# Gut-Brain Connection; IBS linked to Anxiety, Quality of Life, and Academic Performance in Undergraduate Students

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## Abstract

**Background:** Irritable bowel syndrome (IBS) is a disease that affects the lower gastrointestinal tract. Our cross-sectional study aimed to identify the prevalence of IBS and its impact on anxiety levels, quality of life, and academic performance among undergraduate students. **Method:** A total of 357 students (male and female) were randomly selected. IBS prevalence was assessed using Rome III criteria and Birmingham IBS Symptom Questionnaire. Anxiety and quality of life were measured using Beck Anxiety Inventory and IBS-Quality of Life Questionnaire respectively. **Results:** About 16% of students had IBS with the majority from medical departments. Females had a higher IBS prevalence due to diet, lifestyle, and cultural habits. Students with IBS showed high levels of anxiety, below-average quality of life, low academic performance, and insufficient knowledge of IBS. Interestingly, negative, and positive correlations (p =.000) were found between the demographic variables. However, the anxiety levels and quality of life were significantly correlated. **Conclusion:** Several factors, such as social characteristics, diet, and posttraumatic stress disorder caused by wars, are significantly correlated with IBS development, and could impact students' lives. Our findings can pave the way for creating preventive measures, including stress management and health education programs, to curb the incidence of IBS and anxiety among undergraduate students. Therefore, appropriate interventions are necessary to address the student's mental health with IBS and improve their academic and personal lives.

**Keywords:** Irritable Bowel Syndrome, Anxiety, Academic performance, mental health, Quality-of-Life, Undergraduate

## 1. Introduction

IBS is a common gastrointestinal illness characterized by diarrhea, abdominal pain, constipation, cramping, bloating and sometimes, nausea, and vomiting (El-Salhy et al., 2021). Some of these symptoms are common in several other gastrointestinal (GI) conditions, which makes it confusing for physicians when diagnosing IBS. Several etiological factors might be causing IBS including diet, genetics, inflammation, intestinal microorganisms, abnormalities of the GI endocrine cells, with evidence that IBS could be associated with microbes (Carco et al., 2020; Ahmed et al., 2023). Inflammation is a major cause of numerous illnesses, due to its impact on our immune system and our wellbeing whether directly or indirectly (Al-Rawi, Ibrahim & Ahmed, 2023).

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*Significance* | Chronic stress affects many physiological processes including immunity and angiogenesis. IBS impacts anxiety, quality of life, and academic performance of undergraduate students.

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IBS is considered a syndrome due to the presence of various symptoms and the sensing of unfinished bowel movements (Menees, et al., 2012). The prevalence of IBS affects 9% - 23% of people worldwide (Saha, 2014). Moreover, females are more likely to suffer from IBS than males (Liu et al., 2022). IBS is considered as the second reason for staying at home from work and school after influenza (Qureshi, et al., 2016). IBS may begin in early childhood or youth and continue throughout life (Spiller et al., 2007). However, high school and university students are at a high risk of IBS due to mental problems (Schmulson et al., 2018). This is because those students are going through a transition period that will make them experience various mental problems such as anxiety, stress and depression (Al-Rawi, et al., 2021). In addition, the students at this age suffer from eating disorders such as obesity (Ibrahim et al., 2018), which have been linked to IBS (Pickett-Blakely et al. 2014). Lifestyle, diet, sleep, and pain complaints have been reported as associated aspects with IBS symptoms among university students (Gulewitsch, et al., 2011). Students suffering from IBS have shown extreme levels of stress and mental complications compared with students without IBS, particularly nursing, and medical students (Okami, et al., 2011). Chronic stress affects many physiological processes including immunity and angiogenesis. Studies have shown that long-term stress caused by psychological factors may increase the risk of developing tumors (Lu et al., 2021). Moreover, IBS has been shown to negatively affect individuals' quality of life by affecting their daily activities (Weaver, et al., 2017). These activities include study time, attendance, sleep, relationships, diet, and academic achievement (El-Salhy, 2015). In 2006, the Ministry of Health in Iraq reported the prevalence of IBS was 11.2% among the Iraqi population in Baghdad (Ministry of Health/Iraq, 2012) However, little is known regarding the incidence of IBS and its impact on the mental health of undergraduate students in the Kurdistan region of Iraq, where it was affected by displacement and wars. College students transition from youth to adulthood often want to explore new experiences, especially if they were away from home (Al-Rawi, et al., 2023a). During this critical period of growth and development, they may face significant life changes that can affect their choices and well-being (Al-Rawi, et al., 2021). Therefore, this study was carried out to investigate the prevalence and awareness of IBS, as well as its impact on anxiety, academic performance, and quality of life in medical and non-medical students.

