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Microplastics in rice: an invisible threat

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Abstract

Background: Humans are exposed to various dangers in their daily lives, including exposure to contaminants through food. Microplastics are increasingly being studied as an environmental contaminant in both marine and terrestrial systems [1]. They are present in air, water, and soil, leading to their internalization by organisms and, ultimately, to the contamination of the human food chain [2]. Moreover, microplastics can act as vectors for chemical contaminants (e.g., metals) and pathogenic microorganisms [3]. The contamination of microplastics in rice, one of the most consumed foods worldwide, is understudied but should be further investigated considering the potential impacts on human health. Understanding human exposure is important for risk assessment. **Objective:** This study aimed to test analytical methods of extracting and quantifying microplastics in rice. **Methods:** Commonly used methods were applied to rice (Carolino variety, acquired from local markets), including digestion of 10 g with solutions such as 10% KOH, 30% H_2O_2, 15% H_2O_2 + Fe, 30% HNO_3 (with both raw and cooked rice), and 65% HNO_3 for 24 h at 60 ºC. After digestion, samples were filtered using a glass fiber filter (1.2 µm pore). Density separation was also performed using a NaCl solution with a density of 1.2 g/cm³, mixed for 1 min with 50 g of rice, left to settle for 1 h, followed by filtration with a glass fiber filter (1.2 µm pore). After drying, the filter membranes were weighed. **Results:** The tested methods were not effective in extracting microplastics. The presence of starch clogged the filter and concealed microplastics. Similarly, in density separation, the supernatant solution intended for filtration became heavily filled with starch, which did not settle. **Conclusions:** This study concluded that rice presents specific challenges that hinder the applicability of analytical methods commonly used to extract microplastics. Starch is one of the main obstacles, as it interferes with the effectiveness of these techniques, which may explain the scarcity of published studies on the contamination of rice with microplastics.

Keywords: microplastics; food contaminants; analytical methods

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