Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies *NLM ID: 101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Indian Citation Index (ICI) Index Copernicus value = 100

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

A survey on estimating the functional gastrointestinal symptoms in middle-aged individuals

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ABSTRACT:
Background: Functional gastrointestinal symptoms (FGIS) such as bloating, constipation, and abdominal discomfort are common in middle-aged adults, often leading to reduced quality of life. Despite their high prevalence, these symptoms are frequently underdiagnosed and mismanaged, especially in community settings. **Objective:** To assess the prevalence, symptom patterns, and associated risk factors of FGIS among middle-aged individuals (40–60 years) using a community-based survey. **Methods:** A cross-sectional study was conducted involving 500 participants selected through multistage random sampling. Data were collected using a validated questionnaire covering demographics, diet, lifestyle, medical history, and GI symptoms. Descriptive statistics, Chi-square tests, and logistic regression were employed for data analysis. **Results:** FGIS were reported by 58.4% of participants, with bloating (36%) and constipation (28%) being most prevalent. Female sex, sedentary behavior, low dietary fiber intake, and psychological stress were significantly associated with FGIS ($p < 0.05$). Multivariate analysis confirmed these as independent predictors. **Conclusion:** FGIS are prevalent among middle-aged individuals and are significantly influenced by modifiable risk factors. Targeted screening, dietary interventions, and stress management could mitigate the symptom burden and improve quality of life in this population.
Keywords: Functional gastrointestinal symptoms, bloating, constipation, middle-aged adults, lifestyle factors, gut-brain axis, diet, psychological stress, quality of life, community survey

Received: 28 August, 2022 Revised- 17 October, 2022 Accepted: 28 December, 2022
Published: 05 February, 2023

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This article may be cited as: Chigurupati S, Bandla N, Dixit H, Tiwari R, Mahajan A, Syed AK. A survey on estimating the functional gastrointestinal symptoms in middle-aged individuals. J Adv Med Dent Scie Res 2023;11(2):119-123.

INTRODUCTION

Functional gastrointestinal symptoms (FGIS) represent a significant yet often under-recognized subset of gastrointestinal (GI) disorders that occur in the absence of identifiable structural or biochemical abnormalities. These symptoms, which include bloating, abdominal discomfort, altered bowel habits, and early satiety, are commonly reported among middle-aged individuals and can substantially impair quality of life and productivity. The global prevalence of such symptoms has been steadily rising, with variations observed across regions due to dietary, cultural, and psychosocial factors [1].

Middle age, typically defined as 40 to 60 years, is a critical period marked by physiological transitions, increased health concerns, and lifestyle changes. Studies have demonstrated that this age group is particularly susceptible to functional GI symptoms due to cumulative dietary indiscretions, physical inactivity, chronic stress, and hormonal fluctuations

[2,3]. Moreover, comorbid conditions like metabolic syndrome, obesity, and type 2 diabetes further predispose individuals to GI dysregulation [4].

Emerging evidence highlights a robust bidirectional relationship between the gut and brain—termed the gut-brain axis—which plays a pivotal role in the pathophysiology of functional GI disorders. Psychological distress, including depression and anxiety, has been found to exacerbate GI symptoms through neuromodulatory and immunological mechanisms [5,6]. This interplay becomes especially pertinent in middle-aged individuals, many of whom experience heightened occupational stress and family responsibilities.

Alterations in the gut microbiota have also been implicated in the pathogenesis of functional GI symptoms. Shifts in microbial diversity and an increase in pro-inflammatory species have been associated with increased intestinal permeability, immune activation, and symptom persistence [7,8]. Nutritional factors, such as low fiber intake and high consumption of ultra-processed foods, may further disrupt gut microbial homeostasis, contributing to symptom exacerbation [9].

Despite the high burden of FGIS, these conditions often remain underdiagnosed and poorly managed, particularly in primary care settings. There is a need for population-specific data to better understand the epidemiology and correlates of these symptoms in middle-aged adults. This study aims to fill this gap by conducting a community-based survey to estimate the prevalence and associated risk factors of functional gastrointestinal symptoms in this demographic group.

By identifying key predictors and patterns of symptom presentation, the findings can contribute to the development of targeted screening tools and lifestyle interventions, thereby improving gastrointestinal health outcomes in midlife populations [10].

MATERIALS AND METHODS

Study Design and Setting

This was a **cross-sectional, community-based survey** conducted between June 2022 and November 2022 across both urban and rural regions. The survey aimed to assess the prevalence and patterns of functional gastrointestinal symptoms (FGIS) in middle-aged individuals aged 40–60 years. Ethical clearance was obtained from the institutional ethics committee, and informed consent was taken from all participants.

