Original Article

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Frequency of Diarrhea in COVID-19 Patients: A Multicenter Study

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Abstract

Background: Although respiratory manifestations dominate COVID-19 presentations, gastrointestinal involvement, particularly diarrhea, has gained increasing attention. Understanding the frequency and clinical significance of this condition is crucial for managing patients.

Objective: This study aimed to determine the frequency, duration and clinical associations of diarrhea among hospitalized COVID-19 patients in Dhaka, Bangladesh.

Methods: This cross-sectional study was conducted in the COVID-19 Units of BMU and DMCH between June 2020 and May 2021. A total of 140 RT-PCR-confirmed symptomatic patients aged ≥18 years were included. Clinical features, laboratory parameters and comorbidities were recorded using structured questionnaires and medical record reviews. Statistical analyses were performed using SPSS v25.0. The significance level was set at $p \leq 0.05$.

Results: Diarrhea was reported in 29.3% of patients, with a mean duration of 5.28 ± 1.46 days. The majority (53.6%) experienced diarrhea lasting 4–5 days. Patients aged ≥50 years had a significantly higher prevalence of diarrhea (87.8%, p=0.015). Diarrhea was more frequent in severe cases (61.0%) than in moderate (29.2%) and mild (9.8%) disease (p=0.001). No significant associations were observed between sex, BMI, smoking, or antibiotic/antiviral use.

Conclusion: Diarrhea is a common gastrointestinal manifestation of COVID-19 and is strongly associated with older age and severe disease. Therefore, it should be recognized as a potential prognostic marker to guide clinical decision-making.

Keywords: COVID-19, Diarrhea, Gastrointestinal symptoms, Disease severity.

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Introduction:

Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first emerged in Wuhan, China, in late 2019 and rapidly spread worldwide.[1] Although primarily considered a respiratory illness, COVID-19 has demonstrated a wide spectrum of systemic involvement. Classical symptoms include fever, cough and dyspnea[2] yet accumulating evidence highlights the significance of extrapulmonary manifestations, particularly those involving the gastrointestinal (GI) tract.[3,4]

Gastrointestinal features such as diarrhea, nausea, vomiting and abdominal discomfort have been increasingly reported across diverse populations.[5] Among these, diarrhea is one of the most frequent manifestations, though its reported prevalence varies greatly, ranging from 2% to more than 30%.[6] Such variation is influenced by study design, geographic region, patient demographics and differences in diagnostic criteria. Understanding the true burden of diarrhea in COVID-19 is important, as it may complicate clinical presentation, delay diagnosis and affect prognosis.

The underlying mechanisms of diarrhea in COVID-19 are multifactorial. SARS-CoV-2 binds to angiotensin-converting enzyme 2 (ACE2) receptors, which are abundantly expressed in small intestinal enterocytes, enabling direct viral invasion and mucosal damage.[7] Additionally, systemic inflammation, disruption of the intestinal microbiome and adverse effects of medications such as antivirals or antibiotics may contribute to gastrointestinal symptoms.[8] Importantly, viral RNA has been detected in fecal samples, supporting the possibility of fecal-oral transmission and reinforcing the need for strict infection control measures.[9]

Several studies suggest a potential association between gastrointestinal symptoms and disease severity. For example, Pan et al. demonstrated that patients with digestive involvement often had more severe illness and longer hospital stays.[6] Jin et al. similarly reported that gastrointestinal symptoms were linked to adverse outcomes.[10] Conversely, Richardson et al. in a large New York cohort found no consistent relationship between diarrhea and disease severity, highlighting ongoing uncertainty and the need for further research in different populations.[11]

In Bangladesh, COVID-19 has strained the healthcare system, with most research focusing on respiratory manifestations. However, gastrointestinal features remain less explored, despite their potential clinical implications. A study by Khalil et al. reported diarrhea in nearly one-third of Bangladeshi COVID-19 patients,[5] while Paul et al. also observed digestive symptoms among hospitalized cases.[4]

These findings underscore the need for more focused investigation into gastrointestinal involvement within the local context.

This study was therefore designed to assess the frequency, duration and clinical correlates of diarrhea in hospitalized COVID-19 patients in Dhaka. By examining its relationship with demographic and clinical factors, the study aims to contribute region-specific data and improve the understanding of gastrointestinal involvement in COVID-19, supporting clinicians in better management and risk stratification of affected patients.

