

Print ISSN : 0972-8813
e-ISSN : 2582-2780

[Vol. 24(1) January-April 2026]

Pantnagar Journal of Research

(Formerly International Journal of Basic and
Applied Agricultural Research ISSN : 2349-8765)



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Prevalence and associated risk factors of functional constipation among the selected adult population of Pantnagar, U.S. Nagar, Uttarakhand, India

JYOTI SINGH¹, NEETU DOBHAR², ARCHANA KUSHWAHA³, N.C SHAHI⁴ and SABBU SANGEETA⁵

^{1,2,3}*Department of Food and Nutrition, College of Community Science, ⁵Department of Food Science and Technology, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar-263145 (U.S. Nagar, Uttarakhand), ⁴Department of Processing and Food Engineering, Acharya Narendra Deva University of Agricultural and Technology, Kumarganj, Ayodhya (U.P.)*

**Corresponding author's email id: 46182_jyotisingh@gbpuat-tech.ac.in*

ABSTRACT: Functional constipation is a frequently reported gastrointestinal condition that can negatively influence overall health and daily well-being. However, information regarding its prevalence and associated determinants among Indian adults remains limited. The present investigation aimed to estimate the prevalence of functional constipation and examine its association with selected demographic and socioeconomic variables using the Rome IV diagnostic criteria. A community-based cross-sectional study was carried out among 400 adults aged 20–60 years residing in Pantnagar and nearby areas of Udham Singh Nagar district, Uttarakhand. Data related to gender, age, marital status, education, occupation, and socioeconomic status were collected using a structured questionnaire. Functional constipation was assessed according to Rome IV criteria, and the occurrence of individual symptoms among affected participants was documented. The association between constipation and selected variables was analyzed using the chi-square test. The overall prevalence of functional constipation was found to be 15.5%. A significantly higher proportion was observed among females (17.6%) compared with males (7.3%) ($p = 0.022$). However, no significant association was observed with age ($p = 0.170$), education level ($p = 0.151$), or socioeconomic status ($p = 0.872$). Among individuals experiencing constipation, the most frequently reported symptoms included a feeling of incomplete evacuation (96.77%), straining during defecation (91.94%), and sensation of anorectal blockage (79.03%). These findings suggest that functional constipation occurs at a moderate level in the population studied and is more common among women, emphasizing the importance of early detection and appropriate dietary and lifestyle management.

Key words: Functional constipation, Prevalence, Risk factors, ROME IV criteria

Constipation represents one of the most frequently encountered gastrointestinal complaints across the world and has gradually emerged as an important public health concern in India. It is typically characterized by infrequent bowel movements, difficulty in stool passage, or a sensation of incomplete evacuation, often accompanied by abdominal discomfort, bloating, and reduced quality of life (Rajput and Saini, 2014; Ghoshal *et al.*, 2018). Although constipation is sometimes regarded as a minor digestive disturbance, persistent symptoms can significantly impair daily functioning and psychological well-being. Long-standing constipation may also contribute to complications such as haemorrhoids, anal fissures, faecal impaction, and, in severe cases colorectal malignancies (Wald, 2016; Sundbøll *et al.*, 2019). When symptoms persist for three months or longer, the condition is classified as chronic constipation,

which may arise due to multiple dietary, lifestyle, and physiological factors. Low dietary fibre intake, inadequate fluid consumption, sedentary behaviour, ageing, and certain medications have been identified as major contributors to the development and persistence of chronic constipation (Bharucha *et al.*, 2013; Rao and Patcharatrakul, 2020).

From a clinical perspective, chronic constipation is generally classified into primary and secondary types. Primary constipation includes functional constipation, constipation-predominant irritable bowel syndrome, slow-transit constipation, and defecatory disorders. In contrast, secondary constipation may arise due to metabolic abnormalities, medication use, structural intestinal diseases, or neurological conditions (Sharma and Rao, 2017; Daniali *et al.*, 2020). Globally, the prevalence of constipation is estimated to be

approximately 20%, although it varies widely depending on diagnostic criteria and population characteristics (Bharucha *et al.*, 2013).

