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Assessment of psychological alarms and coping strategies of medical students with irritable bowel syndrome at Zagazig University: A cross-sectional study

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Abstract:

BACKGROUND: Irritable bowel syndrome (IBS) is one of the most prevalent functional gastrointestinal disorders. Medical students tend to report a higher prevalence of IBS since they are under constant stress. Many psychological difficulties are associated with IBS. To cope with IBS, individuals use various strategies which can impact the intensification or alleviation of IBS symptoms. The objective of this study was to assess the prevalence of IBS in medical students as well as psychological alarms and coping strategies employed by IBS sufferers.

MATERIALS AND METHODS: We conducted a cross-sectional study from December 2022 to February 2023. Study participants were first to fifth year medical school students at Zagazig University, Egypt. Data were collected using a structured questionnaire comprising four sections: sociodemographic and clinical data; Rome IV criteria for the diagnosis of IBS; the alarm questionnaire for functional gastrointestinal disorders; and the Coping Strategies Questionnaire (CSQ24). Chi-square test or Fischer's exact test, as appropriate, were used to test for association. Binary logistic regression with a backward stepwise method was used to determine significant risk factors of negative coping with IBS.

RESULTS: Of the studied 221 medical students, 38% had IBS. A statistically significant association was observed between IBS and the feeling of tension, anxiety, nervousness, depression, and frustration in the previous week, severe pain in the past 4 weeks, and the feeling that the bad situation would not get any better. Most of the students in the IBS group coped positively with stress, while 19.0% were negative in coping. Pain affecting the daily activities and the feelings of depression and frustration to the point of self-harm or suicide were the most significant correlates of IBS group's inability to cope.

CONCLUSION: The prevalence of IBS in medical students at Zagazig University was 38%. We recommend psychological intervention and stress management programs to help medical students cope with IBS.

Keywords:

Coping, irritable bowel syndrome, medical students, psychological alarms

Introduction

One of the most common functional gastrointestinal (GIT) disorders in

primary healthcare settings is irritable bowel syndrome (IBS).^[1] According to the Rome IV criteria, IBS is characterized by recurring abdominal pain at least once per week over 3 months. At least two or more

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of the following criteria should accompany the pain: defecation- alterations in stool frequency or consistency, and symptoms first noticed at least 6 months before diagnosis.^[2] IBS is categorized into four main types: diarrhea-predominant, constipation-predominant, mixed, and unclassified.^[2]

IBS affects 10%–25% of the population, with a prevalence of 8.9%–79.7% in Arab countries.^[1,3,4] Its global prevalence in medical students is 9.3%–35.3%.^[5] In a study of Egyptian medical students, conducted at two medical faculties 27.5% were diagnosed with IBS.^[6]

IBS is associated with psychosocial alarm symptoms, including impaired functioning, depression, anxiety, and impaired ability to cope.^[7] Coping strategies that serve as mechanisms employed for stress management and handling are thought to exacerbate or alleviate the symptoms of IBS.^[8] Negative coping strategies were related to worse IBS symptoms, heightened anxiety and depression levels, and a diminished quality of life.^[9]

Although IBS is a widespread disease, little research has been done on the coping mechanisms and psychological alarms associated with it, particularly among medical students. This particular population could experience more stressors and use different coping strategies, influenced by society's norms and the distinctive demands of their medical education.

We had three objectives for this study: The first was to assess IBS prevalence in medical students; the second was to assess psychological alarms and their association with IBS in those students; and the third was to assess coping strategies of those students and the factors affecting coping.

Materials and Methods

This cross-sectional study was conducted from December 1, 2022, to February 28, 2023. The study participants were first to fifth year students of the Faculty of Medicine, Zagazig University, Egypt. Criteria for exclusion were: individuals with known organic gastrointestinal disorders (e.g., inflammatory bowel disease and malignancy), individuals with previous gastrointestinal surgery (e.g., cholecystectomy and intestinal resection), individuals with known chronic diseases (e.g., diabetes mellitus, chronic kidney disease, and thyroid disorders), and individuals with previously diagnosed psychiatric disorders (e.g., depression and anxiety) or receiving any psychiatric medications. Ethical approval was obtained from the Institutional Review Board vide letter number 10159 dated 27/11/2022, and informed written consent was taken from all the study participants.

