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A Cross-sectional Study on Prevalence and Predictors of Irritable Bowel Syndrome Among Medical Students of Melaka-Manipal Medical College, Malaysia

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Abstract

There were a few risk factors that can contribute to Irritable Bowel Syndrome (IBS). IBS seemed to be undiagnosed as symptoms might not be irritable for them to continue their daily life. We conducted this study to assess the prevalence, awareness and risk factors associated with IBS among medical students at Melaka-Manipal Medical College. This was an analytical cross-sectional study with a self-administered questionnaire consisted of 3 parts was distributed. The first part consisted of socio-demographic characteristics and symptoms predicting IBS. The second part was Rome IV diagnostic criteria, to classify the IBS. The third part consisted of a scale of Depression, Anxiety and Stress (DASS-42). This questionnaire was distributed to medical students in semester 6 & 7. Chi-square test was used to find an association between socio-demographic characteristics, stress, anxiety and depression with Irritable bowel syndrome. Depression, stress and anxiety had a significant association with Irritable Bowel Syndrome. Students with depression had an odds ratio of 16.91, 95% CI of 3.59-79.57, chi-square value of 20.468 and p-value of <0.001. Students with stress had an odds ratio of 10.43, 95% CI of 2.24-48.68, chi-square value of 12.572 and p-value was <0.001. Students with anxiety had an odds ratio of 19.20, 95% CI of 4.07-90.65, chi-square value of 22.993 and p-value was <0.001. In general, medical students with depression, stress and anxiety were more likely to develop IBS compared to those without the problems. Our findings suggest that undergraduate medical students in Melaka MMMC who were in semester 6 and 7 had a positive significant association between depression, anxiety and stress and irritable bowel syndrome. 10% of the students had IBS that related to stress, anxiety and depression.

Keywords

Cross-sectional, Irritable Bowel Syndrome, Medical Students, Prevalence, Predictors

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1. Introduction

Irritable Bowel Syndrome (IBS) is a chronic condition characterized by abdominal pain associated with bowel dysfunction. It is accompanied by abdominal bloating and often relieved by defecation. Diagnosis can be made clinically using Rome criteria combined with presence of alarm symptoms. Diagnostic tools that can be used for diagnosis of IBS are Manning Criteria, Rome I, Rome II, and Rome III criteria but currently Rome IV criteria was introduced in May 2016. [1]

Rome III criteria of IBS include recurrent abdominal pain

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or discomfort on at least three days per month in the last three months associated with two or more of the following, that was, improvement with defecation, onset associated with a change in frequency of stool and onset associated with change in form (appearance) of stool. Supportive diagnostic features and alarm features in IBS include presence of symptoms for more than six months, frequent consultations for non-gastrointestinal problems, previous medically unexplained symptoms and worsening of symptoms by stress. Uncommon diagnostic factor was passage of mucus with stool and occurs when the patient was symptomatic. [1] Rome IV criteria for diagnosis of IBS are patients having recurrent abdominal pain at least 1 day per week during the last 3 months associated with two or more of the following; may be increased or unchanged bypassing stools, change in frequency of stool or with change in appearance of stool. [2] IBS subtypes can be classified based on the stool pattern using Bristol stool chart. It could be classified into IBS with constipation (IBS-C), mixed IBS (IBS-M), IBS with diarrhoea (IBS-D) and unclassified IBS (IBS-U). [2]

In the US IBS was present in 10-15% of adults in the USA among adults who seek medical help women outnumber men at a ratio of 2:2. [3] 13% prevalence of IBS has been found in a population-based study from Abbottabad, Pakistan using Rome two criteria. [4] Furthermore, a study done in adults in India for its prevalence in IBS was 7.9% males and 6.9% females [5] According to one study done in Malaysia, young adults had supportive symptoms suggestive of IBS with a prevalence rate of 15.8%. Among them a significant number with positive symptoms of IBS were women. However, only a minority of them sought medical advice for their symptoms. [6]

