

Clinical characteristics of COVID-19 patients with digestive symptoms in Hubei, China: a descriptive, cross-sectional, multicenter study

Lei Pan, MD, PhD^{1,2*}, Mi Mu, MD^{3,4*}, Hong Gang Ren, MD^{5*}, Pengcheng Yang, MD^{6*}, Yu Sun, MD⁷, Rungsheng Wang, MS⁸, Junhong Yan, MD⁹, Pibao Li, MD¹⁰, Baoguang Hu, MD, PhD¹¹, Chaohu, MS⁸, Yuan Jin, MD⁷, Xun Niu, MD⁷, Rongyu Ping, MD², Yingzhen Du, MD⁸, Tianzhi Li, MD², Chengxia Liu, MD^{12†}, Guogang Xu, MD, PhD^{2†}, Qinyong Hu, MD^{6†}, Lei Tu, MD, PhD^{13†}

on behalf of Wuhan Medical Treatment Expert Group for COVID-19

Authors' Affiliation:

¹Department of Respiratory and Critical Care Medicine, Binzhou Medical University Hospital, Binzhou, China

²The Second Medical Center & National Clinical Research Center for Geriatric Diseases, Chinese PLA General Hospital, Beijing, China

³Medical College of PLA, Chinese PLA General Hospital, Beijing, China

⁴Department of Respiratory Medicine, the Eighth Medical Center of PLA General Hospital, Beijing, China

⁵Department of Internal Medicine, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

⁶Cancer Center, Renmin Hospital of Wuhan University, Wuhan, China

⁷Department of Otorhinolaryngology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

⁸Department of Respiratory Medicine, The Second Medical Center & National Clinical Research Center for Geriatric Diseases, Medical College of PLA, Chinese PLA General Hospital, Beijing, China

⁹Department of Ultrasound, Binzhou Medical University Hospital, Binzhou, China

¹⁰Department of Critical Care Medicine, Shandong Provincial Third Hospital, Jinan, China

¹¹Department of Gastrointestinal Surgery, Binzhou Medical University Hospital, Binzhou,

China

¹²Department of Gastroenterology, Binzhou Medical University Hospital, Binzhou, China

¹³Division of Gastroenterology, Union Hospital, Tongji Medical college, Huazhong University of Science and Technology, Wuhan, China

* Lei Pan, Mi Mu, Hong Gang Ren and Peng Cheng Yang contributed equally to this article.

Corresponding Authors: Professor Lei Tu, Division of Gastroenterology, Union Hospital, Tongji Medical college, Huazhong University of Science and Technology, Wuhan, China. E-mail address: tulei_1985@126.com

Professor Qinyong Hu, Cancer Center, Renmin Hospital of Wuhan University, Wuhan, China. E-mail address: rm001223@whu.edu.cn

Professor Guogang Xu, The Second Medical Center & National Clinical Research Center for Geriatric Diseases, Chinese PLA General Hospital, Beijing, China. E-mail address: guogang_xu@163.com

Professor Chengxia Liu, Department of Gastroenterology, Binzhou Medical University Hospital, 661 Yellow River Road, Binzhou, China. E-mail address: phdlcx@163.com

ABSTRACT

Background: Since the outbreak of Corona Virus Disease 2019 (COVID-19) in December 2019, various digestive symptoms have been frequently reported in patients infected with the virus. In this study, we aimed to further investigate the prevalence and outcomes of COVID-19 patients with digestive symptoms.

Methods: In this descriptive, cross-sectional, multicenter study, we enrolled confirmed patients with COVID-19 who presented to three hospitals from January 18th to February 28th, 2020. All patients were confirmed by real-time RT-PCR and were analyzed for clinical characteristics, laboratory data, and treatment. Data were followed up until March 5th, 2020.