The sample size was computed with open Epi software. Assuming the prevalence of IBS in medical students as 27.5% according to the study by El Sharawy *et al.*,^[6] and the number of medical students during the academic year (2022–2023) as 8105, the sample size was 296 with precision of 5% at 95% confidence interval (CI). A stratified random sampling technique was used. The sample was allocated according to the percentage of students in each academic year as a stratum. Participants were chosen randomly from the student list for each year.

A self-reported four-part questionnaire was used to collect the data. Part 1 related to personal and sociodemographic characteristics, general medical and psychiatric history, and red flags necessitating exclusion from the study. The social class was determined using the modified Fahmy *et al.*, socioeconomic scale.^[10] Scores below 40% were indicative of low social class, between 40% and 70% of medium social class, and over 70% of high social class.

The American Gastroenterological Association outlines seven red flags distinguishing organic intestinal diseases from IBS. These include the presence of blood in stool, cases of anemia, arthralgia or fever, nighttime waking because of pain, weight loss, and history of organic GIT disorder or surgery. Participants exhibiting any of these red flags were referred to the gastroenterology clinic for further assessment and excluded from further analysis. Students excluded at this stage were 75, so only 221 completed the questionnaires [Figure 1].

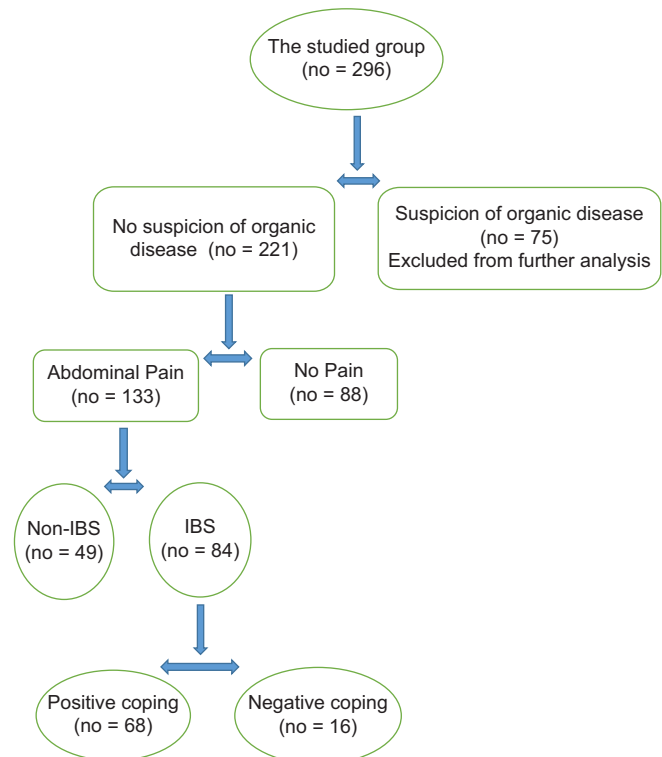


Figure 1: Flow chart for the studied group

The second part included questions about the Rome IV criteria for diagnosing IBS. These criteria demonstrated sensitivity of 0.627 and an excellent specificity of 0.971.^[11] They were 10 questions evaluating the frequency of diarrhea or constipation, the consistency of the stool, and recurrent abdominal pain. Questions from 1 to 7 used a 10-point scale from 0% (never) to 100% (always). “Yes/no” questions made up the eighth and ninth questions, while the last question was a 5-point scale with illustrative photos to determine the nature of bowel movement. According to the criteria for diagnosis of IBS, the patient must experience recurring abdominal pain at least once per week plus 2 or more of the following in the previous 3 months: defecation, alterations in frequency or form of the stools. The instrument requires that symptoms should have been initiated at least 6 months before diagnosis.^[12,13]

The third part was the alarm questionnaire for functional GIT disorders, generated by the Rome Foundation.^[14] This questionnaire comprised seven queries addressing psychological alarms that may associate with IBS and necessitate referral for psychological help. The questions delved into various aspects, including levels of depression and anxiety measured on a 4-point scale from (not at all) to (most of the time); suicidal thoughts measured on a 3-point scale from (not at all) to (often); functional impairment where participants scored how pain interfered with their ability to carry out daily tasks in the previous 4 weeks on a scale from 1 (not at all) to 5 (extremely); pain intensity in the previous 4 years rated by participants on a scale of 1 (none) to 5 (extremely severe); impaired coping where participants rated how they were able to cope using this statement: “I feel that the situation is bad and will not improve” with responses from 0 (never) to 3 (always); and finally, a question on abuse with “yes” or “no” answers. Then responses to each item were grouped into two categories for more informative results.