Among these conditions, functional constipation represents the most reported and clinically relevant form across different age groups (Chen *et al.*, 2022). It is defined as constipation resulting from impaired physiological functioning of defecation without structural or organic abnormalities and is distinct from irritable bowel syndrome (Mearin *et al.*, 2016; Shin *et al.*, 2019). Diagnosis is generally based on the Rome criteria, which evaluate symptoms such as straining, hard stools, sensation of incomplete evacuation, and reduced bowel movement frequency (Moharana and Moharana, 2011; Lacy *et al.*, 2016). Previous research indicates that the global prevalence of functional constipation varies depending on the diagnostic criteria used, with estimates ranging from approximately 10% to 15% in different populations (Barberio *et al.*, 2021). In Asia, functional constipation affects nearly 15–23% of women and around 11% of men, with a rising trend in recent years (Gwee *et al.*, 2013). In India, community-based studies have reported a prevalence of approximately 16.8%, indicating that constipation is a common yet under-recognized health issue (Rajput and Saini, 2014). Dietary practices play a crucial role in the development and management of functional constipation. Poor dietary habits, particularly low intake of dietary fibre and inadequate fluid consumption, have consistently been identified as key risk factors. In addition to dietary influences, demographic and socioeconomic characteristics such as gender, age, education, and socioeconomic status may also affect bowel habits through differences in health awareness, lifestyle patterns, and access to nutritious foods (Vriesman and Benninga, 2020; Chen *et al.*, 2022).

Despite its growing prevalence, limited data is available related to the prevalence of functional constipation and its associated factors among the Indian adult population. Understanding its distribution and determinants is essential for planning appropriate dietary and lifestyle interventions. Therefore, the present study was

undertaken to assess the prevalence of functional constipation using Rome IV diagnostic criteria and to examine its association with selected demographic and socioeconomic variables among adults.

MATERIALS AND METHODS

The present investigation adopted a cross-sectional research design to evaluate the prevalence of functional constipation and its associated determinants among adults living in Pantnagar, U.S. Nagar district, Uttarakhand. Ethical approval was obtained from the University Ethics Committee for Human Research (UECHR), G.B. Pant University of Agriculture and Technology, Pantnagar (Letter No. CCS/FN/Ethical Comm/06 dated June 21, 2025) before the initiation of the study in the field. The survey was carried out between July and October 2025 in selected hostels and residential colonies of Pantnagar, Udham Singh Nagar, Uttarakhand. Written informed consent was obtained from all participants before the data collection.

The study included adult males and females aged 20–60 years residing in five girls' hostels, including Subhash Bhawan, Yamunotri Bhawan, Golden Jubilee Bhawan, Saraswati Bhawan, and Ambedkar Bhawan, as well as selected residential localities of Pantnagar, including Lalbagh, Phoolbagh, Chakpheri, Jha Colony, Ta Colony, Hospital Colony, Beni, and nearby hostel colonies. Sample size for the prevalence study was calculated using the formula suggested by Charan and Biswas (2013).

$$\text{Sample size (n)} = Z_{1-\alpha/2}^2 p(1-p)/d^2$$

Where, $Z_{1-\alpha/2}$ = standard normal variate (at 3% type 1 error ($P < 0.05$) is 1.96); p = Expected proportion in population based on previous studies or pilot studies; d = Absolute error or precision

Based on an expected prevalence of 10.1% (Barberio *et al.*, 2021) and a precision of 3%, the required sample size came out to be 388; however, a total of 400 participants were included to account for possible non-response and ensure adequacy of the sample.

Data was collected using a structured and pre-tested

interview schedule comprising both open- and closed-ended questions. The tool was pilot-tested on 40 respondents (10% of the sample size) and modified accordingly. Information on demographic profile and socioeconomic status was collected. Socioeconomic status was assessed using the updated Kuppaswamy Socioeconomic Status Scale (2024) (Javalkar *et al.*, 2024). Functional constipation was diagnosed using the Rome IV criteria, which require the presence of at least two characteristic symptoms for a minimum duration of three months, with symptom onset at least six months prior to assessment, and the exclusion of irritable bowel syndrome.

All collected data were entered into Microsoft Excel and subsequently analyzed using SPSS software version 25.0. Results were expressed as frequencies and percentages. Pearson's chi-square test was applied to examine the association between functional constipation and selected demographic and socioeconomic variables. A p-value of <0.05 was considered statistically significant.

RESULTS AND DISCUSSION

General information about the participants

A total of 400 subjects were included in the present investigation to assess the prevalence and risk factors of functional constipation. The general characteristics of the respondents showed that females constituted 79.5 per cent of the study sample. Most participants belonged to the younger age group of 20–29 years (57.25%), followed by 30–39 years (15.75%), 40–49 years (15.25%) and ≥50 years (11.75%) as shown in Table 1. This distribution suggested that the study population largely comprised young adults compared to other age groups.

Regarding marital status, more than half of the respondents were single (53%), while 44.25 per cent were married, and only a small proportion were widowed (2.5%) or divorced (0.25%). In terms of educational attainment, nearly half of the participants were graduates (48.75%), followed by those with professional degrees (21.5%), indicating a relatively

well-educated cohort. Only a small percentage had education up to primary level (3.75%) or were illiterate (4.25%), reflecting overall higher literacy among the study population.

