Research Square

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The prevalence of neuropsychiatric disorders (Anxiety & depression) among IBS patients

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Abstract

Background:

Irritable bowel syndrome (IBS) is a the most common functional gastrointestinal disorder. Growing evidence suggests a significant association between IBS and psychological problems, such as anxiety and depression. This study was conducted to assess the prevalence of anxiety and depression in Jordanian patients diagnosed with IBS according to Rome IV criteria.

Methods:

The study was conducted at the Gastroenterology Department of Prince Hamza Hospital and New Zarqa Governmental Hospital in Jordan recruiting 681 patients. IBS diagnosis was established using the validated Rome IV criteria. Anxiety and depression were assessed using an Arabic version of the Hospital Anxiety and Depression Scale (HADS).

Results:

based on the ROME IV criteria used in this study, 529 (77.68%) people were found to be positive for IBS. Results revealed that 568 (83.41%) participants were not diagnosed with any psychological problems. However, 225 (33.0%) were positive for depression and 356 (52.3%) positive for anxiety among all participants.

Conclusion:

The findings revealed a high prevalence of depression and anxiety disorders among Jordanian patients with IBS. Suggesting the importance of screening for depression and Anxiety in newly diagnosed IBS patients.

Introduction

Irritable bowel syndrome (IBS) is a functional bowel disorder characterized by abdominal pain, irregular feces, and bloating or discomfort. It is not associated with any anatomical or biochemical abnormalities detectable by conventional diagnostic methods. While some patients may experience severe symptoms, others may only experience mild to moderate symptoms. Furthermore, gut sensitivity, psychiatric disorders such as anxiety and depression, among other somatic comorbidities including pain syndromes, overactive bladder, and migraines are frequently linked to IBS[1].

In this study, the Rome IV criteria was used for the screening of IBS, as it was the most recent criteria available during data collection. The Rome IV criteria defines IBS as a functional bowel disorder characterized by recurrent abdominal pain associated with defecation or altered bowel habits. Symptoms of abdominal bloating or distension are typically present, along with disturbed bowel habits, including constipation, diarrhea, or a combination of both. Symptoms onset must occur at least six

months before the diagnosis is made, and symptoms must be present during the preceding three months[4]. After excluding other diseases (including other functional gastrointestinal disorders) that may cause symptoms similar to IBS, the diagnosis is made clinically, and the following subtypes must be distinguished: IBS with predominant constipation (IBS-C), IBS with predominant diarrhea (IBS-D), mixed IBS (IBS-M), and unclassified IBS (IBS-U)[1].

Significant mental distress, particularly depression and anxiety, are very common among IBS patients[5]. Current psychological research on IBS has demonstrated a clear relationship with psychological factors, especially somatization, anxiety, and depression[2]. Given this strong association, assessing psychological comorbidity is an important component of understanding the overall burden of IBS.

The Hospital Anxiety and Depression Scale (HADS) is a widely used screening tool for anxiety and depression in patients with chronic diseases. Its advantages include its brevity, its clarity of questions, and its ability to simultaneously assess both anxiety and depression disorders[6].

Therefore, this study aims to utilize the HADS to investigate anxiety and depression among patients with IBS.

Methodology and tools

Data Collection

1- Instrument:

The study was conducted at the Gastroenterology Department of Prince Hamza Hospital and New

Zarqa Governmental Hospital in Jordan.

Data was collected, analyzed and compared using appropriate statistical methods.

The questionnaires have been translated using reverse translation to the Arabic language in a simplified manner and the questionnaire use to main validated questionnaires to measure anxiety, depression and irritable bowel syndrome, and the questionnaire includes:

- Rome IV Diagnostic Criteria for Irritable Bowel Syndrome (IBS): which includes five questions about abdominal pain or discomfort in the last 3 months, change in the appearance or consistency of stool according to Bristol Stool Form Scale and change in the frequency of defecation.
- Hospitalization Anxiety & Depression Scale (HADS): To evaluate the anxiety and depression levels. Score for each subscale (anxiety and depression) can range from 0 (Minimal) to 21 (Severe). with the following interpretation: 0–7: Normal range, 8–10: Possible anxiety or depression, 11–21: Probable anxiety or depression, ≥ 8: Significant anxiety or depression

