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Changes in General Health (GHQ-28) Scores before and Two Months after Colonoscopy among Patients with Lower Gastrointestinal Diseases

Forouzan Ganji [a], **Masoud Lotfizadeh** [a], **Sahar Sobhani** [a], **Ghorbanali Rahimian** [a], **Kimia Jafari** [a], **Mahsa Farhadi** [a], **Zahra Karimi** [b]*

[a] Shahrekord University of Medical Sciences, Shahrekord, Iran
[b] School of Public Health, Iran University of Medical Sciences, Tehran, Iran

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***Corresponding Author:**
Zahra Karimi

Email:
zkarimi932014@gmail.com

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ABSTRACT

Background: Lower gastrointestinal disorders are among the most common chronic conditions and may affect both physical and psychological aspects of health. Previous evidence suggests that psychological factors, including anxiety, depression, and stress, play an important role in the onset, persistence, and exacerbation of gastrointestinal symptoms. In addition, diagnostic procedures such as colonoscopy and awareness of disease status may influence patients' overall health. This study aims to evaluate the general health status of patients with lower gastrointestinal diseases before and two months after colonoscopy.

Methods: This was a single-group before-and-after observational study conducted on 135 patients with lower gastrointestinal diseases who attended Imam Ali Clinic in Shahrekord, Iran, in 2020. Participants were selected using a convenience sampling method. Data were collected using the 28-item General Health Questionnaire (GHQ-28) before colonoscopy and again two months after the procedure. Then, data were analyzed using SPSS version 22. Descriptive statistics and inferential tests, including Kolmogorov–Smirnov, paired t-test, independent t-test, one-way ANOVA, and ANCOVA, were used. Finally, a p-value <0.05 was considered statistically significant.

Results: The mean age of participants was 47.38±12.05 years. The mean total GHQ score was 23.78±12 before colonoscopy and 24.34±13.94 two months later. No statistically significant difference was observed in the overall general health score before and after colonoscopy (P=0.33). Likewise, no significant differences were found in the domains of physical symptoms, anxiety and insomnia, and social functioning. However, depression scores increased significantly two months after colonoscopy (P=0.01). Before colonoscopy, 49.6% of patients had poor general health status, compared with 41.5% two months later.

Conclusion: Colonoscopy did not significantly change overall GHQ-28 scores. However, because there was no control group, causal conclusions cannot be made. Although depressive symptoms increased significantly, the change was small, so its clinical importance should be interpreted cautiously.

Keywords: General Health, Mental Health, Gastrointestinal Diseases, Colonoscopy, Depression

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Introduction

Health is considered one of the most important indicators of human and social development, and several definitions have been proposed. In the past, health was mainly equated with the absence of disease and physical disability; however, this concept has expanded over time and now includes physical, mental, and social dimensions. According to the World Health Organization (2006), health is not merely the absence of disease or infirmity but a state of complete physical, mental, and social well-being. Mental health is an essential component of overall health, and mental disorders can substantially affect functioning, disability, and participation in society (Prince et al., 2007). In gastrointestinal disorders, psychological factors and biopsychosocial mechanisms can influence symptom experience, disease burden, and clinical outcomes (Drossman, 2016; Staudacher et al., 2023).

The interaction between psychological status and gastrointestinal diseases has been well documented. Stress, anxiety, and depression may contribute to symptom severity, disease perception, and reduced quality of life, particularly in disorders of gut-brain interaction such as irritable bowel syndrome (IBS) (Drossman, 2016; Hu et al., 2021; Mayer et al., 2023; Staudacher et al., 2023). Previous studies have mainly focused on functional gastrointestinal disorders, particularly IBS, and have shown a significant association between psychological symptoms and gastrointestinal complaints.(Kaji et al.,2010) reported that overlap among IBS, gastroesophageal reflux disease (GERD), and functional dyspepsia (FD) is common in the general population and is associated with reduced health-related quality of life. However, psychological changes among patients undergoing evaluation for lower gastrointestinal diseases and their changes following diagnostic procedures have received comparatively less attention.

