

# Clinical Characteristics of COVID-19 Patients with Digestive Symptoms: A Retrospective Study from Dakar, Senegal

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## Abstract

**Introduction:** As of February 2022, coronavirus disease 2019 (COVID-19) has caused a pandemic affecting all countries, with a total of 399 million patients and 5 million deaths. The lungs are the major organs involved in COVID-19. COVID-19 infection is not limited to the respiratory system but can affect multiple organs including the gastrointestinal tract. The aim of our study was to assess the prevalence of gastrointestinal (GI) symptoms on admission in patients with COVID-19 and their association with adverse outcomes, including mortality. **Methods:** In a retrospective study, we examined medical record data from patients with SARS-CoV-2 infection admitted to epidemic treatment center of hospital Aristide Le Dantec, Dakar (Senegal) between May 1, 2020, and June 31, 2021. SARS-CoV-2 infection was diagnosed by real-time polymerase chain reaction on nasopharyngeal and throat swabs. We included all patients with SARS-CoV-2 infection and GI symptoms. **Result:** The study identified 472 hospitalized patients with confirmed SARS-CoV-2 infection during the study period. We recruited 222 patients with gastrointestinal symptoms. The mean age of patients with GI symptoms was 56 years [17 - 90 years], and 54.9% were male. Patients with GI symptoms had comorbidities in 66.2% of cases. Hypertension, diabetes mellitus and chronic kidney disease were the most common comorbidities at 29.3%, 23.9%, and 6.7%, respectively. Patients with GI had cough in 69.4%, shortness of breath in 61.7%, ageusia in 57.6%, and fever in 53.1%. At presentation among patients with GI symptoms, 32.4% had mild disease, 27.5% had mod-

erate disease, and 40.1% had severe disease. The prevalence of digestive manifestations was 47%, and the main digestive manifestations were nausea (27%), diarrhea (17.1%), abdominal pain (17.1%) and vomiting (14.4%). GI symptoms such as abdominal pain, diarrhea, and vomiting were more common in those with hypertension (45%) and those with diabetes (43%). **Conclusion:** Gastrointestinal symptoms are common in patients with COVID-19. During a pandemic, patients with GI symptoms should be considered for SARS-CoV-2 infection.

## Keywords

COVID-19, Gastrointestinal Symptoms, Senegal

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## 1. Introduction

In December 2019, the first case of coronavirus disease 2019 (COVID-19) was reported [1]. The virus responsible has been identified as a novel coronavirus (CoV) and named severe acute respiratory syndrome coronavirus SARS-CoV-2. The disease has been named Coronavirus Disease 2019 (COVID-19) by the World Health Organization (WHO). Coronavirus disease (COVID-19) was declared a pandemic by the World Health Organization on March 11, 2020 [2]. According to the World Health Organization, 399 million cases and 5 million deaths have been registered globally, including 8 million cases and 166,102 deaths in Africa (Accessed: 2022-02-09) [2]. The lungs are the major organs involved in COVID-19. Clinical outcomes of COVID-19 infection range from asymptomatic to death. COVID-19 infection is not limited to the respiratory system but can affect multiple organs including the gastrointestinal tract. SARS-CoV-2 enters host cells through the interaction of the viral spike protein (S) with the human angiotensin-converting enzyme 2 receptor (ACE2), and ACE2 is abundantly expressed in the small intestine and lung epithelium, suggesting an efficient way to show that the coronavirus passes respiratory and gastrointestinal infections in humans [3] [4]. Gastrointestinal involvement may or may not be accompanied by pulmonary manifestations of COVID-19 [5]. The incidence of gastrointestinal symptoms ranged from 11% to 53%, with nearly half of patients experiencing at least one of symptoms including loss of appetite, nausea, vomiting, diarrhea, and abdominal pain [6]. To our knowledge, there are few studies on gastrointestinal symptoms during COVID-19 in sub-Saharan Africa. The aim of our study was to determine the prevalence of gastrointestinal symptoms on admission in patients with COVID-19 and their association with adverse outcomes, including mortality.

## 2. Patients and Methods

We conducted a retrospective study investigating data from the medical records of patients with SARS-CoV-2 infection who were admitted to the center for the

treatment of epidemics between May 1, 2020 and June 31, 2021. SARS-CoV-2 infection was diagnosed by real-time polymerase chain reaction on nasopharyngeal and throat swabs.

Inclusion criteria: all the patients with SARS-CoV-2 infection and gastro intestinal symptoms.