The aetiology was probably multifactorial and consist of inflammatory, genetic, immune, psychological and dietary components. IBS could affect population of all ages, more likely affecting people in between teenagers to the age of 40s. Young women were 2 to 3 times more likely to get IBS compared to men. Stress, anxiety, depression could also contribute to IBS. [7] Education level or job position contributed to stress level based on workloads. Hence, higher study level and position contributed to stress level and hence higher chances to develop IBS. Besides, diet intake that could cause dehydration in the patient can cause IBS due to water outflow. For instance, foods that can cause dehydration are chocolate, dairy products, red meat, unripe bananas, caffeinated drinks like coffee, carbonated drinks and also alcohol. [8] In those patients who took drugs like antibiotics, antidepressants and/or medicines that contain sorbitol-based products might trigger symptoms. [9] Family history (coeliac disease, IBS, colon cancer). Family with low socio economics background shown high prevalence in IBS. In some studies, twin patients with same abdominal pain contributing in supporting that IBS has both genetic and environmental. [10]

Prevalence of irritable bowel syndrome and its association with anxiety among medical students was 21%. It was noted higher among females which was 26% and males 19%. This research was done at king Saudi Abdul Aziz University for health sciences in the year 2015-2016 with a sample size of 270. [11]

Population chosen for this study are medical students as they contributed most of the risk factors. They were in the age range of getting IBS due to huge studies and exams load, lack of sleep, high education level, and poor eating habits, anxiety and possibility of having depression is high. [12]

We conducted this cross-sectional study to assess the prevalence of IBS among undergraduate medical students of MMMC and to identify the association of depression, anxiety and stress with IBS.

Research question: What is the prevalence and risk factors of irritable bowel syndrome among medical students?

Research objective:

a. To assess the prevalence of IBS among medical students in MMMC

b. To study the awareness of IBS among medical students in MMMC

c. To find out risk factors associated with IBS.

Research Hypothesis

a. Students with poor stress coping will end up or diagnosed with IBS

b. Students with poor anxiety coping will end up or diagnosed with IBS

c. Students with poor depression coping will end up or diagnosed with IBS

2. Research Methodology

2.1. Study Design, Setting, Time and Population

This analytical cross-sectional study was carried out from December 2019 to January 2020 for a duration of 6 weeks. It was conducted at Muar Campus of Melaka-Manipal Medical College, Johor, Malaysia. 3 different programs were offered in our college which consists of Bachelor of Medicine and Surgery (MBBS), Bachelor in Dentistry (BDS) and Foundation in Science (FIS). Total population for students of Bachelor of Medicine and Surgery in MMMC for all

semesters was 750. Study population was medical students (MBBS students) in semester 6 and 7 of Melaka-Manipal Medical College. The total population of semester 6 medical students was 157, while semester 7 was 150.

2.1.1. Sample Size

The sample size of this research was calculated using Epi Info version 7.2 website. The total population was 750. The study population calculated using Epi Info was 143.

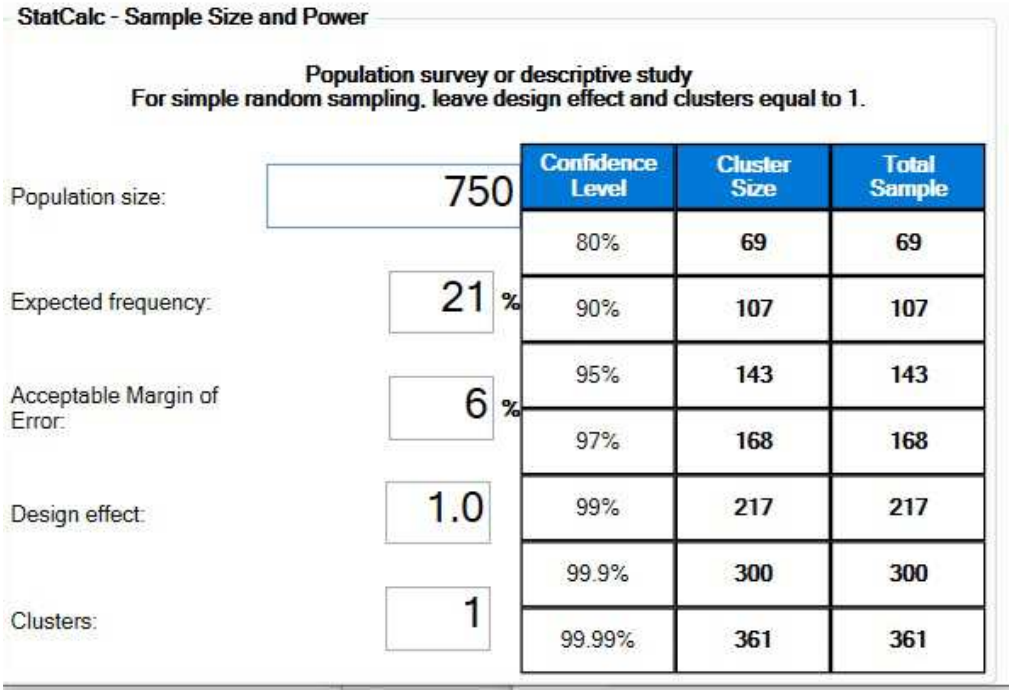

Figure 1. StatCalc- Sample Size and Power.