The questionnaire used in this study was developed specifically for this research. An English version of the questionnaire is provided as Supplementary File 1

2- Study procedure:

Informed consent

is obtained by the following words at the beginning of the questionnaire “If you started to answer the following questions this means that you agree to participate in this medical research”. The confidentiality of each participant is ensured by not asking any personal questions that might reveal the identity of the participants such as: full name, detailed address, email address, ID number and phone number which ensures that each participant is anonymous.

Before data entry into the SPSS database, responses with missing data will be excluded.

Initially, we interviewed 872 patients who presented to the Gastroenterology Departments of Prince Hamza Hospital and New Zarqa Governmental Hospital. Based on screening for gastrointestinal symptoms consistent with irritable bowel syndrome (IBS), 190 patients were excluded for not meeting the Rome IV diagnostic criteria. A total of 682 patients who fulfilled the Rome IV criteria were included in the final analysis. Only patients who fulfilled the Rome IV criteria were included in the study.

Statistical Analysis

Data were tabulated in Microsoft Excel and analyzed using IBM SPSS Statistics v27.0. Descriptive statistics, including frequencies and percentages, were used to summarize sociodemographic data and clinical characteristics.

To examine the relationship between variables, the following methods were applied:

Bivariate Analysis: Chi-square tests were used to find associations between categorical variables. In cases where cell counts were low, Fisher’s Exact or Fisher-Freeman-Halton tests were utilized.

Correlation: Spearman’s correlation was performed to assess the strength and direction of the relationship between IBS symptoms and HADS scores (anxiety and depression).

Multivariable Analysis: A binary logistic regression model was conducted to evaluate the association between anxiety/depression and the presence of IBS. This model adjusted for potential confounders, including age, gender, and socioeconomic status.

A p-value of < 0.05 was considered statistically significant, and results were reported with 95% confidence intervals (CI).

Results

3.1. Inflammatory Bowel Syndrome vs. Psychiatric Disorders

In this study, aiming to see if there is any association between the status of having inflammatory bowel syndrome (IBS) and any psychiatric condition, mainly anxiety and depression, a total of 681 participants were included. A large segment of them were already diagnosed with IBS by a physician (n = 448, 65.79%); however, based on the ROME IV criteria used in this study, 529 (77.68%) people were found to be positive for IBS. Table 1 shows the distribution of participants based on their test results and the recalled IBS status diagnosed by a physician.

Table 1
Recalled IBS diagnosis vs. ROME IV diagnosis

Screening (ROME IV criteria)	Diagnosis by a physician		Total
	Yes	No	
Positive	356 (52.3%)	173 (25.4%)	529 (77.7%)
Negative	92 (13.5%)	60 (8.8%)	152 (22.3%)
Total	448 (65.8%)	233 (34.2%)	681 (100%)

As for psychiatric disorders, participants were asked if they were diagnosed with any problem, and they answered the Hospital Anxiety and Depression Scale (HADS). Results revealed that 568 (83.41%) participants were not diagnosed with any psychological problems, though HADS shows that anxiety and depression are prevalent in this study group. Figure 1 shows the recalled psychological status of participants. Table 2 shows the HADS results.

Table 2
Hospital Anxiety and Depression Scale (HADS) results

Anxiety Results	Depression Results			Total
	Normal	Borderline	Positive	
Normal	93 (13.7%)	31 (4.6%)	15 (2.2%)	139 (20.4%)
Borderline	54 (7.9%)	58 (8.5%)	74 (10.9%)	186 (27.3%)
Positive	73 (10.7%)	147 (21.6%)	136 (20.0%)	356 (52.3%)
Total	220 (32.3%)	236 (34.7%)	225 (33.0%)	681 (100%)

As per the data presented in Table 3, positive IBS status on the ROME IV criteria was significantly associated with positive anxiety status ($X2$ (2, n = 681) = 19.953, $p < 0.001$) and borderline depression status ($X2$ (2, n = 681) = 12.513, $p = 0.002$), which indicate that people with IBS suffer from psychiatric problems.

