# Digestive Symptoms in COVID-19 Patients with Mild Disease Severity: Clinical Presentation, Stool Viral RNA Testing, and Outcomes

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**Running title:** Gastrointestinal Symptoms in COVID-19 Infection

**Word count：** 2076

**Guarantor of the article:** Xiaohua Hou MD, PhD, accepts official responsibility for the overall conduct of this study and publication of this manuscript.

**Specific author contributions:**

C. Han collected medical records data, analyzed the data and drafted the manuscript; C. Duan and S. Zhang helped for data statistics. B. Spiegel contributed revisions of the manuscript for important intellectual content. W. Wang and H. Shi helped with data collection; L. Zhang supported data entry and sorting; R. Lin and J. Liu checked the data to confirm accuracy; Z. Ding contributed revisions of the manuscript for important intellectual content; X. Hou designed, supervised the study and revised the manuscript

as the corresponding author.

**Financial support:** This study was supported by grants of a novel coronavirus pneumonia emergency science and technology projects from the Science and Technology Department of Hubei Province, Wuhan, China (2020FCA014). And part was supported by the National Natural Science Foundation of China (No. 81800467, 81974062) and International (Regional) Cooperation and Exchange (ICE) Projects of the National Natural Science Foundation of China (NSFC: No. 81720108006).

**Potential competing interests:** All authors state that they have no conflict of interest.

## STUDY HIGHLIGHTS

### What is Known

- Coronavirus disease 2019 (COVID-19) most commonly presents with respiratory symptoms, including cough, shortness of breath, and sore throat.
- However, digestive symptoms also occur in patients with COVID-19 and are often described in outpatients with less severe disease.
- In this study, we sought to describe the clinical characteristics, results of stool testing for viral RNA, and outcomes of COVID-19 patients with digestive symptoms and mild disease severity.

### What is New Here

- We describe a unique sub-group of COVID-19 patients with low severity disease marked by presence of digestive symptoms.
- These patients are more likely to test positive in stool for COVID-19 RNA, to have a longer delay before viral clearance, and to experience delayed diagnosis compared to patients with respiratory symptoms but no digestive symptoms.
- In some cases, the digestive symptoms, particularly diarrhea, can be the initial presentation of COVID-19, and may only later or never present with respiratory symptoms or fever.
- These data emphasize that patients with new-onset digestive symptoms after a possible COVID-19 contact should be suspected for the illness, even in the absence of cough, shortness of breath, sore throat, or fever.

## ABSTRACT

**Objectives:** Coronavirus disease 2019（COVID-19）most commonly presents with respiratory symptoms, including cough, shortness of breath, and sore throat. However, digestive symptoms also occur in patients with COVID-19 and are often described in outpatients with less severe disease. In this study, we sought to describe the clinical characteristics of COVID-19 patients with digestive symptoms and mild disease severity.

**Methods:** We identified COVID-19 patients with mild disease and one or more digestive symptoms (diarrhea, nausea, vomiting), with or without respiratory symptoms, and compared them to a group presenting solely with respiratory symptoms. We followed patients clinically until they tested negative for COVID-19 on at least two sequential respiratory tract specimens collected ≥24 hours apart. We then compared clinical features between those with digestive vs. respiratory symptoms.

**Results:** There were 206 patients with low severity COVID-19, including 48 presenting with a digestive symptom alone, 69 with both digestive and respiratory symptoms, and 89 with respiratory symptoms alone. Between the two groups with digestive symptoms, 67 presented with diarrhea, of whom 19.4% experienced diarrhea as the first symptom in their illness course. The diarrhea lasted from 1 to 14 days, with an average duration of 5.4±3.1 days and a frequency of 4.3±2.2 bowel movements per day. Concurrent fever was found in 62.4% of patients with a digestive symptom. Patients with digestive symptoms presented for care later than those with respiratory symptoms (16.0±7.7 vs. 11.6±5.1 days, $p<0.001$). Nevertheless, patients with digestive symptoms had a longer duration between symptom onset and viral clearance ($p<0.001$) and were more likely to be fecal virus positive (73.3% vs. 14.3%, $p=0.033$) vs. those with respiratory symptoms.

**Conclusions:** We describe a unique sub-group of COVID-19 patients with mild disease severity marked by presence of digestive symptoms. These patients are more likely to test positive for viral RNA in stool, to have a longer delay before viral clearance, and to experience delayed diagnosis compared to patients with only respiratory symptoms.