Lower gastrointestinal diseases include a wide range of conditions affecting the colon and rectum, for which colonoscopy is one of the main diagnostic procedures. Although colonoscopy plays an important role in the diagnosis and management of lower gastrointestinal disorders, the procedure may be associated with psychological stress related to bowel preparation, possible pain or complications, embarrassment, and concerns about the diagnosis (Yang et al., 2018). Anxiety surrounding an initial colonoscopy can also extend across the diagnostic experience rather than being limited to the procedure itself (Mikocka-Walus et al., 2012). Therefore, evaluating changes in general health and psychological status following colonoscopy may provide important information regarding the overall impact of this diagnostic process on patients.

The bidirectional relationship between physical and mental health highlights the importance of assessing psychological well-being in patients with lower gastrointestinal diseases. However, previous studies have mainly focused on pre-procedure anxiety and specific gastrointestinal symptoms, with limited evidence on changes in general health after colonoscopy. Therefore, this study evaluated changes in GHQ-28 scores before and two months after colonoscopy to better understand patients' psychological health and identify potential needs for supportive care.

Methods

Study design and research environment :

This study was a prospective pre-post observational study without a control group, conducted in 2020 at the Imam Ali specialized clinic in Shahrekord. The study aimed to assess changes in the general health status of patients with lower gastrointestinal tract diseases before and two months after colonoscopy.

Research population and sampling:

The study population consisted of all patients with lower gastrointestinal tract diseases who were referred to the Imam Ali (AS) specialized clinic in Shahrekord for colonoscopy. Eligible participants were recruited using convenience sampling, and a

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total of 135 patients were included in the study. Due to the observational nature of the study and the available number of eligible patients during the study period, this sample size was considered feasible for evaluating changes in GHQ-28 scores before and two months after colonoscopy. The use of convenience sampling and the lack of a formal sample size calculation are acknowledged as limitations of this study. Finally, no formal a priori sample size calculation was performed because participants were recruited based on the number of eligible patients available during the study period. Although a sensitivity analysis indicated that the available sample of 135 participants could detect small standardized within-person effects (approximately Cohen's dz ≥ 0.24) with 80% power at a two-sided alpha level of 0.05, the observed effect for the total GHQ-28 score was smaller (dz ≈ 0.08). Therefore, the possibility of insufficient power to detect very small effects cannot be excluded.

Inclusion criteria were being aged 18-60 years, having symptoms or clinical indications related to lower gastrointestinal tract disorders requiring colonoscopy evaluation, being able to complete the questionnaire, and providing informed consent to participate in the study. On the other hand, patients with previously diagnosed psychiatric disorders, inability to complete the questionnaire, or unwillingness to participate were excluded. Lower gastrointestinal disorders included patients referred for colonoscopy due to clinical indications such as abdominal symptoms, changes in bowel habits, gastrointestinal bleeding, constipation, diarrhea, or other suspected colonic conditions. The specific colonoscopy findings and final diagnoses were not included in the present analysis and are considered a limitation of the study, as these factors may influence patients' psychological status and perceived general health.

Data collection tool:

Data was collected using two tools:

Demographic information questionnaire including age, gender, employment status, education level and duration of illness.

The Goldberg General Health Questionnaire (GHQ-28) is a widely used screening instrument for psychological distress and general mental health (Goldberg & Hillier, 1979). It contains 28 items across four seven-item subscales: somatic symptoms, anxiety and insomnia, social dysfunction, and severe depression. The total score ranges from 0 to 84, with higher scores indicating poorer psychological health. In this study, the questionnaire was scored using the Likert method (0-1-2-3). A score of ≥6 in each subscale and a total score of ≥22 were used as the study thresholds for psychological symptoms. Previous Iranian studies have supported the reliability and validity of the Persian GHQ-28, although optimal cutoff values have varied across populations (Malakouti et al., 2007; Noorbala et al., 2009).

