

TITLE: EVALUATION OF THE EFFICIENCY OF SEWAGE TREATMENT STATIONS IN THE REDUCTION OF VIRAL AND BACTERIAL LOADS IN THE METROPOLITAN REGION OF BELÉM, PARÁ, BRAZIL.

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ABSTRACT:

Sewer Treatment Stations (STS) are indispensable for the quality control in residual water. Treatment methods are essential to establish a mean to prevent pathogenic agents in water, such as acute gastroenteritis and hepatitis virus. The hepatitis A (HAV) of the *Picornaviridae* family is transmitted, primarily, through fecal-oral route or through contaminated water and food. Biological treatment technologies remove 20% to 80% of enteric viruses in raw sewage allowing a significant viral load to be spread in water bodies. This study aimed to assess the efficiency of five STS of the city of Belem in the state of Para through microbiological environmental quality indicators and the presence of HAV. The samples were collected in Vila da Barca's, Juscelino Kubistchek's, Ulisses Guimarães', Viver Melhor Marituba's and Outeiros' STS, from August 2018 to April 2019. Viral particles concentration was based on the organic flocculation method with skimmed milk and the extraction of nucleic acid was done with the Viral RNA Isolation Kit: QIAamp Viral RNA Mini Kit[®] followed by reverse transcription using the Super Script III[®] (INVITROGEN). The junction region VP1/2A of the HAV genome was amplified using the Nested – PCR technique. The most probable number (MPN/100ml) of total coliforms, thermotolerant, *Escherichia coli* and heterotrophic bacteria was determined by the chromogenic substrate method COLLILERT 18 and SimPlate respectively. Physico-chemical parameters were assessed by multiparameter and spectrophotometry probe. The HAV was found in two out of the five analyzed STS. The amount of pH varied between 5 and 7 and the temperature was below 40°C in the samples studied, remaining within the limits established by the Conama Resolution 430/2011. The Biochemical Oxygen Demand (BOD) varied from 9,6 to 579 mg/L and the Chemical Oxygen Demand (COD) from 26 to 942 mg/L. The total concentration of coliforms, thermotolerant, *E. coli* and Heterotrophic Bacteria varied from 738000 to 12997000000 MPN/100 ml in the raw sewage samples and from 52000 to 2909000000 MPN/100 ml in the samples collected after the treatment stage. The data shows the need to use complementary treatment as a mean of reducing, to the maximum, the amount of indicators which have been assessed in the treated effluent water.

Keywords: Hepatitis A. Efficiency. Sewage.

Development Agency: Evandro Chagas Institute/Secretariat of Health Surveillance/Ministry of Health/ Para's Sanitation Company.