Results: In the present study, 204 patients with COVID-19 and full laboratory, imaging, and historical data were analyzed. The average age was 54.9 years (SD \pm 15.4), including 107 men and 97 women. We found that 99 patients (48.5%) presented to the hospital with digestive symptoms as their chief complaint. Patients with digestive symptoms had a significantly longer time from onset to admission than patients without digestive symptoms (9.0 days vs. 7.3 days). Patients with digestive symptoms had a variety of manifestations, such as anorexia (83 [83.8%] cases), diarrhea (29 [29.3%] cases), vomiting (8 [0.8%] cases), and abdominal pain (4 [0.4%] cases). In 7 cases there were digestive symptoms but no respiratory symptoms. As the severity of the disease increased, digestive symptoms became more pronounced. Patients without digestive symptoms were more likely to be cured and discharged than patients with digestive symptoms (60% vs. 34.3%). Laboratory data revealed no significant liver injury in this case series.

Conclusion: We found that digestive symptoms are common in patients with COVID-19. Moreover, these patients have a longer time from onset to admission and their prognosis is worse than patients without digestive symptoms. Clinicians should recognize that digestive symptoms, such as diarrhea, may be a presenting feature of COVID-19, and that the index of suspicion may need to be raised earlier in at-risk patients presenting with digestive symptoms rather than waiting for respiratory symptoms to emerge. However, further large sample studies are needed to confirm these findings.

INTRODUCTION

On January 7th, 2020, a novel coronavirus was isolated and named as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses (ICTV) in the wake of an outbreak of pneumonia of unknown cause in Wuhan city, China [1,2]. This pneumonia was called coronavirus disease 2019 (COVID-19) by the World Health Organization on February 11th, 2020. As of this writing, the COVID-19 outbreak has become a pandemic that is threatening global health, undermining the global economy, and destabilizing societies across the world[3-5].

It is well established that most patients with COVID-19 have fever along with respiratory signs and symptoms, such as cough and dyspnea[6-9]. As of this writing, there is some uncertainty about the prevalence of extra-pulmonary symptoms, such as those arising from the gastrointestinal tract. However, with the evolution of the pandemic and the accumulation of case data, we are now able to describe the initial clinical presentations and chief complaint of patients with COVID-19; our experience is revealing in that digestive symptoms are very common[10]. In particular, our initial observations with COVID-19 indicate that many patients present initially with diarrhea, anorexia, and vomiting, not necessarily with respiratory symptoms. In this study, we enrolled patients confirmed to have COVID-19 from 3 hospitals in Hubei province, and investigated the prevalence, clinical characteristics, and outcomes of COVID-19 patients with vs. without digestive symptoms.

METHODS

Study design and participants

This descriptive, cross-sectional, multicenter study was conducted in China, from January 18th to February 28th, 2020. All patients were recruited from 3 hospitals in Hubei province, including Wuhan Hanan Hospital, Wuhan Union Hospital, and Huanggang Central Hospital. This study was approved by the Ethics Committee of the above 3 hospitals.

We applied two inclusion criteria: (1) all adult patients were confirmed by real-time RT-PCR and were diagnosed as having COVID-19 according to WHO interim guidance; (2) all patients underwent chest computerized tomography and complete panel of routine laboratory tests, including complete blood count, urinalysis, blood biochemistry, and blood coagulation function. Patients who did not meet the above inclusion criteria were excluded from the study.

Procedures

The epidemiological history, demographics data, clinical characteristics, laboratory data, treatment programs, and outcome measures were obtained from patients' medical records. Clinical outcomes were followed up to March 5th, 2020. Data were collected as comprehensively as possible through a combination of chart review and, when necessary, through communication with attending doctors and other medical workers to fill-in missing data. All data were separately extracted by two authors (Lei Tu and Mi Mou). Throat swab specimens from the upper respiratory tract obtained from all patients at admission were immediately maintained in viral-transport medium and were tested to confirm COVID-19 by real-time RT-PCR[13]. Additionally, other respiratory viruses including influenza A virus, influenza B virus, and respiratory syncytial virus were also examined. All patients underwent chest computerized tomography (CT).

Outcome data

We extracted the epidemiological history (i.e., clear contact history and unclear contact history), demographic data, clinical characteristics including respiratory symptoms and digestive symptoms on admission, comorbidities, laboratory data, treatment programs, and

clinical outcomes (remained in hospital, discharged, or died).