Exclusion criteria: all patients who reported old digestive symptoms or who had digestive diseases and patients with incomplete medical reports were excluded from this study.

Demographic, clinical, radiologic assessments, treatment and outcome data were records. These included: age, symptoms, comorbidities, smoking, alcohol intake, the outcomes (recovery, death).

The severity of COVID-19 was defined according to the World Health Organization guidelines and categorized into five groups.

- Asymptomatic: Individuals who test positive for SARS-CoV-2 using a virologic test but who have no symptoms that are consistent with COVID-19.
- Mild Illness: Individuals who have any of the various signs and symptoms of COVID-19 (e.g., fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhea, loss of taste and smell) but who do not have shortness of breath, dyspnea, or abnormal chest imaging.
- Moderate Illness: Individuals who show evidence of lower respiratory disease during clinical assessment or imaging and who have an oxygen saturation ( $SpO_2$ )  $\geq$  94% on room air at sea level.
- Severe Illness: Individuals who have  $SpO_2 < 94\%$  on room air at sea level, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen ( $PaO_2/FiO_2$ )  $< 300$  mmHg, a respiratory rate  $> 30$  breaths/min, or lung infiltrates  $> 50\%$ .
- Critical Illness: Individuals who have respiratory failure, septic shock, and/or multiple organ dysfunction.

All statistical analyses were performed using SPSS statistical software version 23. The comparison of variables was done by standard Chi<sup>2</sup> and Fisher.

### 3. Results

This study identified 472 hospitalized patients with confirmed SARS-CoV-2 infection during the study period. We include 222 patients with GI symptoms. The mean age of patients with GI symptoms was 56 years [17 - 90 years], and 54.9% were male. The clinical characteristics at presentation are shown in **Table 1**. Patients with GI symptoms had comorbidities in 66.2% of cases. Hypertension, diabetes mellitus and chronic kidney disease were the most common comorbidities at 29.3%, 23.9%, and 6.7%, respectively. Patients with GI symptoms had cough in 69.4%, shortness of breath in 61.7%, ageusia in 57.6%, fever in 53.1%, headache in 45.5% and anosmia in 38.3%. At presentation of patients with GI symptoms, the disease was 32.4% mild, 27.5% moderate and 40.1% severe. The prevalence of digestive manifestations was 47%, and the main GI symptoms

**Table 1.** Demographic and epidemiological characteristics and symptoms of COVID-19 patients with and without gastrointestinal symptoms, n (%).

Characteristics	All patients n = 472	With GI symptoms n = 222	Without GI symptoms n = 250	P-value	
Age, Years	56	56	56	0.024	
Sex, Male (%)	222 (47)	122 (54.9)	149 (59.6)	0.308	
Diabetes Mellitus	96 (20.3)	53 (23.9)	43 (17.2)	0.072	
Hypertension	143 (30.3)	65 (29.3)	78 (31.2)	0.65	
Chronic Kidney Disease	33 (7)	15 (6.7)	18 (7.2)	0.85	
Obesity	4 (0.8)	2 (0.9)	2 (0.8)	0.9	
Asthma	4 (0.8)	2 (0.9)	2 (0.8)	0.9	
Pregnant	21 (4.4)	10 (4.5)	11 (4.4)	0.95	
Alcohol	2 (0.4)	1 (0.4)	1 (0.4)	0.93	
Smoking	19 (4)	12 (5.4)	7 (2.8)	0.15	
Hiccup	11 (2.3)	6 (2.7)	5 (0.2)	0.61	
Anorexia	148 (31.3)	88 (39.6)	60 (24)	<0.01	
Anosmia	121 (25.6)	85 (38.3)	36 (14.4)	<0.01	
Ageusia	157 (33.3)	128 (57.6)	29 (11.6)	<0.01	
Cough	287 (60.8)	154 (69.4)	133 (53.2)	<0.01	
Shortness of breath	253 (53.6)	137 (61.7)	116 (46.4)	0.001	
Chest Pain	59 (12.5)	38 (17.1)	21 (8.4)	0.004	
Headache	168 (35.6)	101 (45.5)	67 (26.8)	<0.01	
Fever	200 (42.4)	118 (53.1)	82 (32.8)	<0.01	
Disease severity at admission	Mild	179 (37.9)	72 (32.4)	107 (42.8)	0.021
	Moderate	116 (24.6)	61 (27.5)	65 (26)	0.17
	Severe	176 (37.3)	89 (40.1)	87 (34.8)	0.24
	Critical	1 (0.2)	0	1 (0.4)	0.346
Death	93 (19.7)	47 (21.2)	46 (16.8)	0.456	