The fourth part included the Coping Strategies Questionnaire, which assessed coping strategies employed by individuals with IBS.^[15] The questionnaire has 23 items in total divided into four subscales: (a) catastrophizing, with six items (e.g., I feel like I can't stand it anymore); (b) diversion, with six items (e.g., “I do anything to get my mind off the pain”); (c) reinterpreting, with six items (e.g., “I imagine the pain is outside my body”); and (d) cognitive coping, with five items (for example, “no matter how bad it gets, I know I can handle it”). Adding 20% to the cognitive coping factor scores is suggested to ensure comparability with other factors containing six items each. A Likert scale with seven points—from 1 for “never” to 7 for “always”—was used to score each response. On the suggestion of Harland and Georgieff^[15] that most respondents would exhibit some

degree of positive scores across the four subscales of the CSQ24, the subscale garnering the greatest score should be regarded as the individual's main coping strategy. We considered catastrophizing as the only negative coping strategy, while the other three were seen as positive coping strategies.

A pilot study involving 30 participants (equivalent to 10% of the total study participants) was conducted to predict potential data collection difficulties and determine the necessary time for data gathering. As no modifications were deemed necessary following the pilot, that sample was incorporated into the main sample.

The statistical package for social sciences, version 25 (SPSS, IBM Corporation, Armonk, NY, USA), was used to analyze the data. The categorical variables were labeled with their absolute frequencies, and the quantitative data were presented as mean \pm standard deviations. When comparing the study groups for categorical variables, the Chi-square test, Fischer's exact test, and extended Mantel–Haenszel Chi-square for linear trend were utilized. Binary logistic regression with a backward stepwise (Wald) method was used to predict the most evident risk factors of negative coping with IBS. $P < 0.05$ and $P < 0.001$ were designated as the levels of statistical significance and high significance, respectively.

Results

The average age of our participants was 20.2 years. Females were ~57.5%, and ~54% of students were in clinical years. About half of the studied groups (55.6%) were of a low socioeconomic status [Table 1].

More than half of the studied groups (60.2%) had had abdominal pain once a week or more. 84 research participants (38.0%) met the diagnostic criteria for IBS; the constipating type was the most frequent at 48.8%, the mixed type was 29.8%, diarrheal was 13.1%, and finally, the unclassified IBS was 8.3% [Figure 1 and Table 1].

Table 2 shows that IBS was statistically significantly related only to clinical education and smoking, with odds ratios (ORs) of 2.1 and 2.2, respectively. Concerning clinical history, IBS was significantly related to decreased hours of sleep and social problems (OR: 2.4 and 3.1) [Table 2].

Regarding psychological alarms, IBS was significantly related to the feeling of tension, anxiety, or nervousness, depression and frustration in the past week, severe pain in the past 4 weeks, and the feeling that the already bad situation would not improve (OR: 25.7, 3.1, 1.6, 2.6, respectively). While the recent feeling of depression and frustration to the point of self-harm or suicide, the pain

Table 1: Sociodemographic and clinical characteristics of medical students at Zagazig University, Egypt (n=221)

Characteristics	N (%)
Age (years)	
Mean±SD	20.2±1.5
Range	17–24
Sex	
Male	94 (42.5)
Female	127 (57.5)
Education	
Academic	101 (45.7)
Clinical	120 (54.3)
Residence	
Rural	139 (62.9)
Urban	82 (37.1)
Smoking habits	
No	157 (71.1)
Yes	64 (28.9)
Socioeconomic classes	
Low	74 (55.6)
Medium	29 (21.8)
High	30 (22.6)
Abdominal pain	
No pain	88 (39.8)
Once a week	20 (9.1)
2–3 days a week	42 (19.0)
Most days (4–6 days a week)	39 (17.6)
Every day	13 (5.9)
Several times per day or all the time	19 (8.6)
IBS prevalence	
IBS	84 (38.0)
Non-IBS (with abdominal pain)	49 (22.2)
No abdominal pain	88 (39.8)
IBS subtypes	
Constipation predominant	41 (48.8)
Diarrhea predominant	11 (13.1)
Mixed IBS	25 (29.8)
Unspecified type	7 (8.3)