Statistical analysis

Descriptive data were presented as means (\pm standard deviation [SD]) for normally distributed continuous variables and as medians with interquartile range (IQR) for non-normally distributed data. Categorical variables were presented as percentages. For laboratory results, we also assessed whether the measurements were outside the normal range. All statistical analyses were performed using SPSS version 20 (SPSS, Chicago, IL, USA). Two independent samples were tested by T-test; the analysis of variance or Kruskal-Wallis rank sum test was used for comparison between multiple groups. The chi-square test was performed to compare count data, and a two-tailed $P < 0.05$ was considered statistically significant.

RESULTS

Patients flow and baseline characteristics

To build our final study sample, we began by randomly selecting 310 patients with pneumonia of unknown cause admitted to the general wards and intensive care units in the partner hospitals during the study period (January 18th to February 28th, 2020), which coincided with the initial outbreak of COVID-19 in our region. We excluded 96 patients who lacked complete data, such as no chest CT, missing nucleic acid of SARS-CoV-2 test, a negative SARS-CoV-2 test, or lacked a full set of laboratory data. This resulted in an analyzable population of 204 COVID-19 positive patients, of whom 74 (36%) were critically ill. The last follow-up at the time of writing this study was March 5th, 2020.

The baseline characteristics of 204 patients with COVID-19 are provided in **Table 1**. The average age was 54.9 years (SD \pm 15.4), including 107 men and 97 women. The average time from symptom onset to hospital admission was 8.1 days (SD \pm 4.9). Based on epidemiological history, we found that most patients could not recall a clear history of a known exposure. There were 54 (26.5%) patients with cardiovascular diseases, 25 (12.3%) patients with endocrine system diseases, and others with respiratory diseases (12 [13.2%]), malignant tumors (7 [3.43%]) and other disorders as shown in Table 1. After admission, there were 184 (26.5%) patients receiving antiviral treatment (e.g., lopinavir/ritonavir), 132 (64.7%) on antibiotics, 90 (44.1%) on glucocorticoids, 85 (41.7%) on nebulized α -interferon, 43 (21.1%) on intravenous immunoglobulin, 13 (6.4%) using probiotics, and 6 (3.0%) on antifungal treatment. Additionally, 16 patients were transferred to the ICU (7.8%), 71 were still remaining in hospital at the time this study was completed (34.8%), 97 were discharged (47.5%), and 36 (17.6%) died. Among the discharged patients, the average hospital stay was 16.3 days (SD \pm 6.9), and the average length of stay in the ICU was 7.8 days (SD \pm 5.8).

Prevalence and Outcomes of Patients with Digestive Symptoms

The clinical features and medical treatment of COVID-19 patients with digestive symptoms are shown in **Table 1**. We found that 99 patients (48.5%) were admitted to the

hospital with one or more digestive symptoms as their chief complaint. Of these 99 patients, 92 developed respiratory symptoms along with digestive symptoms, and 7 presented with only digestive symptoms in the absence of respiratory symptoms. Among the 105 patients without digestive symptoms, 85 presented only with respiratory symptoms, and 20 neither had respiratory nor digestive symptoms as their chief complaint. **Figure 2** shows a breakdown of these categories.

Patients with digestive symptoms had a significantly longer time from onset to hospital admission vs. patients without digestive symptoms (9.0 days vs. 7.3 days, $p=0.02$). In **Table 2**, we found that patients with digestive symptoms had a variety of digestive manifestations including anorexia (83 [83.8%] cases), diarrhea (29 [29.3%] cases), vomiting (8 [0.8%] cases), and abdominal pain (4 [0.4%] cases). If anorexia is excluded from the analysis (since it is less specific for the gastrointestinal tract), there were 41 total cases (20%) where patients presented with a gastrointestinal specific symptom, including diarrhea, vomiting, or abdominal pain. Cases of diarrhea were usually not high volume or clinically severe, but more commonly presented as non-dehydrating loose stools, typically up to thrice daily. Moreover, as the severity of the disease increased, digestive symptoms become more pronounced. Patients without digestive symptoms were more likely to be cured and discharged at the time of this study than patients with digestive symptoms (60% vs. 34.3%).

In addition, we conducted statistics for laboratory tests and found no obvious injury to liver function and kidney function (see **Table 3**). No significant differences were found in complete blood count, electrolytes, and C-reactive protein when comparing patients with vs. those without digestive symptoms. However, we did find that prothrombin time prolongation was more significant in patients with vs. without digestive symptoms (14.1s vs. 12.5s), while other indicators of coagulation function were not significantly different.

