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Occurrence and Prevalence of Antibiotic-Resistant Bacteria in Landfill Leachate**Favas, M.F.¹, Abdul, M.¹, Meddage, A.K.M.M.K.^{2,3}, Wijerathna, P.A.K.C.²****Liyanage, G.Y.^{2,4}, Sadupama, P.M.^{2,5}, Manage, P.M.^{2*}**¹*School of Science, BMS Campus, Colombo 06, Sri Lanka*²*Centre for Water Quality and Algae Research, Department of Zoology,**Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*³*Faculty of Graduate Studies, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*⁴*Department of Aquatic Bioresources, Faculty of Urban and Aquatic Bioresources,**University of Sri Jayewardenepura, Nugegoda, Sri Lanka*⁵*Teaching hospital Polonnaruwa, Sri Lanka***pathmalal@sjp.ac.lk***Abstract**

Leachate, the liquid produced when rainwater percolates through solid waste in landfills, often contains a mixture of contaminants, including residual antibiotics and microbial communities. In countries like Sri Lanka, inadequate solid waste management leads to leachate discharge, posing significant public health risks through the dissemination of Antibiotic-resistant Bacteria (ARB) into surrounding environments and water sources. The present study assessed the prevalence of ARB in leachate collected from three landfill sites in Sri Lanka: Karadiyana (urban), Kurunegala (suburban), and Horana (rural). One leachate sample was collected from each landfill site, resulting in a total of three samples for analysis. Four commonly used antibiotics: Augmentin (AUG), Azithromycin (AZT), Ciprofloxacin (CIP), and Gentamicin (GEN), were selected to evaluate resistance profiles. Total viable counts (TVC) and minimum inhibitory concentrations (MIC) were determined following Clinical and Laboratory Standards Institute (CLSI) guidelines. TVC in the leachate samples ranged from 1.24×10^2 to 3.58×10^2 CFU/mL. Horana leachate exhibited the highest prevalence of ARB, particularly for CIP and AUG, with MIC values ranging from 60-360 $\mu\text{g/mL}$ for AUG and 60-180 $\mu\text{g/mL}$ for CIP. CIP-resistant isolates constituted 27.9% of the total bacterial load, while AUG resistance was 14%. Resistance to AZT (1.4%) and GEN (1.7%) was comparatively lower. Karadiyana leachate showed moderate resistance, with AZT at 3.9%, AUG at 3.1%, and CIP at 1.8%; no GEN resistance was detected. Minimal resistance was observed in Kurunegala samples, with AUG at 0%, CIP at 1.6%, and both AZT and GEN at 2.4%. These results suggest that Horana landfill leachate represents a significant source of environmental antibiotic contamination, likely due to industrial or municipal inputs, whereas Karadiyana and Kurunegala leachates exhibit lower ARB prevalence. Overall, the study highlights landfills and their leachates as important reservoirs for ARB, emphasizing the need for improved waste management and monitoring to mitigate the environmental spread of antibiotic resistance.

Keywords: *Landfill, Leachate, Antibiotic resistance, Antibiotic-resistant bacteria, Solid waste*