4.3		

χ 2 Chi square test of significant Mann-Whitney U significant p<0.05

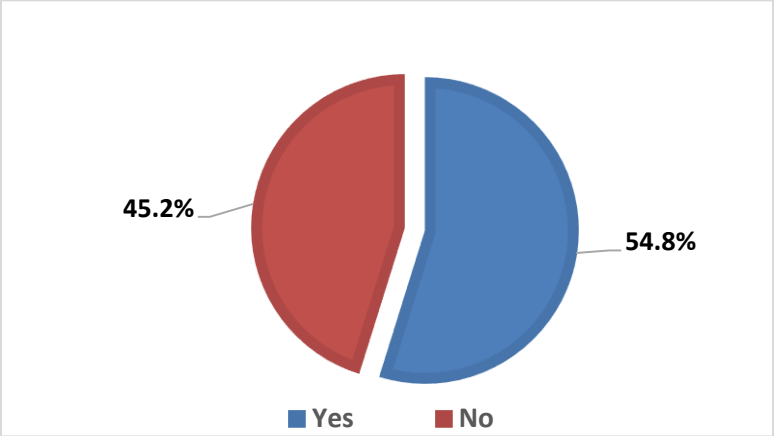

Figure 1 prevalence of irritable bowel syndrome according to Rome's diagnostic criteria

4. DISCUSSION

Irritable bowel syndrome accounts for 40% of all gastroenterology referrals. IBS is prevalent in KSA and mostly Northern borders region. This cross-sectional study explored the prevalence of IBS among female secondary school students in Arar city, the central city in the northern borders region of KSA. The present study showed that more than half of female secondary school students (54.8%) expressed symptoms suggestive of IBS. This finding represents a relatively high prevalence of IBS compared with other studies in different kingdom regions. However, this finding is consistent with a study on IBS's common causes in Northern borders; IBS symptoms were recognized in 46% of the study population, of whom 38% were males, and 62% were females. In that study, results were similar to the current study. IBS and IBS related symptoms are prevalent in Northern Saudi Arabia. Anxiety, depression were also significantly associated with IBS symptoms (Alharbi, 2019). Low water intake and insufficient fiber intake (particularly in vegetables and fruits) might be behind the growing prevalence of IBS in Saudi Arabia. The prevalence of IBS in Saudi Arabia reached 40%in some settings (Khan et al., 2013). In a study in Najran, 39.8% of male secondary school students expressed symptoms suggestive of IBS (Alshahrani, 2020).

On the contrary, another study in Northern borders, the prevalence of IBS was 11% among males vs. 12.5% among females. The prevalence of IBS symptoms among males was 30% vs. 36.5% in females (Alharbi et al., 2019). A recent study on Saudi undergraduates revealed that the prevalence of IBS was 15.8% (Al Butaysh et al., 2020). Also, a study on Saudi university students in Jazan found that the prevalence of IBS was 8.8% using Rome IV (Hakami et al., 2019). This variation in reported prevalence may be explained that all previous studies were reporting the epidemiology of IBS using different Romes criteria. As countries increasingly adopt a western diet and lifestyle, there is a parallel increase in IBS prevalence rates, coinciding with an increasing awareness of the condition. The Rome IV IBS population sometimes represent a subgroup of Rome III IBS patients with lower quality of life, more severe GI symptomatology, and psychological comorbidities (Vork et al., 2018).

On other hand, a study on medical students in Al-Hasa, revealed a prevalence of IBS of 44.5%, with a high prevalence in females (31.8%). IBS was higher among students with a positive family history of IBS and students who experienced emotional stress in the past 6-month (Alsuwailm et al., 2017). These results were similar to results of current study. However, Another study on university students in Majmmah revealed that 12.6% of the students had IBS symptoms and signs, and only 7.3% of them were previously diagnosed with IBS (Alzahrani et al., 2020). This confirms that some of IBS cases may be missed or undiagnosed.

Regarding risk factors associated with IBS occurrence, the current study found that the significant sociodemographic risk factors were being third-grade students, married, had not enough income, with a family number more than ten, or living with divorced parents. However, there were also multiple lifestyle risk factors related to IBS as low consumption of fruits and vegetables, eating fast food, eating Spicy food, frequently intake a soft drink, sleeping less than 8 hours daily, and being physically inactive. These findings were consistent with previous studies (Alharbi et al., 2019 & Alzahrani et al., 2020). An Iranian study investigated the relation between IBS and dietary habits in adolescent girls found that the consumption of spicy and fried food was associated with an increased risk of IBS (Ibrahim et al., 2016). Besides, big family size and living with divorced parents were associated with more IBS symptoms in secondary school students. This finding is consistent with the study in Aljouf province (Alhaznn et al., 2011) this could be explained with less care and more stress facing these students.