DISCUSSION

The present study was conducted by reviewing the medical records of patients with COVID-19 from January 18th to February 28th, 2020, in three heavily affected hospitals during the initial outbreak in China. We found that digestive symptoms are a common presenting complaint in patients with COVID-19. Compared to patients without digestive symptoms, those presenting with digestive symptoms have a longer time from onset to admission and a worse prognosis. However, our preliminary findings should be further confirmed in additional large sample studies.

At the time of this writing in March 2020, the COVID-19 pandemic remains severe and expanding. In clinical practice, COVID-19 patients are still mainly affected by the respiratory system, but evidence of damage to other system organs has been reported[14,15], and especially critical patients are susceptible to multiple organ dysfunction[16]. Our results indicate that nearly one-half of COVID-19 patients admitted to the hospital reported digestive symptoms as their chief complaint, mostly commonly anorexia and diarrhea. This is important because if clinicians solely monitor for respiratory symptoms to establish case definitions for COVID-19, they may miss cases initially presenting with extra-pulmonary symptoms, or the disease may not be diagnosed later until respiratory symptoms emerge. This theory is supported by our finding that patients with digestive symptoms had a significantly longer time from onset to admission than those without digestive symptoms, possibly because they did not initially exhibit typical respiratory symptoms and thus did not receive timely diagnoses and treatment for COVID-19. Of note, it was reported that many medical staff in China were infected at the beginning of the epidemic. Although this was related to improper protection of medical personnel early on, it may also have resulted from failing to consider COVID-19 in the face of atypical extra-pulmonary symptoms, especially those with digestive symptoms at the beginning of the outbreak.

There are many reasons why COVID-19 appears to cause digestive symptoms. Firstly, SARS-CoV-2 is similar to SARS-CoV and can invade the human body by binding to the

human angiotensin converting enzyme 2 (ACE-2) receptor, which causes liver tissue injury by up-regulation of ACE-2 expression in liver tissue caused by compensatory proliferation of hepatocytes derived from bile duct epithelial cells[17]. Secondly, SARS-CoV-2 indirectly or directly damages the digestive system through an inflammatory response. The chain reaction of inflammatory factors and viremia may injure the digestive system. Studies reveal that viral nucleic acid is detected in stool samples in up to 53.4% of patients [18-20]. Enteropathic viruses may directly damage the intestinal mucosa and cause digestive symptoms, but further research is needed to confirm this possibility. Thirdly, the intestinal flora is colonized in the human intestine, and their numbers are astonishing and diverse. The intestinal flora plays a variety of important physiological roles in the body, such as affecting the body's nutritional metabolism, regulating the development and maturation of the body's immune system, and antibacterial effects[21]. The virus itself may cause disorders of the intestinal flora, which could result in digestive symptoms. We are currently in the process of collecting stool samples for testing of intestinal flora diversity to explore the role of intestinal flora in this disease. Finally, the intestine is the largest immune organ in the body. Changes in the composition and function of the digestive tract flora affect the respiratory tract through the common mucosal immune system, and respiratory tract flora disorders also affect the digestive tract through immune regulation. The effect is called the “gut-lung axis”[22,23], which may further explain why patients with COVID-19 pneumonia often have digestive symptoms.

Curiously, our data indicate that patients with digestive symptoms in our case series rarely had underlying digestive diseases. Unlike other studies[14,15], we did not find significant liver injury, which was similar to Wu et al’s findings[24]. It is difficult to speculate why there are variations in liver test abnormalities among studies, but these variations should be further investigated to better understand how and when COVID-19 affects hepatic function.

Importantly, our results indicate that as the severity of the disease increases, digestive symptoms become more pronounced. Patients without digestive symptoms in this study were more likely to be cured and discharged than patients with digestive symptoms. It remains

unclear why there were differences in mortality between patients with vs. without digestive symptoms. One possibility is that digestive symptoms indicate viral load and replication within the gastrointestinal tract, which leads to more severe disease. Another possibility is that patients with extra-pulmonary symptoms reported later for care because they did not initially have typical respiratory symptoms, and thus presented at a later and less curable stage of disease. These hypotheses deserve close examination in future research.

