

Enumeration of heterotrophic bacteria in raw and treated water of the river Mahaweli - A culture-based approach

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Heterotrophic bacteria are naturally present in water bodies. While most are harmless, some species can have implications on human health and water quality. Thus, it is essential to monitor heterotrophic bacterial counts (HPCs) and implement appropriate treatment processes to maintain the safety of drinking water. Mahaweli river is the main drinking water source in the central province. This study investigated the HPCs in raw and treated drinking water and the efficiency of the water treatment process in removing heterotrophic bacteria at 14 water treatment plants (WTPs) situated along the Mahaweli River between Kotmale and Victoria reservoirs. Water samples were collected in September 2022 (rainy season) and February 2023 (dry season), and the HPCs were determined by spread plate technique according to APHA guidelines. Gram staining was used for preliminary identification of morphologically different colonies (>85 colonies per season). Raw water HPCs ranged from 1.40×10^2 to 3.48×10^5 CFU/mL, while treated water HPCs ranged from 0.00 to 2.36×10^4 CFU/mL. The lowest and highest HPCs of raw water were reported from Kotagala and Greater Kandy WTPs respectively. The HPCs varied significantly between seasons and locations, probably due to anthropogenic activities (urbanization etc.) and rainfall. Treated water had only Gram positives, whereas raw water gave an average of 70% and 66% Gram negatives in the wet and dry seasons, respectively. The heterotrophic bacteria removal efficiency was >78% in WTPs, except for two; Nawalapitiya and Nillambe in the dry season. However, treated water samples from Thalawakelle, Nawalapitiya, Pundaluoya, Ulapane, Nillambe, and Polgolla exceeded the maximum HPC recommended by WHO for treated drinking water (<500 CFU/mL at 35°C) in the rainy season whereas only Elpitiya exceeded it in the dry season. Overall, this study highlights the importance of monitoring heterotrophic bacterial contamination in water sources, especially during the rainy season. The findings demonstrate that the majority of selected WTPs effectively remove heterotrophic bacteria.

Keywords: Heterotrophic bacteria, Mahaweli River, Treatment plants, Water quality

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