Moreover, students who had poor sleep quality, emotional stress, and a family history of IBS were more likely to have IBS symptoms. These results are comparable to the results of AlButaysh et al. on Saudi undergraduates (AlButaysh et al., 2020). Also,

Hasosah et al. (2017) study on medical students in Jeddah found that family history of IBS and lack of exercise, and an elevated level of stress were significantly associated with IBS. In Hail, a study on medical students revealed that lack of exercise and stress are the highest risk factors of IBS (Alshammari et al., 2018). In Egypt, A study revealed that around 31% of the studied group was suffering from IBS. Anxiety, positive family history, and physical inactivity were the main associated factors for IBS (Elhosseiny et al., 2019). Secondary school students are obliged to study for many hours and strive to pass the exams with a high score. They are similar to medical students who have many courses, exams and study for a longer time. Furthermore, the present study concluded that students with IBS have more absenteeism rate than healthy peers.

Previous studies found that IBS has an enormous social and medical burden and lower quality of life (Black et al., 2020 & Qora et al., 2018). Irritable bowel syndrome diarrheal type has a lower quality of life than IBS constipation type (Singh et al., 2015). Many cases become socially embarrassed due to unpredictable bowel habits. IBS can be considered lifestyle disease that has considerable social effect.

5. CONCLUSION

IBS is prevalent among female secondary school students. Students suffering from Anxiety and having unhealthy life style are more likely to have IBS symptoms. Psycological and medical support would allivate the disease burden. The researchers recommend further studies to assess impact of covid on IBS prevalence.

Limitations

The present study employed a self-administered questionnaire that may lead to fallacies in self-reporting. The study did not assess the effect of IBS on students' quality of life. With a cross-sectional design, the temporal sequence cannot be assessed. Rome criteria were developed concerning research conducted largely in Western populations; their applicability might be limited to these countries and cultures.

Data availability

Data included in the study are available from the corresponding author on request.

Acknowledgement

We would like to thank our participants who were all dedicated to the study. We would also like to thank our professors who spared no effort in mentoring us and providing us with proper feedback.

Authors Contributions

Entsar Owaid Alanazi, shared in setting the study design, research objectives, preparing study instrument, pilot administration, data collection, and reviewing the results. Prof. Sabry Mohamed Hammad, held study approvals and supervised study phases. Dr. Amel Elwan, shared in preparing study proposal, logistics plan, data collection plan, supervised data entry and conducted the statistical analysis, data display, discussion guidelines, and final write up. All authors read and approved the final manuscript.

Funding

This study has received no external funding.

Conflict of interest

The authors would like to declare that there are no conflicts of interests.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Ethical approval

The study was approved by research ethical local committees of General Health Affairs of Northern Border region with researcher No. (0536947983 - entsaralsultani@gmail.com - 1090837921), committee No. (H-09-A-51).

