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Distribution and potential health impacts of microplastics and microrubbers in air and street dusts from Asaluyeh County, Iran

Abbasi S, Keshavarzi B, Moore F, Turner A, Kelly FJ, Dominguez AO, Jaafarzadeh N. Distribution and potential health impacts of microplastics and microrubbers in air and street dusts from Asaluyeh County, Iran. Environmental pollution. 2019 Jan 1;244:153-64.

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چکیده ۳۲۲ کلمه):

While the distribution and effects of microplastics (MPs) have been extensively studied in aquatic systems, there exits little information on their occurrence in the terrestrial environment and their potential impacts on human health. In the present study, street dust and suspended dust were collected from the city and county of Asaluyeh, Iran. Samples were characterized by various microscopic techniques (fluorescence, polarized light, SEM) in order to quantify and classify MPs and microrubbers (MRs) in the urban and industrial environments that are potentially ingestible or inhalable by humans. In < 5-mm street dust retrieved from 15 sites, there were an average of 900 MPs and 250 MRs per 15 g of sample, with MPs exhibiting a range of colours and sizes (<100 to >1000 μm). Most street dust samples were dominated by spherical and film-like particles and MRs largely made up of different sizes of black fragments and fibrous particulates. Airborne dust collected daily over an eight-day period at two locations revealed the ubiquity of fibrous MPs of sizes ranging from about 2 μm to 100 μm and an abundance of about 1 per m−3. These samples contained small MR fragments whose precise characteristics were more difficult to define. Based on the median concentrations in street dust, estimates of acute exposure through ingestion are about 5 and 15 MP d−1 and 2 and 7 MR d−1 for construction workers and young children, respectively. Quantities of inhalable particulates were more difficult to define but the potential toxicity of MPs and MRs taken in by this route was evaluated from assays performed using particulates isolated from street dusts in the presence of an artificial lung fluid. Both types of particle exhibited oxidative potential, with MPs displaying consumptions of different antioxidants that were comparable with corresponding values for a reference urban particulate dust but lower than those for London ambient particulate matter. Thus, MPs and MRs contribute towards the health impacts of urban and industrial dusts but their precise roles remain unclear and warrant further study.