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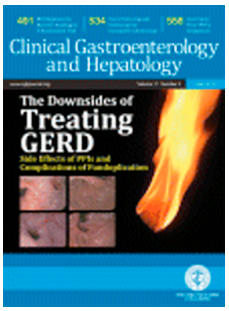

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Author Affiliation: Department of Respiratory and Critical Care Medicine, Union Hospital, Tongji Medical College Huazhong University of Science and Technology, Wuhan, China (Xiao-Shan Wei, Xu Wang, Yi-Ran Niu, Lin-Lin Ye, Wen-Bei Peng, Zi-Hao Wang, Wei-Bing Yang, Bo-Han Yang, Jian-Chu Zhang, Wan-Li Ma, Xiao-Rong Wang, Qiong Zhou)

Corresponding Author: Dr. Qiong Zhou, Department of Respiratory and Critical Care Medicine, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China,1277 Jiefang Avenue, Wuhan 430022, China; Telephone: (86) 27 85726705; Fax: (86) 27 85726527; E-mail: zhouqiongtj@126.com.

Contributors: Q.Z. conceived the idea, designed and supervised the study, had full access to all data and took responsibility for the integrity of the data. X.S.W, X.W., Y.R.N., L.L.Y., and W.B.P. collected and analyzed the clinical and laboratory data. Z.H.W., W.B.Y and B.H.Y. evaluated pulmonary computed tomographic images.

J.C.Z., W.L.M. and X.R.W. analyzed data and performed statistical analysis. All authors reviewed and approved the final version.

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Abstract:

Background & Aims: We compared clinical, laboratory, radiological, and outcome features of patients with SARS-CoV-2 infection (COVID-19) with pneumonia, with vs without diarrhea.

Methods: We performed a retrospective, single-center analysis of 84 patients with SARS-CoV-2 pneumonia in Wuhan Union Hospital, China, from January 19 through February 7, 2020. Cases were confirmed by real-time reverse-transcriptase PCR of nasal and pharyngeal swab specimens for SARS-CoV-2 RNA. Blood samples were analyzed for white blood cell count, lymphocyte count, alanine aminotransferase, creatine kinase, lactate dehydrogenase, D-dimer, C-reactive protein, and in some cases, immunoglobulins, complement, lymphocyte subsets, and cytokines. Virus RNA was detected in stool samples by real-time PCR.

Results: Of the 84 patients with SARS-CoV-2 pneumonia, 26 (31%) had diarrhea. The duration of fever and dyspnea in patients with diarrhea was significantly longer than those without diarrhea (all $P<.05$). Stool samples from a higher proportion of patients with diarrhea tested positive for virus RNA (69%) than from patients without diarrhea (17%) ($P<.001$). As of February 19, a lower proportion of patients with diarrhea had a negative result from the latest throat swab for SARS-CoV-2 (77%) than patients without diarrhea (97%) ($P=.010$), during these patients' hospitalization. Of 76 patients with a negative result from their latest throat swab test during hospitalization,

a significantly higher proportion of patients with diarrhea had a positive result from the retest for SARS-CoV-2 in stool (45%) than patients without diarrhea (20%) (*P*=.039).

Conclusions: At a single center in Wuhan, China, 31% of patients with SARS-CoV-2 pneumonia had diarrhea. A significantly higher proportion of patients with diarrhea have virus RNA in stool than patients without diarrhea. Elimination of SARS-CoV-2 from stool takes longer than elimination from the nose and throat.

KEY WORDS: COVID-19; SARS-CoV-2; Diarrhea; pneumonia

Need to Know

Background: Studies are needed to compare the clinical, laboratory, and outcome features of patients with SARS-CoV-2 infection (COVID-19) with pneumonia, with vs without diarrhea.

Findings: At a single center in Wuhan, China, 31% of patients with SARS-CoV-2 pneumonia had diarrhea. A significantly higher proportion of patients with diarrhea have virus RNA in stool than patients without diarrhea.

Implications for patient care: Elimination of SARS-CoV-2 from stool takes longer than elimination from the nose and throat.