**Key words:** COVID-19; gastrointestinal system; prognosis; stool viral RNA

## INTRODUCTION

Coronavirus disease 2019 (COVID-19) has been declared an international public health emergency by the World Health Organization (WHO) (1-3). Up until now, the virus has spread to over 100 countries, infecting more than 700,000 people and causing over 35,000 deaths globally. Although COVID-19 most commonly presents with respiratory symptoms, such as cough and shortness of breath (5), there is evidence that the illness can also present with non-respiratory symptoms, most notably digestive symptoms such as diarrhea, diminished appetite, and nausea (4, 6, 7).

The digestive symptoms of COVID-19 likely occur because the virus enters target cells through angiotensin converting enzyme 2 (ACE2) (8), a receptor found in both the upper and lower gastrointestinal tract where it is expressed at nearly 100-fold higher levels than in respiratory organs (9). In addition, viral nucleic acid is detected in feces in over half of patients infected with COVID-19 (4), and in nearly one-quarter of cases stool samples test positive when respiratory samples are negative (6, 10).

Up to now, most of the emerging COVID-19 literature has focused on severe or critically-ill patients, yet over 80% of patients have mild disease (5, 11, 12). It is important to describe the clinical characteristics of low severity patients to provide information for early clinical recognition of COVID-19 and to prompt rapid self-quarantine for people with presumed symptoms who are not sick enough to warrant hospitalization. Moreover, mild patients can facilitate rapid dissemination of COVID-19 by unwittingly spreading the virus in the outpatient setting; this group appears to be a major driver of the pandemic (13). Because COVID-19 testing has largely focused on

patients with respiratory symptoms—not digestive symptoms—it is possible there is a large cohort of undiagnosed patients with low severity illness but with digestive symptoms, such as diarrhea, who unknowingly spread the virus. In this study, we sought to better understand the prevalence and clinical characteristics of this important COVID-19 sub-group with digestive symptoms and mild disease.

## METHODS

### Patient diagnosis and Inclusion criteria

This retrospective study was performed at Union Hospital, Tongji Medical College (Wuhan, China), which was a designated hospital to manage patients with COVID-19. We began by reviewing the clinical records of 850 consecutively hospitalized patients admitted between February 13th to February 29th, 2020, with laboratory-confirmed COVID-19 based on real-time reverse-transcriptase polymerase-chain-reaction (RT-PCR) assay for nasal and pharyngeal swab specimens (5). From this group, we included patients who met criteria for mild disease severity, defined as patients without dyspnea, without clinical evidence of respiratory distress, and able to maintain blood oxygen saturation above 93% in resting condition (14). Of note, these patients were admitted to hospital despite mild symptoms in order to monitor clinically and to maintain in quarantine during the peak of the Wuhan outbreak until they had two sequential negative respiratory tract specimens collected ≥24 hours apart according to Chinese Center for Disease Control guidance (4). We excluded patients from this study who were unable to provide a history of presenting illness and/or did not have complete clinical data available for extraction. We also excluded patients who had not yet

achieved viral clearance of COVID-19, and thus were not yet discharged at the time of this analysis. From this group, we systematically evaluated the symptoms recorded on the admission intake, supported by direct patient interviews using a standardized questionnaire and by telephone interview into the patient's room when necessary (due to extreme isolation precautions), to identify a cohort of patients with one or more digestive symptoms, including diarrhea, nausea, and vomiting.

We then matched each of these patients to another patient from the cohort with only respiratory—but not digestive—symptoms, including cough, expectoration, chest discomfort, shortness of breath, and sore throat. Matching was based on sequential hospital identification numbers, such that the next admitted patient who met study criteria but who lacked digestive symptoms was enrolled as a control. Finally, we further divided the patients with digestive symptoms into those with *only* digestive symptoms, and those with both digestive *and* respiratory symptoms, yielding three groups for comparison, herein referred to as "Digestive Only," "Digestive+Respiratory," and "Respiratory Only." We monitored clinical outcomes in these three groups up until March 18th, 2020, the final date of follow-up.

This study was approved by the Medical Ethical Review Committee, Union Hospital of Tongji Medical College, Huazhong University of Science and Technology, China ([2020] No.0033).

**Statistical analysis**

Categorical variable results are presented as numbers and percentages. Continuous variables are presented as mean ± standard deviation (SD), means, maximums and

minimums as appropriate. Chi-square tests and Fisher's exact tests were used for categorical variables and Wilcoxon rank-sum tests were applied to continuous variables as appropriate. Statistical analysis was performed using IBM SPSS Statistics software (version 20.0, IBM Corp, Armonk, NY, USA). A significance level of $P \leq 0.05$ was used for all models (two-sided).

