

ORIGINAL ARTICLE

Overlap of Disorders of Gut-Brain Interaction: Frequency, Somatization, Quality of Life, and Psychological Impact

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ABSTRACT

Background: Disorders of gut-brain interaction (DGBI) often occur in multiple anatomical regions of the gastrointestinal tract, and this overlap has been associated with increased symptom severity and psychological impact. This study aimed to determine the prevalence and distribution of DGBI overlap and its relation to somatization, quality of life, and psychological parameters among patients attending a tertiary care hospital. **Methods & Materials:** This cross-sectional observational study was conducted at National Gastro liver Institute and Hospital, Mohakhali, Dhaka, from January 2023 to October 2023. All adult patients who met the Rome IV criteria for at least one DGBI were consecutively enrolled. The Patients with alarm features, organic gastrointestinal disease, or incomplete data were excluded. PHQ-15 was used to assess somatization, the PROMIS-10 for quality of life, and the PHQ-4 for anxiety/depression state. Patients were divided according to the number of anatomical regions of the GI tract involved. Data were entered and analyzed on SPSS version 26; a $p < 0.05$ was considered statistically significant. **Results:** Of the 595 patients (mean age 34.81 ± 1.11 years; 67.1% male), the most prevalent subtype was functional dyspepsia (44.9%), followed by irritable bowel syndrome (29.2%), functional constipation (25.4%), and functional diarrhea (22%). Two-thirds of patients (66.6%) had overlap involving two or more anatomical regions. Somatization scores increased slightly with increasing regional overlap, and PROMIS-10 physical and mental health scores did not vary significantly across groups. The prevalence of depression significantly increased with overlap (17.1% to 26.7%), while the increase in anxiety prevalence was not significant. **Conclusion:** There is a high degree of anatomical overlap in this tertiary care cohort, and this is significantly correlated with worsening depressive symptoms, suggesting the importance of psychological screening in patients with multi-regional DGBI.

Keywords: Disorders of Gut-Brain Interaction; Somatization; Quality of life; Depression

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INTRODUCTION

Previously known as functional gastrointestinal disorders, Disorders of Gut-Brain Interaction (DGBI) are one of the most common disorders seen in gastroenterology practice globally, impacting an estimated 40% of the global population across all age groups [1]. DGBI are often found in more than one anatomical regions of the GI tract and this "overlap" has been associated with increased symptom severity, somatization, reduced quality of life, and significant psychological impact [2]. There are 6 major DGBI categories with their subtypes based on ROME foundation according to the site of involvement of the digestive tract and cross-regional symptom clustering is a common characteristic of DGBI [3]. These disorders are not restricted to Western populations. DGBI are prevalent in South Asian countries including India, Bangladesh, and Malaysia, but the prevalence rates have been reported to be widely variable depending on the diagnostic criteria, survey method, and healthcare setting studied [4]. Data from hospitals in Pakistan

also indicate that a significant number of patients attending tertiary care centers for gastrointestinal complaints fulfill the criteria of DGBI of more than one anatomical region [5]. Similar regional studies in Saudi Arabia and multicenter studies across low- and middle-income countries confirm that overlap of DGBI are a significant and under-recognized burden in resource-limited healthcare systems, where access to structured psychological assessment is often limited [6, 7]. In addition to gastrointestinal symptoms, DGBI overlap has been associated with systemic and extra-intestinal comorbidities. DGBI often occurs in association with other conditions, including non-alcoholic fatty liver disease (NAFLD) in which the burden of Rome IV bowel disorders is high in affected patients, and rheumatological disorders like fibromyalgia (FD) in which almost half of DGBI patients have concurrent IBS and FD, with pathological somatic symptom scores [8, 9]. Despite this, most studies of DGBI overlap are conducted in high-income countries or population-based internet surveys, and there is

comparatively little known about the relationship between anatomical overlap and somatization, physical and mental quality of life, and psychological distress in patients attending tertiary care gastroenterology services in Bangladesh. This relationship is significant in a hospital-based South Asian population both for the integrated biopsychosocial management and for predicting the disproportionate impact that multi-regional DGBI may have already strained the clinical services. This study was therefore designed to identify the prevalence of individual DGBI subtypes, their anatomical overlap, and to investigate the relationship between the degree of overlap and somatization, quality of life, and anxiety and depressive symptoms in patients attending a tertiary care setting.