Introduction

Since December 2019, pneumonia caused by novel coronavirus (Severe Acute Respiratory Syndrome Coronavirus 2, SARS-CoV-2) has broken out in Wuhan, Hubei province, China[1]. The novel coronavirus has spread to other cities in China, and even around the world[1-4]. As of April 10, 2020, 1,521,252 confirmed cases have been reported globally. Among them, 83,305 confirmed cases were from China, furthermore, 3345 cases had died[5]. The clinical manifestations of novel coronavirus – infected pneumonia (Corona Virus Disease 2019, COVID-19) have been reported in several recent studies[1,6-9]. Some COVID-19 patients had gastrointestinal symptoms, especially diarrhea. It has been reported that the stool from confirmed cases were tested positive by RT-PCR for SARS-CoV-2, suggesting the possibility of "fomite transmission"[1,3]. However, the difference in clinical characteristics between diarrhea and non-diarrhea cases has not been reported.

In this study, we analyzed the differences of the clinical characteristics, laboratory examinations, imaging manifestations and outcomes between COVID-19 patients with diarrhea and those without diarrhea.

Methods

Sources of data

Consecutive patients with confirmed COVID-19 who were admitted to Wuhan Union Hospital from January 19 to February 7, 2020, were enrolled retrospectively. All

patients were diagnosed according to World Health Organization interim guidance. A confirmed case was defined as a positive result to real-time reverse-transcriptase polymerase-chain-reaction (RT-PCR) assay of nasal and pharyngeal swab specimens for SARS-CoV-2 RNA. Only the confirmed cases were enrolled in this study. Stool samples were also tested for SARS-CoV-2 RNA by RT-PCR. The definition of diarrhea by the WHO is having three or more loose or liquid stools per day or having more stools than a person's health condition.

All medical records of the enrolled patients were collected, including clinical symptoms, laboratory findings, imaging manifestations and outcomes. The clinical outcomes (ie, discharges, mortality) were monitored up to February 19, 2020, the final date of follow-up.

Data collection and analysis of cases were determined by the National Health Commission of the People's Republic of China to be part of a continuing public health outbreak investigation and were thus considered exempt from institutional review board approval.

Laboratory confirmation

The SARS-CoV-2 laboratory test assays were performed for throat-swab specimens and stool samples based on the previous WHO recommendation[10]. RNA in patients' specimens were extracted and tested for SARS-CoV-2 by real-time RT-PCR using the same protocol as previously described in the studies from Wuhan Jinyintan Hospital[6,7].

Statistical Analysis

Continuous variables were expressed as the means and standard deviations. Categorical variables were summarized as the counts and percentages in each category. Comparisons were determined by unpaired t test or chi-square tests as appropriate. All statistical analyses were performed with SPSS22.0 (SPSS Inc., Chicago, IL).

All authors had access to the study data, reviewed and approved the final manuscript.

Results

Clinical characteristics

A total of 84 hospitalized health-care workers with confirmed COVID-19 were enrolled in this study population, including 17 doctors, 66 nurses and 1 allied health worker. All the doctors worked in the wards and went to outpatient clinic intermittently, for two half-days per week. Most of the nurses worked in the wards, except 3 nurses who worked in the fever clinic. The only allied health worker worked in the Network Center of Union Hospital. All of these patients were admitted to isolation wards. The median age of the patients was 37 years (range:24-74 years), and 28(33%) of the 84 patients were male. Among them, 26(31%) patients had diarrhea, the rest 58 patients had no diarrhea. The comparison of clinical characteristics between these two groups was shown as Table 1. Several clinical symptoms were more common in diarrhea group, as compared with non-diarrhea group, including

headache (58% vs 22%, *P*= .003), myalgia or fatigue (65% vs 34%, *P* = .010), cough(85% vs 45%, *P* < .001), sputum production(54% vs 21%, *P* = .004), nausea(38% vs 10%, *P* = .005) and vomiting(19% vs 2%, *P* = .010).

Laboratory and Radiologic findings on Admission to Hospital

Table 2. shows the comparison of laboratory findings between the diarrhea group and non-diarrhea group, at the time of hospitalization. Most of the laboratory findings had no difference between these two groups, including white blood cell count, lymphocyte count, alanine aminotransferase, creatine kinase, lactate dehydrogenase, D-Dimer and C-reactive protein. Some of the 84 patients were tested for immunoglobulins, complement, lymphocyte subsets and cytokines. As shown in Appendix Table 1, several cytokine including interleukin-2, interleukin-4 and interferon-γ decreased significantly in diarrhea group, as compared with non-diarrhea group (2.26 ± 0.27 vs 2.59 ± 0.24 pg/ml, *P* = .001; 1.54 ± 0.37 vs 2.11 ± 0.44 pg/ml, *P* = .001; 1.90 ± 0.49 vs 2.85 ± 1.27 pg/ml, *P* = .012; respectively). However, there were no differences in immunoglobulins, complement and lymphocyte subsets between these two groups, as shown in Appendix Table 2 and 3.