## RESULTS

### Patient characteristics

**Figure 1** displays the patient flow with application of inclusion and exclusion criteria, yielding a final cohort of 206 patients. All the patients were residents of Wuhan with a mean age of 62.5 years (ranged from 27 to 92 years). One hundred seventeen were older than 60 years (56.8%) and just over half were female (55.8%). Only 21 (10.2%) were aware of a clear direct exposure to known patients with confirmed or highly suspected COVID-19 infection. No patients had a history of exposure to the Huanan seafood market where the outbreak began, or were part of a known familial cluster.

The three study groups are compared across clinical characteristics in **Table 1**. Although clinical features were largely similar among the three groups, the Digestive+Respiratory group was more likely to report shortness of breath and constitutional symptoms (fatigue and muscle soreness) compared to the the Respiratory Only group.

**Clinical characteristics of patients with gastrointestinal symptoms**

Sixty-seven patients presented with diarrhea (**Table 2**), of whom 13 (19.4%) experienced diarrhea as their first symptom prior to the onset of respiratory symptoms; the rest developed diarrhea within the first 10 days after the onset of respiratory symptoms. Women were more likely to report diarrhea than men (44/67, 65.7% vs. 71/139, 51.1%, p=0.048). The diarrhea lasted from 1 to 14 days, with an average duration of 5.4±3.1 days. The average daily frequency was 4.3±2.2 bowel movements per day (maximum of 18 per day). Patients described the diarrhea as "watery" in 52.2% of cases, with the remainder considered loose but not watery. Abdominal pain and discomfort were rarely observed in our cohort of patents with digestive symptoms.

Not all patients with digestive symptoms had an accompanying fever in this cohort of low severity COVID-19 patients; concurrent fever was found in 73 (62.4%) of patients with a digestive symptom (Table 2). Among those with diarrhea, in particular, 49 (73.1%) presented with concurrent fever, of which 10 (20.4%) had diarrhea before fever, 5 (10.2%) after fever, and the rest occurring simultaneously. Patients with both upper (e.g. nausea, vomiting) *and* lower (e.g. diarrhea) digestive symptoms were more likely to have a fever compared to those with either upper or lower symptoms, alone (94.4% vs. 57.1% vs. 63.3%; p=0.024).

**Delayed viral clearance among patients with digestive symptoms**

All patients in this study were discharged following viral clearance. The mean interval between symptom onset and viral clearance across the study cohort was 38.1 days (SD 8.7; range 15–62). The average hospital stay was 23.7 days while awaiting symptom resolution and objective evidence of viral clearance. Patients with digestive symptoms had a longer period between initial symptom onset and hospital admission

than patients with only respiratory symptoms (Table1, Figure 2A: 16.0±7.7 vs. 11.6±5.1 days, p<0.001). The total time between symptom onset and viral clearance was significantly longer in the Digestive Only and Digestive+Respiratory groups compared to the Respiratory Only group (40.9 vs. 42.0 vs. 33.5 days, p<0.001). Across groups, those with diarrhea had a longer delay between symptom onset and viral clearance than those without diarrhea (Table 2 and Figure 2B, 41.0±8.5 vs. 36.6±8.5 days, p<0.001).

**Results of stool testing for COVID-19 viral RNA**

Fecal leukocytes and occult blood tests were performed in all patients, but only 1.9% had abnormal results (2 with fecal leukocytes, 1 occult blood positive), consistent with the characteristics of viral diarrhea. Stool RNA was tested in a sub-group of 22 COVID-19 infected patients using Rrt-PCR. Twelve (54.5%) of these patients tested positive for viral RNA in stool. The percentage testing positive for the Digestive Only, Respiratory Only and Digestive+Respiratory groups were 60.0% (3/5), 14.3% (1/7) and 80.0% (8/10), respectively. Across groups, patients who were positive for viral RNA in stool had a significantly longer time to viral clearance compared to the ten negative patients (44.2 vs. 33.7 days, p=0.003). In addition, patients presenting with digestive symptoms were more likely to test positive for fecal virus (73.3% vs. 14.3%, p=0.033) (**Table 3**).

