

Coexisting illness and COVID-19

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Abstract

Background: Coronavirus disease 2019 (COVID-19) has rapidly spread throughout worldwide. Hypertension, diabetes, cardiovascular disease, and cerebrovascular disease were the most common coexisting illness among patients with severe SARS-CoV-2 infection. We aim to analyze the effect of them on the result of laboratory finding in patients with severe or critical SARS-CoV-2 infection.

Methods: The date of a total of 49 patients who met the inclusion criteria from January 12 to March 20, 2020, from the first affiliated hospital of Harbin medical university were analyzed in our study.

Results: Compared with patients without any coexisting illness, we found that PT levels were decreased in patients with cerebrovascular disease, hypertension or cardiovascular disease, and D-Dimer levels were decreased in patients with cerebrovascular disease, hypertension or diabetes. Similarly, LDH and ALT levels were lower in patients with cerebrovascular disease than that without any coexisting illness.

Conclusions: Hypertension, diabetes, cardiovascular disease, and cerebrovascular disease are associated with an increased disease severity and risk of death in patients with COVID-19. Recently study also reported that the levels of PT, D-dimer, and LDH were increased and predicted the deterioration of disease in severe patients with SARS-CoV-2 infection. Interestingly, our results demonstrate that the levels of laboratory indicators such as PT, D-dimer, LDH and ALT were decreased in patients with coexisting illness than without any coexisting illness. It may give us the inaccurate result when we use those laboratory indicators to predict the deterioration of the patients and we need to pay more attention to it.

Background

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection is an ongoing pandemic. Hypertension, cardiovascular disease, diabetes, and cerebrovascular disease were the most common coexisting illness among patients with severe SARS-CoV-2 infection^[1]. However, the clinical characteristics and laboratory findings in severe or critical SARS-CoV-2 infection patients with coexisting illness is still unclear.

Methods

In this study, we analyze 49 severe or critical patients infected with COVID-19 from January 12 to March 20, 2020 at the first affiliated hospital of Harbin medical university. All the patients were laboratory-confirmed cases and classification of the severity of COVID-19 was based on the New Coronavirus Pneumonia Prevention and Control Program (6th edition) published by the National Health Commission of China^[2]. Continuous variables are expressed as the mean \pm standard deviation (SD). Continuous data with skewed distributions were compared with the Wilcoxon rank sum test. Categorical variables are summarized as counts (percentages). All analyses were performed with SPSS software, version 23. A P value less than 0.05 was considered statistically significant.

Results

The total mean age was 64.3 ± 13.1 years. Mean hospital stay was 22.5 ± 5.3 days. Approximately two-third of the patients had underlying diseases (30 [61.2%]), including hypertension (25 [51.0%]), cardiovascular disease

(22 [44.9%]), diabetes (11 [22.4%]), cerebrovascular disease (8 [16.3%]), TB infection(4 [8.2%]), COPD (3 [6.1%]) and cancer (2[4.1%]).

Interestingly, laboratory data within 3 days of admission demonstrated that the mean PT levels in patients without coexisting illness disease (normal 11–13 sec, n = 19) were 13.5 ± 2.1 sec, but it was only 12.2 ± 1.0 sec in patients with cardiovascular disease(n = 16), 12.3 ± 1.0 sec (n = 18) in patients with hypertension and 12.2 ± 0.4 sec (n = 8) in patients with cerebrovascular disease(P < 0.05). Similarly, the mean D-dimer levels in patients without coexisting illness disease were 9.2 ± 13.9 mg/L (n = 19, normal D-dimer < 0.5 mg/L), but it was only 2.7 ± 2.0 mg/L in patients with cardiovascular disease(n = 16), 2.4 ± 1.8 mg/L (n = 18) in patients with hypertension, 1.6 ± 1.1 mg/L (n = 8) in patients with cerebrovascular disease (p < 0.5) and 2.0 ± 1.6 in patients with diabetes. The mean LDH levels in patients without cerebrovascular disease were 776.6 ± 413.5 U/L (n = 19, normal LDH 135.0-215.0 U/L), but it was only 517.8 ± 145.7 U/L (n = 8) in patients with cerebrovascular disease (P < 0.5). The mean ALT levels in patients without cerebrovascular disease demonstrated were 48.3 ± 42.1 U/L (n = 19, normal ALT 0–40 U/L), but it was only 22.2 ± 10.7 U/L (n = 8) in patients with cerebrovascular disease (P < 0.5) (Table 1). The levels of other laboratory findings, including white blood cell, Neutrophil count, lymphocyte count, monocyte count, platelet count, activated partial thromboplastin time, aspartate aminotransferase, CK, CKMB, BUN, cTnl, PCT, CRP and IL-6, had no statistic difference between patients with coexisting illness disease and without that.