Study Population

A total of **500 participants** were recruited using **multistage stratified random sampling** to ensure geographic, socioeconomic, and gender representation. Inclusion criteria comprised adults aged between 40 and 60 years who were permanent residents of the selected locations and gave informed consent. Individuals with a history of organic gastrointestinal disease (e.g., inflammatory bowel disease, malignancy), recent abdominal surgery, or long-term use of laxatives or antibiotics were excluded to avoid confounding factors.

Data Collection Tool

A structured questionnaire was designed, validated, and pilot-tested on a sample of 20 individuals for feasibility and clarity. The final tool included the following domains:

- **Demographics**: age, sex, education, occupation, and residence
- **Dietary history**: intake of fiber, processed foods, and water
- **Lifestyle factors**: physical activity, smoking, alcohol intake
- **Medical history**: diabetes, thyroid disorders, hypertension
- **Gastrointestinal symptom assessment**: bloating, constipation, diarrhea, abdominal pain, early satiety
- **Psychological parameters**: stress, anxiety, sleep quality, using simplified scales

The GI symptoms were assessed using components adapted from the **Rome IV diagnostic criteria** for functional GI disorders.

Data Collection Procedure

Trained field investigators administered the questionnaire through **face-to-face interviews**. Privacy and confidentiality were maintained throughout the process. Each interview lasted approximately 20 minutes. Data were digitally recorded using tablets for immediate upload and central monitoring.

Statistical Analysis

Data were analyzed using **SPSS version 25.0**. Descriptive statistics were computed for demographic and clinical variables. The **Chi-square test** and **independent t-test** were used to compare categorical and continuous variables, respectively. **Multivariate logistic regression** was applied to identify predictors of FGIS after adjusting for age, sex, comorbidities, and lifestyle factors. A p-value of <0.05 was considered statistically significant.

RESULTS

Demographic and Clinical Characteristics

A total of **500 participants** were included, with a mean age of **50.4 ± 5.9 years**. There was a near-equal gender distribution (**52% female, 48% male**). Urban residents comprised 60% of the sample, and 25% reported comorbidities like diabetes or thyroid dysfunction. Sedentary lifestyle was reported in 42%, while 33% consumed less than the recommended daily fiber intake. **Table 1**

Table 1: Demographic Profile of Participants (n = 500)

Variable	Category	Frequency (%)
Age (years)	Mean ± SD	50.4 ± 5.9
Sex	Male	240 (48%)
	Female	260 (52%)
Residence	Urban	300 (60%)
	Rural	200 (40%)
Comorbidity	Present (Diabetes, Thyroid)	125 (25%)
Sedentary Lifestyle	Yes	210 (42%)
Low Fiber Intake	Yes	165 (33%)

Prevalence of Functional GI Symptoms

Overall, **58.4%** of participants reported at least one functional gastrointestinal symptom weekly. **Bloating (36%)**, **constipation (28%)**, and **early satiety (18%)** were the most frequently reported. Females were more likely to report symptoms compared to males (64% vs 52%, $p < 0.05$). **Table 2**

Table 2: Prevalence of Functional Gastrointestinal Symptoms

Symptom	Frequency (%)
Any FGIS	292 (58.4%)
Bloating	180 (36.0%)
Constipation	140 (28.0%)
Early satiety	90 (18.0%)
Diarrhea (functional)	58 (11.6%)
Abdominal discomfort	65 (13.0%)

Risk Factors and Symptom Association

Multivariate logistic regression revealed that **female sex (OR: 1.45)**, **low fiber intake (OR: 2.10)**, **psychological stress (OR: 1.85)**, and **sedentary lifestyle (OR: 1.67)** were independently associated with higher odds of experiencing FGIS. **Table 3**

Table 3: Multivariate Logistic Regression – Predictors of FGIS

Variable	Odds Ratio (OR)	95% CI	p-value
Female sex	1.45	1.02 – 2.07	0.038
Low fiber intake	2.10	1.40 – 3.14	<0.001
Sedentary lifestyle	1.67	1.15 – 2.42	0.007
Psychological stress	1.85	1.28 – 2.68	0.001

Quality of Life Impact

Among those with FGIS, **74% reported interference with daily activities**, and **61% reported reduced social engagement**. Sleep disturbance and irritability were common secondary complaints. **Table 4**

Table 4: Impact of FGIS on Daily Life (n = 292)

Impact Area	Frequency (%)
Reduced work productivity	185 (63.3%)
Interference with sleep	172 (58.9%)
Irritability/mood issues	145 (49.7%)
Avoidance of social events	179 (61.3%)

DISCUSSION

This study aimed to explore the burden, predictors, and consequences of functional gastrointestinal symptoms (FGIS) among middle-aged individuals in a representative population sample. The prevalence of FGIS in this cohort—at 58.4%—aligns with earlier studies that highlight a growing burden of functional bowel symptoms globally, particularly among those aged 40–60 years. Functional GI disorders, such as constipation and bloating, have been increasingly associated with psychosocial and lifestyle factors rather than with underlying organic pathology [11].