**DISCUSSION**

In this study of COVID-19 patients with mild disease severity, we describe a clinically important sub-group that presents with digestive symptoms. We found that compared to patients with only respiratory symptoms, those with digestive symptoms tend to have a longer course between symptom onset and viral clearance and are more likely to test positive for COVID-19 viral RNA in the stool, suggesting (but not confirming) direct infectivity of the virus on the intestinal tract. In addition, patients

with digestive symptoms took longer to report for medical care, a finding observed in other research from Wuhan, China (7), suggesting that COVID-19 was not initially recognized in these patients leading to delayed diagnosis.

The longer disease course in patients with digestive symptoms might reflect a higher viral burden in these patients in comparison to those with only respiratory symptoms. As the intestinal wall is invaded by COVID-19, there may be increased permeability and diminished barrier function, easier invasion of pathogens across a vast intestinal surface area, presence of enteric symptoms like diarrhea, and nutrient malabsorption (6). Recent evidence reveals that fecal nucleic acid is readily detected in the stool of patients with COVID-19 (4) and rectal swabs are also positive in some patients (15). Given the high prevalence of positive stools in patients with COVID-19, coupled with the correlation between diarrhea and stool positivity, we recommend routine rRT-PCR testing of feces in COVID-19 patients, especially those presenting with digestive symptoms.

In addition, ACE2 expression is higher in the small intestine, duodenum and colon than that in the lungs (9, 16). Patients with digestive symptoms have more virus in the gut based on our stool RNA testing results, and thus potentially greater opportunity to suffer direct damage on the gut mucosa. This might be another cause of digestive symptoms but should be further investigated.

Our study has limitations. First, although large enough to conduct valid comparisons among groups, the sample size remains limited; larger studies should be performed to further characterize digestive symptoms in patients with low severity

COVID-19. Future research should include antibody testing on outpatients who developed new-onset digestive symptoms during the COVID-19 outbreak, but who might not have sought care or been tested at the time, to compare antibody titers versus control groups who did not experience symptom during the pandemic.

Second, we were unable to perform correlations between presence of fecal virus RNA and severity of digestive symptoms, namely diarrhea severity, as we were not able to test stool RNA in a large enough sub-sample during the period this study was conducted early in the outbreak.

Third, because this was a retrospective study, there is always potential for bias. Nonetheless, we made systematic efforts to obtain a thorough and detailed history from each patient in this study, including chart review, but also supplemented in-person interviews. Even in cases when staff could not safely enter an isolation room, we performed telephone interviews into the patient's room to fill-in historical data that was not otherwise recorded in the chart using a standardized questionnaire.

Finally, this study does not directly confirm that viral particles in stool are infectious and capable of disease transmission, but our results offer more evidence that COVID-19 can present with digestive symptoms, that the virus is found in the stool of patients with diarrhea, and presents more indirect support of possible fecal transmission. Further research is vital to determine if COVID-19 can spread via the fecal-oral route.

In conclusion, we describe a unique sub-group of COVID-19 patients with low severity disease marked by the presence of digestive symptoms. These patients are more likely to test positive in stool for COVID-19 RNA, to have a longer delay before viral

clearance, and to experience delayed diagnosis compared to patients with respiratory symptoms. In some cases, the digestive symptom, particularly diarrhea, can be the initial presentation of COVID-19 and may only later (or never) present with respiratory symptoms. These data emphasize that patients with new-onset diarrhea after a possible COVID-19 contact should be suspected for the illness, even in the absence of cough, shortness of breath, sore throat, or even fever. These patients should self-quarantine and seek medical care if not already under evaluation. Optimally, testing for COVID-19 should be performed using both respiratory *and* stool samples, if available.

Importantly, digestive symptoms are common in the community, and most instances of new-onset diarrhea, nausea, or vomiting are not from COVID-19. Nonetheless, clinicians should recognize that new-onset, acute digestive symptoms in a patient with a possible COVID-19 contact should at least prompt consideration of the illness, particularly during times of high COVID-19 incidence and prevalence. Failure to recognize these patients early and often may lead to unwitting spread of the disease among outpatients with mild illness who remain undiagnosed and unaware of their potential to infect others. The data in this study highlight the presence and features of this important subgroup of COVID-19 patients and should be confirmed in larger international studies.

**Acknowledgements:**

We would like to express our heartfelt thanks to those on the front lines of this struggle: medical staff, community workers, cleaners, drivers, construction workers, and all the volunteers involved. We are also very grateful to those who sacrifice their freedom and isolated themselves to break the chain of transmission.