The population size used was the total population of MBBS students in Melaka-Manipal Medical College which was 750. The expected frequency was the prevalence of irritable bowel syndrome and its association with anxiety among medical students at Pakistan which was 21%. [15] The acceptable margin of error was set to 6%.

Formula to calculate final sample:

$$\text{Final sample} = \frac{n^{calculated}}{1 - Nonresponse\ rate}$$

$$\frac{143}{1 - 0.29} = 201$$

The formula given above was a formula to calculate final sample size for the study. 143 was the value calculated using Epi Info. The non-response rate was 29% and therefore the final sample size was 201 calculated using the formula.

2.1.2. Sampling

Sampling method used for this study was convenience sampling. Questionnaires were distributed among students in the classrooms and were collected at the end of the classes. The inclusion criteria were the undergraduate medical students of semester 6 and 7 who was present on the day of distribution of questionnaire and who was willing to take part in our study. The exclusion criteria were the ones who did not complete the questionnaire, students who weren't willing to take part in the study and students absent for classes on that day.

2.2. Data Collection Methods

The independent variable for our study were age, gender, ethnicity, religion, education level, alcohol intake, smoking, drug intake, family history of large intestinal disease (coeliac disease, IBS, colon cancer) stress, anxiety and depression. Our dependent variable was the prevalence and predictors of Irritable Bowel Syndrome among undergraduate medical students.

Data collection method was self-administered structured questionnaires and data collection tool was questionnaire where written consent was taken and they answered it on the spot which was collected on the same day.

The questionnaire consisted of 3 parts. Part 1 was basic socio-demographic details of the participants and symptoms predicting irritable bowel syndrome. Socio-demographic details consist of age, gender, ethnicity, religion, and semester, history of smoking, alcohol intake, medications and family history of large intestinal diseases. It also consisted of symptoms predicting irritable bowel syndrome like altered bowel habits, abdominal pain, abdominal bloating/distension,

dyspepsia/heartburn, nausea/vomiting, constipation, diarrhoea and meals precipitate pain.

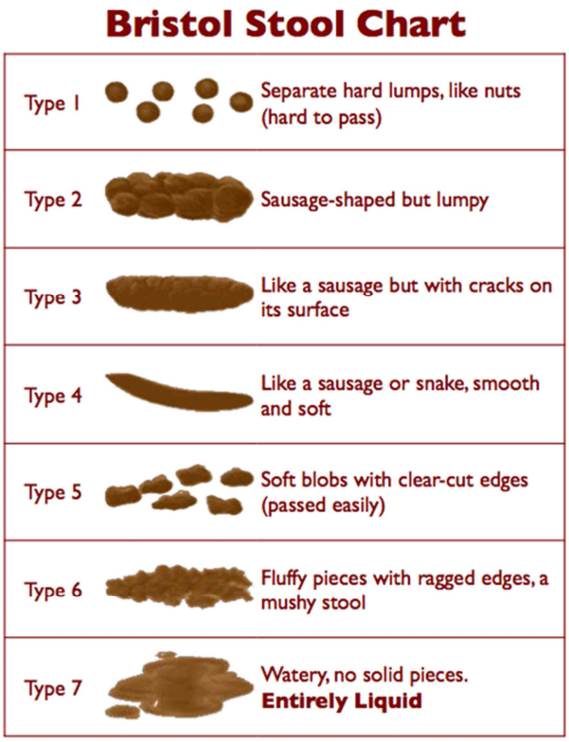

Figure 2. Bristol Stool Chart.

Part 2 of the questionnaires was of Rome IV diagnostic criteria questionnaire. It consists of 6 questions in which participants need to choose from the given answer. For question 40, if they did not experience any pain in the abdomen, they can skip to the end of the questionnaires. If they have pain in the abdomen for the last 3 months, they need to proceed to the second question. Question 41, 42 and 43 required them to choose from 0% to 100%. 0% which means that they had never experienced the symptoms, while 100% means they always have it. Question 48 required the participants to choose either yes or no for the abdominal pain which lasted for 6 months or more. Question 64 was a Bristol Stool Chart which have Type 1 till Type 7, for which they need to choose the answer based on their usual stool type for the last 3 months. If they usually had constipation, they need to answer 1, if usually diarrhoea was 2, if they experienced both constipation and diarrhoea should answered 3, if they did not have any abnormal bowel movements, they need to answer 4. This specific question helps to classify the IBS into its subtypes. Picture of Bristol Stool chart was given for them to refer.