The most common finding in CT images were ground-glass opacifications (96%), as shown in Appendix Table 4. There were no differences in the location or number of ground-glass opacifications between these two groups. On admission to hospital, all confirmed COVID patients were tested for SARS-CoV-2 RNA from stool samples. Stool samples from a higher proportion of patients with diarrhea tested positive for

virus RNA (69%) than from patients without diarrhea (17%) (*P*<.001) (Table 3).

Clinical outcomes

As of Feb 19, none of these 84 patients had died or admitted to ICU; 63 patients had been discharged; 21 patients were still in hospital. All patients received antibiotics and antiviral agents during hospitalization, 39(46%) patients received two kinds of antibiotics. After a period of time for treatment, throat swab specimens from patients were regathered and tested for SARS-CoV-2. If the result of real-time RT-PCR turned to be negative two times consecutively, body temperature returned to normal for more than 3 days, respiratory symptoms and lung lesions on CT scan improved significantly, patients were permitted to discharge.

The duration of fever and dyspnea in patients with diarrhea was significantly longer than those without diarrhea (10.5±4.7 vs 7.6±3.4day, *P* = .005; 8.1±3.2 vs 4.7±2.3day, *P* = .002; respectively) (Figure 1A&B). By the end of Feb. 19, a lower proportion of patients with diarrhea had a negative result from the latest throat swab for SARS-CoV-2 (77%) than patients without diarrhea (97%) (*P*=.010), during these patients' hospitalization (Table 4). The mean time of SARS-CoV-2 in throat swab turning to be negative was longer in diarrhea group, as compared to non-diarrhea group (12.5±4.0 vs 9.2±3.9day, *P* = .002) (Figure 1C). Patients' stool specimens were also retested for SARS-CoV-2. Of 76 COVID-19 patients who had a negative result from their latest throat swab test during hospitalization, a significantly higher proportion of patients with diarrhea had a positive result from the retest for

SARS-CoV-2 in stool (45%) than patients without diarrhea (20%) (*P*=.039) (Table 5). All patients reexamined a CT scan during hospitalization. By the end of Feb. 19, the improvement rate and deterioration rate show no differences between diarrhea group and non-diarrhea group, as shown in Appendix Table 5. Discharged patients were more common in non-diarrhea group, as compared to diarrhea group (83% vs 58%, *P* = .028) (Appendix Table 6). Meanwhile, the hospital stays were longer in diarrhea group than non-diarrhea group (16.5±5.2 vs 11.8±5.6day, $P < .001$) (Figure 1D).

The mean diarrhea time of the 26 patients was 3.7 days. The smear for stool fungus was positive in 7(27%) patients, and stool occult blood was positive in 3(12%) patients. After treatment of intestinal microecological modulator, the VAS scores for diarrhea, frequency of defecation and Bristol scores decreased significantly in patients suffered diarrhea (6.8±1.1 vs 3.0±1.0; 5.7±2.8 vs 2.1±0.8; 5.9±0.6 vs 3.7±0.7; respectively, all $P < .0001$), as shown in Appendix Table 7.

Discussion

This study has shown that diarrhea occurred in 31% of SARS-CoV-2 infectious pneumonia patients and is the first report which focus on the difference between COVID-19 patients with diarrhea and those without. Despite most of the laboratory and radiologic findings show no difference between these two groups, we do find some characteristics differs between them.

The COVID-19 patients with diarrhea suffered headache, myalgia or fatigue, cough, sputum production, nausea, vomiting more frequently than those patients

without diarrhea, but seldomly suffered abdominal pain, abdominal distension and tenesmus. The characteristics of diarrhea in SARS-CoV-2 pneumonia patients includes increased defecation frequency (3~14 times per day), pastry stool with no mucous or purulent blood. The diarrhea in some patients gradually alleviates and disappears during hospitalization; but in other patients, the frequency of diarrhea increased, and smear for stool fungus and stool test for occulted blood showed positive.