Table 3
IBS status (ROME IV) vs. psychiatric disorders

Psychiatric disorders	Total	IBS status (ROME IV)		p-value
		Positive	Negative	
Total	681 (100%)	529 (77.7%)	152 (22.3%)	
Anxiety				< 0.001
Normal	139 (20.4%)	89 (13.1%)	50 (7.3%)	
Borderline	186 (27.3%)	156 (22.9%)	30 (4.4%)	
Positive	356 (52.3%)	284 (41.7%)	72 (10.6%)	
Depression				0.002
Normal	220 (32.3%)	153 (22.5%)	67 (9.8%)	
Borderline	236 (34.7%)	191 (28.0%)	45 (6.6%)	
Positive	225 (33.0%)	185 (27.2%)	40 (5.9%)	

3.2. Patient Characteristics vs. IBS Diagnosis

Patient characteristics, socioeconomic, environmental factors, and clinical outcomes based on IBS diagnosis are presented in Table 4. With the study population consisting of middle-aged individuals, the majority of participants were in the 20–29 year age group (n = 295, 43.3%). Females constitute a great proportion of IBS-positive people (n = 412, 60.5%). As for work circumstances, people with moderate-effort jobs were found to be more likely to test positive for IBS (n = 291, 42.7%). Almost all participants are educated and have finished high school (n = 174, 25.6%) and a bachelor's degree (n = 401, 58.9%).

Table 4

Patient characteristics vs. IBS diagnosis

Patient characteristics	Total	IBS status (ROME IV)		p-value
		Positive	Negative	
Total	681 (100%)	529 (77.7%)	152 (22.3%)	
Age				0.275
10–19 years	22 (3.2%)	16 (2.3%)	6 (0.9%)	
20–29 years	295 (43.3%)	235 (34.5%)	60 (8.8%)	
30–39 years	138 (20.3%)	108 (15.9%)	30 (4.4%)	
40–49 years	122 (17.9%)	95 (14.0%)	27 (4.0%)	
50–59 years	64 (9.4%)	50 (7.3%)	14 (2.1%)	
60 and more	40 (5.9%)	25 (3.7%)	15 (2.2%)	
Sex				0.005
Female	412 (60.5%)	305 (44.8%)	107 (15.7%)	
Male	269 (39.5%)	224 (32.9%)	45 (6.6%)	
Educational level				0.280*
Illitrate	9 (1.3%)	8 (1.2%)	1 (0.1%)	
Less than high school	75 (11.0%)	63 (9.3%)	12 (1.8%)	
High school	174 (25.6%)	127 (18.6%)	47 (6.9%)	
Bachelor’s degree	401 (58.9%)	315 (46.3%)	86 (12.6%)	
Postgraduate studies	22 (3.2%)	16 (2.3%)	6 (0.9%)	
Work circumstances				0.003
No effort	189 (27.8%)	160 (23.5%)	29 (4.3%)	
Moderate effort	377 (55.4%)	291 (42.7%)	86 (12.6%)	
Great effort	115 (16.9%)	78 (11.5%)	37 (5.4%)	
Physical activity				0.657
No activity	328 (48.2%)	248 (36.4%)	80 (11.7%)	
1 time a week	129 (18.9%)	102 (15.0%)	27 (4.0%)	
3–5 times a week	161 (23.6%)	129 (18.9%)	32 (4.7%)	

* Fisher or Fisher-Freeman-Halton exact tests.

