

COMPARISON OF ANTIBIOTIC RESISTANCE IN BACTERIA IN POLLUTED AND UNPOLLUTED SOIL

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Antibiotic resistance is a major global health threat. Soils can be polluted by antibiotics with the addition of antibiotic-containing wastes. The current study investigated and compared the antibiotic sensitivity of soil bacteria isolated from polluted soil (PS) from the Gohagoda dumping site and unpolluted soil (UPS) from a restored area in Hanthana. Soil samples from polluted ($n = 5$) and unpolluted ($n = 5$) areas were collected, and a dilution series were prepared using 1.0 g of soil from each sample. Dominant soil bacterial isolates from PS and UPS were subcultured. Antibiotic sensitivity tests were performed using seven antibiotics commonly used in Sri Lanka (amikacin, amoxicillin-clavulanate, ciprofloxacin, cefotaxime, imipenem, meropenem, ticarcillin-clavulanate). The diameter of the zone of inhibition produced by each antibiotic was measured. Statistical analyses were performed at 5% significance level using Minitab 18.1. With all antibiotics, the mean diameters of zones of inhibition obtained for isolates from UPS were higher compared to those from PS. The values for UPS were significantly higher for all antibiotics except meropenem. The percentage of antibiotic-resistant bacteria was higher in PS than in UPS. Results showed significantly higher values for all antibiotics except amikacin and cefotaxime. The findings confirm the higher prevalence of antibiotic-resistant bacteria in soil in the Gohagoda dumping site, in comparison to an unpolluted area, emphasising that unsafe disposal of antibiotic-containing wastes can cause environmental and health risks. Understanding antibiotic resistance in bacteria in landfills will be useful in managing sanitation practices among landfill workers to avoid health risks. Further, these antibiotic-resistant bacteria need to be investigated for pathogenicity.

Keywords: Antibiotic sensitivity, Landfill area, Restored area, Soil bacteria, Zone of inhibition