The present study has several limitations. Firstly, our analysis was based on a retrospective study with a relatively small sample, which might cause bias and limit the reliability or generalizability of our results. Second, we did not test for RNA of SARS-CoV-2 in the stool of patients with COVID-19, so we cannot correlate digestive symptom prevalence and severity with presence of viral RNA in stool specimens. Future research needs to focus on this relationship in order to further explore the prognostic value of stool testing as both a diagnostic and prognostic indicator in COVID-19. Finally, given the dynamic nature of the current COVID19 pandemic, many of our patients were still hospitalized at the time of this writing; the relationship between these patients' prognosis and digestive symptoms remains to be investigated.

Conclusions

In summary, we have found that patients with COVID-19 are prone to digestive symptoms and nearly half report a digestive symptom as their chief complaint. In rare instances, patient can even present with digestive symptoms in the absence of respiratory symptoms. Compared to COVID-19 patients without digestive symptoms, those with digestive symptoms have a longer time from onset to admission and a worse clinical outcome. These results obligate additional research evaluating the prevalence, incidence, predictors, and outcomes of digestive symptoms in this still emerging pandemic. In the meantime, clinicians must bear in mind that digestive symptoms, such as diarrhea, may be a presenting feature of COVID-19 that arise before respiratory symptoms, and on rare occasions are the only presenting symptom of COVID-19. Clinicians should raise their index of suspicion when

at-risk patients, such as those exposed to COVID-19, present with fever and digestive symptoms, even in the absence of respiratory symptoms. This knowledge may help with earlier identification of COVID-19, faster time to treatment, earlier quarantine, and lower exposure to bystanders.

Conflict of interest

Guarantor of the article: Lei Pan, Guogang Xu, and Lei Tu accept full responsibility for the conduct of the study.

Specific author contributions: Conceiving and designing the experiments: Lei Pan, Guogang Xu, Lei Tu. Case collection: Mi Mu, Chao Hu, Yuan Jin, Rongyu Ping, Yingzhen Du, Tianzhi Li, Jun-Hong Yan. Data Extraction: Xun Niu, Pengcheng Yang, Yu Sun, Runsheng Wang. Statistical Analysis: Lei Pan, Hong Gang Ren, Mi Mu. Interpretation of results: Chengxia Liu, Pibao Li, Baoguang Hu, Guogang Xu, Qinyong Hu, Lei Tu. Writing and revising paper: Lei Pan, Guogang Xu, Honggang Ren, Mi Mu, Pengcheng Yang, Yu Sun.

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Potential competing interests: None.

Study Highlights

WHAT IS CURRENT KNOWLEDGE

- ✓ COVID-19 is currently a pandemic that threatens global health
- ✓ Most patients with COVID-19 present with typical respiratory symptoms and signs.
- ✓ However, early experience with the outbreak in Wuhan, China, revealed that many people experienced extra-pulmonary digestive symptoms as their chief complaint.

WHAT IS NEW HERE

- ✓ Digestive symptoms are common in COVID-19, occurring as the chief complaint in nearly half of patients; in rare cases digestive symptoms may occur in the absence of any respiratory symptoms
- ✓ COVID-19 patients with digestive symptoms have a longer time from symptom onset to admission than that of patients without digestive symptoms; this may reflect diagnostic delay since typical respiratory symptoms were not initially predominant
- ✓ COVID-19 patients with digestive symptoms have a worse clinical outcome and higher risk of mortality compared to those without digestive symptoms, emphasizing the importance of including symptoms like diarrhea to diagnose COVID-19 early

Figure Legends

Figure 1. Patients flowchart.

Figure 2. Frequency of COVID-19 patients with or without digestive symptoms.