The intestinal epithelial injury caused by the infection of novel coronavirus might be an important cause of the diarrhea in COVID-19 patients. Full-genome sequencing and phylogenic analysis showed that SARS-CoV-2 and SARS-CoV belong to the same genus of coronaviruses (betacoronaviruses), with about 80% sequence identity[11,12]. SARS viral particles and genomic sequence were detected in the mucosa of the intestine[13]. Recently, researchers from Guangzhou Institute of Respiratory Health successfully isolate SARS-CoV-2 from a COVID-19 patient's stool (not published data). Studies indicated that SARS-CoV-2 and SARS-CoV utilize the same receptor, angiotensin-converting enzyme 2 (ACE2), to get access into host cells[11,14]. Through single-cell RNA sequencing technology, Yu Zhao and his colleagues found that the expression of ACE2 was concentrated in a small population of type □ alveolar cells (AT2 cells) in the normal human lungs[15]. However, the lung AT2 cells was not the only highly expressing ACE2 cells, but also in esophagus upper and stratified epithelial cells and absorptive enterocytes from ileum and colon[16]. Digestive system is also a potential pathway for SARS-CoV-2 infection. Diarrhea, as

a common symptom in COVID-19 patients, also indicates the involvement of the digestive system. The absorptive enterocytes were the most vulnerable intestinal epithelial cells and can be invaded by coronavirus and norovirus, leading to malabsorption, unbalanced intestinal secretion and activated enteric nervous system, resulting in diarrhea finally[17,18]. The diarrhea symptom may be caused by the invaded ACE2-expressing enterocytes. The underlying molecular pathogenesis needs to be further investigated.

Another reason for the diarrhea in COVID-19 patients might be antibiotic-associated diarrhea. Broad-spectrum antibiotic use can disrupt the gastrointestinal microbiota resulting in diarrhea[19]. All patients in this study had received oral or intravenous antibiotics (100%), and some had received two antibiotics (46%). Because this is a small size study, we failed to analyze the correlation between antibiotic and diarrhea. The diarrhea in these patients significantly relieved after taking intestinal probiotics, indicating that the use of antimicrobial drugs might be an important cause of diarrhea in COVID-19 patients.

We also find that the duration of symptoms in patients with diarrhea was significantly longer than those without diarrhea, including fever and dyspnea. Patients with diarrhea took much more time to eliminate SARS-CoV-2 from respiratory system, leading to longer hospital stay time.

The frequency of positive rate for testing SARS-CoV-2 from stool was higher in patients with diarrhea, as compared with patients without diarrhea at admission. It indicated that SARS-CoV-2 infection in digestive system maybe more common and

severer in patients with diarrhea. Moreover, stool specimens retesting to SARS-CoV-2 in patients with persistent diarrhea persist positive, even after the throat swab testing to SARS-CoV-2 has turn to be negative. The elimination of SARS-CoV-2 from digestive system may be much later and harder than that from respiratory system. Patients with negative throat swab test for SARS-CoV-2, may still be able to spread infection to other people through fomite transmission.

We supposed the delay elimination of SARS-CoV-2 in digestive system might partly related with the use of antibiotic. Studies indicated that antibiotics had profound effect on gut microbiota, leading to altered immune system, including antibody production and T cell differentiation[20-22]. Further studies are needed to investigate the relationship between gut microbiota and antibiotics in COVID-19 patients.

The proportion of patients with diarrhea (31%) in this study is much higher than what was reported in other series[1,7,8]. The possible reasons are the precise and timely descriptions of symptoms of the 84 patients, which are all infected medical staff. According to their descriptions, we noticed 26 patients complained of diarrhea among the total 84 patients. However, the sample size was relatively small and it couldn't represent the overall situation. The collection and analysis of such data are still ongoing in our group, and expected to give a more comprehensive explanation in the near future.

None of these 84 infected health care workers died or required ICU admission. One explanation might be that almost all the medical staff with COVID-19

pneumonia in our cohort were younger people and had mild disease. Another one explanation might be that our patients did not had significant underlying chronic diseases and receive timely treatment.

This study has several limitations. First, the sample size of COVID-19 patients with diarrhea was relatively small than those without diarrhea (26 vs 58). Second, all of the 84 patients were confirmed with throat swab specimens, and no paired lower respiratory tract specimens were obtained to see the difference of the viral RNA detection rate between them.