Implementation:

After obtaining the necessary ethical approvals and written informed consent from the participants, the research questionnaires were completed in two stages. The first assessment was conducted in person during the patients' visit, before colonoscopy. The second assessment was also conducted in person at the two-month follow-up visit after colonoscopy, during which the same questionnaire was completed again. In both stages, the questionnaires were completed by the participants under the researcher's supervision and guidance to ensure data completeness. All 135 participants completed the two-month follow-up assessment; therefore, there was no loss to follow-up.

Research variables:

The main variable of the study was the general health score and its four dimensions, including physical symptoms, anxiety and insomnia, social functioning and depression. Demographic variables including age, gender, employment status, education level and duration of illness were investigated as contextual variables.

Data analysis method:

Data were analyzed using SPSS version 22. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to

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summarize the data. The normality of continuous variables and the distribution of paired differences were assessed using the Kolmogorov–Smirnov test. Since the assumptions for the paired t-test were met, paired t-tests were used to compare the mean GHQ-28 total and subscale scores before and two months after colonoscopy.

Moreover, independent t-tests and one-way analysis of variance (ANOVA) were used to examine the association between baseline GHQ-28 scores and demographic characteristics. ANCOVA was performed to compare the two-month GHQ-28 scores (dependent variable) while adjusting for baseline GHQ-28 score (covariate) and demographic variables (independent variables), including age, sex, marital status, educational level, and occupation, where appropriate. Ultimately, a two-sided P value <0.05 was considered statistically significant**.**

Results

In this study, 135 patients with diseases of the lower digestive system were examined, 81 patients (60%) were women and the rest were men. The average age of patients was 47.38±12.05 years and the age range of most people was 50-60 years (51.1%). In this study, 67.4% of people were unemployed and retired and 32.6% were employed. The educational level of most of the researched units (57.8 percent) was at the diploma and elementary level (Table 1).

Table 1. Frequency distribution of individual characteristics of the research units

Variable		n	Percentage
Gender	Female	81	60
	Male	54	40
Age	Less than 40 years	39	28.9
	40-50 years	27	20
	50-60 years	69	51.1
Job	Employed (employee, free)	44	32.6
	Unemployed (unemployed and retired)	91	67.4
Education	Illiterate	34	25.2
	High school diploma and primary education	78	57.8
	Higher than diploma education	23	17

The mean and standard deviation of the general health scores and their dimensions before colonoscopy and two months afterward are shown in Table 2. Examining the changes in general health scores showed that the average general health score increased from 23.78±12 before colonoscopy to 24.34±13.94 two months after; however, this change was not statistically significant (P=0.33). Furthermore, no statistically significant difference was observed between the two measurement stages in the dimensions of physical symptoms (P=0.62), anxiety and insomnia (P=0.22), and social functioning (P=0.8). On the other hand, the average depression score increased from 4.53±2.19 before colonoscopy to 4.91±4.66 two months later, and this difference was statistically significant (P=0.01) (Table 2).

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Table 2. Mean and standard deviation of general health scores and their dimensions in the research units before colonoscopy and two months after, and their comparison

Variables	Before colonoscopy (number = 135)	Two months after colonoscopy (number = 135)	Paired t test results
Physical health	3.81±7.09	4.64±6.69	t=0.49 df=134 P-value=0.62
Anxiety and insomnia	4.33±6.36	4.76±6.65	t= - 1.20 df=134 P-value=0.22
Impairment in social functioning	2.43±7.81	2.56±7.84	t= -0.25 df=134 P-value=0.80
Depression	2.19±4.53	4.66±4.91	t= -2.54 df=134 P-value=0.01
General health	12±23.78	13.94±24.34	t= -0.97 df=134 P-value=0.33

The frequency distribution of patients' general health status before and two months after colonoscopy is presented in Table 3. According to the cut point of the GHQ-28 questionnaire, before colonoscopy, 67 people (49.6%) had unfavorable general health and 68 people (50.4%) had good general health. Two months after colonoscopy, following disease diagnosis, the number of people with unfavorable general health decreased to 56 (41.5%), whereas the number of people with favorable general health increased to 79 (58.5%). This change may be associated with the underlying diagnosis and should be considered in the interpretation of the results (Table 3).