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Table 1: Baseline characteristics and clinical outcomes of patients with COVID-19

Characteristics	All patients (n= 204)	Patients without digestive symptoms (n= 105)	Patients with digestive symptoms (n= 99)	<i>P</i> value	Classification of patients with digestive symptoms* (n= 99)			
					Mild (n= 1)	Moderate (n= 63)	Severe (n= 13)	Critical (n= 22)
Age, years [Mean (SD)]	54.9 ± 15.4	55.2 ± 14.7	54.6 ± 16.1	0.77	24.0 ± 0	51.4 ± 15.4	59.4 ± 12.4	62.3 ± 16.6
Sex (M/F)	107/97	53/52	54/45	0.56	1/0	32/31	5/8	16/6
Respiratory rate	21.5 ± 4.4	20.8 ± 3.9	22.1 ± 4.8	0.03	23 ± 0	20.6 ± 2.3	21.5 ± 3.9	24.9 ± 7.4
Smoking	11(5.4%)	6 (5.71%)	5 (5.1%)	0.83	0 (0.0%)	1 (1.6%)	1 (7.7%)	3 (13.6%)
Days from illness onset to admission	8.1 ± 4.9	7.3 ± 3.9	9.0 ± 5.7	0.02	1.0 ± 0	8.0 ± 4.3	9.5 ± 3.6	9.8 ± 7.3
Epidemiological history								
Clear contact history	27 (13.2%)	13 (12.4%)	14 (14.1%)	0.71	1(100%)	10 (15.9%)	2 (15.4%)	1 (4.6%)
Unclear contact history	177 (86.8%)	92 (87.6%)	85 (85.9%)	0.71	0 (0.0%)	53 (84.1%)	11 (84.6%)	21 (95.5%)
Chronic medical illness								
Respiratory system disease	12 (5.9%)	4 (3.8%)	8 (8.1%)	0.20	1(100%)	2 (3.2%)	1 (7.7%)	4 (18.2%)
Digestive system disease	3 (1.5%)	0 (0.0%)	3 (3.0%)	0.22	0 (0.0%)	3 (4.8%)	0 (0.0%)	0 (0.0%)
Cardiovascular system disease	54 (26.5%)	28 (26.7%)	26 (26.3%)	0.95	0 (0.0%)	12 (19.1%)	2 (15.4%)	12 (54.6%)
Nervous system disease	4 (2.0%)	4 (3.8%)	0 (0.0%)	0.15	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Endocrine system disease	25 (12.3%)	17 (16.2%)	8 (8.1%)	0.08	0 (0.0%)	3 (4.8%)	0 (0.0%)	5 (22.7%)
Malignant tumor	7 (3.4%)	4 (3.8%)	3 (3.0%)	1.00	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (13.6%)
Medical treatment after admission								
Antibiotic treatment	132 (64.7%)	57 (54.3%)	75 (75.8%)	0.00	0 (0.0%)	43 (68.3%)	12 (92.3%)	20 (90.9%)
Antifungal treatment	6 (2.9%)	2 (1.9%)	4 (4.0%)	0.63	0 (0.0%)	0 (0.0%)	1 (7.7%)	3 (13.6%)

Antiviral treatment	184 (90.2%)	93 (88.6%)	91 (91.9%)	0.42	0 (0.0%)	60 (95.2%)	10 (76.9%)	21 (95.5%)
Glucocorticoids	90 (44.1%)	38 (36.2%)	52 (52.5%)	0.02	0 (0.0%)	29 (46.0%)	8 (61.5%)	15 (68.2%)
Nebulized α -interferon	85 (41.7%)	38 (36.2%)	47 (47.5%)	0.10	1(100%)	37 (58.7%)	3 (23.1%)	6 (27.3%)
Intravenous immunoglobulin	43 (21.1%)	14 (13.3%)	29 (29.3%)	0.01	0 (0.0%)	9 (14.3%)	5 (38.5%)	15 (68.2%)
Probiotics	13 (6.4%)	2 (1.9%)	11 (11.1%)	0.01	1(100%)	4 (6.4%)	1 (7.7%)	5 (22.7%)
Number of cases transferred to intensive care unit	16 (7.8%)	11 (10.5%)	5 (5.1%)	0.15	0 (0.0%)	0 (0.0%)	1 (7.7%)	4 (18.2%)
Clinical outcome								
Remained in hospital	71 (34.8%)	25 (23.8%)	46 (46.5%)	0.00	0 (0.0%)	37 (58.7%)	8 (61.5%)	2 (9.1%)
Discharged	97 (47.6%)	63 (60.0%)	34 (34.3%)	0.00	1(100%)	27 (42.9%)	5 (38.5%)	1 (4.6%)
Died	36 (17.7%)	17 (16.2%)	19 (19.2%)	0.57	0 (0.0%)	0 (0.0%)	0 (0.0%)	19 (86.4%)
Discharged								
Total days in hospital	16.3 \pm 6.9	17.1 \pm 6.4	15 \pm 7.5	0.16	10 \pm 0	14.7 \pm 7.5	17 \pm 9.4	17 \pm 0
Days of intensive care	7.8 \pm 5.8	8.9 \pm 6.7	5.4 \pm 2.5	0.28	\	\	6 \pm 0	\

