

Multi-antibiotic resistant bacteria in landfill bioaerosols: Environmental conditions and biological risk assessment

Wendy B. Morgado-Gamero, Alexander Parody, Jhorma Medina, Laura A. Rodríguez-Villamizar, Dayana Agudelo-Castañeda

Abstract

Landfills, as well as other waste management facilities are well-known bioaerosols sources. These places may foment antibiotic-resistance in bacterial bioaerosol (A.R.B.) due to inadequate pharmaceutical waste disposal. This issue may foster the necessity of using last-generation antibiotics with extra costs in the health care system, and deaths. The aim of this study was to reveal the multi-antibiotic resistant bacterial bioaerosol emitted by a sanitary landfill and the surrounding area. We evaluated the influence of environmental conditions in the occurrence of A.R.B. and biological risk assessment. Antibiotic resistance found in the bacteria aerosols was compared with the AWaRE consumption classification. We used the BIOGAVAL method to assess the workers' occupational exposure to antibiotic-resistant bacterial bioaerosols in the landfill. This study confirmed the multi-antibiotic resistant in bacterial bioaerosol in a landfill and in the surrounding area. Obtained mean concentrations of bacterial bioaerosols, as well as antibiotic-resistant in bacterial bioaerosol (A.R.B.), were high, especially for fine particles that may be a threat for human health. Results suggest the possible risk of antibiotic-resistance interchange between pathogenic and non-pathogenic species in the landfill facilities, thus promoting antibiotic multi-resistance genes spreading into the environment.

Keywords

Landfill, BIOGAVAL method, AWaRE qualification, Antibiotic-resistant bacteria, Bacteria bioaerosol, Antibiotic resistance