

MICROBIOLOGICAL WATER QUALITY AND BIOFILM FORMATION IN TAPS AND SHOWERHEADS IN SELECTED HALLS OF RESIDENCE AT THE UNIVERSITY OF PERADENIYA, SRI LANKA

P.A.S.K. Ananda, B.S. Nanayakkara* and K.M.G.G. Jayasuriya

Department of Botany, University of Peradeniya, Peradeniya, Sri Lanka.

**buddhie@sci.pdn.ac.lk*

Although biofilms in water systems affect water quality and health, their impact on microbial contamination of residential environments is rarely studied in Sri Lanka. Microbially contaminated water and biofilms pose health risks as they can harbor pathogens and antimicrobial-resistant microorganisms. The objectives of the current study were to investigate water quality in terms of total coliforms, *Escherichia coli* and *Pseudomonas* spp., to explore biofilm formation in taps and showerheads and to conduct a sociological survey on water-use at selected halls of residence of the University of Peradeniya, Sri Lanka. Forty-eight water samples and 48 biofilm scraping samples were collected from taps and showerheads in four halls of residence: Wijewardene, Hilda Obeysekera, Ramanathan and Sarasaviyana. Water samples were subjected to membrane filtration, and biofilm scrapings were quantified using the crystal violet assay. Biofilms were investigated using light microscopy (LM) and scanning electron microscopy (SEM). Relationship between biofilms and microbial density was detected using correlation analysis. In most samples, total coliform counts exceeded permissible limits for drinking water, according to WHO (0 CFU/100 mL) and SLSI (3 CFU/100 mL) standards, while *E. coli* showed localised contamination in Hilda Obeysekera (800 CFU/100 mL) and Sarasaviyana (133 CFU/100 mL) halls, with low levels elsewhere (0 – 2 CFU/100 mL). No shower water samples exceeded permissible limits for recreational water (235 CFU of *E. coli*/100 mL). *Pseudomonas* spp. was not detected in any sample. In the crystal violet assay, biofilm formation showed significant differences ($p < 0.05$) across Halls, with Sarasaviyana Hall showing the highest (0.343 ± 0.046). Biofilms could be detected through LM and SEM. A weak negative correlation ($r = -0.32$) was observed between biofilm formation and total coliform density, suggesting that biofilms influence the presence of coliforms in water. According to the sociological survey, inadequate maintenance and irregular cleaning are possible contributors to contamination. These findings underscore the need to improve water quality management in residential halls.

Keywords: Crystal violet biofilm assay, *Escherichia coli*, Membrane filtration, Sociological survey, Total coliforms