Tracking COVID-19 Variants of Concern in Wastewaters of Central Arkansas

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The COVID-19 pandemic has been ravaging on for more than 2 years now, ever since it was declared a pandemic in early March of 2020. Wastewater-based epidemiology (WBE) has been used in tracking highly infectious diseases such as polio. Thus, the goal of the project was to develop an efficient method to track SARS-CoV-2 variants of concern in wastewater treatment facilities in Central Arkansas over a period of time and investigate whether or not SARS-CoV-2 variants detected in wastewaters is associated with COVID-19 variants in clinical cases. Amplicon RNA next-generation sequencing was used for sequencing of wastewater influent samples in Adams Field, Fourche Creek, Little Maumelle (Little Rock Water Reclamation Authority), and Pine Bluff (Pine Bluff Wastewater Utility) wastewater treatment facilities from 11/2021 to 11/2022. The data showed dynamic changes in abundancy of SARS-CoV-2 variants in all four locations over period of time. Specifically, Delta variant was detected from 11/2/2021 to 12/14/2021, followed by Omicron BA.1* - 12/28/2021-2/22/2022 in all four wastewater treatment facilities. Omicron BA.2* variant was detected from 4/5/2022-6/28/2022, then Omicron BA.5* - 6/28/2022-11/29/2022, and beginning on 10/18/2022, traces of Omicron BQ.1* variant was present in wastewaters across all four locations. The results of this study show that surveillance of wastewaters using targeted RNA sequencing is a powerful complementary tool for the early identification and tracking of multiple variants of SARS-CoV-2 virus in wastewater and may be used for identification, readiness, and response to future pandemic threats.

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