Table 1
Clinical characteristics and laboratory findings in COVID-19 patients with coexisting illness.

	Total	No other illness	Cerebrovascular disease	Cardiovascular disease	Hypertension	Diabetes
	n = 49	n = 19	n = 8	n = 16	n = 18	n = 11
Symptoms (Top 5)						
Fever, n (%)	32(65.3)	15(78.9)	2(25.0)	9(56.3)	11(61.1)	4(36.4)
Dyspnea, n (%)	27(55.1)	7(36.8)	3(37.5)	6(37.5)	6(33.3)	4(36.4)
Expectoration, n (%)	21(42.9)	7(36.8)	2(25.0)	7(43.8)	8(44.4)	5(45.5)
Dry cough, n (%)	18(36.7)	12(63.2)	1(12.5)	5(31.3)	6(33.3)	5(45.5)
Fatigue, n (%)	14(28.6)	1(5.3)	0(0.0)	4(25.0)	6(33.3)	1(9.1)
PT (sec), mean \pm SD	13.02 \pm 1.79	13.53 \pm 2.14	12.21 \pm 0.39*	12.24 \pm 0.99*	12.33 \pm 1.04*	13.16 \pm 2.02
< 11 sec, n (%)	2(4.1)	0(0.0)	0(0.0)	2(12.5)	2(11.1)	0(0.0)
11–13 sec, n (%)	30(61.2)	12(63.2)	8(100.0)	10(62.5)	11(61.1)	7(63.6)
> 13 sec, n (%)	17(34.7)	7(36.8)	0(0.0)	4(25.0)	5(27.8)	4(36.4)
D-dimer (mg/L)	4.98 \pm 9.27	9.18 \pm 13.91	1.60 \pm 1.13*	2.66 \pm 2.01	2.38 \pm 1.82*	1.95 \pm 1.61*
> 0.5 mg/L, n (%)	49(100.0)	19(100.0)	8(100.0)	16(100.0)	18(100.0)	11(100.0)
LDH, mean \pm SD	681.12 \pm 321.12	776.57 \pm 413.46	517.76 \pm 145.66*	677.85 \pm 276.94	657.00 \pm 256.50	616.89 \pm 214.85
ALT (U/L), mean \pm SD	37.37 \pm 30.62	48.26 \pm 42.07	22.18 \pm 10.67*	28.17 \pm 15.05	36.61 \pm 19.74	31.24 \pm 20.17
> 40 U/L, n (%)	11(22.4)	10(52.6)	1(12.5)	2(12.5)	5(27.8)	2(18.2)
SD: standard deviation; PT: prothrombin time; ALT: Alanine transaminase; LDH: lactate dehydrogenase; *compared with patients with No other disease, P < 0.05						

Discussion

Recently study reported that the levels of PT, D-dimer, and LDH were increased and predicted the deterioration of disease in severe patients with SARS-CoV-2 infection^[3, 4]. Cerebrovascular disease, cardiovascular disease, diabetes and hypertension are associated with an increased disease severity in patients with COVID-19^[5–8]. Conversely, compared with patients without any coexisting illness, we found that PT and D-Dimer levels were

decreased in patients with cerebrovascular disease, hypertension or cardiovascular disease. Similarly, LDH and ALT levels were lower in patients with cerebrovascular disease than that without any coexisting illness. Maybe because the body of the patients combined with basic diseases such as cerebrovascular disease, cardiovascular disease or hypertension is in a state of stress for a long time and has increased tolerance to stress. So, the changes of laboratory indicators are not so obvious. But it may give us the inaccurate result when we use those laboratory indicators to predict the deterioration of severe or critical patients with COVID-19.

Conclusion

In summary, our study demonstrates that the levels of laboratory indicators such as PT, D-dimer, LDH and ALT were decreased in patients with coexisting illness than without any coexisting illness. It may give us the inaccurate result when we use those laboratory indicators to predict the deterioration of the patients and we need to pay more attention to it. However, studies with larger sample size and number of events are needed to confirm our findings.

Declarations

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Competing Interests: All other authors report no potential conflicts.

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Availability of data and materials

The datasets generated and analyzed for this study are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

Written informed consent was waived by the Ethics Commission of the designated hospital due to the emergency situation of COVID-19.

Consent for publication

Not applicable

Abbreviations

COVID-19: Coronavirus disease 2019; SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2; SD: standard deviation; PT: prothrombin time; ALT: Alanine transaminase; LDH: lactate dehydrogenase; CK: creatine kinase; CKMB: creatine phosphokinase isoenzyme; BUN: Blood Urea Nitrogen; cTnl: cardiac troponin I; PCT: procalcitonin; CRP: C-reactive protein; IL-6: interleukin-6.

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