IBS=Irritable bowel syndrome, SD=Standard deviation

affecting daily activities outside or at home, and the experience of any form of violation was not statistically significantly associated with IBS [Table 3].

Most IBS groups (68 participants, 81%) coped positively with stress, while 19.0% (16 participants) were negative in coping [Figure 1]. Univariate analysis demonstrated that clinical education, social problems, feeling depressed and frustrated to the point of self-harm or suicide, severe pain in the past 4 weeks, pain that affected the usual daily activities in or out of the house, the bad situation was not going to improve, and experience of any form of violation were statistically significant related to the inability of the IBS group to cope (OR: 3.08, 8.2, 10.4, 4, 17.9, 4.9, and 5.5, respectively). In binary logistic regression, all significant factors on univariate analysis

entered the regression analysis; only pain affected the usual daily activities whether in or out of the house, and recent feeling of depression and frustration to the point of being inclined to self-harm or suicide were the most significant risk factors for negative coping of the IBS group (adjusted OR 95% CI: 18.7 [1.81–94.4] and 7.4 [1.42–39.1]) [Tables 4 and 5].

Discussion

IBS remains a prevalent functional gastrointestinal disorder affecting most of the population. Global prevalence of IBS ranges from 10%–25%, with significant variations in different countries.^[1,3] IBS significantly diminishes the quality of life of individuals who have it and raises the burden of mental health disorders.^[16]

More than half of the medical students studied (133 out of 221 (60.6%)) experienced functional abdominal pain at least once a week. Furthermore, ~ two-thirds of students with abdominal pain were diagnosed with IBS. This observation is in accord with the results of Selim *et al.*,^[13] who noted that one out of every two individuals experiencing abdominal pain was diagnosed with IBS in Riyadh, Saudi Arabia.

In our study, 38.0% of medical students had IBS. This is similar to previous Egyptian studies in which 31.7% of Ain Shams University medical students and 27.5% of undergraduate and postgraduate medical students at Tanta and Kafr El-Sheikh Universities were diagnosed with IBS.^[6,17] Furthermore, comparable prevalence rates of 28.3% to 42.2% have been documented in a number of Saudi Arabian medical universities^[13,18-20] and 27.2% in one Sudanese medical college.^[21] Conversely, lower prevalence rates have been reported in several nations (Latin America: 17.5%, Asia: 9.6%, Middle East and Africa: 5.8%, Peru: 9.5%, Malaysia: 14.7%).^[3,22-25] Similarly, lower rates have been reported among medical and nonmedical students in Syria and Lebanon (17% and 20%, respectively).^[26,27]

The cause of the increased prevalence of IBS in our study can be explained by many factors, including the criteria for diagnosis, the sample sizes utilized, variations in the distribution of risk factors, and the distinct academic and clinical commitments characterizing the educational context.^[20]

Four subtypes of IBS are based on the predominant stool pattern: IBS with mixed bowel habits (IBS-M), diarrhea (IBS-D), constipation (IBS-C), and unclassified IBS (IBS-U). The IBS-C-subtype was more common in our study (48.8%), than IBS-M and IBS-D. Results from Pakistan by Zeeshan *et al.*,^[28] revealed that IBS-C is the most prevalent subtype (63%), which lends support to

Table 2: Association between sociodemographic and clinical characteristics and irritable bowel syndrome among students with abdominal pain (n=133)