Patient characteristics	Total	IBS status (ROME IV)		p-value
		Positive	Negative	
Everyday	63 (9.3%)	50 (7.3%)	13 (1.9%)	
Smoking status				0.233
Smoker	284 (41.7%)	227 (33.3%)	57 (8.4%)	
Non-smoker	397 (58.3%)	302 (44.3%)	95 (14.0%)	
Diet				0.142
Balanced	71 (10.4%)	51 (7.5%)	20 (2.9%)	
Moderate calories	461 (67.7%)	368 (54.0%)	93 (13.7%)	
High calories	149 (21.9%)	110 (16.2%)	39 (5.7%)	
Lactose intolerance				< 0.001
Yes	254 (37.3%)	221 (32.5%)	33 (4.8%)	
No	427 (62.7%)	308 (45.2%)	119 (17.5%)	
Family history of IBS				0.200
Yes	455 (66.8%)	360 (52.9%)	95 (14.0%)	
No	226 (33.2%)	169 (24.8%)	57 (8.4%)	
Past surgeries in the abdomen				0.097*
Appendectomy	36 (5.3%)	25 (3.7%)	11 (1.6%)	
Cholecystectomy	40 (5.9%)	35 (5.1%)	5 (0.7%)	
Colectomy	5 (0.7%)	4 (0.6%)	1 (0.1%)	
Hystrectomy	6 (0.9%)	4 (0.6%)	2 (0.3%)	
Gastrectomy	12 (1.8%)	7 (1.0%)	5 (0.7%)	
Others	55 (8.1%)	37 (5.4%)	18 (2.6%)	
No history	527 (77.4%)	417 (61.2%)	110 (16.2%)	
* Fisher or Fisher-Freeman-Halton exact tests.				

Using Pearson's Chi-Square test, results revealed that IBS diagnosis is significantly associated with sex, with females testing positive more than males (X^2 (1, n = 681) = 8.018, p = 0.005). Also, work circumstances groups were significantly different in terms of IBS status (X^2 (2, n = 681) = 11.798, p = 0.003), with moderate effort jobs resulting in a more positive IBS diagnosis when compared to other

circumstances. On the other hand, age, educational level, physical activity, diet, and smoking status didn't show a statistically significant association with IBS diagnosis ($p > 0.050$).

Lactose intolerance was significant when compared between positive and negative IBS diagnoses (X^2 (1, n = 681) = 20.329, $p < 0.001$), with 308 (45.2%) participants being positive for IBS but didn't have lactose intolerance. Family history and having a past abdominal surgery were not significantly associated with IBS diagnosis.

People participating in the study were asked if the psychiatric symptoms were present with the gastrointestinal symptoms. Most patients reported IBS symptoms to be in sync with psychiatric ones (n = 211, 31.0%) or preceding gastrointestinal problems (n = 191, 28.0%). For those who are diagnosed with IBS and taking drugs for it, a lot of them reported mood changes for the better when taking IBS medications and treatments (n = 232, 34.1%). Figure 2 shows the detailed answers by participants.

Discussion

This study analyzed the prevalence of neuropsychiatric disorders -specifically anxiety and depression- among adults with irritable bowel syndrome (IBS), using a wide sample of 681 participants. Our findings imply a high burden of psychological symptoms among individuals with IBS, with statistically significant associations between IBS (based on Rome IV criteria) and both anxiety and depression (based on the Hospital Anxiety and Depression Scale HADS). These results support the bidirectional nature of the gut-brain axis and highlight the importance of integrating psychological assessment into IBS management. In the study, 77.7% of participants fulfilled the Rome IV criteria for IBS, a greater proportion than the 65.8% with a clinical diagnosis of IBS. This difference proposes a potentially large number of individuals with undiagnosed yet symptomatic IBS, consistent with previous evidence that IBS remains underdiagnosed due to symptom overlap and sociocultural barriers to pursuing gastrointestinal care.

The prevalence of IBS in our study was higher than that reported by Derar Abdel-Qader [7], who found a lower percentage.

This difference may be credited to our study population, which primarily included patients presenting with abdominal pain, whereas Abdel-Qader's study was based on a randomly distributed questionnaire among the general population. Fundamentally, anxiety and depression symptoms were markedly common: 52.3% of participants screened positive for anxiety and 33.0% screened positive for depression. IBS-positive individuals had significantly higher rates of both anxiety ($p < 0.001$) and borderline depression ($p = 0.002$). These results align with a Vietnamese study on IBS [8] A systematic review on the prevalence of anxiety and depression in patients with irritable bowel syndrome found that the prevalence rates of anxiety symptoms and disorders among IBS patients were 39.1% (95% CI: 32.4–45.8) and 23% (95% CI: 17.2–28.8) respectively [9].

