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Microplastics Pollution in the Aquatic Environment: Problems and Challenges

Maryam Dolatabadi [1], Saeid Ahmadzadeh [2,3*]

[1] *Environmental Science and Technology Research Center, Department of Environmental Health Engineering, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.*
[2] *Pharmaceutics Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran.*
[3] *Pharmaceutical Sciences and Cosmetic Products Research Center, Kerman University of Medical Sciences, Kerman, Iran.*

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Corresponding Author:
Saeid Ahmadzadeh

Email:
chem_ahmadzadeh@yahoo.com

Tel:
+983431325241

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The annual growth rate of plastic production has reached more than 5% in the last fifty years in the world. Plastics refer to a kind of synthetic chemical material with special characteristics. Plastics are light-weight, low-cost, easily manufactured, flexible, malleable, and resistant to water. These characteristics provide an affordable improvement and enhance the extensive use of plastics in the world.

The pollution of aqueous ecosystems by plastic litter is considered a common topic of serious concern [1, 2]. Microplastics are considered as plastics' dimensions less than 5mm. Nevertheless, no commonly accepted definition is currently available in universally accepted dimensions' range of microplastics. Microplastics are among the most emerging contaminants in the sediments, surface water, and oceans all over the world.

The first reports of microplastics have emerged in aquatic environments in 1970s. Microplastics have emerged as a serious universal problem in the environment, because of their global distribution, persistence to biodegradation, and toxicity. They probably pose a potential concern to aquatic creatures [3, 4]. Based on the recent reports, the total annual input of plastic is about of 100,000 tonnes into the Mediterranean Sea [5]. Microplastics consist of carbon and hydrogen atoms' bound in polymer. Additional chemicals, such as phthalate compounds, plasticizers, and ester chemistries are typically contained in the microplastics and several of these chemical additives are released from the microplastics after entering the aqueous ecosystems [4, 6]. Furthermore, the lipophilic organic pollutants accessible in aqueous environments may attract the microplastics residue in ordinary ecological situations. These microplastics in aquatic environments are absorbed by plankton and can be bioaccumulated to higher levels of organisms. Microplastics have been detected in the digestive systems and tissues of several organisms such as invertebrate, crustaceans, corals, planktons, fishes, turtles, and other sea animals [7, 8].

Fish and birds probably ingest microplastics floating on the water surface, mistaking the microplastics for food bait. The ingestion of

microplastics can affect marine biota to consume less food materials and to have less energy to carry out the lifecycle, which can cause neurological and reproductive toxicity [9, 10].

Nowadays, the most important challenges are presence of microplastics in oceans scattered over a large volume and separation of microplastics from the oceans. Strategies have been proposed to overcome effects of the microplastics on the environment including educational campaigns aimed at improving awareness of the plastics contamination, encouraging reuse and recycling, placing prohibitions on microplastics-free (Microbead-Free) in personal care products, putting heavy fines for plastic consumers and etc.

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