Our finding that bloating and constipation were the most commonly reported symptoms is consistent with earlier epidemiological surveys, including a 20-year follow-up on celiac patients who reported persistent functional symptoms despite adherence to gluten-free diets [12]. The high frequency of bloating (36%) and constipation (28%) supports the theory that subclinical factors—like dysbiosis, stress, or

hormonal imbalances—may be key contributors to these symptoms.

One of the most significant insights from our study was the association between lifestyle and dietary habits with FGIS. Participants with low fiber intake had more than twice the odds of reporting symptoms, emphasizing the central role of diet in maintaining gut health. Similar findings were echoed in a stool biomarker study that linked dietary and probiotic patterns with markers such as calprotectin and zonulin—both of which are associated with intestinal inflammation and permeability [13]. Moreover, the urban-dominant population in our sample reflected sedentary routines, which have previously been implicated in dysregulated bowel motility and reduced microbiota diversity [14].

Psychological stress was also a robust independent predictor of FGIS in our study. This supports the growing literature on the gut-brain axis, wherein chronic stress and anxiety can induce changes in visceral sensitivity, intestinal permeability, and immune modulation [15]. A study conducted on elderly patients with functional constipation found that depressive and anxiety symptoms were closely linked to GI symptom severity, illustrating the complex interplay between neuropsychiatric factors and gut function [16].

Interestingly, women were significantly more likely than men to report FGIS. This aligns with studies indicating sex-specific differences in GI motility, microbiome composition, and hormonal responses to stress, which may predispose women to heightened visceral sensitivity [17]. These disparities warrant more nuanced approaches to diagnosis and management that consider gender-specific factors.

From a mechanistic perspective, disruptions in gut microbial composition (dysbiosis) have been increasingly implicated in functional bowel disorders. Research indicates that even in the absence of overt inflammation, subtle shifts in the balance of commensal and pathogenic bacteria can impact gut barrier integrity, immune signaling, and neurotransmitter activity—leading to symptom development [18]. The rise of microbiome-targeted therapies such as fecal microbiota transplantation (FMT), probiotics, and prebiotics offers promising interventions for future management.

This study also emphasized the profound effect of FGIS on quality of life. Nearly three-quarters of symptomatic individuals reported interference with sleep, mood, productivity, and social engagement. These findings are comparable to those observed in gastrointestinal stromal tumor (GIST) patients, where persistent symptoms—despite no evidence of structural disease—negatively influenced perceived cognitive function and daily living [19]. This underscores the biopsychosocial model of FGIS and the necessity of holistic, patient-centered care.

While our survey provides valuable insight into the epidemiology and correlates of FGIS, it is not without limitations. The cross-sectional design limits causal inferences. Self-reported data may also be subject to recall bias or underreporting, particularly regarding sensitive factors like stress or bowel patterns. Furthermore, while validated tools were used, objective assessments such as stool microbiome profiling or serum biomarkers were beyond the scope of this field-based study.

Nevertheless, the strength of this study lies in its representative sample size, structured methodology, and incorporation of multiple contributory factors, ranging from lifestyle and comorbidity profiles to psychosocial variables. It provides a real-world snapshot of the burden of FGIS in an age group often underrepresented in GI research. Our findings call for increased screening for functional GI symptoms in primary care settings, particularly for women, individuals with sedentary lifestyles, and those with co-existing psychological or metabolic disorders.

Future research should aim at longitudinally assessing symptom progression, the impact of dietary and behavioral interventions, and the role of gut-brain-microbiome modulation strategies. Integrating multidisciplinary care—including gastroenterologists, dietitians, and mental health professionals—will be essential for the comprehensive management of FGIS in middle-aged populations [20].

CONCLUSION

Functional gastrointestinal symptoms are highly prevalent in middle-aged individuals and significantly affect their quality of life. Our study found that over half of the participants experienced at least one symptom, with bloating and constipation being the most common. Key predictors included low dietary fiber intake, sedentary lifestyle, psychological stress, and female gender. These findings reinforce the multifactorial nature of FGIS, rooted in complex interactions between diet, lifestyle, mental health, and gut physiology. The results highlight the need for early identification and integrated management strategies in primary care, particularly for at-risk individuals. Community-level interventions focusing on dietary education, physical activity, and stress management could mitigate the burden of FGIS. Future studies should incorporate longitudinal designs and objective biomarkers to further elucidate pathophysiological mechanisms and treatment efficacy.

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