

Letter to the Editor

Shupeng Jiang, Panpan Liu, Ge Xiong, Zhaohui Yang, Ming Wang*, Yan Li* and Xue-jie Yu*

Coinfection of SARS-CoV-2 and multiple respiratory pathogens in children

<https://doi.org/10.1515/cclm-2020-0434>

Received April 3, 2020; accepted April 5, 2020; previously published online April 16, 2020

Keywords: children; coinfection; SARS CoV-2.

To the Editor,

The COVID-19 outbreak occurred in Wuhan City of China in December 2019. Within 3 months, the disease has swept the world resulting in 191,127 confirmed cases and 7807 deaths in more than 150 countries and territories [1]. COVID-19 has been reported predominantly in adults, particularly in those with chronic comorbidities [2, 3]. A small number of cases of COVID-19 have been reported in children; therefore, children are widely believed to be not susceptible to COVID-19 [4, 5]. Here we report two cases of COVID-19 in children who were coinfecting with human respiratory viruses and *Mycoplasma pneumoniae* (MP) in China.

A total of 161 hospitalized children (≤ 14 years of age) with positive respiratory virus polymerase chain reaction (PCR) were enrolled in a retrospective study of respiratory infections in the pediatric ward of a class A tertiary comprehensive hospital in Wuhan, China from December 1, 2019 to January 16, 2020. Nasopharyngeal swab, sputum or bronchoalveolar lavage fluid specimens were tested for respiratory viruses by real-time PCR (RT-PCR) or multiplex PCR combined with capillary electrophoresis. Clinical presentation, laboratory findings

and radiological features were collected from electronic medical records. The study was approved by the Ethics Committee of the Renmin Hospital of Wuhan University.

A total of 239 positive targets of pathogens were detected in 161 children. The highest proportion of pathogens were human respiratory syncytial virus (HRSV) (in 76 patients [31.80%]) and influenza A virus (in 72 patients [30.13%]). Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19, was detected in two patients and accounted for 0.84%.

SARS-CoV-2, HRSV and human metapneumovirus (HMPV) were found in the bronchoalveolar lavage fluid of patient 1, and SARS-CoV-2, MP and HMPV were found in the bronchoalveolar lavage fluid of patient 2. The two patients stayed in different pediatric wards. Clinical characteristics of these two children with COVID-19 are shown in Table 1.

Patient 1 was admitted to the hospital on December 28, 2019, for fever and dry cough that occurred a few hours ago. Routine blood tests revealed a leukocyte count of 16.81×10^9 cells/L (reference range $3.5\text{--}9.5 \times 10^9$ cells/L), neutrophil count of 14.02×10^9 cells/L (reference range $1.8\text{--}6.3 \times 10^9$ cells/L) and lymphocyte count of 2.05×10^9 cells/L (reference range $1.1\text{--}3.2 \times 10^9$ cells/L). Inflammatory factor investigations revealed elevated C-reactive protein (CRP) level (46.92 mg/L, normal: 0–10 mg/L) and procalcitonin (PCT) level (0.11 ng/mL, reference range 0–0.10 ng/mL). Blood culture and sputum culture were all negative. Chest computed tomography revealed a ground-glass opacity in the lung. Due to her oxygen saturation of 70% in ambient air, this patient was diagnosed with severe pneumonia and was admitted to the intensive care unit (ICU). After 2 weeks of treatment with antiviral agents, antibiotic agents and supportive therapies, she was discharged smoothly with no residual symptoms.

Patient 2 was admitted to the hospital on December 29, 2019, for fever, cough and vomiting the day before. Laboratory investigations showed the leukocyte, neutrophil and lymphocyte counts were in the normal range. Serum amyloid A was increased (41.20 mg/L, normal: 0–10 mg/L), but PCT and CRP levels were normal. After 11 days of treatment with supportive therapies and antibiotic agents, she was on the mend and was re-examined for

***Corresponding authors: Ming Wang**, MD, PhD and **Yan Li**, MD, PhD
Department of Laboratory Medicine, Renmin Hospital of Wuhan University, No. 238 Jiefang Rd, Wuhan 430060, P.R. China, E-mail: morgan@whu.edu.cn (M. Wang); yanlift1120@163.com (Y. Li); and **Xue-jie Yu**, MD, PhD State Key Laboratory of Virology, School of Health Sciences, Wuhan University, No. 115 Donghu Rd, Wuhan 430071, P.R. China, E-mail: yuxuejie@whu.edu.cn
Shupeng Jiang and Ge Xiong: Department of Laboratory Medicine, Renmin Hospital of Wuhan University, Wuhan, P.R. China.
<https://orcid.org/0000-0001-6401-4127> (S. Jiang)

Panpan Liu: State Key Laboratory of Virology, School of Health Sciences, Wuhan University, Wuhan, P.R. China

Zhaohui Yang: Department of Radiology, Renmin Hospital of Wuhan University, Wuhan, P.R. China

Table 1: Clinical characteristics of the two children with COVID-19.