Conclusion

In this single-center case series of 84 confirmed COVID-19 patients in Wuhan, China, 26 (31%) patients suffered diarrhea. COVID-19 patients with diarrhea suffered discomfort longer, as compared with COVID-19 patients without diarrhea. In patients with diarrhea, stool specimens testing to SARS-CoV-2 may persist positive, even after the throat swab testing to SARS-CoV-2 has turn to be negative.

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Figure legend

Figure 1. (A) The lasting days of fever in COVID-19 patients. (B) The lasting days of dyspnea in COVID-19 patients. (C) Time from the day of the COVID-19 patients' admission to patients' SARS-CoV-2 in throat swab turning to be negative. (D) The hospital stays in COVID-19 patients. Data are presented as means ± SD. $*p < 0.05$

Comparisons were determined by unpaired t test.

Appendix

Appendix Table 1. Cytokine Detection Assays in patients infected with SARS-CoV-2

Characteristic	Patients (n = 30)	Diarrhea group (n = 15)	Non-diarrhea group (n = 15)	*P* value
IL-2 (pg/ml; normal range 0.10-4.10)	2.41±0.30	2.26±0.27	2.59±0.24	0.001
IL-4 (pg/ml; normal range 0.10-3.20)	1.80±0.49	1.54±0.37	2.11±0.44	0.001
IL-6 (pg/ml; normal range 0.10-2.90)	13.27±15.16	15.87±18.78	10.10±9.16	0.294
Increased ---no. (%)	27 (90)	13(87)	14(93)	>0.999
IL-10 (pg/ml; normal range 0.10-5.00)	4.62±2.59	3.84±1.64	5.57±3.27	0.078
Increased ---no. (%)	8 (27)	3(20)	5(33)	0.682
TNF-α (pg/ml; normal range 0.10-23.00)	2.41±1.90	2.68±2.56	2.08±0.36	0.376
IFN-γ (pg/ml; normal range 0.10-18.00)	2.33±1.02	1.90±0.49	2.85±1.27	0.012

Appendix Table 2. Identification of immunoglobulins and complement in patients infected with SARS-CoV-2

Characteristic	Patients (n = 30)	Diarrhea group(n = 15)	Non-diarrhea group (n = 15)	*P* value
IgE (IU/ml; normal range 1-190)	92.02±110.29	79.36±120.60	99.25±108.02	0.638
Increased ---no. (%)	6(20)	2(13)	4(27)	0.651
IgG (g/L; normal range 7.51-15.60)	11.85±2.04	11.45±1.87	12.09±2.17	0.394
IgA (g/L; normal range 0.82-4.53)	1.95±0.75	2.14±0.93	1.83±0.63	0.294
IgM (g/L; normal range 0.460-3.040)	1.34±0.74	1.29±0.34	1.43±0.90	0.578
C3 (g/L; normal range 0.790-1.520)	0.81±0.19	0.79±0.20	0.82±0.19	0.677
Decreased ---no. (%)	14 (47)	6(40)	8(53)	0.715

C4 (g/L; normal range 0.160-0.380)	0.27±0.07	0.25±0.08	0.28±0.07	0.284

Appendix Table 3. Analysis of lymphocyte subsets in patients infected with SARS-CoV-2

Characteristic	Patients (n = 30)	Diarrhea group (n = 15)	Non-diarrhea group (n = 15)	*P* value
$CD3^+$ T cells (%; normal range 58.17-84.22)	74.74±8.15	74.69±6.41	74.80±10.59	0.973
$CD4^+$ T cells (%; normal range 24.34-51.37)	42.41±10.20	42.12±12.61	42.82±6.33	0.849
$CD8^+$ T cells (%; normal range 14.23-38.95)	27.55±10.13	27.66±11.45	27.39±8.75	0.943
B cells (%; normal range 4.10-18.31)	12.15±3.26	11.64±2.69	12.96±4.09	0.305
NK cells (%; normal range 3.33-30.47)	9.96±7.06	10.50±6.78	9.10±7.95	0.608
$CD4^+/CD8^+$ ratio (normal range 0.41-2.72)	2.11±2.22	2.40±2.91	1.72±0.58	0.382

Appendix Table 4. Pulmonary Computed Tomographic of Patients with COVID-19 Pneumonia on Admission to Hospital

