

COVID-19 pandemic and its consequences disrupt epidemiology of enterovirus meningitis, South–East France

To the Editor,

In northern hemisphere, enteroviral infections predominate during summer.¹ Most enterovirus meningitis affect children and are self-limited, but their clinical presentation leads to a hospital consultation almost systematically. To assess the impact of the current COVID-19 pandemic on local epidemiology of enteroviral meningitis, we analyzed the data from the microbiology laboratory of public hospitals of Marseille, France. From 2018 January to 2020 August, we analyzed 4782 cerebrospinal fluid (CSF) for suspected community-acquired meningitis. Each week, 20–60 CSF were analyzed using a polymerase chain reaction multiplex assay (Biofire-FilmArray meningitis/encephalitis panel; Biomérieux) that performs simultaneous detection of 14 pathogens including enteroviruses.

In South–East of France, the first case of COVID-19 was detected in late February 2020. Because of drastic increase of COVID-19 associated deaths, a strict lockdown was applied in France from March 17th to May 11th 2020. During this period, we diagnosed only one case of enterovirus meningitis while sporadic cases were observed continuously in 2018–2019 (8 and 6 cases, respectively, during the same period; Figure 1B,C). Then, the lockdown was gradually lifted with hygiene and social distancing measures enhanced. Schools also reopened, but according to data from French ministry for national education, youth and sport, attendance barely reached 20% until late June. During the 2020 summer period (June, July, and August) we detected only one case of enterovirus meningitis in August, which is extremely low compared

to the same period in 2018 and 2019 (Figure 1B,C). Indeed, the mean weekly number of enterovirus meningitis was significantly lower in 2020 (0.1 ± 0.2) in comparison with those observed in 2018 and 2019 (respectively, 7.5 ± 3.1 and 4.6 ± 2.0); Figure 1E; $p < .001$). Mean weekly percentage of CSF positive for enterovirus was also significantly lower in 2020 ($0.2 \pm 0.5\%$) in comparison with those observed in 2018–2019 (respectively, $16.0 \pm 5.7\%$ and $10.0 \pm 3.7\%$); Figure 1F; $p < .001$). The number of CSF tested during 2020 spring was not affected by lockdown (Figure 1A). This observation suggests that suspected cases of community-acquired meningitis continued to present at emergency wards during the lockdown period because of the severity of the symptoms. However, we noticed a significant decrease of the mean weekly number of CSF analyzed during the summer period (32.2 ± 4.3 vs. 46.4 ± 4.9 and 46.5 ± 5.7 in 2018 and 2019, respectively; Figures 1A and 1D; $p < .001$) probably due to the lack of enterovirus outbreak.

Altogether, our data show that the COVID-19 pandemic and its consequences have disrupted the epidemiology of enteroviral meningitis. Enteroviruses are excreted in the respiratory and digestive tracts and can be transmitted from person to person by direct or indirect contact.^{2–6} It is difficult to establish a direct causal link but we assume that the lockdown followed by a large increase of the proportion of out-of-school children may have drastically reduced the circulation of enteroviruses. We also speculate that the continuous promotion of hygiene and social distancing measures may have played a role. Other studies showed that this pandemic affected