METHODS & MATERIALS

This cross-sectional observational study was carried out at National Gastro liver Institute and Hospital, Mohakhali, Dhaka, from January 2023 to October 2023. A non-probability consecutive sampling technique was used to identify consecutive adult patients who presented to the outpatient department with symptoms suggestive of DGBI for screening. DGBI were diagnosed by ROME IV criteria. Those who fulfilled the criteria of DGBI, underwent detailed physical examination either investigation or reviewing previous investigation reports to exclude organic diseases and recorded in a structured questionnaire that includes symptom based criteria based on ROME IV questionnaire and demographic profile of the patients. Patients were excluded from the final analysis if they had alarm features (unintentional weight loss, gastrointestinal bleeding, anemia, family history of colorectal or gastric malignancy), a confirmed structural, inflammatory,

or organic gastrointestinal disease on previous endoscopic, radiological, or laboratory work-up, a history of gastrointestinal surgery, pregnancy, known severe psychiatric or cognitive illness that precluded reliable questionnaire completion, or incomplete or inconsistent response data. Variables: All participants were given baseline demographic information (age, sex). Patients were divided into Rome IV DGBI subtypes and into three groups according to the number of anatomical gastrointestinal regions affected (one, two, or three or more). The Patient Health Questionnaire-15 (PHQ-15) was used to measure somatization. The Patient-Reported Outcomes Measurement Information System (PROMIS-10) Global Health Scale was used to assess general physical and mental health-related quality of life. The four-item Patient Health Questionnaire (PHQ-4) was used to screen for anxiety and depressive symptoms. Data analysis: All the collected data were entered and analyzed using IBM SPSS Statistics version 26. Continuous variables were presented as mean $\pm$ standard deviation and compared between groups by one-way analysis of variance (ANOVA); categorical variables were presented as frequencies and percentages and compared by chi-square test. Throughout the analysis, a p-value <0.05 was deemed statistically significant.

RESULTS

The overall cohort of 595 patients with disorders of gut-brain interaction is described in *Table I*. The mean age was 34.81 ± 1.11 years, with a preponderance of males (399, 67.1%) over females (196, 32.9%), which is the overall gender distribution of the patients attending this tertiary gastroenterology service with complaints related to DGBI.

Table I: Demographic Characteristics of Patients with DGBI

Variable	DGBI patients, N=595
Age, years, mean $\pm$ SD	34.81 $\pm$ 1.11
Male, n (%)	399 (67.1%)
Female, n (%)	196 (32.9%)

The frequency of most commonly found DGBI among 595 patients is summarized in *Table II*. Functional bowel disorders were overwhelmingly the most frequently represented anatomical category, occurring in 566 (95.1%) patients. Functional gastroduodenal disorders were identified in 359

(60.3%), while functional esophageal disorders affected 154 (25.9%). Functional anorectal disorders were comparatively uncommon, occurring in only 17 (2.9%) patients.

Table II: Frequency of DGBI according to anatomical regions

DGBI type	Frequency (n)	Percentage (%)
Functional esophageal disorder	154	25.9
Functional gastroduodenal disorders	359	60.3
Functional bowel disorders	566	95.1
Functional anorectal disorder	17	2.9

The frequency of most commonly found DGBI among 595 patients is summarized in *Table III*. The most common was functional dyspepsia (267/595, 44.9%), followed by irritable

bowel syndrome (174/595, 29.2%), functional constipation (151/595, 25.4%) and functional diarrhea (131/595, 22.0%).

Table III: Frequency of common DGBI

DGBI subtype	n/N (%)
Functional dyspepsia (FD)	267/595 (44.9%)
Irritable bowel syndrome (IBS)	174/595 (29.2%)
Functional constipation (FC)	151/595 (25.4%)
Functional diarrhea (FDr)	131/595 (22.0%)

Table IV shows how many anatomical GI regions were affected per patient: one region in 199 (33.4%), two regions in 295 (49.6%), and three or more regions in 101 (17.0%) patients,

with two or more overlapping regions present in two-thirds (396/595, 66.6%) of the overall cohort.

Table IV: Distribution of DGBI According to Anatomical Region Overlap

Anatomical involvement	n/N (%)
One anatomical region	199/595 (33.4%)
Two anatomical regions	295/595 (49.6%)
Three or more anatomical regions	101/595 (17.0%)
Two or more anatomical regions combined	396/595 (66.6%)

Table V presents age, sex, somatization (PHQ-15), and PROMIS-10 physical and mental health scores for the three overlap groups. Somatization scores increased slightly with increasing regional involvement, and global physical and mental health

scores were fairly comparable across groups, with a trend toward more female than male individuals as the number of regions increased.

Table V: Comparison of Demographic and Health Outcomes by Number of Anatomical Regions Involved

Variable	1 region (n=199)	2 regions (n=295)	≥3 regions (n=101)
Age, mean ± SD (years)	36.07 ± 1.10	33.47 ± 1.05	36.26 ± 1.12
Male, n (%)	152 (76.4%)	200 (67.8%)	47 (46.5%)
Female, n (%)	47 (23.6%)	95 (32.2%)	54 (53.5%)
Somatization (PHQ-15), mean ± SD	23.41 ± 2.40	24.46 ± 2.80	24.93 ± 4.70
Global physical health (PROMIS-10), mean ± SD	42.48 ± 3.46	41.95 ± 3.14	42.17 ± 3.85
Global mental health (PROMIS-10), mean ± SD	41.44 ± 4.25	41.01 ± 4.14	41.58 ± 4.35

Table VI shows the differences in anxiety and depression state (PHQ-4) between overlap groups. There was no significant difference in prevalence of anxiety (p=0.18), but there was a

significant difference in prevalence of depression (17.1% vs 15.1% vs 26.7%; p=0.047), suggesting a meaningful association between anatomical overlap and depressive symptoms.