Pulmonary Computed Tomography	Patients (n = 84)	Diarrhea group (n=26)	Non-diarrhea group (n=58)	*P* value
Ground-glass opacification	81(96)	24(92)	57(98)	0.225
Side of ground-glass opacification				0.556
Left	5(6)	2(8)	3(5)	
Right	4(5)	2(8)	2(4)	
Both	72(89)	20(83)	52(91)	
Location of ground-glass opacification				0.315
Peripheric parenchyma	54(67)	14(58)	40(70)	
Central parenchyma	0	0	0	
Both	27(33)	10(42)	17(30)	

Number of ground-glass opacification				>0.999
Single	9(11)	3(13)	6(11)	
Multifocal	72(89)	21(88)	51(89)	
Patchy consolidation	34(40)	14(54)	20(34)	0.148
Reticular change	12(14)	3(12)	9(16)	0.746

no. (%)

Appendix Table 5. Outcome of computed tomography imaging reexamination in patients infected with SARS-CoV-2

Computed tomography imaging reexamination	All Patients (n = 84)	Diarrhea group (n = 26)	Non-diarrhea group (n=58)	*P* value
improvement	64(76)	17(65)	47(81)	
deterioration	12(14)	4(15)	8(14)	0.115
similarity	8(10)	5(19)	3(5)	

no. (%)

Appendix Table 6. Number of discharged and hospitalized patients as of Feb.19

	All Patients (n = 84)	Diarrhea group (n = 26)	Non-diarrhea group (n = 58)	*P* value
Discharged	63(75)	15(58)	48(83)	0.028
Hospitalized	21(25)	11 (42)	10(17)	

no. (%)

Appendix Table 7. Outcome of diarrhea patients before or after probiotics treatment

	Before probiotics treatment (n = 26)	After probiotics treatment (n = 26)	*P* value
VAS scores for diarrhea	6.8 ± 1.1	3.0 ± 1.0	< 0.0001
Defecating frequency	5.7 ± 2.8	2.1 ± 0.8	< 0.0001
Bristol score	5.9 ± 0.6	3.7 ± 0.7	< 0.0001
Stool occult blood positive -no. (%)	3(12)	0(0)	0.235
Smear for stool fungus positive -no. (%)	7(27)	0(0)	0.010

VAS, Visual Analogue Scale/Score (0: no diarrhea, ≤3: slight diarrhea, 4-6: moderate diarrhea; 7-10: severe diarrhea); Bristol score: 1: separate hard lumps (like nuts), 2: sausage-shaped, but lumpy, 3: like a sausage or snake, but with cracks on its surface, 4: like a sausage or snake, and smooth and soft, 5: soft blobs with a clear cut edge, 6: fluffy pieces with ragged edges and mushy, 7: watery with no solid pieces.

Table 1. Characteristics and Symptoms of Patients with COVID-19 Pneumonia

Characteristic	All Patients (n = 84)	Diarrhea group (n = 26)	Non-diarrhea group (n = 58)	p value
Male sex – no. (%)	28(33)	8(31)	20(35)	0.806
Age – yr				
Median	37	38.5	37	
Range	24-74	29-74	24-67	
Age ≥ 50 yr – no. (%)	23 (27)	7(27)	16(28)	>0.999
Suspected case contact exposure – no. (%)	57 (68)	19(73)	38(66)	0.616
Current smoking – no. (%)	5 (6)	2(8)	3(5)	0.643
Underlying illness – no. (%)	13(16)	3(12)	10(17)	0.746
Respiratory Disease	3 (4)	0	3(5)	0.549
Diabetes mellitus	6 (7)	2(8)	4 (7)	>0.999
Hypertension	4 (5)	1(4)	3(5)	>0.999
Symptoms				
Fever	72 (86)	22(85)	50(86)	>0.999
Headache	28 (33)	15(58)	13(22)	0.003
Myalgia or fatigue	37(44)	17(65)	20(34)	0.010
Cough	48(57)	22(85)	26(45)	<0.001
Sputum production	26 (31)	14(54)	12(21)	0.004
Dyspnea	32 (38)	9 (35)	23 (40)	0.809
Nausea	16(19)	10(38)	6 (10)	0.005
Vomiting	6 (7)	5 (19)	1 (2)	0.010
Abdominal pain	2 (2)	2(8)	0 (0)	0.093
Abdominal distension	3 (4)	2(8)	1 (2)	0.225
Tenesmus	1 (1)	1(4)	0 (0)	0.310

no. (%)

Table 2. Laboratory findings of 84 patients infected with SARS-CoV-2 on admission to hospital

