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Impact of Microplastic Pollution on Human Health

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Abstract

Besides visible plastic pollution, there is also a microplastic threat. Microplastics are ultrasmall plastic items, smaller than 5 mm in size. The presence of microplastics in aquatic ecosystems is increasing at an exponential rate posing a direct or indirect threat to all biodiversity on the planet This paper highlights the Indian scenario of microplastic pollution in comparison with developed regions of the globe while primarily focusing on impacts on human health. Microplastic particles are not metabolised by living organisms and thus they keep bioaccumulating. These tiny plastics also sorb a wide plethora of chemical substances that may have severe effects on life forms. Pathogenic bacteria may also adhere to microplastics affecting health. Exposure to microplastics has become impossible to avoid as these tiny plastics can enter through food, cosmetics and even via air. Besides bioaccumulating microplastics have been proven to interfere with cellular processes and normal physiological functioning of the human body. Very few papers have been published to date highlighting this issue, more research needs to be done on sources, distribution patterns and effects of microplastics on the ecosystem and humans.

Keywords: Microplastic pollution; Marine plastics; Aquatic ecosystems; Bioaccumulation; Biomagnification; Human health

Introduction

Plastics are a set of materials (predominantly synthetic) that use polymers having long carbon skeletons such as polyethene, polypropylene, polystyrene etc. as their main constituent (Woodford, 2022). Plastic entities having a size of 1µm – 5mm are classified as MPs (NOAA, 2021). Based on origin, MPs are further divided into primary and secondary MPs. Plastic particles that are less than 5mm, when released into the environment are called primary MPs. 1.5 million tonnes of primary MPs are released annually into the world's oceans (Boucher and Friot, 2017). Secondary MPs are predominantly generated via photodegradation by UV radiation (in parallel with the action of oxidative degradation and physical weathering agents like heat, wind and hydraulic forces) acting on larger plastic pieces. (NEA, 2014; GESAMP, 2015, Andrady et al., 1996) (Figure 1).

Almost all of the plastic produced to date persists in our environment (UNEP). Surface MPs form great garbage patches in the oceans wherein MPs with heavier densities sink into world oceans (Evers, 2022). Among various sources of MPs, plastic fibres and tyre abrasions are classified as the biggest sources of their genesis; while mismanagement and improper dumping of plastic waste is