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Human adenoviruses and hepatitis A viruses in the final effluent of five wastewater treatment plants in the Eastern Cape Province, South Africa

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Abstract

Background: Large reservoirs of human enteric virus and bacteria have been attributed to municipal effluent. Contemporary monitoring practises rely on indicator bacteria but do not test for viruses. Different viruses including Norwalk-like viruses, hepatitis A virus, adenovirus and rotavirus are important agents of illnesses in human.**Method**s: The viral detection was done using the real-time PCR and conventional PCR was used for serotying in final effluents of five wastewater treatment plants in the Eastern Cape, South Africa over a period of 12 months (Sept 2012 – Aug 2013). **Result**s: Adenovirus was detected in all five wastewater treatment plants (WWTPs) effluent samples, while HAV was not detected in any of the effluent samples. At the WWPT-A, samples were collected from the final effluent tank and the discharge point. The viral concentration at the final effluent ranged between 1.05×10^1 - 1.10×10^4 genome copies/L and at the discharge point it ranged between 1.2×10^1 - 2.8×10^4 genome copies/L. At WWPT-B, the viral concentration ranged between 7.92×10^1 - 2.37×10^5 genome copies/L. The HAdV detected at WWPT-C ranged between 5.32×10^1 - 2.20×10^5 genome copies/L. WWPT-D recorded viral concentration ranged between 1.23×10^3 - 1.05×10^4 genome copies/L, while at the last WWTP (WWPT-E) viral concentration ranged between 1.08×10^1 - 5.16×10^4 genome copies/L. The characterizations of adenovirus reveal the presence of HAdV 2 (1.4%) and HAdV 41(7.1%) which

is of species C and F respectively.**Conclusions**: This is the first study to demonstrate the prevalence of HAdV in final effluents of WWTPs in the Eastern Cape, South Africa and the frequency of detection of the virus demonstrates a potential contamination of the environment with adverse public health impact.