Wastewater-Based Epidemiology (WBE) To Monitor COVID-19 in a Private Community Campus

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By March 4th 2022, the WHO confirmed about 440 million cases and approximately 6 million deaths due to COVID-19. Recently, many studies relied on only expensive swab testing, which cannot predict outbreaks in a wide community in a timely manner, or easily capture asymptomatic carriers. In this work, wastewater-based epidemiology (WBE) was used to predict outbreaks or spread of the virus. During the study, two sewage water samples were collected every Sunday from KAUST WWTP. Subsequently, the filtration process was done to concentrate the virus. RNA was extracted to achieve a higher concentration. A RT-PCR test was performed to convert the RNA into cDNA. Then, qPCR was performed to quantify the cDNA. The results provided a correlation between N gene signals and swab test positive cases. This demonstrates the feasibility of using the WBE method for detecting and quantifying SARS-COV-2. To validate the results, PMMoV was used as a biomarker to indicate the WBE method is reliable. Before the mass vaccination drive, N1 and N2 gene signals were detected twice. After that only N1 gene signals were detected. The highest N2 signal we were able to detect before the vaccination was 1190 copy/L and that correlated with the daily positive cases before the mass vaccination, and the least number of N1 gene signals was 9.7 copy/L. Utilizing WBE allows us to estimate the occurrence, distribution, and genetic diversity of these viruses and possibly generate human health risk assessments for global communities.

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