Rome IV diagnostic criteria helps to identify population with Irritable Bowel Syndrome and to classify the IBS. For the participant to be considered having Irritable Bowel Syndrome, they should have answered "at least weekly" for question 40, "at least 30% of occasions" for question 41, "at least 30% of occasions" for question 42, "at least 30% of occasions" for question 43 AND "Yes" for question 48. Question 64 uses a picture of Bristol Stool scale to classify IBS as follows:

IBS-C if abnormal stool are usually constipation (type 1-2)

IBS-D if abnormal stool are usually diarrhoea (type 6-7)

IBS-M if abnormal stool are mixed with at least ¼ constipation AND at least ¼ diarrhoea

IBS-U if the subject never or rarely has abnormal stool

Rome IV Irritable Bowel Syndrome - Subtypes Criteria [2]

Table 1. Rome IV Irritable Bowel Syndrome - Subtypes Criteria.

IBS Subtype	Criteria
IBS-C	More than one-fourth (25%) of bowel movements with Bristol Stool Scale Types 1–2 and less than one-fourth (25%) with Types 6–7.
IBS-D	More than one-fourth (25%) of bowel movements with Bristol Stool Scale Types 6–7 and less than one-fourth (25%) with Types 1–2.
IBS-M	More than one-fourth (25%) of bowel movements with Bristol Stool Scale Types 1–2 and more than one-fourth (25%) with Types 6–7.
IBS-U	Patients meet diagnostic criteria for IBS but their bowel habits cannot be accurately categorized in any of the above subtypes.

Part 3 of the questionnaire was Depression, Anxiety and Stress (DASS-42) questionnaire. It consists of 42 questions. The participants have to select a number either 0, 1, 2 or 3 to indicate how much the statement applied to them over the past week just as below:

0 = Did not apply to me at all

1 = Applied to me to some degree or for some of the time

2 = Applied to me to a considerable degree or for a good part of time

3 = Applied to me very much or most of the time

In this DASS-42 questionnaire, the component of depression, anxiety and stress were randomly distributed. Depression component was in questions 3, 5, 10, 13, 16, 17, 21, 24, 26, 31, 34, 37, 38, and 42. Anxiety component was in questions 2, 4, 7, 9, 15, 19, 20, 23, 25, 28, 30, 36, 40 and 41. While the stress component of DASS-42 was in questions 1, 6, 8, 11, 12, 14, 18, 22, 27, 29, 32, 33, 35 and 39.

The minimum score for DASS-42 was 0 for each component, while the maximum score was 42 in each depression, anxiety

and stress component. The scoring scales were as below:

Table 2. DASS-42 Scoring Scale.

	Normal	Mild	Moderate	Severe	Very severe
Depression	0-9	10-13	14-20	21-27	28+
Anxiety	0-7	8-9	10-14	15-19	20+
Stress	0-14	15-18	19-25	26-33	34+

However, we classified this into having or not having depression, anxiety or stress.

2.3. Data entry / Processing

Data collected was tabulated using Microsoft Excel 2010, while data analysis was done using Epi Info version 7.2 website. The frequency and percentage were used to analyse age, gender, ethnicity, religion, educational level, alcohol intake and smoking, drug/medication, family history of large intestinal disease, depression, stress and anxiety. Hypothesis testing used for all the categories stated before was chi square test. Measure of association used was odds ratio. The level of significance was set at 0.05.

Table 3. Statistical Test Table.

Independent Variable	Dependent Variable	Statistical test
Age	Irritable bowel syndrome	Chi-square test
Gender (Male/Female)		Chi-square test
Ethnicity (Malay/Chinese/Indian/Others)		Chi-square test
Religion (Islam/Hindu/Buddhism/Christian/Others)		Chi-square test
Education level (semester 6/7)		Chi-square test
Alcohol intake/ Smoking		Chi-square test
Drugs/Medications		Chi-square test
Family history of large intestinal diseases		Chi-square test
Stress/Anxiety/Depression		Chi-square test

2.4. Ethical consideration

It was a voluntary participation of the undergraduate medical students of semester 6 and 7. We asked for the written informed consent prior to the study. In order to make sure that this study is ethically conducted, no participants were forced to take part in this study. All the information in the questionnaire were confidential. For the Rome IV criteria, we asked the official permission from Marketing Director of Rome Foundation. This study was approved by Research Ethics Committee, Faculty of Medicine, Faculty of Dentistry, MMMC, Malaysia.

