

MONITORING OF SARS-COV-2 IN PORTO ALEGRE'S SEWAGE SLUDGE.

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Monitoring SARS-CoV-2 virus in the population is of great importance to assist governmental decision-making and to contain and mitigate damage caused by the COVID-19 epidemic. However, the scarcity of rapid tests and inputs for molecular diagnostic tests can make mass testing of the population unfeasible, especially during the peaks of contamination during the pandemic. A viable alternative is the detection and quantification of the virus in sewage networks, since SARS-CoV-2 is released into the feces of infected patients, including asymptomatic patients. Hence many countries have studied wastewater monitoring of SARS-CoV-2 as a secondary monitoring of the infection in the population. Knowing that coronaviruses have a greater affinity for solids compared to other non-enveloped viruses and that Brazil holds the largest park of upflow anaerobic sludge blanket digestion (UASB) reactors in the world, this work aimed to analyze the viral load in weekly sludge samples from the Serraria sewage treatment station, considered the most representative of the city of Porto Alegre. During the period of January to August of 2021, 32 sludge samples were analyzed by qRT-PCR. Thirty (93%) of them were positive for SARS-CoV-2 and copy numbers varied from 0.147 to 2.314 copies x10⁶/ L. In wastewater samples from the same days, 31 (96%) were positive for SARS-CoV-2 and copy numbers varied from 0.058 to 3.014 copies x10⁶/ L. For the identification of variants of concern (VoCs), 15 sludge samples (with lower cycle thresholds) were analysed for the presence of nine different mutations. All 15 samples tested were positive for the presence of the reference alleles and, since March 2021, mutations N501Y, E484K and K417T of the Gamma variant were identified. Mutations P681R and L452R, of the Delta variant, were detected since beginning of August 2021. This represents the first attempt to use sludge from a UASB reactor to monitor SARS-CoV-2 in a population. The viral loads in sludge reflected the weekly variation in the number of hospitalizations, but showed a two-week delay in relation to the number of new Covid-19 cases. Reducing such a delay will require an improvement in the methodology. On the other hand, we successfully identified known VoCs even in samples from periods with a low number of cases. The earlier identifications in the sludge of both the Gamma and Delta variants matched the predominance of these variants in Rio Grande do Sul as communicated by the weekly genomic bulletins from the State surveillance organ.

Palavras-chave: Sars-Cov-2; Sludge, Wastewater, Surveillance, Environmental Virology.

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