

Detection of SARS-CoV-2 RNA from two wastewater treatment plants of Nepal

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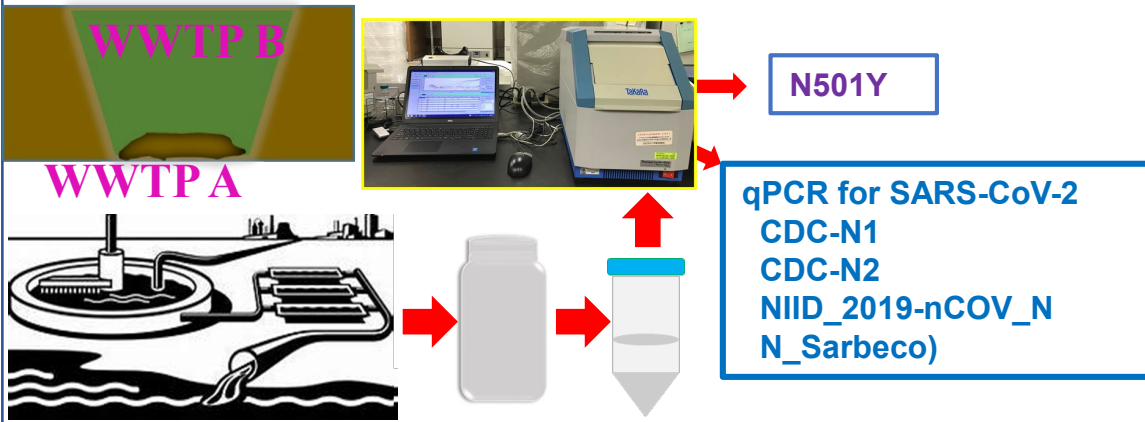
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Background

- Wastewater-based epidemiology (WBE) is a noninvasive early warning surveillance tool (Daughton, 2020).
- The studies have (Ahmed *et al.*, 2020; Haramoto *et al.*, Sherchan *et al.*, 2020) successfully quantified the RNA of severe acute respiratory syndrome coronavirus (SARS-CoV-2) from wastewater.
- This study was conducted to measure SARS-CoV-2 in wastewater to know the current and future possible trend of the disease as well as reduction efficiency of SARS-CoV-2.

Materials and Methods

All together eighty-four grab water samples were collected from two wastewater treatment (WWTPs) [n = 40; WWTP A (oxidation ditch) and n = 28; WWTP B (non-aerated lagoons)].



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Daughton *et al.*, *Science of Total Environment*, 2020;736:139631. doi: 10.1016/j.scitotenv.2020.139631; Ahmed *et al.*, *Science of Total Environment*, 728, 138764. doi: 10.1016/j.scitotenv.2020.138764.

Haramoto, *et al.*, *Science of the Total Environment*, 2020;737:140405. doi: 10.1101/2020.06.04.20122747. Sherchan *et al.*, *Science of Total Environment*, 2020;140621. doi: 10.1016/j.scitotenv.2020.140621

Results and Discussion

The positive ratios of SARS-CoV-2 RNA were 53% (21/40) and 61% (17/28) at WWTP A and B, respectively, using at least one of the four quantitative PCR assays tested.

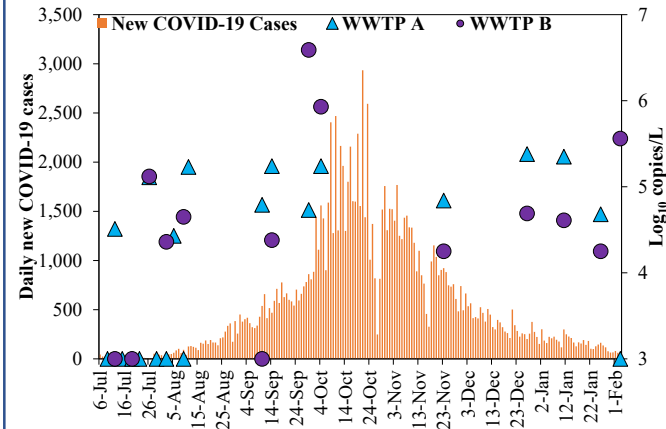


Figure 2. Number of daily new reported cases of COVID-19 and the concentrations of SARS-CoV-2 RNA in influent samples of WWTP A and B.

Conclusions

- Detection of SARS-CoV-2 before, after, and during the increased number of clinical cases, suggesting the use of WBE as an early diagnosis of SARS-CoV-2 in developing countries.
- Moreover, due to a strong correlation with that of SARS-CoV-2 and abundance in wastewater, crAssphage can be proposed as the indicator.
- Low LRVs of SARS-CoV-2 indicate that effluents of WWTPs are releasing a considerable amount of SARS-CoV-2 RNA in the environment.

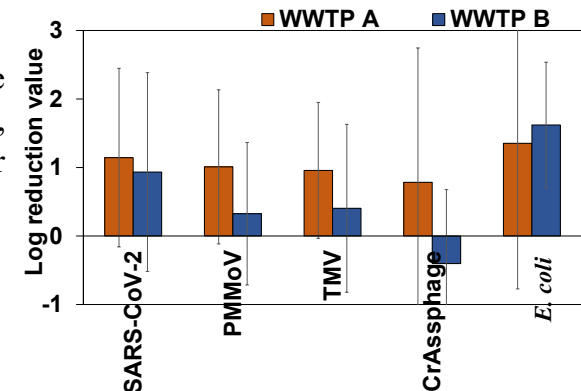


Figure 1. LRVs of SARS-CoV-2 and indicators at WWTP A and B

The log reduction values (LRVs) of SARS-CoV-2 were calculated to be 1.14 ± 1.30 (n = 12) and 0.93 ± 1.45 (n = 11) at WWTP A and B, respectively.

One influent sample of WWTP A tested positive for N501Y variant, highlighting a need for further typing of water samples of other variants.