3. Results

Table 4. Socio-demographic characteristics of medical students (n=140).

Independent Variable		Frequency (n)	Percentage (%)
Age	≤22	100	71.43
	>22	40	28.57
Gender	Male	89	63.57
	Female	51	36.43
Ethnicity	Malay	40	28.57
	Chinese	37	26.43
	Indian	36	25.71
	Others	27	19.29
Religion	Islam	42	30.00
	Hindu	34	24.29
	Buddhism	36	25.71
	Christian	15	10.71
	Others	13	9.29
Education level	6	63	45
(semester)	7	77	55
Alcohol intake	Yes	25	17.86
	No	115	82.14
Smoking	Yes	5	3.57
	No	135	96.43
Drugs	Yes	5	3.57
	No	135	96.43
Family history of large intestinal diseases	Yes	11	7.86
	No	129	92.14

Table 4 was about the frequency and percentages of socio-demographic characteristics of medical students. Of those who responded, the participants who were below 22 years old was higher than above 22 years with 71.43% and 28.57% respectively. Furthermore, the responses were greater in males which was 63.57% in comparison to the females with a percentage of 36.43%. In terms of ethnicity, the highest response came from the Malay community which was 28.67%, while Chinese was 26.43%, Indian was 25.71% and the others was 19.29%. Whereas for religion, respondents who follow Islam was highest, at 30% followed by Hindus with 24.29%, Buddhist was 25.71% and the least respondents by Christians and others with 10.71% and 9.29% respectively. In terms of respondents from semester 6 and 7, response from semester 7 was higher with 55% in comparison to semester 6 which was 45%. Moreover, alcohol intake and smoking among respondents was not significantly high since alcohol intake was only 17.86% and smoking was only 3.57%. Furthermore, participants who took medication was

only 3.57% and the rest don't consume them. Finally, for family history of large intestinal disease, majority responded negative with a positive response of 7.86%.

Table 5. Symptoms of Inflammatory Bowel Syndrome (IBS) among medical students (n=140).

No	Symptoms		Frequency (n)	Percentage (%)
1	Altered bowel habit:	Yes	35	25.0
		No	105	75.0
2	Abdominal pain	Yes	46	32.9
		No	94	67.1
3	Abdominal bloating/distention	Yes	47	33.6
		No	93	66.4
4	Dyspepsia, heartburn	Yes	28	20.0
		No	112	80.0
5	Nausea, vomiting	Yes	21	15.0
		No	119	85.0
6	Constipation	Yes	29	20.7
		No	111	79.3
7	Diarrhoea	Yes	56	40.0
		No	84	60.0
8	Meals precipitate pain	Yes	12	8.6
		No	128	91.4

Table 5 was about the frequency and percentages the participants having the Inflammatory Bowel Syndrome (IBS) symptoms for the past 6 months. Participants were allowed to choose more than one option for the symptoms. Diarrhoea contributed to the highest percentage (40%), followed by abdominal distention/bloating (33.6%) then, abdominal pain (32.9%). About (25%) of the participants having altered bowel habits, constipation (20.7%) and dyspepsia/heartburn (20%). 15% of the participants had symptoms of nausea or vomiting for the past 6 months. Last but not least, meals precipitate pain (8.6%) was less likely to be IBS symptoms among the participants.

Table 6. Presence/Absence of Inflammatory Bowel Disease and its Subtypes (C, D, M, U) among medical students (n=140).

Variable		Frequency (n)	Percentage (%)
Inflammatory Bowel Syndrome (IBS)	Yes	14	10.0
	No	126	90.0
Inflammatory Bowel Syndrome (IBS) Subtypes	C	3	21.4
	D	5	35.7
	M	3	21.4
	U	3	21.4

Table 6 highlighted the main part of our questionnaire which consisted of 6 questions that helped to diagnose the participants with Inflammatory Bowel Syndrome (IBS) based on Rome's Criteria IV and subdivided them into subtypes (C, D, M, U). 14 out of 140 participants (10%) were having IBS symptoms. Among 14 students who had IBS, subtype C, M and U gave the same percentage of 21.4% each. While subtype D had the highest percentage with 35.7% occurrence.