In contrast to our results, a Jordanian study conducted among medical students found no significant difference in the prevalence of IBS between males and females (P = 0.477) [10]

However, in our study IBS diagnosis was significantly associated with sex, with females showing higher rates than males ($\chi^2(1, n = 681) = 8.018$, $p = .005$) consistent with global epidemiological trends showing a higher prevalence of IBS in women[11], possibly due to hormonal influences, differences in stress reactivity, or health-seeking behaviors. This variation may be explained by differences in the study populations and sampling contexts. Medical students represent a relatively homogenous group with extraordinary stressors and health-seeking behaviors that may lessen gender discrepancies. In comparison, our study included a wide-ranging outpatient and online population, which may better reflect community-level gender differences in symptom reporting, healthcare utilization, and IBS susceptibility.

Several biological and psychological mechanisms may explain these findings. The gut-brain axis, involving bidirectional communication through neuroendocrine, immune, and autonomic pathways, plays a central role in the pathophysiology of IBS. Dysbiosis, visceral hypersensitivity, and chronic low-grade inflammation can exacerbate anxiety and mood symptoms, while psychological stress can worsen gastrointestinal motility and sensitivity. This cyclical pattern may contribute to the finding that over 59% of participants reported psychiatric symptoms occurring either simultaneously with IBS symptoms (31.0%) or preceding them (28.0%). Such temporal relationships support the hypothesis that psychiatric distress may precipitate or augment gastrointestinal symptoms in susceptible individuals. The association between IBS and psychiatric conditions is thought to stem from disruptions in **brain–gut communication**. Evidence from psychophysiological and neuroimaging research indicates that impairment of the brain–gut axis— the two-way neural pathway linking the gastrointestinal tract and the central nervous system—plays a key role in the development of IBS. In this model, gastrointestinal discomfort can contribute to anxiety and depressive symptoms, while psychological distress can heighten physiological responses in the gut, thereby worsening IBS manifestations. [12] [13]

Sociodemographic and clinical variables also revealed interesting patterns. Work circumstances were also associated with IBS status ($p = 0.003$), with moderate-effort jobs showing the highest proportion of IBS-positive cases. This may indicate a relationship between occupational stress and functional gastrointestinal disorders.

The findings of our study indicate an association between IBS diagnosis and self-reported lactose intolerance.

This differs from studies that used hydrogen breath tests to evaluate lactose malabsorption, which show no higher prevalence of lactose malabsorption in IBS patients compared to healthy controls [14] [15].

Still, our results adjust with their observation that IBS patients frequently report gastrointestinal symptoms triggered by lactose containing food.

This suggests that even though lactose malabsorption and IBS may be unrelated pathophysiologically, symptoms overlap and visceral hypersensitivity in IBS may lead patients to misattribute symptoms to lactose ingestion.

Accordingly, self-reported lactose intolerance in IBS patients probably reflects symptoms perception not due to enzymatic deficiency.

Other variables did not show significant associations including: Age, diet, smoking status, educational level, physical activity, family history and prior abdominal surgery.

An interesting clinical observation from this study is that **34.1%** of IBS-diagnosed individuals taking IBS medications reported mood improvement with treatment. This suggests that effective management of gastrointestinal symptoms may alleviate psychological distress, possibly through improved quality of life, reduction of pain, or modulation of the gut–brain axis by certain medications or dietary modifications. Although not causal, this finding highlights the potential benefit of integrated care approaches combining gastroenterological and psychological interventions.