Table 3. Frequency distribution of general health before and Two months after colonoscopy in research units

General health	Frequency before colonoscopy (percentage)	Two months after colonoscopy (percentage)
Unfavorable (22 and more)	67(49.6)	56(41.5)
Favorable (less than 22)	68(50.4)	79(58.5)

The relationship between general health scores and demographic variables showed that women had significantly higher general health scores than men before colonoscopy (P=0.004). However, after adjusting for gender, the difference two months after colonoscopy was no longer significant (P=0.24). Within-group analysis showed that women's scores increased from 26.12±15.15 to 27.32±14.34 (P=0.17), while men's scores decreased from 20.20±10.94 to 19.94±12.17 (P=0.76); neither change was significant. There were no significant differences in general health scores across age groups before or two months after colonoscopy, and no significant within-group changes were observed in any age group. Regarding employment, unemployed participants had significantly higher general health scores than employed participants before colonoscopy (P=0.001), but this difference was not significant after adjustment (P=0.50). Changes within either employment group were also not significant (Table 4).

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Table 4. Comparison of health status before and two months after colonoscopy according to demographic and clinical characteristics

Variable	Category	Before colonoscopy (Mean ± SD)	Two months after colonoscopy (Mean ± SD)	Statistical test	P-value
Gender	Female	26.16 ± 12.15	27.32 ± 14.34	Independent t-test	0.17
	Male	20.20 ± 10.94	19.94 ± 12.17		
Age (years)	<40	23.82 ± 12.33	23.95 ± 14.04	ANOVA	0.98 / 0.85
	40–50	23.44 ± 13.58	23.37 ± 12.70		
	50–60	23.88 ± 11.33	25.51 ± 14		
Job	Employed	18.80 ± 9.28	18.82 ± 10.19	Independent t-test	0.001 / 0.50
	Unemployed	26.19 ± 12.46	27.05 ± 14.75		
Education	Illiterate	24.97 ± 10.91	27.09 ± 15.02	ANOVA	0.19 / 0.055
	Diploma and primary education	24.46 ± 12.86	25.04 ± 14.07		
	Higher than diploma education	19.70 ± 9.92	18.09 ± 9.96		
Duration of illness	<5 years	21.22 ± 14.27	22.28 ± 15.06	Independent t-test	0.13 / 0.08
	>5 years	25.32 ± 9.08	26.43 ± 12.52		

Education level was not significantly associated with general health scores before or after colonoscopy. However, among illiterate participants, the score increased significantly two months after colonoscopy (P=0.04), whereas no significant changes were observed among those with primary education or higher. Finally, disease duration (<5 vs. >5 years) was not significantly associated with general health scores at either time point and no significant changes were observed within either disease-duration group (Table 5).

Table 5. Within-group changes and adjusted analysis of health status after colonoscopy

Variable	Category	Mean Difference	Paired t-test (Before vs After)	P-value	Adjusted analysis (ANCOVA)	P-value
Gender	Female	−0.28	t = -1.38, df = 80	0.17	F = 1.36	0.24
	Male	−0.06	t = -0.30, df = 53	0.76		
Age	<40 years	−0.02	t = -0.10, df = 38	0.91	F = 0.15	0.85
	40–50 years	0.01	t = 0.04, df = 26	0.96		
	50–60 years	−0.31	t = -1.44, df = 68	0.15		
Job	Employed	−0.01	t = -0.02, df = 38	0.98	F = 0.44	0.50
	Unemployed	−0.20	t = -1.12, df = 90	0.26		
Education	Illiterate	−0.55	t = -2.10, df = 33	0.04*	F = 3.16	0.055
	Diploma and primary	−0.11	t = -0.67, df = 77	0.50		
	Higher than diploma	0.23	t = 1.12, df = 22	0.27		
Duration of illness	<5 years	−0.02	t = -0.08, df = 66	0.93	F = 1.73	0.08
	>5 years	−0.27	t = -1.30, df = 67	0.19		

*P < 0.05 was considered statistically significant.