Variables	Non-IBS (n=49) N (%)	IBS (n=84) N (%)	P-value	OR (95% CI)
Age (years)				
< The median (20) (n=88)	34 (38.6)	54 (61.4)	0.5 [^]	1.3 (0.59–2.67)
≥ the median (20) (n=45)	15 (33.3)	30 (66.7)		
Sex				
Male (n=55)	19 (34.5)	36 (65.5)	0.6 [^]	0.8 (0.41–1.73)
Female (n=78)	30 (38.5)	48 (61.5)		
Grade of education				
Academic (n=60)	28 (46.7)	32 (53.3)	0.03 ^{*,^}	2.1 (1.06–4.43)
Clinical (n=73)	21 (28.8)	52 (71.2)		
Residence				
Rural (n=94)	38 (40.4)	56 (59.6)	0.18 [^]	1.7 (0.76–3.8)
Urban (n=39)	11 (28.2)	28 (71.8)		
Smoking habits				
Yes (n=47)	12 (35.2)	35 (64.8)	0.04 ^{*,^}	2.2 (1.01–4.8)
No (n=86)	37 (71.4)	49 (28.6)		
Socioeconomic classes				
Low-mid (n=74)	25 (33.8)	49 (66.2)	0.4 ^{^^}	0.8 (0.5–1.29)
Medium (n=29)	12 (41.4)	17 (58.6)	0.5	1.1 (0.7–1.9)
High (n=30)	12 (40.0)	18 (60.0)	0.6	1.1 (0.66–1.8)
Sleeping hours				
<8 (n=83)	24 (28.9)	59 (71.1)	0.01 ^{*,^}	2.4 (1.18–5.09)
≥ 8 (n=50)	25 (50.0)	25 (50.0)		
Exercise				
No (n=85)	27 (31.7)	58 (68.3)	0.1	1.8 (0.87–3.76)
Mild/moderate (n=37)	15 (40.5)	22 (59.4)	0.6	0.8 (0.39–1.85)
Severe (n=11)	7 (63.6)	4 (36.4)	0.06	0.3 (0.08–1.08)
Social problems				
Yes (n=80)	21 (26.3)	59 (73.7)	0.001 ^{**,^}	3.1 (1.5–6.5)
No (n=53)	28 (52.8)	25 (47.2)		
Family history of IBS				
Positive (n=69)	23 (25.9)	46 (74.1)	0.3	1.36 (0.67–2.7)
Negative (n=64)	26 (44.9)	38 (55.1)		

^{*}Statistically significant ($P \leq 0.05$), ^{**}Highly statistically significant ($P \leq 0.001$), [^]P-value for the Chi-square test, ^{^^}Extended Mantel–Haenszel Chi-square for linear trend. OR=Odds ratio, CI=Confidence interval, IBS=Irritable bowel syndrome

our conclusion. IBS-M, on the other hand, was found to be the most common subtype in medical students in studies from Egypt and Saudi Arabia.^[6,29] In addition, IBS-M and IBS-D were the two most prevalent IBS subtypes in East Asia.^[22] IBS subtype prevalence varies by nation or ethnicity.^[30]

Our study revealed a higher prevalence of IBS among the higher clinical grades. This agrees with Ibrahim *et al.*,^[20] who reported that Saudi students in higher grades had a higher prevalence of IBS. Conversely, no association was found between academic degree and IBS diagnosis by El Sharawy *et al.*, in Egypt.^[6]

With regard to clinical history, a significant association was found between IBS diagnosis and decreased hours of sleep, smoking status, and social problems but no association with exercising and having a family history of IBS. This agrees with studies by Al-Turki *et al.*,^[31] and

Ibrahim *et al.*,^[20] which revealed that there was a slightly greater incidence of IBS in students who slept <8 h/day. Studies by Wani *et al.*,^[18] and Murad *et al.*,^[32] showed a strong association between smoking and IBS in medical students. However, Wani *et al.*, found an insignificant association between IBS and physical exercise.^[18] El Sharawy *et al.*,^[6] and Elhosseiny *et al.*,^[17] showed an insignificant relation between smoking status and IBS symptoms in Egyptian medical students. According to studies from Saudi Arabia, IBS was more prevalent in students who did not exercise and in those who had a family history of the disorder.^[20]

In the current study, there was a statistically significant association between the IBS diagnosis and the psychological alarm symptoms of tension, anxiety, nervousness, depression, and frustration in the past week and with severe pain in the past 4 weeks. This concurs with results by Almousa and Alotaibi^[29] in Saudi