Table 7. Chi square analysis association between age, gender, ethnicity, religion, education level, alcohol intake, smoking, drugs, family history of large intestinal diseases and Inflammatory Bowel Syndrome (IBS).

Independent Variable		Inflammatory Bowel Syndrome (IBS)		Odds Ratio (95% CI)	Chi-Square	P-Value
		Yes n (%)	No n (%)			
Age	≤22	11 (7.9)	89 (63)	1.52 (0.40-5.78)	0.389	0.533
	>22	3 (2.1)	37 (26.4)	Reference	-	-
Gender	Male	3 (2.1)	48 (34.3)	Reference	-	-
	Female	11 (7.9)	78 (55.8)	2.26 (0.60-8.50)	1.511	0.219
Ethnicity	Malay	3 (2.1)	37 (26.4)	Reference	-	-
	Chinese	2 (1.4)	35 (25)	0.71 (0.11-4.47)	0.139	0.71
	Indian	7 (5)	29 (20.7)	2.98 (0.71-12.53)	2.366	0.124
	Others	2 (1.4)	25 (17.9)	0.99 (0.15-6.34)	0.0002	0.989
Religion	Islam	3 (2.1)	39 (27.9)	Reference	-	-
	Hindu	7 (5)	27 (19.3)	3.37 (0.80-14.21)	2.973	0.085
	Buddhism	2 (1.4)	34 (24.3)	0.76 (0.12-4.85)	0.0814	0.775
	Christian	0 (0)	15 (10.8)	-	1.131	0.288
	Others	2 (1.4)	11 (7.9)	2.36 (0.35-15.97)	0.816	0.366
Education level (semester)	6	6 (4.3)	57 (40.8)	Reference	-	-
	7	8 (5.7)	69 (49.3)	1.10 (0.36 - 3.36)	0.029	0.856
Alcohol intake	Yes	2 (1.4)	23 (16.4)	0.75 (0.16 - 3.57)	0.135	0.713
	No	12 (8.6)	103 (73.6)	Reference		
Smoking	Yes	0 (0)	5 (3.6)	-	0.576	0.448
	No	14 (10)	121 (86.4)	Reference		
Drugs	Yes	0 (0)	5 (3.6)	-	0.576	0.448
	No	14 (10)	121 (86.4)	Reference		
Family history of large intestinal diseases	Yes	3 (2.1)	8 (5.17)	4.02 (0.93-17.39)	3.957	0.05
	No	11 (7.8)	118 (84.2)	Reference	-	-

Table 7 showed the association between socio-demographic profile of participants and Inflammatory Bowel Syndrome (IBS), odds ratio, 95% CI, chi square and p-value for each. For age, the participants below 22 years and below were 1.52 times more likely in acquiring IBS than participants who were above 22 years. The results however were not significant since there was 1 in the 95% CI for odds ratio (0.40-5.75) and the P value was more than 0.05. Furthermore, the chi square was also <3.841 (0.389) and thus was not significant.

For gender, females were 2.26 times more likely to have IBS compared to males (95% CI for OR 0.599-8.500; P-Value 0.2189). It was not significant because 95% CI with 1 in between, and p-value more than 0.05.

In terms of ethnicity, the reference was Malay. Chinese were 0.71 times less likely in acquiring IBS in comparison to the Malay group. The result was also not significant since the CI for OR was 0.11-4.47 and the chi square value less than 3.841 and also the P value was more than 0.05. Moreover, the Indians were 2.98 times more likely in acquiring IBS in comparison to the Malays and the result was not significant (95% CI was 0.71-12.53, chi square was 2.366 and P value 0.71 which was 0.05). On the other hand, the others were 0.99 times less likely in getting IBS and the test result was not significant as well (95% CI for OR was 0.15-6.34, chi square was 0.0002, P value of 0.989 which was >0.05)

For religion the reference was Islam and the Hindus were 3.37 times more likely in getting in IBS and was not significant (95% CI for OR was 0.80-14.21, chi square was 2.973, P value was 0.085). However, the Buddhism was 0.76 less likely in getting IBS in comparison to Islam and the result was not significant (95% CI for OR was 0.12-4.85, chi square was 0.0814, P value was 0.775). Furthermore, for Christians the OR cannot be calculated. For the others, they were 3.36 times more likely in acquiring IBS in comparison to Islam and the test was not significant. (95% CI for OR-0.35-15.97, chi square was 1.131, P value was 0.288).