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**Table1.** Baseline patient characteristics based on the classification of presenting symptoms in COVID-19 patients with mild disease severity.

| Items | Total (N=206) | Digestive Only (N=48) | Respiratory only (N=89) | Digestive+ Respiratory (N=69) | P |
|---|---|---|---|---|---|
| **Age (years)** | 62.5 (27-92) | 63.5 (32-92) | 65 (27-91) | 56 (27-84) | **0.004** |
| **Gender (Male/Female)** | 91/115 | 13/35 | 48/41 | 30/39 | **0.010** |
| **Fever** | 138 (67.0%) | 19 (39.6%) | 65 (73.0%) | 54 (78.3%) | **<0.001** |
| **Temperature, °C** | 38.5 (37.3-40.0) | 38.5 (37.3-39.8) | 38.5 (37.3-40.0) | 38.4 (37.3-39.8) | 0.725 |
| **Digestive symptoms** | | | | | |
| Poor appetite | 70 (34.0%) | 31 (64.6%) | 0 (0.0%) | 39 (56.5%) | 0.382 |
| Low appetite | 32 (15.5%) | 15 (31.3%) | 0 (0.0%) | 17 (24.6%) | 0.430 |
| Vomit | 24 (11.7%) | 7 (14.6%) | 0 (0.0%) | 17 (24.6%) | 0.185 |
| Diarrhea | 67 (32.5%) | 23 (47.9%) | 0 (0.0%) | 44 (63.8%) | 0.088 |
| Abdominal pain | 9 (4.4%) | 2(4.2%) | 0 (0.0%) | 7 (10.1%) | 0.400 |
| **Respiratory symptoms** | | | | | |
| Cough/Expectoration | 53 (25.7%) | 0 (0.0%) | 26 (29.2%) | 27 (39.1%) | 0.190 |
| Chest distress | 49 (23.8%) | 0 (0.0%) | 23 (25.8%) | 26 (37.7%) | 0.111 |
| Shortness of breath | 30 (14.6%) | 0 (0.0%) | 9 (10.1%) | 21 (30.4%) | **0.001** |
| Pharyngodynia | 13(6.4%) | 0 (0.0%) | 6 (6.7%) | 7 (10.1%) | 0.440 |
| Others[a] | 22(10.7%) | 0 (0.0%) | 13(14.6%) | 9(13.0%) | 0.778 |
| **Constitutional symptoms** | | | | | |
| Fatigue | 93(45.1%) | 25(52.1%) | 28 (31.5%) | 40 (60.0%) | **0.002** |
| Muscle soreness | 44 (21.4%) | 6 (12.5%) | 12 (13.5%) | 26 (37.7%) | **<0.001** |
| Others[b] | 30(14.6%) | 6 (12.5%) | 6 (6.7%) | 18 (26.1%) | **0.003** |
| **Presenting Comorbidity** | | | | | |
| Hypertension | 56(27.2%) | 12 (25.0%) | 24 (27.0%) | 20 (29.0%) | 0.891 |
| Diabetes | 21(10.2%) | 6 (12.5%) | 7 (7.9%) | 8 (11.6%) | 0.621 |
| Cerebrovascular disease | 17(8.3%) | 6 (12.5%) | 7(7.9%) | 4(5.8%) | 0.425 |
| Chronic lung disease | 8 (3.9%) | 2 (4.2%) | 3(3.4%) | 3 (4.3%) | 0.945 |
| Others[c] | 16(7.8%) | 3 (6.3%) | 7 (7.9%) | 6 (8.7%) | 0.888 |
| **Process(days)** | | | | | |
| Before admission | 14.4±7.2 | 16.0±7.7 | 11.6±5.1 | 12.2±8.6 | **<0.001** |
| Hospital stays | 23.7±7.3 | 24.9±7.4 | 21.9±7.0 | 25.3±7.0 | **0.006** |
| The total | 38.1±8.7 | 40.9±8.8 | 33.5±7.0 | 42.0±7.9 | **<0.001** |

Others[a] included stuffiness, runny nose and dyspnea. Others[b] included night sweat, headache and dizziness. Others[c] included thyroid disease, gout and surgical history. In digestive symptoms, p values were compared between the Digestive only and Digestive+Respiratory groups. In respiratory symptoms, p values were compared between the Respiratory and Digestive+Respiratory groups. A significance level of P≤0.05 was used.