Table 3: Association between psychological alarms and irritable bowel syndrome among students with abdominal pain (n=133)

Psychological alarms	Total	Non-IBS (n=49) N (%)	IBS (n=84) N (%)	P-value [^]	OR (95% CI)
Felt tense, anxious, or nervous during the past week					
Most of the time	59	20 (33.9)	39 (66.1)	0.01* ^{***}	25.7 (5.3–46.1)
Often	46	13 (28.3)	33 (71.7)	0.01*	13.1 (3.5–29.7)
Sometimes	28	16 (57.1)	12 (42.9)	0.5	5.2 (0.12–21.7)
Felt depressed and frustrated during the past week					
Most of the time	54	12 (22.2)	42 (77.8)	0.003* ^{***}	3.1 (1.4–6.7)
Often	40	21 (52.5)	19 (47.5)	0.01*	2.5 (1.19–5.5)
Sometimes	37	15 (40.5)	22 (59.5)	0.2	1.2 (0.57–2.7)
Never	2	1 (50.0)	1 (50.0)	0.7	0.79 (0.19–3.17)
Recently felt depressed and frustrated to the point of self-harm or suicide					
Most of the time	18	4 (22.2)	14 (77.8)	0.2 ^{***}	0.16 (0.69–7.26)
Sometimes	31	12 (38.7)	19 (61.3)	0.8	0.9 (0.39–2.1)
Never	84	33 (39.3)	51 (60.7)	0.4	0.7 (0.35–1.57)
Pain severity during the past 4 weeks					
Very severe	7	0	7 (100.0)	0.03* ^{***}	1.6 (1.42–1.88)
Severe	32	9 (28.1)	23 (71.9)	0.2	1.67 (0.7–3.9)
Moderate	70	25 (35.7)	45 (64.3)	0.001**	10.1 (3.8–26.5)
Mild	24	15 (62.5)	9 (37.5)	0.003**	0.54 (0.32–0.93)
The pain affects usual daily activities					
Extremely	13	2 (15.4)	11 (84.6)	0.09 ^{***}	3.5 (0.75–16.6)
To some extent	51	16 (31.4)	35 (68.6)	0.3	1.47 (0.71–3.1)
Moderate	29	13 (44.8)	16 (55.2)	0.3	0.6 (0.28–1.5)
Mild	24	11 (45.8)	13 (54.2)	0.3	1.6 (0.65–3.9)
Never	16	7 (43.8)	9 (56.3)	0.5	1.3 (0.48–3.9)
The situation is bad and will not improve					
Always	8	1 (12.5)	7 (87.5)	0.1 ^{***}	4.3 (0.5–36.6)
Sometimes	63	16 (25.4)	47 (74.6)	0.009*	2.6 (1.25–5.47)
Never	62	32 (51.6)	30 (48.4)	0.001**	0.29 (0.13–0.62)
Experienced any form of violation					
Yes	64	28 (35.1)	36 (64.9)	0.1 [^]	1.7 (0.8–3.6)
No	69	21 (38.9)	48 (61.0)		

^{*}Statistically significant ($P \leq 0.05$), ^{**}Highly statistically significant ($P \leq 0.001$), [^]P-value for the Chi-square test, ^{***}Extended Mantel-Haenszel Chi-square for linear trend. OR=Odds ratio, CI=Confidence interval, IBS=Irritable bowel syndrome

Arabia, which reported a highly significant correlation between depressive symptoms and IBS. Similar findings in Saudi Arabia revealed a significant correlation between psychological stress and IBS, with increased IBS frequency among medical students who had morbid and borderline anxiety and depression, and a higher prevalence of IBS in those with morbid depression than in normal students or those with borderline depression.^[13,20]

With regard to coping strategies, our study showed that most students with IBS symptoms had positive coping strategies to stress, while only 19.0% of the IBS group had a negative coping mechanism. This was in accord with results from Iraq, which found that individuals with IBS tended to use adaptive coping strategies more often than maladaptive ones.^[33] Furthermore, Gomez-Gomez *et al.*,^[34] reported that self-management, active coping, and denial were the most frequently used coping strategies in patients with IBS. Furthermore, records from Iran indicate that individuals with IBS tended to

employ adaptive coping strategies more frequently. Maladaptive coping was associated with worse IBS symptoms, higher levels of anxiety and depression, and a worse quality of life.^[9]

On the other hand a study by Grodzinsky *et al.*,^[35] showed that IBS patients were more likely than controls to have low self-esteem and inadequate coping mechanisms. Both negative and positive coping mechanisms were strongly connected with IBS in participants, according to Selim *et al.*^[13] Only positive coping mechanism, however, independently predicted IBS.^[13] This discrepancy may be related to different cultures and personality traits.

