

**Supplementary Table 1.** Subclassification of Patients According to Change of Aminotransferase during Hospitalization

Group	Normal aminotransferase group (n=512)	Abnormal aminotransferase group (n=362)	Total (n=874)
Group 1. Continuous normal level of aminotransferase	341	0	341
Group 2. Normal to elevated level of aminotransferase	79	130	209
Group 3. Continuous elevated level of aminotransferase	0	143	143
Group 4. Elevated level of aminotransferase to normal	92	89	181

To find out coronavirus disease 2019 patients who experienced elevated aminotransferase at least once during hospitalization, "normal aminotransferase group" and "abnormal aminotransferase group" were subclassified according to following category; group 1. continuous normal level of aminotransferase, group 2. normal to elevated level of aminotransferase, group 3. continuous elevated level of aminotransferase, group 4. elevated level of aminotransferase to normal. We defined abnormal aminotransferase group as sustained elevation of aspartate aminotransferase or alanine aminotransferase aspartate aminotransferase or alanine aminotransferase levels higher than the upper limit of normal values in two consecutive laboratory tests conducted every 3 to 7 days within 2 weeks of hospitalization. Thus, patients with once or rarely twice nonconsecutive elevation of aminotransferase were assigned to "normal aminotransferase group". In case of group 1, all patients had normal aminotransferase level at admission and during hospitalization, thus all were assigned to "normal aminotransferase group". All patients of group 3 had sustained elevated aminotransferase at admission and during hospitalization, thus all were assigned to "abnormal aminotransferase group". Group 2 was defined as patients who had normal aminotransferase at admission and once or more elevated aminotransferase during hospitalization. Among 79 patients of normal aminotransferase group, 76 patients had elevated aminotransferase during hospitalization only once, the remaining 3 patients showed twice nonconsecutive elevation of aminotransferase. 130 patients of abnormal aminotransferase group showed elevated aminotransferase in two consecutive laboratory tests during hospitalization. Group 4 was defined as patients who had elevated aminotransferase at admission and normal aminotransferase during hospitalization at least once. Among 92 patients of normal aminotransferase group, 86 patients had elevated aminotransferase at admission and after that time sustained normal aminotransferase during hospitalization. The remaining 6 patients had elevated aminotransferase at admission and then normalization in next consecutive tests, and elevated aminotransferase in last laboratory test. Among 89 patients of abnormal aminotransferase group, 45 patients had sustained elevated aminotransferase at admission and next consecutive tests, and normalization in last laboratory test. The remaining 44 patients showed elevated aminotransferase at admission and then normalization in next one test, followed by sustained elevated aminotransferase in next consecutive tests.

**Supplementary Table 2.** Clinical Characteristics of Patients with COVID-19 According to Elevated Aminotransferase Levels

Characteristics	Liver tests (aminotransferase)		Total	p-value
	≤2 ULN	>2 ULN		
No. of patients	716 (81.9)	158 (18.1)	874	
Age, yr	62 (51–73)	61 (51–75)	62 (51–73)	0.470
Male sex	234 (32.7)	74 (46.8)	308 (35.2)	0.001
Body mass index, kg/m <sup>2</sup>	23.6 (21.5–25.4)	25.3 (22.6–27.4)	23.7 (21.7–26.0)	0.001
Comorbidity				
Diabetes	146 (20.4)	34 (21.5)	180 (20.6)	0.751
Hypertension	240 (33.5)	43 (27.2)	283 (32.4)	0.125
Coronary artery disease	25 (3.5)	9 (5.7)	34 (3.9)	0.195
Chronic obstructive pulmonary disease	8 (1.1)	5 (3.2)	13 (1.5)	0.054
Chronic kidney disease	14 (2.0)	2 (1.3)	16 (1.8)	0.558
Chronic liver disease	25 (3.5)	5 (3.2)	30 (3.4)	0.838
Liver cirrhosis	10 (1.4)	4 (2.5)	14 (1.6)	0.304
Signs and symptoms on admission				
Fever/chills	300 (42.4)	90 (57.0)	390 (45.0)	0.001
Cough	406 (57.4)	95 (60.5)	501 (58.0)	0.479
Dyspnea	162 (22.9)	61 (38.6)	223 (25.8)	<0.001
Gastrointestinal symptoms (nausea/vomiting/diarrhea)	164 (23.2)	40 (25.3)	204 (23.6)	0.564
Myalgia	230 (32.5)	58 (36.9)	288 (33.3)	0.284
Headache	184 (26.0)	40 (25.5)	224 (25.9)	0.895
Days from symptom onset to admission	6 (3–9)	6 (3–9)	6 (3–9)	0.694
SIRS on admission	74 (10.4)	41 (25.9)	115 (13.2)	<0.001
Severe patients on admission	82 (11.5)	48 (23.5)	130 (14.9)	<0.001
Radiologic findings on admission				
Abnormal chest radiographs	417 (58.2)	114 (72.2)	531 (60.8)	0.001
Bilateral involvement of chest radiographs	285 (39.8)	83 (52.5)	368 (42.1)	0.003
On admission				
Complete blood count				
White blood cell count, /μL	5,235 (4,050–6,698)	5,495 (4,228–7,553)	5,300 (4,077–6,735)	0.006
Lymphocyte count, /μL	1,379 (1,001–1,822)	1,221 (777–1,791)	1,350 (960–1,810)	0.597
Platelet count, ×10 <sup>3</sup> /μL	223 (174–284)	189 (148–251)	216 (166–279)	<0.001
Hemoglobin, g/dL	12.5 (11.7–13.5)	12.8 (11.8–14.0)	12.5 (11.7–13.6)	0.807
Inflammatory markers				
Erythrocyte sedimentation rate, mm/hr	53 (31–71)	43 (30–67)	50 (31–70)	0.527
C-reactive protein, mg/L	1.2 (0.2–6.2)	3.9 (0.5–12.5)	1.5 (0.2–7.2)	0.448
Biochemical tests				
Blood urea nitrogen, mg/dL	14 (11–17)	14 (11–19)	14 (11–18)	0.242
Creatinine, mg/dL	0.7 (0.6–0.9)	0.8 (0.6–1.0)	0.7 (0.6–0.9)	0.614
eGFR, mL/min/1.73 m <sup>2</sup>	92 (76–108)	89 (72–109)	91 (75–108)	0.285
Sodium, mmol/L	140 (138–142)	140 (136–142)	140 (137–142)	0.174
Potassium, mmol/L	4.2 (3.8–4.4)	4.0 (3.7–4.4)	4.1 (3.8–4.4)	0.749