REFERENCES AND NOTES

1. AlButaysh OF, AlQuraini AA, Almukhaitah AA, Alahmdi YM, Alharbi FS. Epidemiology of irritable bowel syndrome and its associated factors in Saudi undergraduate students. Saudi J Gastroenterol 2020; 26(2):89.
2. Alharbi SH, Alateeq FA, Alshammari KI, Alshammri ASS, Alabdali NAN, Alsulaiman MAS, et al. Irritable Bowel Syndrome and Dietary Habits in Northern Saudi Arabia. Health 2019; 11(3):289-97.
3. Alharbi SH. The Common Causes of Irritable Bowel Syndrome (IBS) in Northern Saudi Arabia. IJCM 2019; 10(2):91-100.
4. Alhaznn A. Irritable bowel syndrome in secondary school male students in AlJouf Province, North of Saudi Arabia. JPMA- J. Pak. Med. Assoc 2011; 61(11):1111-5.
5. Alshammari OM, Almuslam AS, Alrashidi AA, Alharbi KFO, Alqasem AA, Aljubour ZA. Prevalence of Irritable Bowel Syndrome among Medical Students in Hail University, Saudi Arabia. EJHM 2018; 71(2):2581-4.
6. Alsuwailm WA, AL-Qahtani MM, AL-Hulaibi AA, AL-Hadi MA, Ali SI, Shehabeldeen SA. Irritable bowel syndrome among medical students and interns in King Faisal University. Open J Prev Med 2017; 7(11):235.
7. Alzahrani AJ, Alghamdi MAA, Alzahrani HJ, Al-Ghamdi SA, Al-Ghamdi AS, Alkhaldi SS. Risk factors of irritable bowel syndrome among male medical students in Majmmah University, Saudi Arabia. IJMDC 2020; 4(8): 1150-1153
8. Alzahrani TA, Aljuaid AS, Alharthi TM, Aljabir AS, Aziz LA, Alshehri MEM. The prevalence and risk factors of irritable bowel syndrome among medical students and interns: results of a national survey in Saudi Arabia. Int. j. med. health res 2018; 4(10).
9. Aziz I, Palsson OS, Törnblom H, Sperber AD, Whitehead WE, Simrén M. The prevalence and impact of overlapping Rome IV-diagnosed functional gastrointestinal disorders on somatization, quality of life, and healthcare utilization: a cross-sectional general population study in three countries. Am. J. Gastroenterol 2018; 113(1):86-96.
10. Bai T, Xia J, Jiang Y, Cao H, Zhao Y, Zhang L, et al. Comparison of the Rome IV and Rome III criteria for IBS diagnosis: A cross-sectional survey. J. Gastroenterol. Hepatol 2017; 32(5):1018-25.
11. Black CJ, Ford AC. Global burden of irritable bowel syndrome: trends, predictions and risk factors. Nat Rev Gastroenterol Hepatol 2020; 17(8):473-486.
12. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? Indian J. Psychol. Med 2013; 35(2):121.
13. Chey WD, Kurlander J, Eswaran S. Irritable bowel syndrome: a clinical review. Jama 2015; 313(9):949-58.
14. El-Fetoh NMA, Abd El-Mawgod MM, Mohammed NA, Alruwaili HSA, Alanazi EOM. Irritable bowel syndrome among medical and non-medical northern border university students, Kingdom of Saudi Arabia: Across sectional study. OJGas 2016; 6(6):188-95.
15. Elhosseiny D, Mahmoud NE, Manzour AF. Factors associatedwith irritable bowel syndrome among medical students in Ain Shams University. The J Egypt Public Health Assoc 2019; 94(1):23.
16. Hakami RM, Elmakki E, Hasanain T, Alnami A, Khawaji A, Ali L, et al. Irritable Bowel Syndrome: assessment of prevalence and risk factors in Saudi University students using Rome IV Criteria. Gastroenterol. Insights 2019; 10(1).
17. Hasosah MY, Alamri SA, Al-Husayni FA, Aljedaani RM, Zwawy MA, Al-Zahrani AA. Prevalence of Irritable Bowel Syndrome among Medical Students and Interns in Jeddah, Saudi Arabia. J Clin Med Case Stud 2017; 2(4).:60-63
18. Ibrahim NK. A systematic review of the prevalence and risk factors of irritable bowel syndrome among medical students. Turk J Gastroenterol 2016; 27(1):10-6.
19. Khan AS, Al Sayegh HA, Al Ali MM, Al Qurini AA, AlKhars HF, AlKhars AA. Assessment of knowledge and related risk factors of irritable bowel syndromein Alahsa, Saudi Arabia. IJMDC 2019; 3(1):030–035.
20. Khayyatzadeh SS, Kazemi-Bajestani SMR, Mirmousavi SJ, Heshmati M, Khoshmohabbat S, Ferns GA, et al. Dietary behaviors in relation to prevalence of irritable bowel syndrome in adolescent girls. J Gastroenterol Hepatol 2018; 33(2):404-10.
21. Lacy BE, Patel NK. Rome criteria and a diagnostic approach to irritable bowel syndrome. JCM 2017; 6(11):99.
22. Palsson OS, Whitehead WE, Van Tilburg MA, Chang L, Chey W, Crowell MD. Development and validation of the Rome IV diagnostic questionnaire for adults. Gastroenterology 2016; 150(6):1481-91.
23. Qora MA, Kot MME, Salama AA, Abd El Rahman MS. Quality of life in patients with irritable bowel syndrome in Qaliobeya Governorate, Egypt. Menoufia Med J 2018; 31(2):438.
24. SAAD ALSHAHRANI M. Prevalence and Risk Factors for Irritable Bowel Syndrome among Male Secondary School Saudi Studentsin Najran City, Saudi Arabia. Med. J. Cairo Univ 2020; 88:1917-21.
25. Singh P, StallerK, Barshop K, Dai E, Newman J, Yoon S, et al. Patients with irritable bowel syndrome-diarrhea has lower disease-specific quality of life than irritable bowel

syndrome-constipation. World J. Gastroenterology 2015; 21(26):8103.

26. Talley NJ, Holtmann G. Irritable bowel syndrome and functional dyspepsia: what can epidemiology tell us about etiology? Expert Rev. Gastroenterol. Hepatol 2018; 12:7, 633-635.
27. Vork L, Weerts Z, Mujagic Z, Kruimel J, Hesselink M, Muris J, et al. Rome III vs Rome IVcriteria for irritable bowel syndrome: A comparison of clinical characteristics in a large cohort study. J Neurogastroenterol Motil 2018; 30(2):e13189.

 ISSN 2321–7359 EISSN 2321–7367 I OPEN ACCESS