Univariate analysis demonstrated that clinical grades of education, social problems, feeling of depression and frustration to the point of self-harm or suicide, severe pain in the past 4 weeks, pain that affects usual daily activities, the feeling that the situation was bad and would not improve and the experience of any

Table 4: Univariate analysis: Association between coping type and sociodemographic characteristics, clinical data, and psychological alarms in medical students with irritable bowel syndrome (n=84)

Variables	Negative coping (n=16) N (%)	Positive coping (n=68) N (%)	P-value	OR (95% CI)
Age (years)				
< The median (20) (n=54)	10 (18.5)	44 (81.5)	0.8 [^]	0.9 (0.29–2.8)
≥ The median (20) (n=30)	6 (20.0)	24 (80.0)		
Sex				
Male (n=36)	5 (13.9)	31 (86.1)	0.3 [^]	0.5 (0.17–1.7)
Female (n=48)	11 (22.9)	37 (77.1)		
Education ^{^^}				
Academic (n=29)	9 (31.0)	20 (69.0)	0.04* [^]	3.08 (1.01–9.43)
Clinical (n=55)	7 (12.7)	48 (87.3)		
Residence				
Rural (n=56)	14 (24.6)	42 (75.4)	0.3 ^{^^}	1.85 (0.54–6.37)
Urban (n=28)	2 (7.4)	26 (92.6)		
Smoking habits				
Yes (n=35)	6 (7.4)	29 (92.6)	0.7 [^]	0.8 (0.26–2.47)
No (n=49)	10 (24.6)	39 (75.4)		
Socioeconomic classes				
Low-mid (n=49)	14 (28.6)	35 (71.4)	0.1 ^{^^^}	2.1 (0.79–5.5)
Medium (n=17)	0	17 (100.0)	0.1	0.24 (0.03–1.72)
High (n=18)	2 (11.1)	16 (88.9)	0.8	0.88 (0.31–2.46)
Sleeping hours (h)				
<8 (n=59)	11 (18.6)	48 (81.4)	0.8 [^]	1.07 (0.41–2.76)
≥8 (n=25)	5 (20.0)	20 (80.0)		
Exercise				
No (n=58)	11 (18.9)	47 (81.1)	0.9 ^{^^}	0.98 (0.31–3.18)
Mild/moderate (n=22)	4 (18.2)	18 (81.8)	0.9	0.92 (0.26–3.24)
Severe (n=4)	1 (25.0)	3 (75.0)	0.7	1.4 (0.14–14.8)
Social problems				
Yes (n=59)	15 (25.4)	44 (74.6)	0.02* ^{^^}	8.2 (1.02–65.8)
No (n=25)	1 (4.0)	24 (96.0)		
Family history of IBS				
Positive (n=46)	9 (19.5)	37 (80.5)	0.8 [^]	1.1 (0.35–3.22)
Negative (n=38)	7 (18.4)	31 (81.6)		
Felt tense, anxious, or nervous during the past week				
Yes (n=72)	15 (20.8)	57 (79.2)	0.3 ^{^^}	2.8 (0.34–24.2)
No (n=12)	1 (8.3)	11 (91.7)		
Felt depressed and frustrated during the past week				
Yes (n=61)	14 (23.0)	47 (77.0)	0.13 ^{^^}	3.1 (0.65–15.1)
No (n=23)	2 (8.7)	21 (91.3)		
Recently felt depressed and frustrated to the point of self-harm or suicide				
Yes (n=33)	13 (39.4)	20 (60.6)	0.001* ^{^^}	10.4 (2.67–40.4)
No (n=51)	3 (5.9)	48 (94.1)		
Pain severity during the past 4 weeks				
Severe to very severe (n=30)	10 (33.3)	20 (66.7)	0.01* ^{^^}	4 (1.28–12.5)
Mild to moderate (n=54)	6 (11.1)	48 (88.9)		
The pain affects your usual daily activities				
Yes (n=46)	15 (32.6)	31 (67.4)	0.001* ^{^^}	17.9 (2.23–43.2)
No (n=38)	1 (2.9)	37 (97.4)		
The situation is bad and will not improve				
Yes (n=54)	14 (25.9)	40 (74.1)	0.03* ^{^^}	4.9 (1.03–23.3)
No (n=30)	2 (6.7)	28 (93.3)		
Experienced any form of violation				
Yes (n=36)	12 (33.3)	24 (66.7)	0.004* [^]	5.5 (1.6–18.9)
No (n=48)	4 (8.3)	44 (91.7)		