Occupational distribution revealed that students constituted the largest group (53%), followed by homemakers (19.25%) and individuals employed in government (14%) and private sectors (10.25%). A minimal proportion of participants were engaged in business (1.75%), farming (0.5%), unskilled labour (1%) or were unemployed (0.25%).

Socio-economic status of the subjects

Socioeconomic assessment indicated that half of the respondents belonged to the upper middle class (50.25%), followed by upper class (15.25%), lower middle class (15.25%) and upper lower class (19%). Only 0.25 per cent of participants were from the lower socioeconomic class, as shown in Figure 1.

Prevalence of functional constipation among the subjects

The prevalence of functional constipation based on ROME IV criteria was observed in 62 out of 400 subjects, corresponding to 15.5 per cent of the study population, as shown in Figure 2. The data from the present study were consistent with the observations of Rajput and Saini (2014). A comprehensive meta-analysis by Barberio *et al.* (2021) reported a global prevalence of functional constipation of 10.4 per cent using the Rome III criteria, with substantial geographic variability. In the present study, most participants were young and educated; the occurrence of constipation highlighted that functional bowel disorders were not restricted to older adults. Previous studies have reported associations with dietary habits, stress, and lifestyle factors among younger populations (Chen *et al.*, 2022; Shin *et al.*, 2024); however, these factors were not specifically evaluated in the present study and warrant further investigation.

Distribution of subjects based on the occurrence of symptoms of functional constipation

Analysis of individual symptoms among constipated subjects (n=62) revealed that the most frequently

reported symptom was sensation of incomplete evacuation (96.77%), followed by straining during defecation (91.94%). A high proportion also reported sensation of anorectal obstruction or blockage (79.03%) as shown in Figure 3. These results indicated that problems related to bowel evacuation and associated discomfort constituted the most prominent symptoms among individuals experiencing constipation. Lumpy or hard stools were reported by 43.55 per cent of subjects, indicating altered stool consistency as a common manifestation. Only 1.61 per cent of subjects reported fewer than three spontaneous bowel movements per week, and none reported the use of manual maneuvers to facilitate defecation.

This indicated that while severe constipation symptoms were relatively less common, most subjects experienced moderate but persistent symptoms such as straining and incomplete evacuation. The presence of multiple symptoms in the same individuals further emphasizes the multifactorial nature of functional constipation.

Comparable observations have been reported in previous studies conducted in India, where

Table 1: General information of the subjects (N=400)

Characteristics	n	%
Gender		
Male	82	20.5
Female	318	79.5
Age		
20-29 years	229	57.25
30-39 years	63	15.75
40-49 years	61	15.25
≥50	47	11.75
Marital status		
Single	212	53
Married	177	44.25
Widower	10	2.5
Divorced	1	0.25
Education of the respondent		
Professional Degree	86	21.5
Graduate	195	48.75
Intermediate/diploma	41	10.25
High school	22	5.5
Middle school	24	6
Primary school	15	3.75
Illiterate	17	4.25
Occupation of the respondent		
Student	212	53
Government Job	56	14
Private Job	41	10.25
Homemaker	77	19.25
Business	7	1.75
Farmer	2	0.5
Unskilled/daily wage	4	1
Unemployed	1	0.25

Table 2: Chi-square analysis for the association of functional constipation with gender, age, education level, and socio-economic status of the respondents (N=400)

Variables		FC		No FC		Chi-square test(p-value)
		n	%	n	%	
Gender	Male	6	7.3	76	92.7	0.022*
	Female	56	17.6	262	82.4	
Age	20-29 years	28	12.2	201	87.8	0.170
	30-39 years	12	19.0	51	81.0	
	40-49 years	11	18.0	50	82.0	
	≥50	11	23.4	36	76.6	
Education level	Professional degree	16	18.6	70	81.4	0.151
	Graduate	21	10.8	174	89.2	
	Intermediate/Diploma	7	17.1	34	82.9	
	High school	5	22.7	17	77.3	
	Middle school	4	16.7	20	83.3	
	Primary school	5	33.3	10	66.7	
	Illiterate	4	23.5	13	76.5	
Socio-economic status	Upper Class	8	13.1	53	86.9	0.872
	Upper Middle Class	32	15.9	169	84.1	
	Lower Middle Class	8	13.1	53	86.9	
	Upper Lower Class	14	18.4	62	81.6	
	Lower Class	0	0.00	1	100.0	

*Significant at 5% level, FC: Functional constipation

symptoms such as hard stools, incomplete evacuation, and straining were frequently documented among individuals with functional constipation (Rajput and Saini, 2014).