**Materials and Methods**
**Study Design**
The focus of this study is to examine the IBS prevalence and their impact on undergraduate students. The research reported in this paper adhered to the Declaration of Helsinki's ethical guidelines. An approval letter for conducting this study was obtained from the Institutional Review Board (IRB) of Zakho Technical Institute/scientific unit with research project number 7/54/2089/2014. This study was a cross-sectional survey, following the STROBE cross-sectional reporting guidelines (Von Elm, et al., 2007). This type of study is more appropriate for exploratory studies and easier to collect data for a large number of variables (Al-Rawi, & H Ibrahim, 2023b). As with every study, this study also has several limitations such as language, cultural values, religious, generalization issues, and instrumentation bias. The nature design of our cross-sectional study is a survey measure design where the participants had to fill out self-report measures. Self-report measures may be convenient to acquire a multitude of information. However, these measures always carry risks of bias (Babbie, 2004). In this study, social desirability bias is one of the risks that may be faced due to the above-mentioned limitations. As a result, obtaining biased results may skew the data obtained.

**Sampling Method and Questionnaires**
In this study, the G*Power program was used to obtain the sample size of this study using the criteria of medium effect size (Cohen's d), power set at 0.95, and alpha set at .05. A total of 357 undergraduate students studying at Zakho Technical Institute, KRG, Iraq, answered the questionnaire and participated in this study. The participants were Kurdish citizens, males, and females, randomly selected, and between the ages of 18-29. Non-Kurdish students were not included in this study, to fulfill the aim of the study. Moreover, the participants were from two medical departments (Nursing and Pathological Analysis) and three nonmedical departments (Information Technology, Banking & Finance, and Petroleum), at Zakho Technical Institute, Zakho, Kurdistan Region of Iraq (KRG). Participants willingly agreed to take part in this study and were offered a survey package. Each package contains a demographic information sheet and the study questionnaires (IBS Symptom Inventory questionnaire, IBS-QOL questionnaire, and Beck's Anxiety Inventory). A consent form was also given to the participants with a brief overview of the study. The signed consent forms with the questionnaires were collected immediately after completion.

**IBS Symptom questionnaire**
An IBS Symptom questionnaire was designed by merging two independent questionnaires: the First questionnaire was the Birmingham IBS symptoms questionnaire, while the second questionnaire was the IBS-Rome III criteria. The Birmingham IBS symptoms questionnaire includes 11 items that are scored on a 6-point Likert scale. The designed questionnaire consists of 21 items selected by the merging of the Birmingham IBS symptom questionnaire and Rome III criteria, where the overlapping questions were removed. Cronbach's alpha was found to be 0.887 for the final 21 items of the questionnaire, which represent an

acceptable range and considered reliable (Drossman, et al., 2000).

**Beck's Anxiety Inventory (BAI)**

Beck Anxiety Inventory (BAI) was published for the first time in 1987 by Aaron T. Beck and teammates (Beck, et al., 1988). It is considered one of the most reliable anxiety inventories that are used worldwide as a self-report measure of anxiety in adults and adolescents. BAI has also been proven to be effective in clinical and research settings. A total of 21 items were listed in the BAI on a 3-point Likert-type scale, ranging from zero to three. The scores of BAI were sorted into three categories; slight anxiety (0–21), mild anxiety (22–35), and for more than 36 was considered severe anxiety. The minimum score is zero while 63 is considered the highest score. Cronbach's alpha was calculated to be 0.90, which is above the acceptable value (Al-Rawi et al., 2021).