Note: *The classification of COVID-19 severity was mainly determined according to the COVID-19 prevention and control program issued by China's National Health Commission (<http://www.nhc.gov.cn/>). Mild patients were those without lesions in the chest computerized tomography (CT). Moderate patients were those with lesions in the chest CT.

Table 2: Summary of clinical features of COVID-19 patients with digestive symptoms

Characteristics	Patients (n= 99)	Mild patients (n= 1)	Moderate patients (n= 63)	Severe patients (n= 13)	Critical patients (n=22)
Symptoms					
Anorexia	83 (83.8%)	0 (0.0%)	48 (76.2%)	13 (100%)	22 (100%)
Diarrhea	29 (29.3%)	1(100%)	19 (30.2%)	3(23.1%)	6 (27.3%)
Vomiting	8 (8.1%)	0 (0.0%)	4 (6.4%)	2 (15.4%)	2 (9.1%)
Abdominal pain	4 (4.0%)	0 (0.0%)	2 (3.2%)	0 (0.0%)	2 (9.1%)
Digestive diseases					
Hepatitis B	1 (1.0%)	0 (0.0%)	1 (1.6%)	0 (0.0%)	0 (0.0%)
Hepatitis C	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
fatty live	1 (1.0%)	0 (0.0%)	1 (1.6%)	0 (0.0%)	0 (0.0%)
Cirrhosis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Gastritis	1 (1.0%)	0 (0.0%)	1 (1.6%)	0 (0.0%)	0 (0.0%)
Ulcerative colitis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Peptic ulcer	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Intestinal polyps	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Crohn's disease	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Colitis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Irritable bowel syndrome	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Cholelithiasis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Cholecystitis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Cholangitis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Pancreatitis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Accompanying symptoms					
Fever	93 (93.9%)	1(100%)	59 (93.7%)	13 (100%)	20 (90.9%)
Weakness	47 (47.5%)	0 (0.0%)	21 (33.3%)	11 (84.6%)	15 (68.2%)
Muscle pain	10 (10.1%)	0 (0.0%)	4 (6.4%)	3 (23.1%)	3 (13.6%)

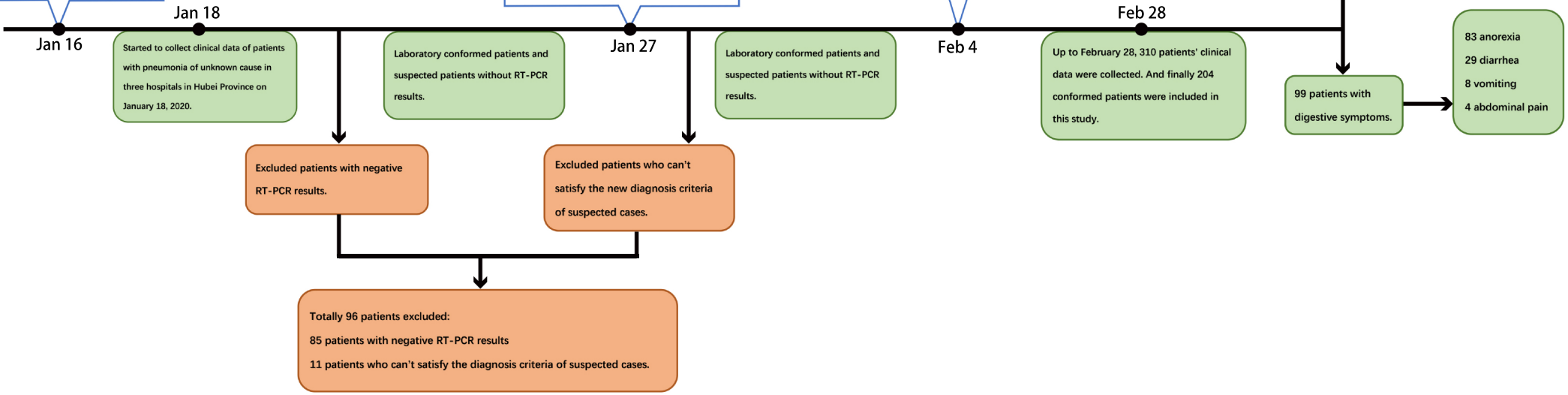
Table 3: Laboratory findings of patients with COVID-19 on admission