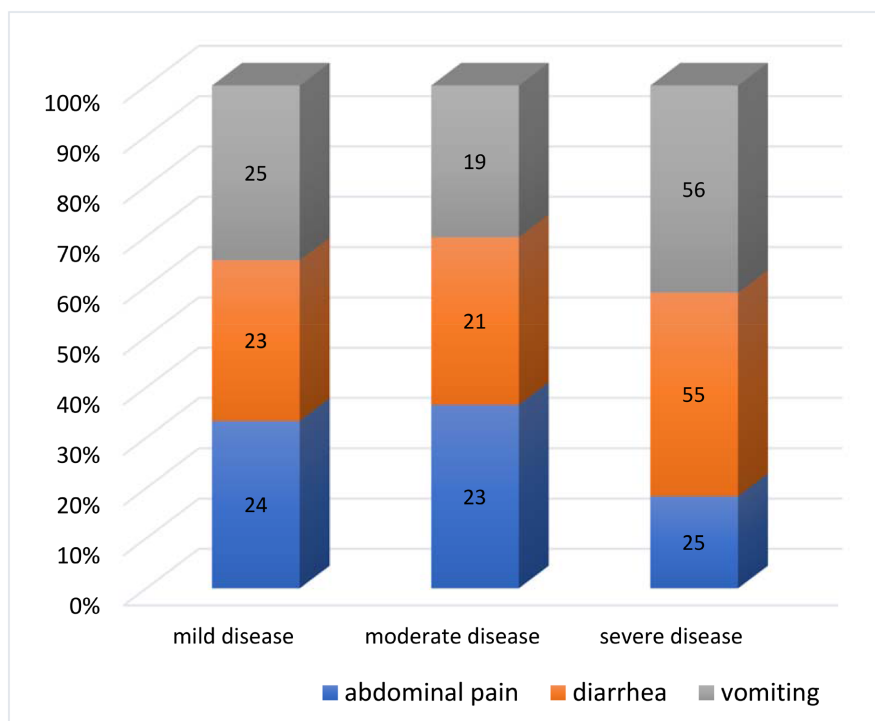
were nausea (27%), diarrhea (17.1%), abdominal pain (17.1%) and vomiting (14.4%) (**Table 2**). 15.1% of patients had isolated digestive symptoms on admission before developing respiratory symptoms during hospitalization. Among those with diarrhea, 52% had severe disease and 24% had mild disease. 17.1% of patients had abdominal pain. Localizations were epigastric (36.6%), diffuse (31.5%), and periumbilical (21.6%). It was isolated in 81% of cases and was associated with diarrhea and/or vomiting in 18%. 45% of these patients had severe

disease, 25% had mild disease, and 30% had moderate disease. GI symptoms such as abdominal pain, diarrhea, and vomiting were more common in those with hypertension (45%) and those with diabetes (43%). Two cases of upper gastrointestinal bleeding were recording, 1 case of hematemesis, 1 case of melena. In both cases, the patients were older than 50 years, and the bleeding was mild and hemodynamically well tolerated with good outcome. The patients with severe disease had diarrhea in 55% and abdominal pain in 47% (**Figure 1**).

During the study 47 patients (21.2%) died. Only age > 65 years was associated with an unfavorable mortality trend in patients with GI symptoms. The analysis of other factors associated with death, particularly gender, diabetes, hypertension, chronic kidney disease, respiratory symptoms and fever, found no significant association.

**Table 2.** Frequency of gastrointestinal symptoms in COVID-19 patients at admission.

Gastro intestinal symptoms	Frequency (n)	Percentage (%)
Abdominal pain	38	(17.1)
Diarrhea	38	(17.1)
Vomiting	32	(14.4)
Constipation	11	(4.9)
Nausea	60	(27)
Upper gastro intestinal bleeding	2	(0.9)



**Figure 1.** Frequency of gastrointestinal symptoms in COVID-19 patients in accordance of disease severity at admission.

## 4. Discussion

The digestive manifestations of SARS-CoV-2 have received increased attention since the detection of SARS-CoV-2 RNA in the stool of the first reported case of COVID-19 in the United States, who also had digestive symptoms such as nausea, vomiting, and diarrhea [7]. The study was conducted by reviewing the medical records of patients with COVID-19 between May 1, 2020 and June 31, 2021 at the epidemic treatment of Aristide Le Dantec Hospital in Dakar, Senegal. During this period, Senegal has been severely affected by the COVID-19 pandemic.