**The Quality of Life (IBS-QOL) Questionnaire**

The IBS-QOL questionnaire measures the quality of life of patients suffering from IBS. It is rated as the most validated and reliable QOL tool for IBS patients. The IBS-QOL questionnaire includes 34 items with a five-point Likert-type response scale. Cronbach's alpha test was applied to test the consistency and stability of the questionnaires. The obtained Cronbach's alpha was found to be 0.95 which demonstrates excellent reliability and consistency (Patrick, et al., 1997).

**Data Collection and Data Analysis**

The survey package contains a demographic information sheet and the study questionnaires along with the signed consent forms were collected immediately after completion. The following tests such as frequency analysis, correlation, and chi-square analysis were used to analyze the collected data.

**Statistical Analysis**

The Statistical Package for Social Sciences (SPSS) v. 21 (SPSS, 2014) was used to analyze the data. The data were analyzed statistically using frequency analysis, chi-square analysis, and correlation analysis. Each research question was analyzed accordingly, and the results are presented in tables in the results section. In addition, a correlation matrix was used as a statistical technique to evaluate the relationship between the demographic variables.

**Results**

This study was conducted to examine the level of prevalence and awareness of IBS symptoms, the levels of anxiety related to IBS, and how it impacts the quality of life of students studying at the Zakho Technical Institute in the Northern Kurdistan region, Iraq. The sample of this study included a total of 357 students (males 280 & females 149), with a mean age of 20 (SD ±1.58). The demographic data are presented in Tables 1, and Table 1a (supplement file). The result showed that the number of students staying with their parents was (47%), the rest were displaced at the

dormitory, friends, and family relatives. The result also showed that most of the participants were from the nursing department with 39%, followed by the medical laboratory with 27% (table 1). The participants from the first year were about 44.53 of the total sample size, while the second year made 55. 5% as shown in Table 1.

Our result showed that the IBS prevalence was 16% with more prevalent in females than in males as shown in Table 2. However, students suffering from IBS symptoms frequently were 20-30%. As for the levels of anxiety among the students which was measured by Beck's anxiety inventory, the results showed that 25.9% of the students showed a slight anxiety level, 39.4% mild, and 34.7% showed a severe level. However, the analysis of the chi-square test showed significant differences in the anxiety levels of both sexes. The chi-square analysis revealed that males were suffering from slightly to moderate levels of anxiety at 31.1% and 44.1% respectively, compared to 19.3% and 33.6 in females. Moreover, females compared showed severe levels of anxiety at 47.1% and 24.9 % respectively, as shown in Table 3. On the other hand, results of the IBS Quality of Life showed that only 6.4% of students had above average quality of life while 93.6% of students had below average quality of life. Interestingly, a significant positive correlation was found between the levels of anxiety and quality of life ($r =.251$, $p =.000$). On the contrary, a significant negative correlation between those who are currently suffering from IBS and their quality of life was found ($r =.353$, $p =.000$) and having a family history of IBS and anxiety ($r =.180$, $p =.001$). In addition, significant negative correlations between IBS Symptom awareness and the level of anxiety were found. However, it is worth mentioning here that correlations coefficient with an R value of 0.3 and above were considered significant in this study. Comparatively, the students' average (GPA), varies with 6.2 % of students had excellent (AA), 37 % had very good (BB), and 57 % had accepted (CC), where the male students average was higher than females. Apart from that, the result showed that anxiety levels had a significant impact on the student's academic performance. The Chi-square analysis revealed that the levels of anxiety slightly affected student's GPAs. Although the effect was not substantial, students with a GPA of CC showed severe levels of anxiety ($X2=3.352$, $df=4$, $p=.07$). On the same line, students with mild levels of anxiety reported a GPA of BB ($X2 =17.452$, $df=4$, $p=.002$) while students with severe levels of anxiety reported a GPA of AA ($X2=16.813$, $df=4$, $p=.002$) as shown in Table 4. However, the Chi-square analysis indicates no significant findings concerning the student's current GPA and level of quality of life. The result also showed that the students lacked knowledge about IBS, and only 24% of the students correctly defined IBS. Moreover, the relation between IBS knowledge and students suffering from IBS was found to be positively correlated ($r =.227$, $p =.000$) as shown in