Methodology & Materials:

This cross-sectional study was conducted in the COVID-19 Units of Bangladesh Medical University (BMU) and Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh. The study was conducted over 12 months from June 2020 to May 2021. A total of 140 patients who met the eligibility criteria were included. The study population consisted of adult patients with laboratory-confirmed COVID-19 who were admitted for inpatient management. Pregnant and lactating women, patients with known chronic liver disease or chronic kidney disease, diagnosed gastrointestinal malignancies, pre-existing chronic gastrointestinal infections or inflammatory diseases, malabsorption syndromes were excluded from the study.

Eligible patients were enrolled after screening for inclusion and exclusion criteria. Demographic data, comorbidities, and clinical features, including gastrointestinal symptoms (diarrhea, anorexia, nausea, vomiting, abdominal pain, and GI bleeding), were recorded using a semi-structured questionnaire. Laboratory investigations (CBC, liver enzymes and coagulation profile) and radiological imaging were performed in accordance with hospital protocols. Disease severity was categorized according to the WHO interim guidance. All information was checked against the medical records for accuracy and consistency.

The research was approved by the Institutional Review Board (IRB) of Bangladesh Medical University and Ethical Review committee (ERC) before initiation.

Data were analyzed using SPSS version 25.0. Descriptive statistics summarized demographic and clinical variables. Associations between diarrhea and patient characteristics were evaluated using Chi-square tests, while continuous variables were analyzed using t-tests and ANOVA. Cross-tabulation was applied to assess associations between disease severity and gastrointestinal manifestations. Results were reported as frequencies, percentages, means and standard deviations. A p-value ≤0.05 was considered statistically significant.

Table 1: Baseline characteristics of COVID-19 patients (N = 140)

Variables	Categories	Frequency (n)	Percentage (%)
Age (years)	19-29	4	2.9
	30-39	15	10.7
	40-49	25	17.9
	≥50	96	68.5
Gender	Male	95	67.8
	Female	45	32.2
BMI	Underweight	3	2.1
	Normal	87	62.1
	Overweight	44	31.4
	Obese	8	5.7
Smoking	Smoker	28	20
	Non-smoker	112	80
Antiviral use	Yes	41	29.3
	No	99	70.7
	Yes	8	5.7
	No	132	94.3
COVID-19 severity	Mild	59	42.1
	Moderate	24	17.1
	Severe	57	40.8

Table I presents the baseline characteristics of the study population. Most patients (68.5%) were aged 50 years or older, and males constituted 67.8% of the cohort. A majority (62.1%) had a normal BMI, while 31.4% were overweight and 5.7% obese. Smoking history was present in 20% of patients. Antibiotic use was reported in 29.3%, and antiviral therapy in 5.7%. In terms of disease severity, 42.1% of patients had mild disease, 17.1% moderate and 40.8% severe.

Table II: Duration of diarrhea among COVID-19 patients (n = 41)

Duration (days)	Frequency (n)	Percentage (%)
4–5	22	53.6
6–7	13	31.7
>7	6	14.7
Mean ± SD	5.28 ± 1.46	

Table II shows the distribution of diarrhea duration among the 41 patients affected. The mean duration was 5.28 ± 1.46 days. More than half of the patients (53.6%) experienced diarrhea for 4–5 days, 31.7% for 6–7 days and 14.7% reported persistence beyond 7 days.

Table III: Association of Diarrhea with sociodemographic, lifestyle and clinical characteristics of COVID-19 patients (N=140)

Variables		With Diarrhea n (%)	Without Diarrhea n (%)	p-value
Gender	Male	28 (68.3)	67 (67.7)	0.943
	Female	13 (31.7)	32 (32.3)	
Age (years)	19-29	1 (2.4)	3 (3.0)	0.015
	30-39	1 (3.0)	14 (14.1)	
	40-49	3 (7.3)	22 (22.2)	
	≥50	36 (87.8)	60 (60.6)	
Smoking	Smoker	9 (22.0)	19 (19.2)	0.71
	Non smoker	32 (78.0)	80 (80.8)	
Antibiotics	Yes	12 (29.3)	29 (29.3)	0.998
	No	29 (70.7)	70 (70.7)	
Antiviral	Yes	3 (7.3)	5 (5.1)	0.599
	No	38 (92.7)	94 (94.9)	
BMI	Normal	24 (58.6)	63 (63.6)	0.908
	Overweight	14 (34.1)	28 (28.3)	
	Obese	2 (4.9)	6 (6.1)	
	Underweight	1 (2.4)	2 (2.0)	
Disease Severity	Mild	4 (9.8)	55 (55.6)	0.001
	Moderate	12 (29.2)	12(12.1)	
	Severe	25 (61.0)	32 (32.3)	

Table III. describes the association between diarrhea and selected baseline characteristics. Diarrhea was more frequent in patients aged ≥50 years (87.8%) compared with younger age groups (p = 0.015). It was also more common in patients with severe disease (61.0%) compared to moderate (29.2%) and mild (9.8%) cases (p = 0.001). No significant associations were observed with gender, BMI, smoking status, antibiotic use or antiviral therapy.