Discussion

To our knowledge, this is one of the few prospective studies assessing changes in GHQ-28 scores before and after colonoscopy in patients with lower gastrointestinal diseases. Given the complex relationship between mental health and gastrointestinal disorders, evaluating psychological status is an important part of patient assessment and management. Previous research has shown

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substantial mental health comorbidity in functional gastrointestinal disorders such as IBS. Gut-brain and biopsychosocial mechanisms can influence symptom perception, symptom burden, and quality of life in IBS (Drossman, 2016; Mayer et al., 2023; Staudacher et al., 2023). Psychological interventions can also improve mental health and daily functioning in adults with IBS (Laird et al., 2017). Associations between anxiety, depression, and IBS further support consideration of psychological dimensions in digestive disorders (Hu et al., 2021). However, these findings should be interpreted carefully when applied to broader populations of patients with lower gastrointestinal diseases.

The present study evaluated changes in general health status among patients with lower gastrointestinal tract diseases before and two months after colonoscopy. The results showed that although changes were observed in the overall GHQ-28 score and its dimensions after colonoscopy, these differences were not statistically significant except for the depression domain. Given the observational pre-post design without a control group, these findings should not be interpreted as evidence that colonoscopy itself caused or prevented changes in general health status. Instead, the observed changes may reflect a combination of factors, including patients' underlying gastrointestinal conditions, psychological responses, clinical expectations, and experiences related to the diagnostic process. The lack of a significant change in the overall GHQ-28 score may be explained by the multidimensional nature of general health, which is influenced by various physical, psychological, and social factors. Changes in individual domains may not necessarily be sufficient to produce a significant alteration in the overall health score.

Previous studies have demonstrated a close association between gastrointestinal diseases and psychological problems. (Hu et al.,2021) found substantial levels and prevalence of anxiety and depression among patients with several IBS subtypes. (Pinto et al.,2000) likewise reported clinically significant anxiety and/or depression in a substantial proportion of patients with IBS. A review by(Lydiard ,2001) described frequent psychiatric comorbidity among treatment-seeking patients with IBS, including major depression, generalized anxiety disorder, panic disorder, and social phobia. Psychological comorbidity is also associated with symptom burden and poorer quality of life in IBS (Staudacher et al., 2023). Although IBS represents only one subgroup of lower gastrointestinal disorders, these findings support the importance of considering psychological health among patients with gastrointestinal complaints.

In the present study, 49.6% of patients had unfavorable general health status before colonoscopy, which decreased to 41.5% two months after the procedure. Although this reduction may indicate improvement in some patients, it should be interpreted cautiously because the overall GHQ-28 score did not show a statistically significant change. The relatively high prevalence of unfavorable general health among patients with gastrointestinal diseases is consistent with broader evidence of psychological burden in gastrointestinal populations, including IBS (Hu et al., 2021; Staudacher et al., 2023) and functional dyspepsia or gastroparesis (Overs et al., 2024). These findings emphasize that psychological health problems may be common among gastrointestinal patients, although their prevalence and severity can vary by diagnosis and population.

One important finding of this study was the statistically significant increase in depression scores two months after colonoscopy. However, the magnitude of this change was relatively small, and its clinical significance should be interpreted with caution. Since GHQ-28 is a screening tool rather than a diagnostic instrument, the observed increase does not necessarily indicate the development of clinically significant depression. Several possible explanations may account for this finding: receiving information about possible gastrointestinal abnormalities, uncertainty regarding diagnosis, concerns about future

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treatment, persistence of chronic gastrointestinal symptoms, or the need for further medical follow-up may contribute to psychological distress in some patients. Concerns about diagnosis and the broader colonoscopy experience have been documented as sources of anxiety (Mikocka-Walus et al., 2012; Yang et al., 2018). In addition, anxiety and depression are common across several gastrointestinal populations (Hu et al., 2021; Overs et al., 2024; Staudacher et al., 2023). Nevertheless, further studies with appropriate control groups are required to clarify the factors associated with changes in depressive symptoms after colonoscopy.