**Table2.** Duration of COVID-19 course stratified by study groups. Hospital stay reflects time between admission and subsequent confirmation of viral clearance on two sequential respiratory samples separated by ≥24 hours.

| Groups | Total (including Respiratory) | | | Digestive Only | | | Digestive + Respiratory | | |
|---|---|---|---|---|---|---|---|---|---|
| **Items** | **With Diarrhea (N=67)** | **Without Diarrhea (N=139)** | **P** | **With Diarrhea (N=23)** | **Without Diarrhea (N=25)** | **P** | **With Diarrhea (N=44)** | **Without Diarrhea (N=25)** | **P** |
| **Duration (days)** | | | | | | | | | |
| **Before admission** | 16.2±7.9 | 13.5±6.6 | **0.011** | 16.1±7.6 | 15.9±7.8 | 0.913 | 16.3±8.0 | 17.8±7.3 | 0.455 |
| **Hospital stays** | 24.9±7.8 | 23.2±6.9 | 0.113 | 23.6±7.5 | 26.2±7.1 | 0.234 | 25.6±7.8 | 24.8±5.1 | 0.649 |
| **Total duration** | 41.0±8.5 | 36.6±8.5 | **<0.001** | 39.7±8.4 | 42.0±9.0 | 0.373 | 41.7±8.5 | 42.5±6.7 | 0.669 |

| Groups | Patients with Diarrhea | | | Patients without diarrhea | | | |
|---|---|---|---|---|---|---|---|
| **Items** | **Digestive Only (N=23)** | **Digestive +Respiratory (N=44)** | **P** | **Digestive Only (N=25)** | **Digestive +Respiratory (N=25)** | **Respiratory only (N=89)** | **P** |
| **Duration (days)** | | | | | | | |
| **Before admission** | 16.1±7.6 | 16.3±8.0 | 0.945 | 15.9±7.8 | 17.8±7.3 | 11.6±5.1 | **<0.001** |
| **Hospital stays** | 23.6±7.5 | 25.6±7.8 | 0.324 | 26.2±7.1 | 24.8±5.1 | 21.9±7.0 | **0.010** |
| **Total duration** | 39.7±8.4 | 41.7±8.5 | 0.366 | 42.0±9.0 | 42.5±6.7 | 33.5±7.0 | **<0.001** |

| Groups | Total (including Respiratory) | | | Digestive Only | | | Digestive + Respiratory | | |
|---|---|---|---|---|---|---|---|---|---|
| **Items** | **With Fever (N=138)** | **Without Fever (N=68)** | **P** | **With Fever (N=19)** | **Without Fever (N=29)** | **P** | **With Fever (N=54)** | **Without Fever (N=15)** | **P** |
| **Duration (days)** | | | | | | | | | |
| **Before admission** | 13.8±6.6 | 15.6±8.0 | 0.093 | 12.6±5.3 | 18.2±8.2 | **0.014** | 17.3±7.4 | 15.1±8.9 | 0.336 |
| **Hospital stays** | 24.3±6.8 | 22.6±8.1 | 0.126 | 28.2±6.8 | 22.8±7.0 | **0.013** | 24.5±6.6 | 28.2±7.5 | 0.068 |
| **Total duration** | 38.1±8.0 | 38.0±10.0 | 0.974 | 40.8±6.9 | 40.9±9.9 | 0.958 | 41.8±7.9 | 42.7±7.7 | 0.678 |

| Groups | Patients with Fever | | | | Patients without Fever | | | |
|---|---|---|---|---|---|---|---|---|
| **Items** | **Digestive Only (N=19)** | **Digestive +Respiratory (N=54)** | **Respiratory only (N=65)** | **P** | **Digestive Only (N=29)** | **Digestive +Respiratory (N=15)** | **Respiratory only (N=24)** | **P** |
| **Duration (days)** | | | | | | | | |
| **Before admission** | 12.6±5.3 | 17.3±7.4 | 11.2±4.8 | **<0.001** | 18.2±8.2 | 15.1±8.9 | 12.8±5.8 | **0.045** |
| **Hospital stays** | 28.2±6.8 | 24.5±6.6 | 23.0±6.4 | **0.0120** | 22.8±7.0 | 28.2±7.5 | 18.9±7.5 | **0.002** |
| **Total duration** | 40.8±6.9 | 41.8±7.9 | 34.2±6.4 | **<0.001** | 40.9±9.9 | 42.7±7.7 | 31.6±8.1 | **<0.001** |