Besides, education level of participants for semester 7 was 1.10 times more likely to have IBS compared to semester 6 and the test was not significant (95% CI for OR was 0.36-3.36, chi square-0.029, P-Value 0.856).

Alcohol intake among the participants are 0.75 times less likely to have IBS compared to participants not taken alcohol and not significant (95% CI for OR 0.16-3.57, chi square was 0.135, P-Value was 0.7130).

In terms of smoking, odds ratio and 95% CI for OR was undefined, chi square of 0.576 and P-Value was 0.448. It was not a significant association. For drugs/medications intake, 95% CI for OR was undefined, chi square of 0.576 and P-Value of 0.448. This was not a significant association.

Participants that had family history of large intestinal diseases were 4.02 times more likely to have IBS, 95% CI for OR of 0.93-17.39, chi square was 3.957 and P-Value of 0.05. However, it was not significant.

Table 8. Chi-square analysis of the association between depression, anxiety, stress and Inflammatory Bowel Syndrome (IBS).

Independent Variable		Inflammatory Bowel Syndrome (IBS)		Odds Ratio (95% CI)	Chi-Square	P-Value
		Yes n (%)	No n (%)			
Depression	Yes	12 (8.6)	33 (23.6)	16.91 (3.59-79.57)	20.468	<0.001
	No	2 (1.4)	93 (66.4)	Reference	-	-
Stress	Yes	12 (8.6)	46 (32.9)	10.43 (2.24- 48.69)	12.572	<0.001
	No	2 (1.4)	80 (57.1)	Reference	-	-
Anxiety	Yes	12 (8.6)	30 (21.4)	19.20 (4.07-90.65)	22.993	<0.001
	No	2 (1.4)	96 (68.6)	Reference	-	-

Table 8 shows the association between depression, anxiety, stress and Inflammatory Bowel Syndrome (IBS). For depression, it was 16.91 times more likely for the participant to develop IBS compared to those without it. It was a significant association as 95% CI was 3.59-79.57, chi square of 20.468 and P-Value was <0.001. For stress, it was 10.43 times more likely for the participant to develop IBS compared to those without it. It was a significant association as 95% CI was 2.24- 48.69, chi square of 12.572 and P-Value was <0.001. Lastly, for anxiety, was 19.20 times more likely for the participant to develop IBS compared to those without it. It was a significant association as 95% CI was 4.07-90.65, chi square of 22.993 and P-Value is <0.001. From these results, it clearly stated that depression, anxiety and stress had positive association with IBS.

4. Discussion

A cross sectional study was conducted among undergraduate medical students to assess the prevalence of IBS among medical students in MMMC, to study the awareness of IBS among medical students in MMMC and to find out risk factors associated with IBS. 10% of students had IBS among our students in this study. Among the 10% of students that had IBS, 21.4% are having IBS subtype C, 35.7% for subtype D, 21.4% for subtype M and 21.4%U. In the previous study of medical students with overnight shifts in Canada showed the prevalence of IBS of 20.5% which was higher than our results. [13] The other study conducted among nursing and medical students in Japan revealed 35.5% of those having IBS which was also higher than our result [14. Study conducted among Korean medical students reported higher prevalence of 29.2% 15]

This study shows no significant association between age, gender, ethnicity, religion, and educational level semester 6 and 7, alcohol intake, smoking, drugs, family history of large intestinal disease and presence of IBS. In previous study, gender can be a main factor for diagnosing IBS because in

one of the western studies using Rome II, which was the study done from Spain, Australia and Canada, the female: male ratios diagnosed with IBS were about 2:1. [16] To support the above statement, in Han's study, the female was mostly diagnosed in IBS patients, too. However, many in studies done in Asian countries using Rome II criteria does not prove any significant difference in prevalence of IBS between male and female [17]. Next, in Miwa study, younger age group than the older age group have higher prevalence of IBS. Besides, Miwa reported the prevalence of diarrhoea predominant IBS around mid-20s among the male, and constipation IBS was common among females in their 20s. [5] Above statement was supported based on Nam's study, which was younger patient in the mid-20s have a higher chance and prevalence on developing IBS. [19] For ethnicity, there were studies done by using Rome criteria III, the report of the prevalence of IBS in Western countries encountered for 10 to 20% Besides, for Asian countries with was from 1 to 10%. Next, the lowest IBS reported rates were from Southeast Asia countries which was 7.0% only while the highest hold the IBS reported case were South America 21.0%. [20]