Characteristics	All patients (n= 204)		Patients without digestive symptoms (n=105)		Patients with digestive symptoms (n= 99)		<i>P</i> value
	Mean	Std	Mean	Std	Mean	Std	
White blood cell count, $\times 10^9/L$	6.3	3.8	6.5	3.9	6.1	3.6	0.41
Neutrophil count, $\times 10^9/L$	4.7	3.8	4.8	4.0	5.1	6.3	0.74
Hemoglobin, g/L	128.4	18.1	126.8	18.1	130.1	18.1	0.19
Hematocrit, %	38.2	5.9	37.9	6.5	38.4	5.5	0.67
Lymphocyte count, $\times 10^9/L$	1.6	7.0	1.1	0.5	1.0	0.6	0.26
Monocyte count, $\times 10^9/L$	0.5	0.7	0.4	0.2	0.5	1.0	0.65
Platelet count, $\times 10^9/L$	205.7	92.2	199.8	86.8	211.9	97.8	0.35
Prothrombin time, s	13.2	3.9	12.5	2.3	14.1	5.0	0.00
Activated partial Thromboplastin time, s	33.9	6.2	33.3	6.0	34.6	6.4	0.13
D-dimer, mg/L	4.0	9.4	4.4	11.5	3.7	6.6	0.62
Fibrinogen, g/L	4.5	1.5	4.4	1.4	5.0	4.0	0.13
Creatine kinase, U/L	137.3	179.1	111.3	150.4	161.1	199.8	0.08
Lactate dehydrogenase, U/L	318.0	210.9	291.8	189.0	341.9	227.5	0.12
Alanine aminotransferase, U/L	35.8	48.5	37.0	63.4	34.6	25.4	0.73
Aspartate aminotransferase, U/L	35.6	59.6	36.5	81.4	34.63	19.5	0.82
Glutamate/alanine aminotransferase	1.2	1.1	1.3	1.4	1.176	0.60	0.57
Total bilirubin, mmol/L	13.3	10.2	13.7	8.1	12.84	12.0	0.56
Albumin, g/L	36.1	6.7	35.7	7.0	36.4	6.5	0.48
Blood nitrogen, mmol/L	5.1	2.9	9.5	45.5	5.271	2.7	0.36
Creatinine, $\mu\text{mol/L}$	76.2	28.2	75.9	29.9	76.72	26.4	0.81
Serum sodium, mmol/L	137.7	4.4	138.2	4.4	137.2	4.4	0.12
Serum potassium, mmol/L	4.4	2.6	4.2	0.6	4.5	3.7	0.41
C-reactive protein, mg/L	57.5	54.1	50.1	57.3	63.7	50.8	0.16

The diagnosis criteria of suspected and confirmed cases with COVID-2019 (version 1) published by NHC:
Patients who satisfies any of the epidemiological history and any of the clinical manifestations can be diagnosed as a suspected case.
The suspected cases whose RT-PCR results are positive can be identified as conformed cases.

The diagnosis criteria of suspected and confirmed cases with COVID-2019 (version 4) published by NHC:
Patients with a positive epidemiological history and any two of the clinical manifestations are considered as a suspected case.

The diagnosis criteria of suspected and confirmed cases with COVID-2019 (version 5) published by NHC:
Patients who with a positive epidemiological history and any two of the clinical manifestations or patients without definite epidemiological history but with all the clinical manifestations is considered as a suspected case.
The suspected cases with the imaging characteristics of pneumonia can be diagnosed as clinical diagnosis cases (without RT-PCR results) in Hubei Province.



Frequency of COVID-19 patients with or without digestive symptoms