In the present study, anxiety and insomnia scores did not significantly differ between the two assessment points. (Grover et al., 2021)reported that IBS was associated with anxiety, mood, and sleep-related comorbidities and functional impairment in a nationally representative sample of U.S. adults. The absence of significant changes in anxiety and insomnia in the current study may suggest that these psychological dimensions are influenced by longer-term disease-related factors rather than short-term changes following a diagnostic procedure. However, this interpretation should be considered cautiously due to the lack of a control group and the limited follow-up period.

The analysis of demographic variables showed that women had poorer general health status than men before colonoscopy. Sex-related differences in IBS and its psychosocial correlates have been described previously (Thakur et al., 2015), although psychological responses can also be influenced by biological, social, and cultural factors. Regarding education level, only illiterate participants showed a significant change in general health scores after colonoscopy. Lower educational level has been identified as a predictor of greater pre-procedure anxiety in colonoscopy studies (Yang et al., 2018), but this does not establish that education caused the change observed in the present study. In addition, unemployed participants showed poorer general health status before colonoscopy compared with employed individuals. Population-based data have associated IBS with socioeconomic disadvantage, including unemployment and low family income (Grover et al., 2021). These findings suggest that demographic and socioeconomic factors may contribute to variations in psychological health among patients with lower gastrointestinal diseases.

The main limitations were single-center design, convenience sampling, lack of a control group, self-reported measures, limited clinical information, short two-month follow-up, inadequate control of confounding factors, and no formal sample size calculation. Multiple statistical comparisons without adjustment also increased the risk of Type I error. Therefore, the findings should be interpreted cautiously. Future studies with larger samples, multicenter designs, control groups, and longer follow-up are recommended.

Conclusion

The results of this study showed that the overall GHQ-28 score of patients with lower gastrointestinal tract diseases did not significantly change two months after colonoscopy compared with baseline. Although a statistically significant increase in depression scores was observed, the magnitude and clinical relevance of this change should be interpreted cautiously. Given the relatively high prevalence of unfavorable general health status among patients, attention to psychological aspects alongside gastrointestinal evaluation and treatment may be considered a potential clinical implication. Further studies with controlled designs and consideration of patients' clinical characteristics are recommended to better clarify factors influencing psychological health changes in these patients.

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Conflicts of Interest

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The authors declared no conflict of interest.

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Ethical considerations

The informed consent form was signed by the participants. Participation was considered voluntary and participants' status and other data written on the questionnaire were not disclosed to keep their data confidential. The Committee of Ethics in Human Research at Shahrekord University of Medical Sciences, Shahrekord, approved this research (ethics code: IR.SKUMS.REC. 1397.139).

Code of Ethics

IR.SKUMS.REC. 1397.139

Authors' contributions

Conceptualization: F.G. and G.R.; Methodology: M.L. and Z.K.; Investigation: S.S.; Formal analysis: M.L.; Writing—review and editing: Z.K., K.J., and M.F.; Writing—original draft: Z.K.; Supervision: F.G.

References

Drossman, D. A. (2016). Functional gastrointestinal disorders: History, pathophysiology, clinical features, and Rome IV. *Gastroenterology*, *150*(6), 1262–1279.e2. https://doi.org/10.1053/j.gastro.2016.02.032

Goldberg, D. P., & Hillier, V. F. (1979). A scaled version of the General Health Questionnaire. *Psychological Medicine*, *9*(1), 139–145. https://doi.org/10.1017/S0033291700021644

Grover, M., Kolla, B. P., Pamarthy, R., Mansukhani, M. P., Breen-Lyles, M., He, J.-P., & Merikangas, K. R. (2021). Psychological, physical, and sleep comorbidities and functional impairment in irritable bowel syndrome: Results from a national survey of U.S. adults. *PLOS ONE*, *16*(1), e0245323. https://doi.org/10.1371/journal.pone.0245323

Hu, Z., Li, M., Yao, L., Wang, Y., Wang, E., Yuan, J., ... & Zhong, L. L. (2021). The level and prevalence of depression and anxiety among patients with different subtypes of irritable bowel syndrome: a network meta-analysis. *BMC gastroenterology*, *21*(1), 23.