**Table 1.** Frequency Table for demographic information of Academic Departments

|  | N | % | M | F |
|---|---|---|---|---|
| Nursing Dept. | 140 | 39.2 | 87 | 53 |
| Medical Laboratory Technique D ept. | 97 | 27.2 | 62 | 35 |
| Banking Dept. | 22 | 6.2 | 17 | 5 |
| Petroleum Dept. | 46 | 12.9 | 18 | 28 |
| Information Technology Dept. | 52 | 14.6 | 24 | 28 |
| First year | 158 | 44.3 | 87 | 71 |
| Second year | 198 | 55.5 | 120 | 78 |
| Staying with Parents | 169 | 47.3 | 81 | 88 |
| Staying at Dormitory | 167 | 46.8 | 112 | 55 |
| Staying at Grandfathers, aunt, uncle | 10 | 2.8 | 6 | 4 |
| Staying with Friends | 6 | 1.7 | 6 | 0 |
| live alone | 5 | 1.4 | 3 | 2 |
| Frequency Distribution for GPA |  |  |  |  |
| AA | 22 | 6.2 | 17 | 5 |
| BA | 132 | 37.0 | 77 | 55 |
| CC | 203 | 56.9 | 114 | 89 |

**Table 2** (please see next page)

**Table 3.** Chi-Square Analysis for Gender Differences and Levels of Anxiety

|  | Males % | Females % | X2 | Df | p | Effect Size |
|---|---|---|---|---|---|---|
| Levels of Anxiety |  |  | 17.57 | 2 | .000 | .235 |
| Slight | 31.1 | 19.3 |  |  |  |  |
| Mild | 44.1 | 33.6 |  |  |  |  |
| Severe | 24.9 | 47.1 |  |  |  |  |

**Table 5.** Frequency Distribution for IBS Knowledge. (r =.227, p =.000)

|  | N | % | M | F |
|---|---|---|---|---|
| Have you heard about IBS? Yes/No | 284 | 79.6 | 160 | 124 |
| Define what you understand from IBS. | 71 | 19.9 | 46 | 25 |
| Correct definition. | 84 | 23.5 | 54 | 30 |
| Wrong definition | 273 | 76.5 | 154 | 119 |