Three community studies from Singapore and Malaysia reported no difference between Chinese, Malays and Indians in the prevalence of IBS. [21] There were few studies regarding the relationships between smoking, alcohol and IBS symptoms. In a study done in New York showed a strong association of smoking and alcohol with IBS. The odd ratio of smoking and alcohol was 0.64 and 1.38 respectively showing a significant association with IBS. [17] In our study, students with a positive family history of IBS were about four times more prone to it compared to others. This agrees with the results of a family-based case control research conducted in the United States, which confirmed IBS familial clustering and highlighted that family history was a known predictor of IBS. [23]

There was a significant association between depression, stress, anxiety and IBS and are more likely to get IBS. Students with depression were 16.91 times more likely to get IBS and was significant concluded from our study. Furthermore, in a study done in China, have found out that anxiety and depression to be significantly associated with IBS patients in China. Similarly, psychological stress was also strongly associated with IBS. The exact mechanism of psychological stress inducing the abdominal symptoms has not been discovered yet. Although recently, many researchers have reported that there was a bidirectional relationship between the brain (central nervous system) and the digestive tract. The most common opinion was that a complex reflex circuit between the cerebral cortex and the digestive system exists, and brain-gut axis dysfunction can generate digestive disorders. [18] Anxiety and depression proved to have a positive association and also significant. From out study students with anxiety has 19.20 times more likely to get IBS. From studies conducted in Saudi Arabia, there was a positive statistical significance relationship between Irritable Bowel Syndrome and anxiety. This result shows that more anxiety, more Irritable Bowel Syndrome. [22] From our study stress and IBS had positive relationship and the students who were stressed were 10.43 times more likely in getting IBS. In a study conducted in Pakistan, students who suffer from stress and anxiety were more associated with IBS. [8] Depression, Anxiety and stress contribute to the likelihood of getting IBS concluded from our study and this was due to overload of work, revision and study that have to be done among the students in this medical course. Hence, we would like to recommend that the college should hold a stress, depression and anxiety coping seminar and talk so that the students were aware of handling and managing them. A strong support and active involvement from the counselling department of university should be a priority in making sure that student is well aware of this issue. We would like to recommend for future study to include senior year student and also other batches. Besides, due to our time constraint of carrying out this study, we only used a shorter version of the questionnaire to gather the data. Hence, we would like to suggest using a full version of the questionnaire for Rome's Criteria and DASS-scale in order to obtain more reliable data findings. Furthermore, we would like to suggest that in our study that we should include more independent variable/risk factor that also can contribute to IBS for example; diet habits, sleep deprivation and physical activity of the medical students.

Unfortunately, during this study, there were few limitations that we faced. Firstly, the limitation lies at the fact that we carry out the study among medical students, hence they had the full idea of IBS and starting before answering the questions, they answered them that they have no IBS symptoms. Next, the limitations of this study were the non-respondent students where we distributed around 200 questionnaires but only 140 of them answered fully. There were around 15 questionnaires that were incomplete answered. This was because the questionnaires were distributed and collected during evening lecture classes where they had to focus or have other work to do during the classes. Hence, the students were not given full focus on answering the questionnaire and answered for the sake of the researcher. Next, the limitation the respondents were only from medical students of semester 6 and 7 and not included from other semester. Besides, our study was a cross sectional, hence we can't observe the changes in IBS symptoms for a longer period of time among the medical. Besides, this study can only be conducted in within 6 weeks of posting. Since our study was done in one medical college,

we can't generalize and apply our findings, which was 10% among 140 medical students having IBS to other university and population. We would like to recommend future researchers to include other risk factors and its association with IBS.

5. Conclusion

Our findings suggested that undergraduate medical students in Melaka Manipal Medical College who were in semester 6 and 7 had a positive and significant association between the risk factors depression, anxiety and stress and irritable bowel syndrome. However the other risk factors such as age, gender, ethnicity, education level, alcohol intake, smoking, consuming medication and family history of large bowel disease had no significant association. The students were also aware of the symptoms of IBS with 10% of the students showed that their IBS was related to stress, anxiety and depression. Therefore, students must follow stress management ways and reach out to the student council if depression happened to help control the rise of IBS and to prevent IBS arising in future.

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