Kaji, M., Fujiwara, Y., Shiba, M., Kohata, Y., Yamagami, H., Tanigawa, T., Watanabe, K., Watanabe, T., Tominaga, K., & Arakawa, T. (2010). Prevalence of overlaps between GERD, FD and IBS and impact on health-related quality of life. *Journal of Gastroenterology and Hepatology*, *25*(6), 1151–1156. https://doi.org/10.1111/j.1440-1746.2010.06249.x

Laird, K. T., Tanner-Smith, E. E., Russell, A. C., Hollon, S. D., & Walker, L. S. (2017). Comparative efficacy of psychological therapies for improving mental health and daily functioning in irritable bowel syndrome: A systematic review and meta-analysis. *Clinical Psychology Review*, *51*, 142–152. https://doi.org/10.1016/j.cpr.2016.11.001

Lydiard, R. B. (2001). Irritable bowel syndrome, anxiety, and depression: what are the links?. *Journal of Clinical Psychiatry*, *62*, 38-47.

Malakouti, S. K., Fatollahi, P., Mirabzadeh, A., & Zandi, T. (2007). Reliability, validity and factor structure of the GHQ-28 used among elderly Iranians. *International Psychogeriatrics*, *19*(4), 623–634. https://doi.org/10.1017/S1041610206004522

Mayer, E. A., Ryu, H. J., & Bhatt, R. R. (2023). The neurobiology of irritable bowel syndrome. *Molecular Psychiatry*, *28*(4), 1451–1465. https://doi.org/10.1038/s41380-023-01972-w

Mikocka-Walus, A. A., Moulds, L. G., Rollbusch, N., & Andrews, J. M. (2012). "It's a tube up your bottom; it makes people nervous": the experience of anxiety in initial colonoscopy patients. *Gastroenterology Nursing*, *35*(6), 392-401.

Noorbala, A. A., Bagheri Yazdi, S. A., & Mohammad, K. (2009). The validation of General Health Questionnaire-28 as a psychiatric screening tool. *Hakim Research Journal*, *11*(4), 47–53.

Overs, J., Morgan, S., Apputhurai, P., Tuck, C., & Knowles, S. R. (2024). Comparing the prevalence and association between anxiety, depression and

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gastrointestinal symptoms in gastroparesis versus functional dyspepsia: A systematic review and meta-analysis. *Journal of Psychosomatic Research*, *183*, 111834. https://doi.org/10.1016/j.jpsychores.2024.111834

Pinto, C., Lele, M. V., Joglekar, A. S., Panwar, V. S., & Dhavale, H. S. (2000). Stressful life-events, anxiety, depression and coping in patients of irritable bowel syndrome. *Journal of the Association of Physicians of India*, *48*(6), 589–593.

Prince, M., Patel, V., Saxena, S., Maj, M., Maselko, J., Phillips, M. R., & Rahman, A. (2007). No health without mental health. *The Lancet*, *370*(9590), 859–877. https://doi.org/10.1016/S0140-6736(07)61238-0

Staudacher, H. M., Black, C. J., Teasdale, S. B., Mikocka-Walus, A., & Keefer, L. (2023). Irritable bowel syndrome and mental health comorbidity—Approach to multidisciplinary management. *Nature Reviews Gastroenterology & Hepatology*, *20*(9), 582–596. https://doi.org/10.1038/s41575-023-00794-z

Thakur, E. R., Gurtman, M. B., Keefer, L., Brenner, D. M., Lackner, J. M., & IBS Outcome Study Research Group. (2015). Gender differences in irritable bowel syndrome: The interpersonal connection. *Neurogastroenterology & Motility*, *27*(10), 1478–1486. https://doi.org/10.1111/nmo.12647

World Health Organization. (2006). *Constitution of the World Health Organization.*[online] Available: https://www.who.int/publications/m/item/constitution-of-the-world-health-organization

Yang, C., Sriranjan, V., Abou-Setta, A. M., Poluha, W., Walker, J. R., & Singh, H. (2018). Anxiety associated with colonoscopy and flexible sigmoidoscopy: A systematic review. *The American Journal of Gastroenterology*, *113*(12), 1810–1818. https://doi.org/10.1038/s41395-018-0398-8

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