**Table 2.** Frequency Analysis for IBS Symptom questionnaire

| | Items | *1 M % | F % | *2 M% | F% | *3 M% | F% | *4 M% | F% | *5 M% | F% |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | I have had discomfort or pain in my abdomen during the last 4 weeks. | 7.2 | 9.4 | 9.1 | 9.4 | 11.1 | 19.5 | 29.8 | 22.1 | 42.8 | 39.6 |
| 2. | I have had this discomfort/pain for at least 6 months or longer. | 5.8 | 6.2 | 7.7 | 7.4 | 8.7 | 12.1 | 18.3 | 17.4 | 59.6 | 56.4 |
| 3. | During the last 4 weeks, I had troubles with loose, mushy, or watery bowel movements. | 3.6 | 4.1 | 7.7 | 8.1 | 12.0 | 11.5 | 25.9 | 21.6 | 51.4 | 54.7 |
| 4 | I have been troubled with diarrhea for the last 4 weeks. | 4.8 | 4.1 | 7.2 | 4.7 | 6.3 | 7.4 | 17.3 | 24.2 | 64.4 | 59.7 |
| 5. | I have been troubled by hard bowel motions for the last 4 weeks. | 10. 1 | 11.4 | 6.3 | 8.1 | 8.7 | 16.8 | 28.4 | 27.5 | 46.6 | 36.2 |
| 6. | During the last 4 weeks I have felt the need to strain to pass a motion (stool) | 7.7 | 4.7 | 8.7 | 7.4 | 12.0 | 11.4 | 27.4 | 32.2 | 44.2 | 43.0 |
| 7. | During the last 4 weeks I have experienced pain in my abdomen after eating | 5.8 | 5.4 | 9.1 | 12.1 | 14.4 | 16.8 | 25.5 | 23.5 | 45.2 | 42.3 |
| 8. | During the last 4 weeks, I have leaked or soiled myself. | 3.4 | 4.0 | 2.9 | 4.7 | 9.6 | 4.0 | 24.3 | 26.2 | 59.1 | 61. l |
| 9. | During the last 4 weeks, I had a feeling of urgency to go to the bathroom (feeling you must rush to the toilet to pass a stoo1) | 1.9 | 5.4 | 6.3 | 4.0 | 10.6 | 12.8 | 29.3 | 24.6 | 51.9 | 52.3 |
| 10. | During the last 4 weeks, I have been troubled by Constipation | 6.7 | 7.4 | 5.3 | 6.7 | 8.2 | 15.4 | 28.8 | 30.9 | 51.0 | 39.6 |
| 11. | The discomfort or pain gets better or stops after I have a bowel movement | 12.5 | 11.4 | 6.3 | 7.4 | 13.5 | I 8.8 | 27.9 | 24.8 | 39.9 | 50.3 |
| 12. | When this discomfort or pain starts, I have more frequent bowel movements | 7.7 | 6.7 | 7.7 | 4.7 | 11.1 | 15.4 | 19.7 | 22.8 | 53.8 | 50.3 |
| 13. | When this discomfort or pain stans, I have less frequent bowel movements | 3.8 | 6.0 | 4.8 | 9.4 | 10.6 | I 5.4 | 23.6 | 23.5 | 54.8 | 43.6 |
| 14. | When this discomfort or pain starts, my stool movements) become looser | 7.2 | 6.7 | 9.6 | 8.7 | 11.1 | 14.8 | 24.5 | 24.8 | 47.6 | 45.0 |
| 15. | When this discomfort or pain stans, I often have harder stools | 7.2 | 4.7 | 8.7 | 8.1 | 11.1 | 14.1 | 20.2 | 26.2 | 52.9 | 47.0 |
| 16. | In the last 3 months, I often felt bloated. | 8.2 | 6.0 | 8.2 | 8.1 | 10.6 | 20.8 | 22.6 | 28.9 | 50.5 | 36.2 |
| 17. | In the last 3 months, my abdomen /belly was cramping | 8.7 | 7.4 | 6.7 | 6.7 | 11.5 | 10.7 | 27.4 | 30.2 | 45.7 | 45.0 |
| 18. | In the last 3 months, I often felt like I had passed too much gas | 13 | 5.4 | 1.5 | 4.0 | 13.0 | 23.5 | 26.0 | 27.5 | 36.5 | 38.0 |
| 19 | I have been recently treated with Antibiotics | 2.9 | 5.4 | 6.3 | 10.1 | 1 3.9 | 11.4 | 24.5 | 20.1 | 52.4 | 52.3 |
| 20 | I have unintentionally lost weight | 1.9 | 7.4 | 4.3 | 6.7 | 15.4 | 17.4 | 23.6 | 16. l | 54.8 | 48.3 |
| 21. | I lose blood with my stools. | 2.9 | 6.2 | 3.4 | 3.4 | 0. 1 | 10.1 | I0.6 | 14. l | 74.0 | 63.6 |

* 1=All the time, 2=Most of the time, 3=Sometimes, 4=Not very often, 5= this does not apply for me.

** All values are reported in percentages

Table 5. A significant positive correlation also was found between students suffering from IBS and those having a family history of IBS (r =.347, p =.000). Likewise, the results also showed that the diet of the students lacked vegetables and fruits and consisted mostly of fast and home cooked food as shown in Table 6. Moreover, male students preferred fried home-cooked food in fat and butter. These types of food are considered unhealthy food which can cause major health effects including inflammation which will trigger IBS.

