

Study on the Epidemiological Characteristics of Common Enterovirus among Pediatric Patients in Hangzhou, China: A Comparison between the Pre-COVID-19, COVID-19 Pandemic, and Post-COVID-19 Periods

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Abstract

Nonpharmaceutical interventions (NPIs) against coronavirus disease 2019 (COVID-19) reduced the prevalence of coronavirus among children and influenced the transmission of other viruses. This study investigates the impact of NPIs on human enterovirus (HEV) among children in Hangzhou, China. We collected and analyzed the laboratory results and clinical data of children diagnosed with hand, foot, and mouth disease (HFMD) or herpangina (HA) during the following periods: pre-COVID-19 (January 2019 to December 2019), COVID-19 pandemic (January 2020 to December 2022), and post-COVID-19 (January to August 2023). A total of 38,582 specimens that met the inclusion criteria were enrolled, of which 1,777 (5.58%) tested positive for enterovirus. In comparison to the pre-COVID-19 period, which had 695 (5.63%) HEV-positive specimens, the numbers dramatically decreased to 69 (1.19%), 398 (5.12%), and 112 (1.58%) in 2020, 2021, and 2022, respectively, but significantly increased to 503 (9.00%) in 2023. Seasonal peaks of infections occurred between May and August each year, with positive rates of 10.58%, 25.27%, 31.74%, and 10.97%, respectively. Notably, June and July accounted for half of all cases, with a rate of 57.01%. The difference in the positive rates of HEV infection between males and females was statistically significant ($P < 0.005$), with 5.12% (1,084/21,176) and 4.43% (693/15,629) testing positive, respectively, resulting in a male to female ratio of 1.56:1. Among the same age groups, children aged 3-5 years and 5-7 years had the highest positive rates at 11.03% (342/3,102) and 10.03% (205/2,024), respectively, after synthesizing five years of data. The detection rate of HEV-positive cases increased with age, but after the age of 7, the rate declined. The detected types of HEV indicated that enterovirus 71 (EV-A71) and coxsackievirus A16 (CV-A16) are no longer the two common pathogens causing HFMD and HA. In conclusion, NPIs for COVID-19 are highly effective in reducing the transmission of HEV. However, the relaxation of NPIs results in a resurgence of HEVs, surpassing prepandemic levels. Active awareness and surveillance of the epidemiological characteristics of HEV are essential for preventing, controlling, and managing the development of HFMD and HA, as well as contributing to the development of a multivalent HFMD vaccine.

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