Characterization and Distribution of Microplastics in Deposited Particles Across Urban and Suburban Areas in Malaysia

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Abstract

Airborne microplastics have emerged as a potential threat to public health due to their widespread presence in the atmosphere. This study aimed to determine the concentration and characteristics of airborne microplastics and to assess their relationship with meteorological factors. Passive air sampling (dustfall) was conducted over five months (December 2022–May 2023) at two rooftop sites: the Physics Building, Faculty of Science and Technology, Universiti Kebangsaan Malaysia (UKM) Bangi campus (suburban), and the Faculty of Health Sciences, UKM Kuala Lumpur campus (urban). Microplastics were extracted and analysed using imaging rigs and ImageJ software for quantification and classification. Results showed significantly higher concentrations in the suburban site (1832.58 MP/m²/day) compared to the urban site (1365.31 MP/m²/day) during the monsoon transition. A similar pattern was observed during the northeast monsoon, with concentrations of 991.94 MP/m²/day (suburban) and 819.12 MP/m²/day (urban). Blue and red fiber-shaped microplastics were the most common types, with most particles measuring 0–0.05 mm in size. Pearson correlation analysis indicated no significant relationship between microplastic concentrations and meteorological variables such as temperature and humidity. These findings suggest that local environmental settings and human activities may play a greater role in influencing airborne microplastic levels than weather conditions. This research provides further insights into understanding the role of meteorological factors and different environments towards variability and characterization of airborne control measures for addressing potential health impacts from airborne microplastic exposure.

Keywords: Microplastics; Urban; Suburban; Passive sampling; Deposited particles.