Risk factors of viral RNAaemia and its association with clinical prognosis among patients with severe COVID-19

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Introduction

The features of COVID-19 patients with detectable viral RNA in blood, the risk factors of viral RNAaemia, and its influence on the prognosis remain unclear.

Methods

This is a post-hoc analysis of data prospectively collected in a randomized, controlled, open-label trial (LOTUS China, ChiCTR2000029308).

A total of 199 patients aged 18 years or older with pneumonia caused by SARS-CoV-2, which was confirmed via RT-PCR with respiratory specimens were included in the LOTUS study. All the patients met the criteria of an oxygen saturation (SaO2) of 94% or less while they were breathing ambient air or PaO_2: FiO_2 at or below 300 mg Hg on enrollment.

Plasma specimens were collected on day 1, 5, 10, 14, 21, 28 after enrollment.

Results

Figure 1. Association of viral RNAaemia with prognosis of severe COVID-19 patients
Model 1: Adjusted for age, gender, and seven-category scale at baseline;
Model 2: As for model 1 plus comorbidity, duration from illness onset to admission, antiviral treatment during hospitalization, and corticosteroids treatment before and during hospitalization;

Results

In total, 192 severe COVID-19 patients were included in this study. 36.9% of them showed detectable SARS-CoV-2 viral RNA in plasma during hospitalization.

Baseline viral load in throat swabs and anal swabs were positively associated with viral load in plasma. Disease severity at baseline (odds ratio 2.20, 95%CI 1.15-4.20; p=0.017) and prior corticosteroids therapy for underlying diseases (4.56, 1.10-18.94; p=0.037) were risk factors for developing viral RNAaemia in severe COVID-19 patients.

Severe and prolonged lymphopenia, dysfunction of coagulation characterized by high level of D-dimer, and multi-organ dysfunction including ARDS, acute kidney injury and acute liver injury, were more prominent in the patients with viral RNAaemia compared with those without. Compared with COVID-19 patients without viral RNAaemia, those with viral RNAaemia have higher risk for invasive mechanical ventilation support (6.87, 2.24-21.08; p<0.001), ICU admission (7.80, 2.61-23.31; p<0.001), and in-hospital death (4.48, 1.73-11.62; p<0.001).

Conclusions

A high percentage of severe COVID-19 patients complicated with viral RNAaemia, which is associated with increased risk of poor clinical prognosis. Patients with more severe disease condition at baseline and prior corticosteroids therapy for underlying diseases have higher risk of developing viral RNAaemia.
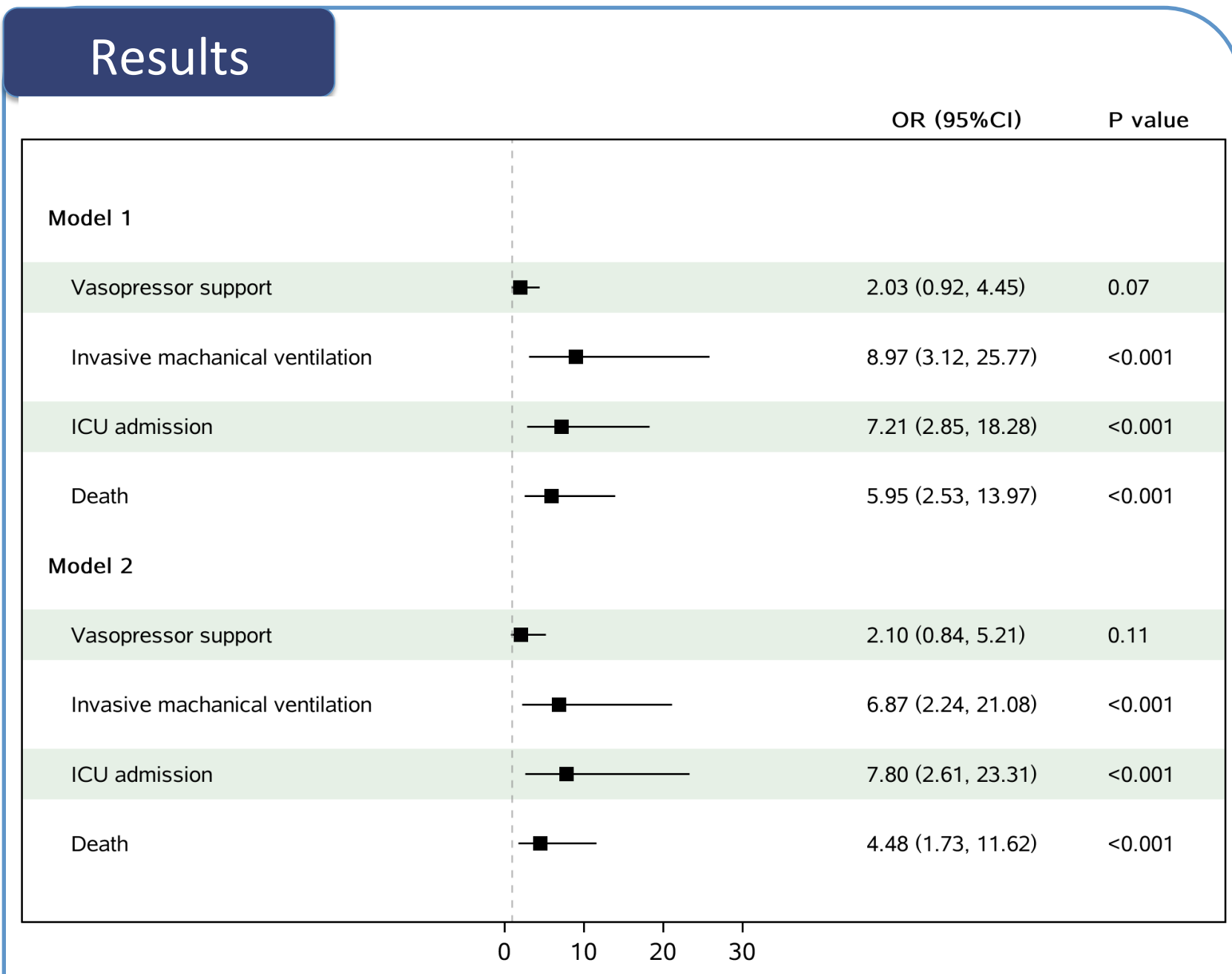
Conflict of interest: none

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