Unlike a large prospective cohort study that demonstrated a modest but significant inverse association between never smoking and IBS incidence, our study did not find smoking status to be significantly associated with IBS similar to a national study among Jordanian students [10]. This discrepancy may be explained by methodological differences. Our study used a cross-sectional design and assessed smoking and IBS simultaneously, which limits the ability to determine causal direction. In contrast, the prospective study followed participants for more than a decade, allowing for evaluation of long-term smoking exposure as a risk factor for new-onset IBS. Differences in sample size, age distribution, cultural factors, and the precision of smoking exposure measurement may also account for the variation in findings.[16]

In our study, the analysis of correlation between family history and IBS was statically insignificant [p:200].

This in contrast with several other studies that found a Significant association, shows that individuals with a positive family history of IBS are more likely to exhibit IBS symptoms than whom with no family history [10]

First Variation in sample size and demographic could be a reason and also the method that we used (self-reported data) can introduce a recall bias or inaccuracy comparing with other studies that might use a medical records or more objective measures.

This study also showed that psychiatric conditions are underdiagnosed in Jordanian population, because even though Results revealed that 568 (83.41%) participants were not diagnosed with any psychological problems, 225 (33.0%) were positive for depression and 356 (52.3%) positive for anxiety among all participants using HADS questionnaire. This sets an alarming rate at the prevalence of both conditions in Jordan.

Key advantages of this research are the employment of an established psychological assessment tool (HADS) a substantial sample size (n = 681) and a confirmed diagnostic criterion (Rome IV criteria). The investigation also examined an array of clinical, lifestyle and demographic attributes providing a

comprehensive overview of the factors associated with IBS diagnosis. By incorporating participants from a survey as well, as outpatients attending gastrointestinal clinics our sampling approach enhances the applicability of the results.

Despite these benefits some limitations must be acknowledged. It cannot establish sequence or causal links between IBS and mental health issues because of the cross-sectional design. Given that all data were self-reported there is potential for recall and reporting bias, regarding lifestyle habits and mental health diagnoses. Additionally, no comprehensive psychiatric assessment was performed to confirm the findings, from the HADS. The study depended on cross-sectional data. Another drawback is that we didn't look at our patients' IBS subtypes.

This finding hold important clinical implications. Given the strong association between IBS and psychological disorders, healthcare providers should routinely screen IBS patients for anxiety and depression symptoms, particularly in primary health centers and gastroenterology clinics. Early detection and management of psychiatric comorbidities may improve the treatment response, symptom severity, and overall quality of life. The high percentage of undiagnosed IBS patients according to Rome IV criteria also draw the attention for our need to increase awareness of IBS symptoms in our public and medical community.

Future research should include prospective studies to better understanding of the relationship between IBS and psychological symptoms. Investigations into therapeutic effect, including whether treatment of anxiety or depression alleviate IBS severity. Additionally, searching for biological markers (such as microbiome profiles, inflammatory mediators, or stress-related hormones) may help differentiate subtypes of IBS with specific psychiatric disorders.

Conclusion

The findings revealed a high prevalence of depression and anxiety disorders among Jordanian patients with IBS. Suggesting the importance of screening for depression and Anxiety in newly diagnosed IBS patients.

Declarations

Funding

The study received no specific grants from any funding agency in the public, commercial or not-for-profit sector

Competing interests

The authors declare that they have no competing interests.

Ethics Approval declaration

Ethical approval for this study was obtained from [New Zarqa Hospital IRB committee] (Reference number: [5145]) and [Prince Hamza Hospital IRB committee] (Reference number [4604]).

The study was conducted in accordance with the Declaration of Helsinki.

Consent to Participate declaration

Consent was obtained electronically, and participants were informed that their data would be anonymized, used solely for scientific research purposes, and that no personal identifying information would be collected. Participation in the study was voluntary, and completion of the questionnaire implied consent

Consent for publication

Not applicable

Author Contribution

M.M. conceived and designed the study. L.S. and H.G. developed the study methodology and data collection tools. All authors collected the data. B.A. performed the statistical analysis and interpreted the results. F.A. drafted the Discussion . R.H. ,A.A. and S.A.critically revised the manuscript for important intellectual content. M.K. wrote the introduction. All authors reviewed and approved the final manuscript and agree to be accountable for all aspects of the work.