| Groups | Total | | | | Digestive Only | | | | Digestive + Respiratory | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Items** | **Upper (N=22)** | **Lower (N=49)** | **Both (N=18)** | **P** | **Upper (N=14)** | **Lower (N=19)** | **Both (N=4)** | **P** | **Upper (N=8)** | **Lower (N=30)** | **Both (N=14)** | **P** |
| **Duration (days)** | | | | | | | | | | | | |
| **Before admission** | 16.3±6.9 | 16.9±8.1 | 14.7±7.1 | 0.577 | 16.6±7.9 | 16.7±8.1 | 13.3±3.3 | 0.728 | 15.9±4.8 | 17.1±8.1 | 17.1±7.8 | 0.722 |
| **Hospital stays** | 24.1±4.3 | 24.7±8.5 | 27..0±6.9 | 0.439 | 24.2±5.1 | 23.3±9.2 | 30.3±3.8 | 0.271 | 23.9±2.4 | 25.7±7.9 | 26.1±7.3 | 0.786 |
| **Total duration** | 40.3±7.2 | 41.5±8.5 | 41.7±8.6 | 0.838 | 40.6±8.2 | 39.9±9.3 | 43.5±4.3 | 0.788 | 39.8±5.1 | 42.5±7.8 | 43.1±9.4 | 0.680 |

| Groups | Upper gastrointestinal tract | | | Lower gastrointestinal tract | | |
|---|---|---|---|---|---|---|
| **Items** | **Digestive Only (N=14)** | **Digestive +Respiratory (N=8)** | **P** | **Digestive Only (N=19)** | **Digestive +Respiratory (N=30)** | **P** |
| **Duration (days)** | | | | | | |
| **Before admission** | 16.6±7.9 | 15.9±4.8 | 0.831 | 16.7±8.1 | 17.1±8.1 | 0.875 |
| **Hospital stays** | 24.2±5.1 | 23.9±2.4 | 0.868 | 23.3±9.2 | 25.7±7.9 | 0.347 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Total duration** | 40.6±8.2 | 39.8±5.1 | 0.793 | 39.9±9.3 | 42.5±7.8 | 0.325 |

Patients were presented with systemic symptoms of the digestive tract, loss of appetite were excluded in the Upper, Low and Both groups. A significance level of $P \leq 0.05$ was used.

**Table 3.** Clinical characteristics of the sub-set of COVID-19 patients tested for viral RNA in stool (N=22).

| Number/Items | Age(y) | Gender | Fever | CT | T | D | R | D+R | S | Disease Course (days)* |
|---|---|---|---|---|---|---|---|---|---|---|
| Patient1 | 51 | Female | + | + | + | + | − | − | + | 29 |
| Patient2 | 56 | Female | + | + | + | + | − | − | − | 50 |
| Patient3 | 27 | Female | − | + | + | + | − | − | + | 43 |
| Patient4 | 32 | Male | + | + | + | + | − | − | + | 53 |
| Patient5 | 57 | Male | − | + | + | + | − | − | − | 39 |
| Patient6 | 27 | Female | − | + | + | − | + | − | + | 47 |
| Patient7 | 28 | Male | + | + | + | − | + | − | − | 31 |
| Patient8 | 28 | Female | + | + | + | − | + | − | − | 30 |
| Patient9 | 48 | Female | + | + | + | − | + | − | − | 31 |
| Patient10 | 42 | Female | − | + | + | − | + | − | − | 29 |
| Patient11 | 37 | Male | + | + | + | − | + | − | − | 25 |
| Patient12 | 71 | Male | − | + | + | − | + | − | − | 28 |
| Patient13 | 30 | Female | + | + | + | − | − | + | + | 48 |
| Patient14 | 27 | Female | − | + | + | − | − | + | − | 42 |
| Patient15 | 27 | Female | + | + | + | − | − | + | + | 52 |
| Patient16 | 36 | Female | + | + | + | − | − | + | − | 32 |
| Patient17 | 49 | Male | + | + | + | − | − | + | + | 43 |
| Patient18 | 46 | Male | + | + | + | − | − | + | + | 44 |
| Patient19 | 57 | Female | + | + | + | − | − | + | + | 47 |
| Patient20 | 68 | Male | − | + | + | − | − | + | + | 36 |
| Patient21 | 56 | Male | + | + | + | − | − | + | + | 49 |
| Patient22 | 52 | Female | + | + | + | − | − | + | + | 39 |

T: throat swab specimens, S: tested virus in stool, CT: computerized tomography, D: digestive symptoms only cases; R: respiratory symptoms only cases; D+R: both digestive and respiratory symptoms.