*Statistically significant ($P \leq 0.05$), **Highly statistically significant ($P \leq 0.001$), [^]P-value for the Chi-square test, ^{^^}P-value for the Fischer's exact test, ^{^^^}Extended Mantel-Haenszel Chi-square for linear trend. OR=Odds ratio, CI=Confidence interval, IBS=Irritable bowel syndrome

Table 5: Binary logistic regression analysis: Factors associated with negative coping among medical students with irritable bowel syndrome (n=84)

Factors	AOR	SE	Wald	P-value	95% CI
Clinical education	1.7	0.8	0.4	0.5	0.33 - 8.2
Social problems	7.7	1.2	2.8	0.09	0.69 - 84.6
Pain severity during the past 4 weeks	2.2	0.76	0.9	0.3	0.46 - 10.7
The pain affects your usual daily activities, whether outside or in the home	18.7	1.2	6.1	0.01*	1.81 - 94.4
Recently felt depressed and frustrated to the point of self-harm or suicide	7.4	0.8	5.6	0.01*	1.42 - 39.1
The situation is bad and will not improve	1.4	1.2	0.09	0.77	0.14 - 14.4
Experienced any form of violation	2.6	0.9	1.1	0.28	0.44 - 15.8

*Statistically significant ($P \leq 0.05$). AOR=Adjusted odds ratio, SE=Standard error, CI=Confidence interval

form of violation were statistically significant related to negative coping mechanism in the IBS group. In binary logistic regression, the pain affected the usual daily activities and the feeling of depression and frustration to the point of self-harm or suicide were the most significant predictors of negative coping of the IBS group. This corresponds with the findings of Selim *et al.*,^[13] which documented similar results. Their research found a substantial correlation between IBS and psychological indicators such as depression, anxiety, pain intensity, disruption of daily functioning, and impaired coping. Beyond mere anxiety and depression, the degree of symptoms significantly influenced the use of negative coping mechanisms by IBS patients.^[9,35]

The strengths of the present study included: the utilization of a validated and well-established questionnaire; the investigation targeted medical students who are under constant stress; and our results showed an association between IBS and many psychological alarms. This underlines the importance of the implementation of psychological intervention and stress management programs to help medical students cope with IBS.

The main limitations of the research were: First, that the cross-sectional study could affect the definite conclusions about the temporal relationships recorded between IBS and perceived stressors and the adopted coping strategies and social supports. Second, IBS diagnosis relied on self-reported questionnaires with no clinical visits or investigation to confirm the diagnosis. Third, our sample size was limited to medical students with a limited age range in a rather stressful study situation. Our findings can, therefore, not be generalized to cover other (non-medical) students or the general Egyptian population.

Conclusion

IBS prevalence in medical students at Zagazig University was 38%, with the habit of smoking, social problems, fewer hours of sleep, the stress of the clinical years rather than the academic grades as the main predictive factors. Most medical students with IBS had positive coping strategies for stress. There was a statistically significant

association between IBS and many psychological alarms, such as anxiety, depression, and frustration.

We recommend additional prospective research to prove the effect of IBS on the academic performance of medical students, as well as psychological intervention and stress management programs to help medical students cope with IBS while studying medicine.

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Conflicts of interest

There are no conflicts of interest.

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