Discussion:

This study demonstrated that diarrhea occurred in 29.3% of hospitalized COVID-19 patients, with a mean duration of 5.28 ± 1.46 days. The symptom was more prevalent among patients aged ≥50 years and those with severe disease, showing significant associations with age (p=0.015) and disease severity (p=0.001). No significant associations were observed with gender, BMI, smoking, antibiotic or antiviral use.

Our findings align with Pan et al., who reported gastrointestinal involvement in nearly one-third of COVID-19 patients in Hubei, China, with diarrhea being a prominent symptom.[6] Similarly, Lin et al. found that approximately 24% of patients experienced diarrhea, underscoring the relevance of digestive symptoms in clinical presentation.[12] In contrast, Richardson et al. observed lower prevalence in a large New York cohort, suggesting regional variability possibly due to genetic, environmental and dietary factors.[11]

The strong association between diarrhea and disease severity in our cohort echoes the findings of Jin et al., who noted that gastrointestinal symptoms correlated with severe disease and poorer prognosis.[10] Han et al. further emphasized that patients with digestive involvement experienced diagnostic delays and prolonged hospitalization.[13] In our study, over 61% of patients with severe disease reported diarrhea, compared to only 9.8% among mild cases. This supports the hypothesis that gastrointestinal manifestations may serve as markers of systemic disease burden and immune dysregulation.

Mechanistically, the expression of ACE2 receptors in enterocytes provides a plausible explanation for direct viral invasion of the intestinal mucosa.[7] Viral replication in the gut can cause mucosal injury, disrupt barrier integrity and trigger diarrhea. Moreover, Ye et al. suggested that systemic inflammation, cytokine storm and altered gut microbiota contribute to gastrointestinal dysfunction.[8] The detection of viral RNA in stool samples further validates the enteric involvement of SARS-CoV-2.9

In Bangladesh, Khalil et al. reported diarrhea in approximately one-third of COVID-19 patients, a finding remarkably consistent with our study.[5] Similarly, Paul et al. identified diarrhea as one of the most common non-respiratory symptoms in hospitalized patients.[4] These national data reinforce the importance of gastrointestinal monitoring in local clinical practice.

Our study, however, did not demonstrate significant associations between diarrhea and other baseline characteristics such as gender, BMI or smoking. Bhandari et al. also found no gender differences in GI symptoms, supporting the notion that diarrhea may be independent of lifestyle factors.[14] Nevertheless, Kuehn reported that obesity was linked to more severe COVID-19 outcomes, though not specifically to diarrhea, suggesting that further research is needed to clarify metabolic influences.[15]

An important implication of our study is the recognition of diarrhea as an early warning symptom of severe disease. Anastasiou et al. highlighted that liver dysfunction and gastrointestinal symptoms often coexisted in patients with poor outcomes, underscoring the need for integrated clinical assessment.[16] Furthermore, Gu et al. cautioned about the potential fecal-oral transmission route, which may be particularly relevant in low-resource settings such as Bangladesh.[3]

Despite these strengths, variability in prevalence and associations across studies highlights the complexity of gastrointestinal manifestations in COVID-19. Factors such as viral variants, host genetics and healthcare access may all influence observed patterns. Our findings add to the growing body of literature supporting the prognostic value of gastrointestinal symptoms and underscore the necessity for clinicians to maintain a high index of suspicion when managing patients with diarrhea during the pandemic.

Limitations of the study:

This study was limited by its cross-sectional design, which precluded the establishment of causal relationships. The findings may not be generalizable to all healthcare settings because the study was conducted in two tertiary hospitals in Dhaka, Bangladesh. Reliance on clinical records and patient reporting may have introduced recall bias.

Despite these limitations, this study provides important insights into the gastrointestinal manifestations of COVID-19 in Bangladesh.

Conclusion:

This study demonstrated that diarrhea was present in nearly one-third of hospitalized COVID-19 patients, with significant associations observed with advanced age and severe disease. The symptoms persisted for an average of five days and were not related to gender, BMI, smoking or therapeutic interventions. These findings highlight the prognostic value of gastrointestinal symptoms in the clinical spectrum of COVID-19 infection. Early recognition of diarrhea may facilitate timely risk stratification and management, particularly in resource-limited settings where severe cases impose high healthcare burdens.

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Conflicts of interest: There are no conflicts of interest.

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