* Disease course refers to the time interval between initial symptom onset and subsequent viral clearance, defined as two negative sputum samples tested ≥24 hours apart.

**Figure 1.** Disposition of study patients. There were 131 patients with digestive symptoms, each matched to one control patient who presented with respiratory symptoms only. Of these 262 patients, full historical and clinical data were available for 223 patients, of whom 206 had cleared the virus and were discharged from quarantine at the time this study was conducted, including 48 with digestive symptoms only, 69 with both digestive and respiratory symptoms, and 89 with respiratory symptoms only.

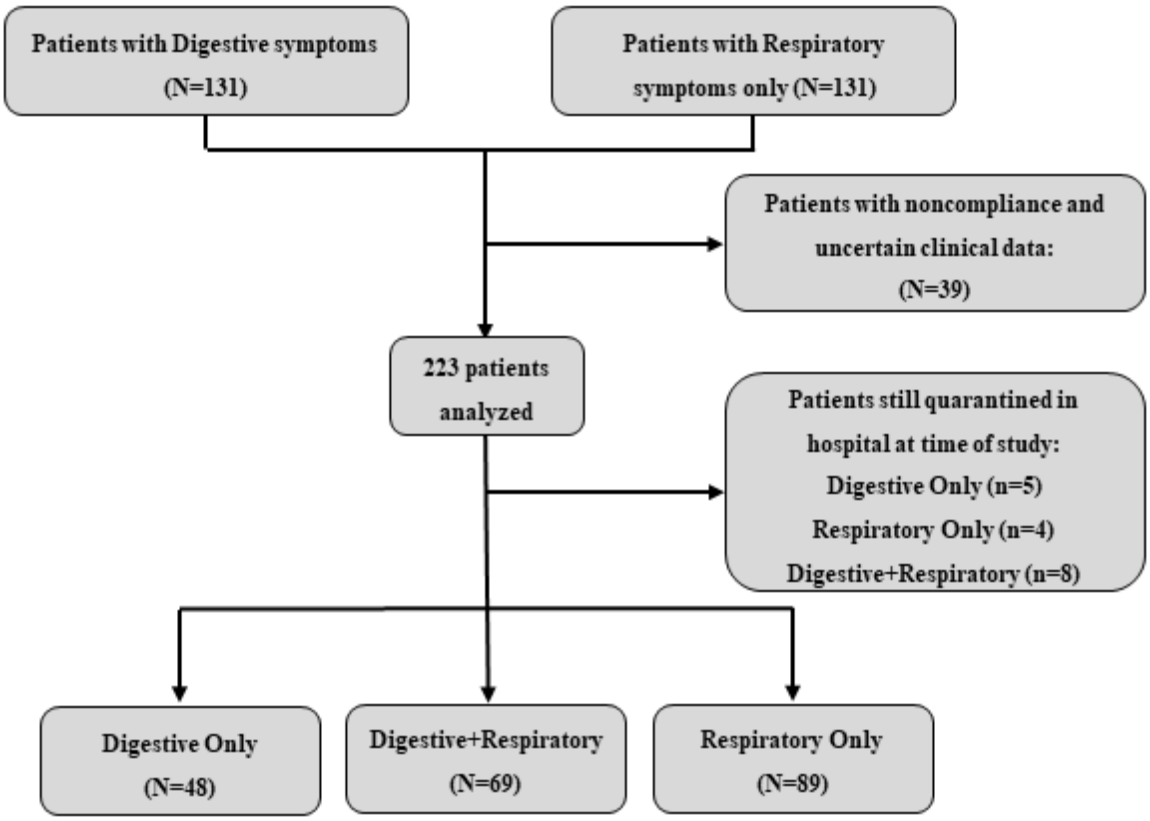

**Figure 2.** Illness duration (in days), including days before admission, total time in hospital before evidence of viral clearance, and total duration between symptom onset and viral clearance. Panel A provides data across the full study cohort. Panel B compares data between those with versus without diarrhea, demonstrating a longer disease course in those with diarrhea. Panel C focuses on those with digestive symptoms only and compares those with versus without diarrhea upon presentation (no differences noted). Panel D repeats the same analyses in those presenting with Digestive+Respiratory symptoms, also showing no difference in illness durations stratified by diarrhea. Panel E focuses only on those with digestive symptoms only and compares those with versus without fever upon presentation (no differences noted). Panel F repeats the same analyses in those presenting with Digestive+Respiratory symptoms, also showing no difference in illness durations stratified by fever.