Table VI: Psychological Outcomes According to Anatomical Overlap

Psychological outcome	1 region	2 regions	≥3 regions	P value
1Anxiety (PHQ-4)	45/199 (22.6%)	42/296 (14.2%)	34/127 (26.7%)	0.18
Depression (PHQ-4)	34/199 (17.1%)	47/311 (15.1%)	27/101 (26.7%)	0.047

DISCUSSION

This hospital-based study on Disorders of Gut-Brain interaction (DGBI) included the highest proportion of patients with functional dyspepsia, followed by irritable bowel syndrome, functional constipation, and functional diarrhea, and two-thirds of patients fulfilled the criteria for more than one anatomical region of DGBI overlap. This is not an unusual overlap, as seen in other South Asian and Middle Eastern tertiary care centers where overlap of functional disorders are increasingly acknowledged as a significant component of gastroenterology workload, and often underdiagnosed [11]. The high proportion of IBS and dyspeptic symptoms in the help-seeking population is similar to the prevalence of IBS and its relationship with psychological distress reported in community- and university-based Bangladeshi samples, which have been conducted in both general and student populations, suggesting that these disorders are not limited to Western clinical settings [12]. The result of nearly half of the cohort having two or more overlapping regions is consistent with descriptive data from developing country's tertiary hospitals where a significant proportion of patients with abdominal symptoms meet IBS criteria and have other functional symptoms [13]. Lebanon regional surveys have also highlighted that functional bowel symptoms are prevalent in the Middle East and South Asian populations, but are relatively under-researched compared to Western populations, which the current hospital-based dataset contributes to filling [14]. The demographic shift across overlap groups, with female

preponderance, increasing with the number of affected anatomical regions, is consistent with Aziz et al., which indicates that women are over-represented in more complex, multi-region functional gastrointestinal symptomatology, possibly due to biological and/or health care-seeking differences, and is also observed in overlap with conditions like functional nausea and vomiting disorders, which are more common in women and often associated with other DGBI [15]. The small increase in somatization scores as the number of anatomical overlaps increased in the present sample, combined with the large increase in depression prevalence as the number of regions increased from one to three or more, suggests that the total burden of gastrointestinal symptoms, not any one particular gastrointestinal symptom type, is the main contributor to psychological comorbidity [16]. This is in line with Zwiener et al., which indicates that functional gastrointestinal disorders, even when diagnosed early in life using Rome IV criteria, suggest that the overlap-psychological distress relationship may start early in life [17]. The relatively stable physical and mental global health scores for the PROMIS-10 across the overlap groups in the present study may be due to the general, non-GI-specific nature of the PROMIS-10 instrument, which has only recently been formally validated for use in gastrointestinal cohorts and may be less sensitive to disease-specific psychological burden than condition-targeted tools [18]. The absence of a statistically significant difference in anxiety prevalence across overlap groups, compared to the significant depression finding, is also plausible because the

ultra-brief screening instruments used (PHQ-4) are well validated across diverse populations and languages and are intended to identify cases, not to discriminate severity levels, and thus may lack the power to detect more subtle anxiety gradients in moderately sized subgroups [19]. These results collectively suggest that anatomical overlap in DGBI is not a statistical quirk but a clinically relevant indicator of psychological vulnerability, especially for depressive symptoms, in a tertiary care South Asian population where structured psychological screening is not yet a common practice.

LIMITATIONS

These results are not generalizable to community populations, as they are from a single-center, hospital-based cross-sectional study, and the cross-sectional design does not allow for any conclusions regarding the causal or temporal relationship between anatomical overlap and psychological outcomes.

CONCLUSION

This study demonstrated that there is a high degree of overlap between the Disorders of Gut-Brain Interaction in a tertiary care South Asian population, with functional dyspepsia and irritable bowel syndrome as the predominant subtypes, and two-thirds of patients affected in two or more anatomical regions. There was a slight increase in somatization and a significant increase in depressive symptoms with increasing anatomical overlap, with general physical and mental health scores remaining fairly constant across overlap categories. The results confirm the hypothesis that the overall burden of overlapping gastrointestinal symptoms, not any individual DGBI subtype, is responsible for much of the psychological burden of these patients. Therefore, somatization disorders and psychological stress screening should be considered as part of routine care in patients with multi-regional DGBI.

RECOMMENDATIONS

Multicenter, longitudinal studies with structured psychiatric assessment are recommended in the future to better understand the directionality of the relationship between DGBI overlap and psychological comorbidity and to assess if early psychological intervention is beneficial in patients with multi-regional disease.

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CONFLICT OF INTEREST

None declared.

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