**Discussion**

Mental health including anxiety and stress has great effects on many physiological processes including immunity, inflammation and angiogenesis process. Studies have shown that long-term stress caused by psychological factors may increase the risk of developing tumors through angiogenesis pathway (Lu et al., 2021). Therefore, preserving the mental health of students is important in maintaining their overall health. The prevalence of IBS affects 9%-23% of people around the world. However, this value varies from country to country. In this study, the IBS prevalence was 16% among undergraduate students in Zakho, Iraq. This value is still within the previously published data in 2012 (Ministry of Health/Iraq, 2012). This finding could be due to the consistent of posttraumatic stress disorder (PTSD), which affected the students because of war and displacement. Posttraumatic stress disorder (PTSD) is also associated with physiological and psychological consequences. PTSD can induce mental health problems, such as stress, anxiety, depression, and eating disorders. It is well known that stress and anxiety play a crucial role in the development of IBS. Thus, those disorders need to be treated with the help and support from specialized healthcare teams. On the same line, our result showed a high number of students were not with their families and were living either in dorms or with their friends and relatives due to the country's condition of wars and some military operations. It has been reported that the Iraqi population suffer from posttraumatic stress, which is caused by wars, homicides, and people displacement (Al-Hadethe, et al., 2014).

On the other hand, our result was consistent with several other studies that report the incidence of IBS in undergraduate students including Saudi Arabia 15.8% (AlButaysh, et al., 2020), and China 17% (Yang, et al., 2022). However, the IBS prevalence of undergraduate students has been reported to be lower in Taiwan at 10.1% (Chen, et al., 2021), France at 7.8% (Spillebout et al., 20190, the US at 10.9% (Das et al., 2022), and Peru at 9.5% (Vasquez-Rios et al., 2019). On the contrary, some studies reported a higher prevalence value than our findings, such as Bangladesh at 39.3% (Das, et al., 2022), Puerto Rico at 36.3% (Velasco-Corrad, et al., 2019], and Egypt at 27.5% (El Sharawy et al., 2022). It has also been reported that those students with IBS

syndrome in these countries were also suffering from anxiety, depression, or both.

As with regards to the occurrence of IBS in both genders, our comprehensive analysis indicates a significant difference in the occurrence of IBS between males and females. Specifically, more females suffer from IBS compared to their male counterparts. This observation unequivocally highlights the gender disparity in the prevalence of IBS. This was in line with previously published works (Jia et al., 2022). Moreover, a higher prevalence of IBS among females was reported with a positive family history of IBS (Elhosseiny et al., 2019). This gender variation could be due to cultural and social features. Sex hormones were also found to play vital roles in the pathophysiology of IBS (Kim & Kim, 2018). In addition, the menstrual cycle can worsen symptoms of (IBS) in women due to hormonal fluctuations and changes in health-seeking behaviors, leading to increased stress and heightened sensitivity to pain (Elhosseiny et al., 2019).

Likewise, in our study the prevalence of IBS was higher in students from the medical departments than other departments. Our result showed that 66 % of the students with IBS were from medical departments. It has been reported in several studies that medical students are more likely to experience IBS symptoms than non-medical students. Studies conducted among undergraduates in Saudi Arabia and Malaysia have shown that the prevalence of IBS symptoms is significantly higher among medical students (Wani et al., 2020; Seger et al., 2020). Moreover, a high IBS prevalence rate of 28.3% was found among medical students in Pakistan (Naeem et al., 2012). This is because medical and nursing students suffer from IBS symptoms more often due to the irregular hours of their classes, study, and clinical practice (Okami et al., 2011). This indicates that quality of life and stress could lead to IBS and vice versa. IBS was reported to cause anxiety, depression, obsessive compulsiveness, and sleep disorder (Kim, et al., 2021; Grover, et al., 2021; Frändemark et al., 2018).

With regards to anxiety, the study results showed that 34.7% of students with IBS had severe anxiety, with significant differences in levels of anxiety among the sexes. Moreover, 47.1% of the female students reported severe levels of anxiety compared to males 24.9 %. A similar finding was obtained from a study by (Spillebout, et al., 2019). They suggested that IBS is related to several mental health problems that have great negative academic consequences. Numerous mental problems were reported in their study were due to IBS such as depression, stress, insomnia, and emotional exhaustion. A study from China reported that IBS was quite widespread among university students, and it was strongly associated with depression and anxiety (Yang, et al., 2022).