	All patients (n = 84)	diarrhea group (n = 26)	Non-diarrhea group (n = 58)	p value
White blood cell count, $\times 10^9$/L	4.0±1.5	3.7±1.6	4.2±1.5	0.170
<3.5 ---no. (%)	36(43)	16(62)	20(35)	
3.5~9.5 ---no. (%)	46(55)	10(38)	36(62)	0.055
>9.5 ---no. (%)	2(2)	0(0)	2(3)	
Neutrophil count, × 10^9/L	2.4±1.1	2.3±1.3	2.5±1.0	0.443

Lymphocyte count, × 10^9/L	1.3±0.6	1.1±0.4	1.3±0.7	0.178
<1.1 ---no. (%)	33 (39)	14(54)	19(33)	
1.1~3.2 ---no. (%)	49 (58)	12(46)	37(64)	0.143
>3.2 ---no. (%)	2 (2)	0	2(3)	
Platelet count, × 109/L	180.1±58.2	164.6±55.4	187.1±58.8	0.103
Haemoglobin, g/L	128.3±15.6	128.8±15.5	128.1±15.8	0.851
ALT, U/L	28.3±19.3	20.6±7.5	31.6±21.8	0.014
AST, U/L	29.0±13.1	24.9±6.4	30.8±14.8	0.055
ALB, g/L	40.4±4.1	40.5±4.7	40.3±3.8	0.837
T-BIL, μmol/L	9.2±3.0	8.3±2.4	9.7±3.2	0.050
D-BIL, μmol/L	3.0±2.2	2.5±1.5	3.2±2.4	0.175
CREA, μmol/L	69.0±18.9	66.4±15.5	70.1±20.3	0.411
BUN, mmol/L	3.7±1.3	3.6±1.3	3.8±1.3	0.516
CK, U/L	109.5±149.3	72.9±45.3	125.9±175.4	0.134
LDH, U/L	238.1±98.5	213.1±49.6	249.3±112.6	0.121
PT, s	13.3±1.5	13.8±2.6	13.1±0.5	0.051
APTT, s	38.8±3.5	38.8±4.2	38.7±3.2	0.905
D-Dimer, mg/L	0.47±0.41	0.49±0.51	0.46±0.36	0.758
CRP, mg/L ---no. (%)				
<8.0	35 (42)	9 (35)	26 (45)	0.475
≥8.0	49 (58)	17 (65)	32 (55)	
PCT, μg/L --- no. (%)				
<0.5	82 (98)	25 (96)	57 (98)	0.526
≥0.5	2 (2)	1(4)	1 (2)	
ESR, mm/h	21.9±18.7	19.2±14.1	23.0±20.3	0.390

--- no./total no. (%)

Abbreviations: ALT, Alanine aminotransferase; AST, Aspartate aminotransferase; ALB, Albumin; T-BIL, Total bilirubin; D-BIL, Direct bilirubin; CREA, Creatinine; BUN, Blood urea nitrogen; CK, Creatine kinase; LDH, Lactic dehydrogenase; PT, Prothrombin time; APTT, Activated partial thromboplastin time; CRP, C-reaction protein; PCT, Procalcitonin; ESR, Erythrocyte sedimentation rate.

Table 3. Outcome of SARS-CoV-2 RT-PCR for stool in patients at admission

SARS-CoV-2 （RT-PCR）	All Patients (n = 84)	Diarrhea group (n = 26)	Non-diarrhea group (n = 58)	*P* value

Negative	56(67)	8(31)	48(83)	< 0.001
Positive	28(33)	18 (69)	10(17)	

no. (%)

Table 4. Outcome of SARS-CoV-2 RT-PCR latest examination for throat swab in patients infected with SARS-CoV-2 during hospitalization

SARS-CoV-2 RT-PCR latest examination	All Patients (n=84)	Diarrhea group (n=26)	Non-diarrhea group (n=58)	*P* value
Negative	76(90)	20(77)	56(97)	0.010
Positive	8(10)	6(23)	2(3)	

no. (%)

Table 5. Outcome of SARS-CoV-2 RT-PCR reexamination for stool in patients whose throat swab latest test to SARS-CoV-2 has turn to be negative.

SARS-CoV-2 （RT-PCR）	All Patients (n = 76)	Diarrhea group (n = 20)	Non-diarrhea group (n = 56)	*P* value
Negative	56(74)	11(55)	45(80)	0.039
Positive	20(26)	9 (45)	11(20)	

no. (%)