Environmental surveillance of SARS-CoV-2 in wastewater samples from Porto Alegre and metropolitan region

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During the SARS-CoV-2 pandemic, the prevalence of infection in the community has been done by testing symptomatic patients. Nonetheless, this approach can underestimate the number of infected individuals, since asymptomatic cases are not identified. Knowing that infected people excrete SARS-CoV-2 on their feces and that the virus can be found in untreated wastewater, the present study aims to detect and quantify the SARS-CoV-2 in wastewater samples obtained in Porto Alegre city and the metropolitan region, using as a sensitive surveillance system. The analyses were conducted in samples obtained from Wastewater Treatment Plants (WWTPs) and Pumping Stations (WWPSs). The samples were concentrated by ultracentrifugation, submitted to RNA extraction employing Maxwell® 16 Viral Total Nucleic Acid Purification Kit and automatic extractor Maxwell® RSC (*Promega*) and RT-qPCR tests were performed using primer-probe, targeting two regions of the nucleocapsid gene (N1 and N2) and the envelope gene (E), as validated by US CDC and Charité/Berlin. Here, 508 samples were processed and 484 samples were SARS-CoV-2 positive, with CTs ranging between 29 and 38. The genome quantifications varied according to the sample collection method (simple or composite), weather condition and the number of diagnosed cases in the region. Furthermore, genomic variants of SARS-CoV-2 were identified in 6 samples collected in May, June and August, 2021, reflecting the circulation of the Gamma variant in the first 4 samples and Delta variant in the last 2 samples. Such analysis were performed using the TaqMan™ SARS-CoV-2 Mutation Panel from Thermo Fisher Scientific. These results show that the detection and quantification of SARS-CoV-2 in wastewater samples of Porto Alegre and metropolitan region reflects virus circulation in these regions, while such data can contribute to a more accurate monitoring of the presence of the virus in different regions. As a consequence, the environmental monitoring of SARS-CoV-2 can help the Public Health Authorities on the decision making process in order to better control the pandemics.

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