Qality of life is considered as one of the most important factors in affecting individuals with IBS through it impact on mental health. The result of our study indicates that 93.6% of students had a

below average quality of life and only 6.4% had above average quality of life. Several studies reported that IBS is highly associated with quality of life and depression (Kopczyńska, et al., 2018). Chen reported higher levels of stress and lower QOL among female students with IBS, which is remarkably similar to our findings (Chen, et al., 2021). IBS was strongly linked to several physical problems including lower quality of life and academic achievements (Gulewitsch, et al., 2011: Yang, et al., 2022). Significant relationships were found between IBS syndrome, students' characteristics, and sleeping hours during exposure to psychological stress (Soliman, et al., 2022). This indicates that IBS strongly affects the mental health of students and their academic performance. Students need to have a rest and good sleep to have full concentration and time to study.

On the other hand, diet and certain types of food can activate symptoms in most patients with IBS (Rej, et al., 2019; Dimidi, et al., 2020). Many studies have shown that food plays a vital role in the development of IBS and its symptoms, since diet has a direct effect on the digestive system, especially if the sources of food are unknown and contain chemical substances such as food preservatives (McKenzie et al., 2012, Janice 2012). Thus, in this study, possible variables that may influence IBS symptoms were examined. Significant positive interactions were found between how food was cooked at home and the students' preferences for the type of food. The finding showed that the students' diet consisted mostly of fast and fried food, and their diet lacked fruit and vegetables. Fast and fried food is known to trigger IBS symptoms. Darabi, et al., (2019) reported that consuming processed meat and fast foods can increase the risk of IBS. A strong correlation between diet and the development of irritable bowel syndrome was found with recommendations to reduce spicy foods and fat (Dale, et al., 2023; Cozma-Petru, et al., 2017). Moreover, the inclusion of healthy food such as low-fermentable oligo, di, monosaccharides, and polyols diets improved the symptoms and quality of life of individuals with IBS (Weber, 2022; Varjú, et al., 2017). This in return can improve the student's quality of life, since IBS has a great interference with the individual's daily activities and IBS symptoms (Shulman, et al., 2014). On the other hand, individuals with IBS are more likely to know, understand and accurately define IBS. Patients who experience certain symptoms are often better at providing a simplified definition of their ailment. However, our findings showed only 24% of students were able to give a correct definition of irritable bowel syndrome. This shows a lack of knowledge of IBS syndrome among undergraduate students, especially medical students. This might be because college students normally go through transition from youth to adulthood (Al-Rawi, et al., 2021). During this critical time of development, they are often ignored where they face life and developmental changes that put them at

risk and are susceptible to accepting new challenges that will affect their health (Al-Rawi et al., 2023a). Therefore, different treatment strategies could be implemented to overcome the severity of this disease, as the pathogenesis of many diseases including IBS could be correlated to several mechanisms including cellular immune complexes and innate immunity which is connected to inflammation (Shulman, et al., 2014; Al-Rawi, Ibrahim, & Ahmed, 2023). In addition, awareness programs should be implemented to educate people about this syndrome and to help them ease the symptoms and improve their quality of life.

## Conclusion

This study highlights the prevalence of IBS in undergraduate students and its significant impact on students' physical and mental health. Female students have a higher prevalence of IBS, which may be attributed to cultural, hormons and lifestyle factors. Students with IBS had higher levels of anxiety, poorer quality of life, and lower academic performance. The study also revealed a lack of knowledge about IBS among students, indicating a need for education and awareness-raising programs. In light of these findings, universities should develop effective screening programs for IBS, and provide the necessary support to affected students. In addition, raising awareness about the condition that impact student's well-being and academic performance is critical factor in identifying IBS. Further research is needed to explore the underlying causes of IBS among undergraduate students and to identify more effective preventive and therapeutic strategies.

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