Association of functional constipation with socio-demographic variables

Table 2 showed the association of functional constipation with socio-demographic variables. Chi-square analysis revealed a significant association between gender and functional constipation ($p=0.022$), whereas age, education level and socioeconomic status were not significantly associated ($p>0.05$). The prevalence of functional constipation was notably higher among females (17.6%) than males (7.3%), indicating greater vulnerability among women. This finding was consistent with previous research suggesting that hormonal fluctuations, lower physical activity, stress, and dietary irregularities may contribute to a

higher risk of constipation among females. Similar association was reported by Rajput and Saini (2014), Tamura *et al.* (2016), Verkuijlen *et al.* (2020), Barberio *et al.* (2021) and Chen *et al.* (2022).

Although age was not significantly associated with functional constipation ($p=0.170$), an increasing trend in prevalence with advancing age was observed, rising from 12.2 per cent in the 20–29 years group to 23.4 per cent among individuals aged ≥ 50 years. This pattern may be attributed to age-related physiological changes, reduced gastrointestinal motility and sedentary lifestyle, which are commonly linked with constipation. These observations were in line with the findings of Chen *et al.* (2022), who reported a significantly higher pooled prevalence of functional constipation among individuals aged above 50 years compared to younger age groups. Such evidence suggests that advancing age remains an important contributory factor in the development of functional constipation, even when statistical significance is not evident within specific study populations.

Education level was not significantly associated with functional constipation in the present study ($p=0.151$), although a relatively higher prevalence was observed among respondents with lower educational attainment compared to graduates. This trend may reflect variations in nutritional awareness, dietary fibre intake, and lifestyle practices across educational groups. Similar observations were reported by Chen *et al.* (2022), who found no significant differences in functional constipation prevalence across education levels, though slightly higher rates were noted among individuals with only primary education. These findings suggest that functional constipation is a multifactorial condition that can affect individuals across all educational backgrounds, irrespective of literacy status.

Similarly, socio-economic status showed a non-significant association with functional constipation ($p=0.872$), with comparable prevalence across different socio-economic classes. This finding is in accordance to the reports of Barberio *et al.* (2021) and Chen *et al.* (2022), who also observed non-

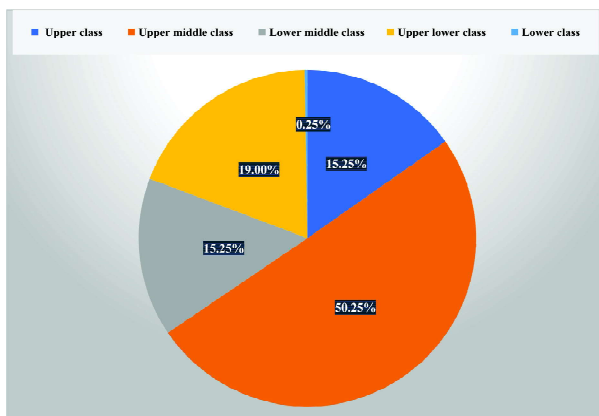


Fig. 1: Socioeconomic status of the participants (N=400)

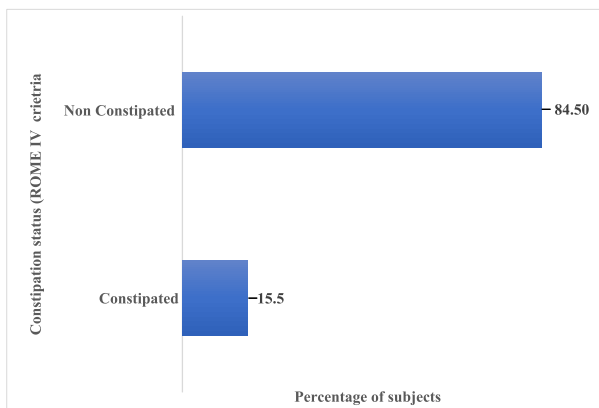


Fig. 2: Prevalence of constipation among subjects (N=400)