Data Availability

The datasets generated during the current study are available from the corresponding author upon reasonable request

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Figures

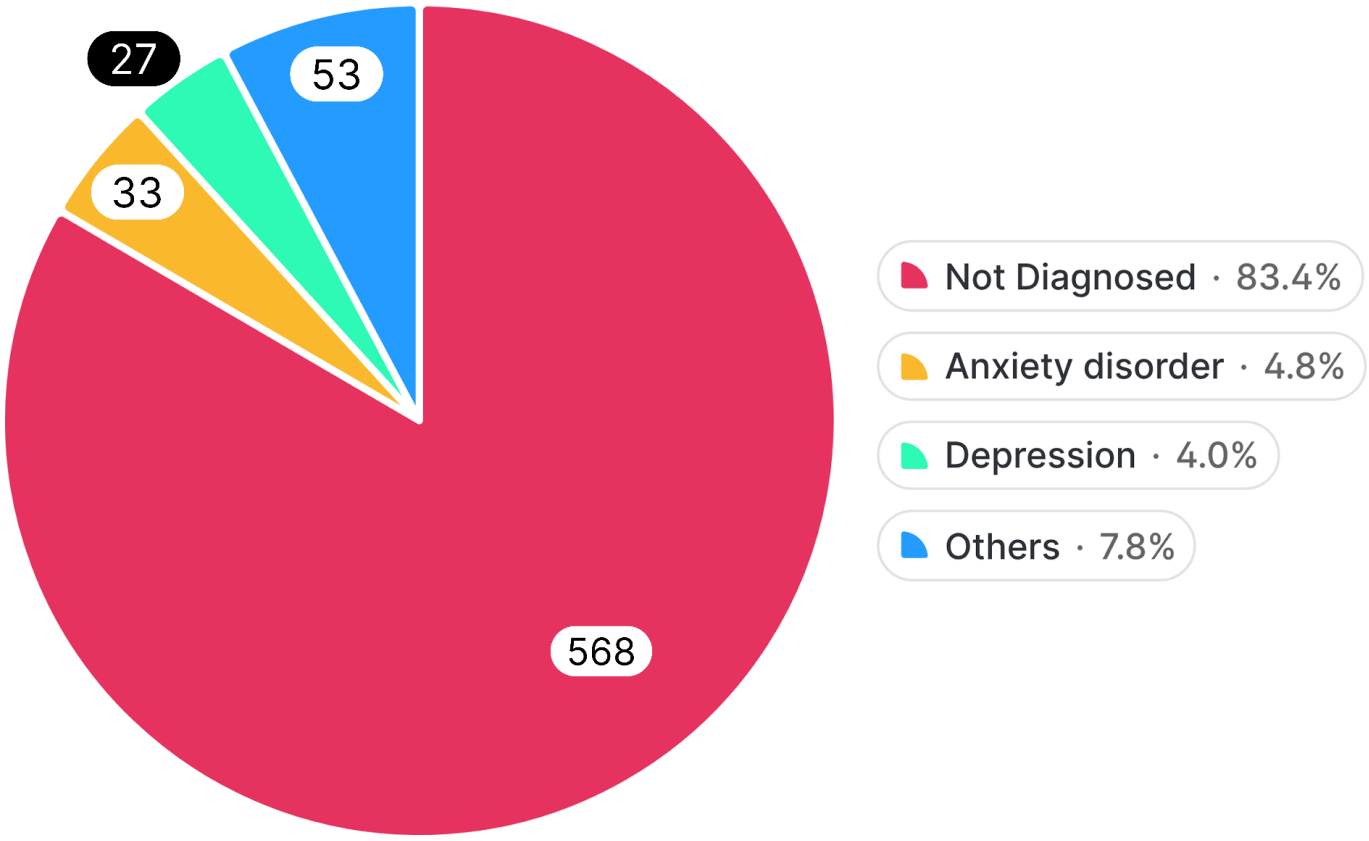


Figure 1