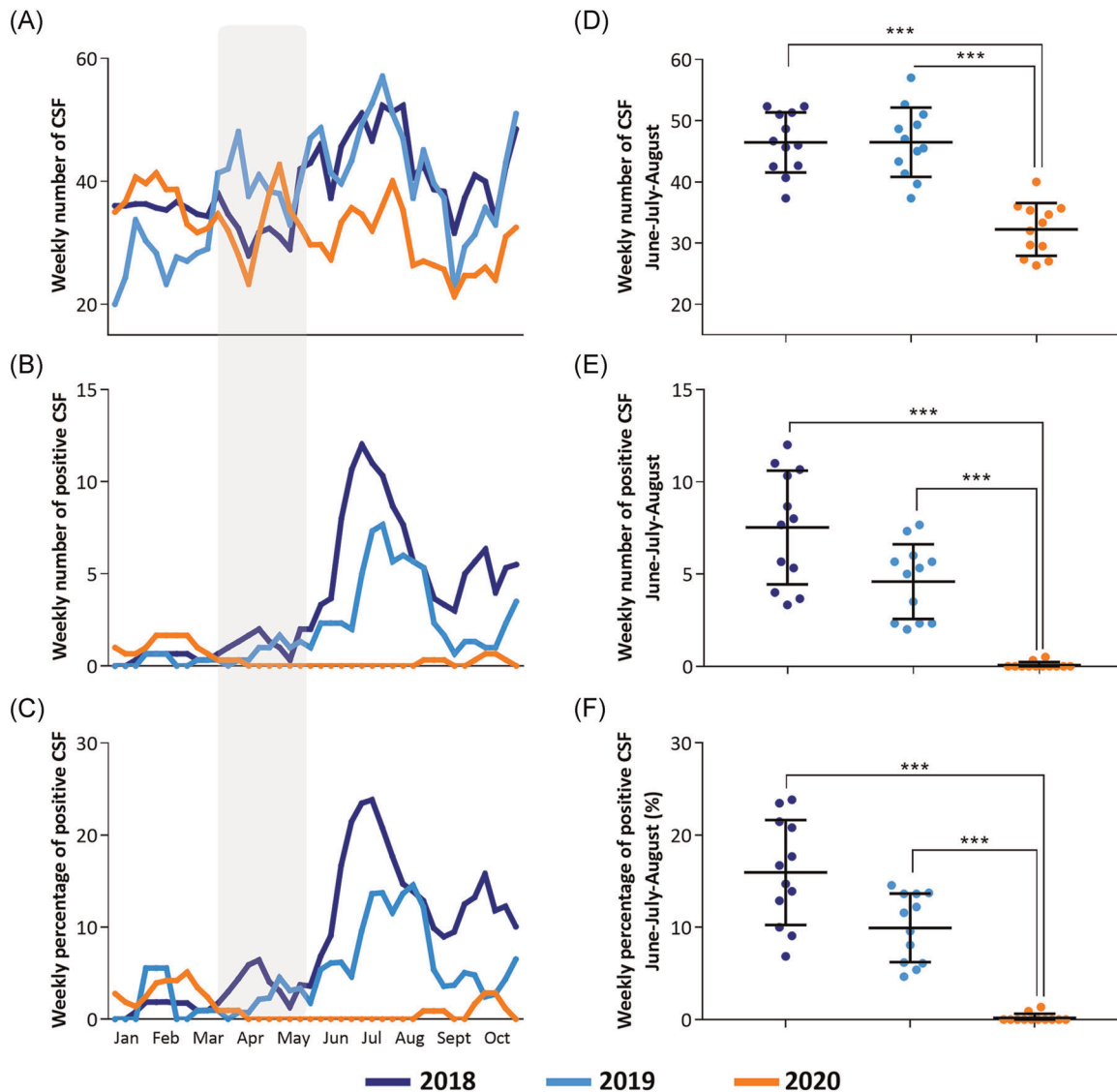


FIGURE 1 Comparison of epidemiology of enterovirus meningitis between 2018, 2019, and 2020. (A) Weekly distribution of the number of cerebrospinal fluid (CSF) received. (B) Weekly distribution of the number of CSF-tested positive for enterovirus. (C) Weekly distribution of the percentage of CSFs tested positive for enterovirus. (A–C) Data were represented using 3 weeks sliding windows and the gray rectangle represents the lockdown period in France. (D–F) Data during the summer period (June, July, and August): (D) Weekly number of CSF received, (E) weekly number of CSF-tested positive for enterovirus, and (F) weekly number of the percentage of CSFs tested positive for enterovirus. (D–F) Mean weekly numbers/percentages were compared using a Mann-Whitney test (***) $p < .0001$

the circulation of several viral pathogens particularly in the pediatric population^{7–12} and results similar to ours were recently published (data from Minnesota, USA).¹³ A better understanding of this phenomenon could help to control more effectively epidemic infectious diseases.

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CONFLICT OF INTERESTS

All authors declare that there is no conflict of interests.

AUTHOR CONTRIBUTIONS

Léa Luciani and Antoine Nougairède wrote the manuscript. Laetitia Ninove and Christine Zandotti helped with proofreading and corrections. All authors have approved the final manuscript for publication.


DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

According to national regulations, specific consent from patients was not required for inclusion in the study and publication of the results

since all diagnostic procedures were performed following physician's prescriptions and all data were anonymized.

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