In this study, digestive symptoms were a common complaint among patients with COVID-19, with a prevalence of 47%. The incidence of GI symptoms in patients with COVID-19 ranged from 11% to 53% [6]. In a large series of 60 studies and 4243 patients, the GI symptoms rate was 17.6% [1]. In Tunisia, Mnif K and al. reported a prevalence of GI symptoms of 44% in 303 patients [8]. The study conducted by Pan *et al.* in China, showed a prevalence of 50.5% in 204 patients [9]. The main symptoms in our study were nausea (27%), diarrhea (17.1%), abdominal pain (17.1%) and vomiting (14.4%). Several studies found varying percentages of the same symptoms, but according to the meta-analysis of Mao and al, which included 35 studies, diarrhea was the most common digestive symptom reported during COVID-19 [10]. In this meta-analysis, the most important GI symptoms were nausea or vomiting, diarrhea. The combined prevalence was 9% for diarrhea, 6% for nausea or vomiting and 3% for abdominal pain [10]. In our study, nearly half of COVID-19 patients admitted to epidemic treatment center reported digestive symptoms. The criteria used to define the COVID-19 case definition are based on respiratory symptoms. Clinicians may miss cases with extrapulmonary symptoms initially, or the disease may not be diagnosed until after respiratory symptoms are present.

Several theories have been proposed to explain the cytopathic mechanism of digestive system involvement during disease progression [11]. Similar to SARS-CoV, SARS-CoV-2 can enter the gastrointestinal tract by binding to the human angiotensin-converting enzyme 2 (ACE-2) receptor, causing damage by upregulating the expression of ACE-2 in GI tissues [12]. The ACE2 protein has been shown to be the cellular receptor for SARS-CoV-2, is abundantly expressed in glandular cells of gastric, duodenal, and rectal epithelia, and facilitates the entry of SARS-CoV-2 into host cells [13]. There is a two-way communication between the gut and the lungs, known as the gut-lung axis. The gut microbiota is thought to help regulate the development and function of the innate and adaptive immune systems, modulate immune cells to generate pro and anti-inflammatory responses, and maintain immune homeostasis, thereby affecting host susceptibility to various diseases [13] [14]. SARS-CoV-2 directly or indirectly damages the digestive system through an inflammatory response. Changes in the composition and role of the gut microbiota affect the airways through a common mucosal immune system, and airway dysbiosis similarly affects the gastrointestinal

tract through immune control.

This effect, known as the “gut-lung axis”, may further explain why patients with COVID-19 pneumonia often experience digestive symptoms [15]. After virus entry, virus-specific RNA and proteins are synthesized in the cytoplasm to assemble new virions, which can be released into the gastrointestinal tract. Continued positive detection of viral RNA in stool indicates that infectious virions are secreted by virus-infected gastrointestinal cells [16].

SARS-CoV-2 has been isolated from stool confirming the release of the infectious virions to the gastrointestinal tract. Therefore, fecal-oral transmission could be an additional route for viral spread. Prevention of fecal-oral transmission should be taken into consideration to control the spread of the virus [16]. In this study, digestive manifestations were more common in subjects with diabetes, and these patients developed severe forms of the disease more frequently than patients without comorbidities and without digestive symptoms. The Chinese study conducted by Jin and al., reported a higher prevalence of the severe form of COVID-19 in patients with GI symptoms [17]. Pan and al. found that digestive symptoms become more pronounced as the severity of the disease increased. This could be explained by high viral replication in the digestive tract responsible for high viremia or by a delay in diagnosis at the onset of the disease due to isolated digestive signs without respiratory signs [9]. Our study has some limitations. This is a retrospective design and reporting bias may affect accurate estimates.

## 5. Conclusion

The COVID-19 pandemic, a highly contagious disease caused by the novel coronavirus SARS-CoV-2, is a global public health crisis. The lungs are the major organs involved in COVID-19. COVID-19 infection is not limited to the respiratory system but can affect multiple organs including the gastrointestinal tract. ACE2-positive cells in digestive tract tissue amplify potential pathways of SARS-CoV-2 infection. Patients may present GI symptoms alone or with respiratory symptoms. Physicians should be especially vigilant and suspect COVID-19 when at-risk patients, such as those exposed to COVID-19, present with digestive symptoms, even in the absence of respiratory symptoms. This allows for earlier identification of COVID-19 and prompt and appropriate treatment.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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