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Dr. Radha Krishna
PGT Biology, Air Force School
Bamrauli, Allahabad,
Uttar Pradesh, India

Plastic pollution and its effect on environment and health

Dr. Radha Krishna

Abstract

The majority of plastics used today are organic polymers created using chemicals with a petroleum foundation. Plastic pollution results from the buildup of plastic and plastic-made products in the environment, endangering wildlife and the human food chain. Due to their chemical makeup, plastics are resistant to environmental deterioration, corrosion, and high levels of environmental pollution since their rate of deterioration is moderate. Plastic pollution is caused by products made of plastic that differ chemically. Plastic pollutants are divided into micro, meso, and macro trash categories based on their size. Humans' exposure to plastic pollution poses additional health risks. Only nine percent (9%) of the nine billion tonnes of plastic that have ever been created worldwide have been recycled, according to the status of plastics study.

Keywords: Plastic pollution, environmental effects, health effects

Introduction

Plastic pollution is the buildup of synthetic plastic items in the environment to the point where they pose a threat to both human populations and wildlife and their ecosystems. Pollutants are substances that have a negative impact on a population's health, activities, or survival (Starr and McMillan, 2007) ^[4]. Thousands of tonnes of pollutants are released into the atmosphere every day as a result of human activity and natural occurrences. The pollutants that humans release into the atmosphere are significantly more harmful (Fellman *et al.*, 2013) ^[1].

Due to the introduction of genuinely synthetic plastic resins into global trade in 1907, the invention of Bakelite sparked a revolution in materials. Plastics were discovered to be a chronic pollutant of various environmental niches at the turn of the 20th century, from Mount Everest to the ocean's depths. In 1950, the annual global production of plastic was above 2 million tonnes. This annual manufacturing increased to 419 million tonnes by 2015, which increased the amount of plastic garbage in the environment.

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Surprisingly, according to National Geographic, 91 percent of all plastic ever produced is not recycled, posing not just one of the greatest environmental issues of our time but also another colossal market failure. Given that plastic takes 400 years to degrade, many generations will pass before it is completely gone. It is impossible to predict what long-term impacts plastic pollution will have on the environment. Plastics have drawn more attention as a substantial pollutant, whether it is because they are mistaken for food by animals, flood low-lying areas by clogging drainage systems, or just negatively impact the environment significantly in terms of aesthetics.

Environmental Effects of Plastic Pollution

Plastics contain significant harmful chemicals that have the potential to seriously damage the environment through air, water, and land contamination.

Correspondence

Dr. Radha Krishna
PGT Biology, Air Force School
Bamrauli, Allahabad,
Uttar Pradesh, India

Plastic is a material that cannot decompose, thus it can harm the ecosystem and cause long-term problems for people, animals, and plants. Urban regions, shoreline geography, trade routes, wind and ocean currents, and other variables all affect where plastic waste is found. In some places, the human population is another important factor. Plastic is typically found in enclosed spaces, like the crevices of cities and towns, having an impact on the environment. This contributes to the spread of creatures to distant shores that are not their usual habitats. Groundwater pollution, disruption of the food chain, animal deaths, land pollution, toxic potential, air pollution, and cost are a few repercussions of plastic pollution on our habitats.

Land, oceans and large water bodies are mostly affected from these pollutions. The marine animals dwelling in the oceans suffer from an altered digestive physiology for the accidental consumption of plastic materials mixed with their feed (Hester and Harrison, 2011) [2].

As a result of seepage from plastics, harmful chemicals are released into the ecosystem, groundwater, and especially the soil. Methane gas is released from the degradation of nylon by bacteria like *Pseudomonas*, bacteria that eat nylon, and flavobacteria, which contribute to greenhouse gas emissions and global warming.

Storm-water runoff, which is released into watercourses or straight into coastal waters, contaminates water bodies and oceans. Due to the emission of diethylhexyl phthalate, lead, mercury, and cadmium, this pollution penetrates the food chain and poses a long-term risk to fish, animals, and humans. The majority of the time, microplastic trash floating on the water's surface pollutes the oceans (Walker *et al.*, 1997) [5].

The majority of plastic pollution affects sea turtles, particularly some jellyfish species that can choke their oesophages and build up in whales' stomachs. The microscopic pieces of plastic below the ocean's surface are also eaten by small fish. Plastic waste accidentally consumed by tuna, swordfish, and lantern fish enters the aquatic food chain (Parker, 2014) [3].

Along with the mammals, plastic pollution harms birds like seabirds by obstructing their gastrointestinal tracts and causing tissue damage from harmful compounds known as polychlorinated biphenyls (PCBs). Through their eating habits, birds that have never been near the sea can come into contact with marine plastic trash. Along with the plastic trash, such as styrofoam mixed with their meal, the plastic fragments were discovered whole within the birds' gizzards and proventriculi (Parker, 2014) [3].

Health Effects of Plastic Pollution

Plastic pollution is when plastic builds up or gathers in a place and starts to have a harmful impact on the ecosystem, posing issues for both flora and wildlife as well as the human population. As a result, local animals and people are put in risk and plant life is killed. Although it is constructed of harmful chemical compounds that can make people sick, plastics are an extraordinarily valuable material in both smaller communities and more developed nations.

Carcinogens and hormonal growth disruption are also documented effects of plastic. The chemicals used to make the primary feedstocks for plastics have some known negative effects on human health, including neurological, cancer, reproductive, and developmental toxicity, immune system damage, and birth defects. According to research, the production of plastic has complex, significant, intersecting, and dangerous effects on human health. These effects can be found at every stage of the plastic lifecycle, from the wellhead to the refinery, from store shelves to

people's bodies, and from waste management to more recent effects like water, air, and soil pollution. Exposure of the human body to the poisons generated by plastics is unsanitary.

In the manufacturing of plastics, the health concerns/issues is of great consideration which has much focus on additives such as bisphenol A and a class of chemicals called phthalates) that go into plastics during the manufacturing process, which make them to be more flexible, durable, and transparent. The utilization of plastic products normally leads to inhalation and/or ingestion of large amount of both microplastic particles and hundreds of toxic substances with known or suspected developmental, carcinogenic, or endocrine disrupting impacts/effects. The use of plastic can also be connected with public hygiene and prevention of bacterial contamination. For instance, the people in Taiwan, normally use plastic straws to drink everything in liquid form from beer to milk out of fear of a contaminated supply chain. Therefore, consumers need to be very careful /cautious of chemicals leaching into food or drink products. It is advisable for humans to keep away from PVC (often found in pipes) and PS (Styrofoam, often used as food/drink containers).

In the environment, the microplastics enter the body of humans through direct exposures resulting into ingestion or inhalation which can lead to an array of health impacts/effects which include oxidative stress, inflammation, genotoxicity, apoptosis, necrosis, dizziness and unconsciousness, which are linked to an array of negative health outcomes which include cancer, cardiovascular diseases, diabetes, chronic inflammation, inflammatory bowel disease, rheumatoid arthritis, auto-immune conditions, neuro-degenerative diseases, and stroke disease, rheumatoid arthritis, auto-immune conditions, neuro-degenerative diseases, and stroke.

Conclusion

Research should be done to convert petroleum-based plastics to bioplastics in order to lessen the instances of plastic pollution. Additionally, reducing the mortality of fish and sea life due to plastic pollution can be achieved through teaching and raising awareness among people to clean up water bodies including rivers, ponds, and lakes. Fish and reptiles exposed to bisphenol A may experience lower birth weights, stalled egg development, and decreased body weight, tail length, and body length in animals exposed to plastic pollution over the long term.

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