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Microplastics in Dentistry: A Review of Health and Environmental Risks

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Abstract

Objectives: This narrative review investigated the sources, mechanisms of release, and health implications of microplastics within the dental profession.

Methods: A systematic literature search on Databases PubMed, Scopus, Web of Science and Google Scholar found eight key studies that examined various combinations of terms, including "microplastics" and "nanoplastics" related to "dental materials" and "oral healthcare," as well as their impact on the environment impact accordingly to inclusion/exclusion criteria. Detection techniques such as scanning electron microscopy (SEM), Fourier-transform infrared spectroscopy (FTIR), and gas chromatography-mass spectrometry (GC-MS) were commonly applied to characterize the morphology and composition of microplastics.

Results: The main findings indicate that microplastics originate from different sources, including mechanical wear, chemical degradation, and thermal stress, with occupational exposure posing risks to dental professionals, primarily through inhalation of airborne particles. Systemic exposure, resulting from ingestion or mucosal absorption of microplastics, has been linked to immune suppression, oxidative stress, and systemic toxicity. Environmentally, microplastics from dental sources infiltrate wastewater and contribute to aquatic pollution.

Conclusions: This review underscores the importance of adopting sustainable practices, including the use of biodegradable materials and enhanced waste management. Future research should focus on longitudinal studies, bioremediation approaches, and the development of alternative, eco-friendly dental materials.

Keywords: biodegradable materials, dentistry, environmental pollution, health risks, microplastics, occupational exposure, oral healthcare products, oxidative stress, resin-based composites, sustainable practices, wastewater contamination