Data are presented as the number (%) or median (interquartile range).

COVID-19, coronavirus disease 2019; ULN, upper limit of normal; SIRS, systemic inflammatory response syndrome; eGFR, estimated glomerular filtration rate.

**Supplementary Table 3.** Subgroup Analysis for 550 Patients with Normal Aminotransferase on Admission

Variable	Liver tests (aminotransferase)		Total	p-value
	Normal	Abnormal		
No. of patients	420 (76.4)	130 (23.6)	550	
Age, yr	60 (47–73)	59 (50–69)	60 (48–72)	0.628
Male sex	106 (25.2)	50 (38.5)	156 (28.4)	0.003
Body mass index, kg/m <sup>2</sup>	22.8 (20.7–24.9)	24.0 (22.2–25.8)	23.4 (21.3–25.0)	0.014
Comorbidity				
Diabetes	81 (19.3)	23 (17.7)	104 (18.9)	0.685
Hypertension	132 (31.4)	29 (22.3)	161 (29.3)	0.046
Coronary artery disease	8 (1.9)	9 (6.9)	17 (3.1)	0.004
COPD	5 (1.2)	3 (2.3)	8 (1.5)	0.352
CKD	10 (2.4)	1 (0.8)	11 (2.0)	0.251
Chronic liver disease	18 (4.3)	5 (3.8)	23 (4.2)	0.827
Liver cirrhosis	4 (1.0)	1 (0.8)	5 (0.9)	0.848
Signs and symptoms on admission				
Fever/chills	159 (38.4)	55 (42.3)	214 (39.3)	0.427
Cough	229 (55.4)	85 (65.4)	314 (57.8)	0.045
Dyspnea	63 (15.2)	25 (19.2)	88 (16.2)	0.278
Gastrointestinal symptoms (nausea/vomiting/diarrhea)	85 (20.5)	37 (28.5)	122 (22.4)	0.059
Myalgia	124 (30.0)	49 (37.7)	173 (31.8)	0.098
Headache	112 (27.1)	41 (31.5)	153 (28.1)	0.321
Days from symptom onset to admission	6 (4–9)	6 (3–8)	6 (3–9)	0.082
SIRS on admission	24 (5.7)	14 (10.8)	38 (6.9)	0.047
Severe patients on admission	22 (5.2)	11 (8.5)	33 (5.7)	0.176
Radiologic findings on admission				
Abnormal chest radiographs	202 (48.1)	78 (60.0)	280 (50.9)	0.018
Bilateral involvement of chest radiographs	114 (27.1)	51 (39.2)	165 (30.0)	0.009
Treatment				
Lopinavir/ritonavir	193 (46.0)	81 (62.3)	274 (49.8)	0.001
Darunavir/cobicistat	9 (2.1)	1 (0.8)	10 (1.8)	0.306
Hydroxychloroquine	198 (47.1)	70 (53.8)	268 (48.7)	0.181
Antibiotics	273 (65.0)	107 (82.3)	380 (69.1)	<0.001

Data are presented as the number (%) or median (interquartile range).

COPD, chronic obstructive pulmonary disease; CKD, chronic kidney disease; SIRS, systemic inflammatory response syndrome.