



Effect of traffic congestion and vegetation on airborne bacteria in a city of a developing country

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Abstract

The study was designed to determine the variations in the diversity and the total abundance of airborne bacteria in the atmosphere of nine locations in Kandy City, the cultural capital of Sri Lanka. Culturable microorganisms were identified using 16S rDNA sequencing. Quantification of total bacterial abundance was calculated using real-time PCR. Twenty-eight bacterial species were identified by 16S rDNA sequencing. *Bacillus cereus*, *Bacillus pumilus*, *Pseudomonas aeruginosa*, *Pseudomonas stutzeri*, and *Brevundimonas vesicularis* were present in all the sampling sites. Most of the recorded species were opportunistic human pathogens of the respiratory tract (*Pseudomonas* spp., *B. cereus*, *B. vesicularis*, *Klebsiella pneumoniae*), gastro intestine (*B. cereus*, *K. pneumoniae*), and skin (*B. cereus*). The highest total bacterial load (1.42×10^{10} cells/m²) was at the railway station where traffic congestion was the highest while significantly high mean culturable bacterial concentration (5.35×10^6 CFU/m²) ($p < 0.05$) was recorded from the site close to a tea plantation with heavy vegetation cover. This study shows the impact of vegetation and traffic congestion on airborne microorganisms. The presence of opportunistic pathogens highlights the need for risk assessment and management of air quality in congested urban areas.

Keywords Opportunistic pathogens · Diversity · Total abundance · Real-time PCR · 16S rDNA sequencing