Characteristic	Patient 1	Patient 2
Age, years	6Y8M	3Y6M
Gender	Female	Female
Top temperature	40.0 °C	40.0 °C
Respiratory symptoms	Fever, cough	Fever, cough, wheeze
Pharyngeal symptoms	Swollen pharynx, large tonsils	Swollen pharynx
Gastrointestinal symptoms	Vomiting	Vomiting
CT findings	Patchy shadows	NA
Pathogens	SARS-COV-2, HRSV, HMPV	SARS-COV-2, MP, HMPV
Treatments		
Oseltamivir	Yes	No
Glucocorticoids	No	Yes
Antibiotic treatment	Yes	Yes
Intravenous immune globulin	Yes	No
Supplemental oxygen	Yes	Yes
Bronchoalveolar lavage	Yes	Yes
Clinical course		
ICU admission	Yes	No
Duration of hospitalization	14D	11D

COVID-19, coronavirus disease 2019; CT, computed tomography; HMPV, human metapneumovirus; HRSV, human respiratory syncytial virus; ICU, intensive care unit; MP, *Mycoplasma pneumoniae*; NA, not available; SARS-COV-2, severe acute respiratory syndrome coronavirus 2.

all inflammatory indexes and all showed normal, and she was discharged from the hospital.

In this retrospective study, we demonstrate that children are not only susceptible to SARS-CoV-2 infection, but they can be coinfectd with SARS-CoV-2 and multiple respiratory viruses and bacterial pathogens including HRSV, HMPV and MP in China. Children were reported to have milder illnesses and shorter durations compared to adults [5]. Our study indicated that one of the two children needed ICU, indicating the child had severe symptoms. Because the number of cases of coinfection is small, we cannot determine whether coinfection of SARS-CoV-2 with other viruses or bacteria aggravates the condition. Our study

indicated that coinfection of SARS-CoV-2 and HRSV, HMPV or MP in children occurs, suggesting that children with respiratory infection should be screened for SARS-CoV-2 and other respiratory viral and bacterial pathogens during the COVID-19 pandemic to prevent missed diagnosis and transmission of SARS-CoV-2. The prevalence of SARS-CoV-2 coinfection with other pathogens is also unclear in adult COVID-19 patients, as there has only been a case report of a 69-year-old man who was coinfectd with SARS-CoV-2 and influenza A virus in China [3]. Our study indicates that COVID-19 patients should be investigated for coinfection with other respiratory viruses and bacterial pathogens.

Research funding: This study was supported by a grant from National Natural Science Funds of China (Grant No. 81971939).

Author contributions: Drs. Li, Wang and Yu had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Jiang and Liu contributed equally to the study. All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

Competing interests: Authors state no conflict of interest.

Informed consent: Informed consent was obtained from all individuals included in this study.

Ethical approval: The study was approved by the Ethics Committee of the Renmin Hospital of Wuhan University.

References

1. World Health Organization. Coronavirus disease (COVID-2019) situation reports. at <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/>.
2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* (London, England) 2020;395:497–506.
3. Wu X, Cai Y, Huang X, Yu X, Zhao L, Wang F, et al. Co-infection with SARS-CoV-2 and influenza A virus in patient with pneumonia, China. *Emerg Infect Dis* 2020;26. doi: 10.3201/eid2606.200299. [Epub ahead of print].
4. Liu W, Zhang Q. Detection of Covid-19 in children in early January 2020 in Wuhan, China. *New Engl J Med* 2020;382:1370–71..
5. Wei M, Yuan J, Liu Y, Fu T, Yu X, Zhang ZJ. Novel coronavirus infection in hospitalized infants under 1 year of age in China. *J Am Med Assoc* 2020;323:1313–14.