Recalled psychological status of participants

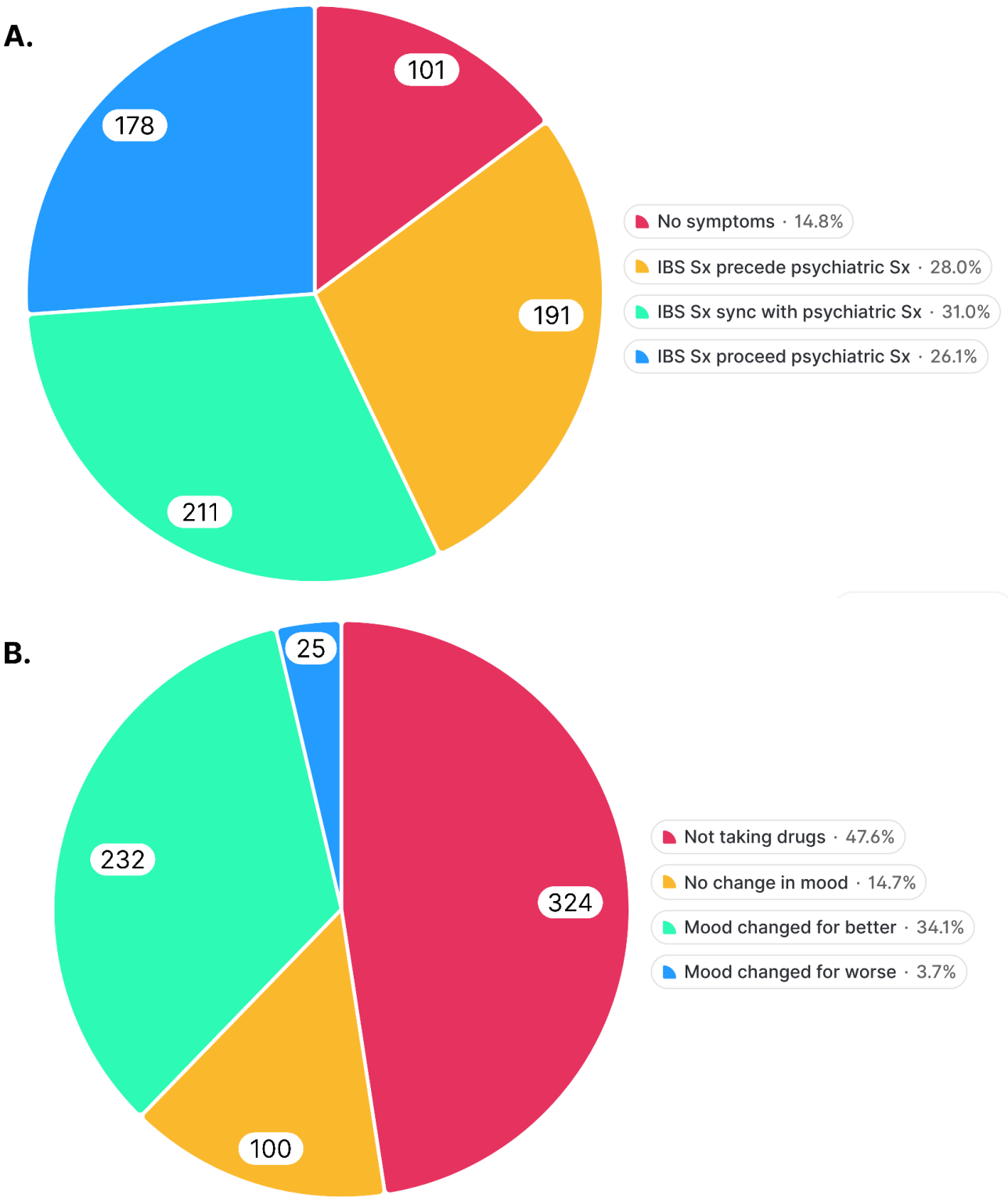


Figure 2

A represents the distribution of participants in terms of the chronological order of symptoms. B represents the distribution of participants in terms of IBS drug taking and mood changes.