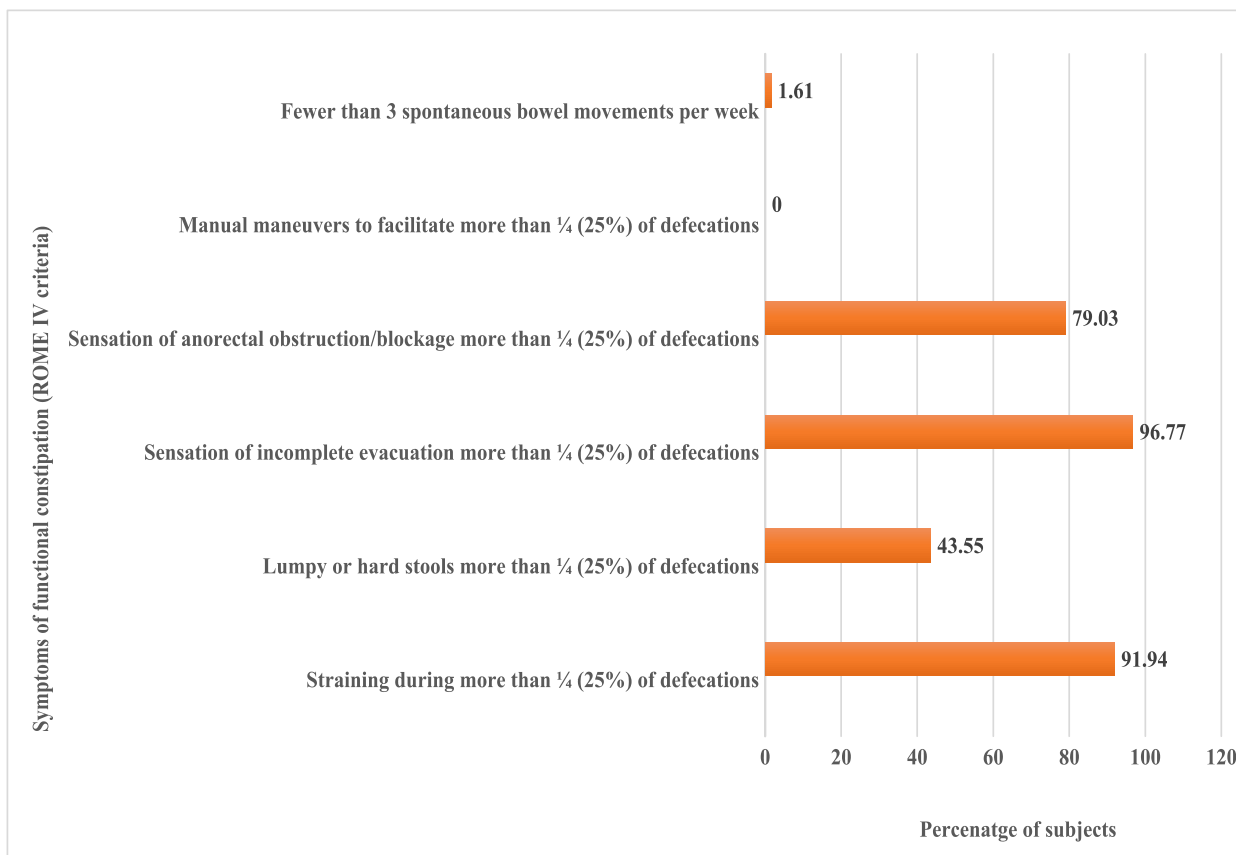


Fig. 3: Frequency of individual symptoms of functional constipation among constipated subjects (N= 62)

significant differences in the prevalence of functional constipation across different socioeconomic strata. This suggests that functional constipation affects individuals irrespective of economic background and could be influenced by lifestyle behaviour such as inadequate fibre intake, low fluid consumption, and physical inactivity, which could be further explored in future studies.

CONCLUSION

The present study provided insights into the prevalence and determinants of functional constipation among a selected adult population in Pantnagar. Based on the Rome IV diagnostic criteria, the overall prevalence was 15.5%, indicating a moderate occurrence even among a relatively young and educated population. The findings suggested that functional constipation was not limited to older individuals but was also common among young

adults, possibly due to changing dietary habits, sedentary lifestyles, and psychosocial stress. A significantly higher prevalence was observed among females than males, indicating greater susceptibility among women, likely influenced by hormonal, dietary, and lifestyle factors.

Although age, education, and socioeconomic status showed non-significant statistical associations, an increasing trend with advancing age and a slightly higher prevalence among individuals with lower educational attainment were observed, highlighting the multifactorial nature of functional constipation. The most frequently reported symptoms were incomplete evacuation, straining during defecation, and anorectal obstruction, reflecting impaired bowel evacuation and discomfort. Overall, the study underscores that functional constipation is a common yet often overlooked gastrointestinal disorder, emphasizing the need for early identification and

comprehensive management through dietary modification, adequate fibre and fluid intake, and promotion of active lifestyles to improve bowel health and quality of life.

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Received: March 11, 2026

Accepted: April 12, 2026