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Microplastics: Endangering Aquatic System

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Introduction

With the rise in world population, the pollution in varieties form is also escalating. The rise of technology and industrial revolution has beefed up many forms of pollution into the environment. As we can see, there are plastic pollution, aquatic pollution, sound pollution, light pollution and many more. On a closer note, it is seen that these pollutions are somewhat coupled to each other either directly or indirectly. Another evolving menace in the form of microplastics is slowly invading our ecosystem [1]. This can be treated as a subset of plastic pollution. They are slowly polluting the aquatic systems; thereby jeopardizing the existing ecosystem. This short communication overviews the basics of microplastics. It further highlights the dreadful impacts on the aquatic species, followed by future recommendations.

Basic Overview

Microplastics are small particles of plastic that are smaller than 5mm. They usually break down from larger objects such as bottles and bags. Microplastics can emerge form a variety of sources. As for instance, facial scrubs, cosmetic products are some of the prominent ones. It one of the constituent materials is listed as polyethylene, then it is referred to as microplastics. Another major source of microplastic fiber is synthetic wools. Because of their small size, they can permeate into the metabolic system of ours. As for example, in a research paper, it has been reported that there was evidence microplastics in stored water of plastic bottles after a long duration. It is established that plastics take years to degrade. As such they accumulate faster. While waster treatment plants can effectively remove up to 98 % microplastic moving through them. A 2016 study determined that average wastewater treatment plant would still release between 4 and 65 million particles per day despite the high removal rates of wastewater treatment plants. Another recent study demonstrated that microplastics can be airborne and they can settle down on urban settings. Likewise, microplastics can arise from car tires. Plastic dust is created by the friction between the wheels and the road and is blown into watersheds by winds. Car tires shed 20g of plastic dust every 100 kilometers. wear and tears. Another study showed that around 1 microplastic particle can be found in every square of meter. In 2017, researchers extracted microplastics larger than 149 microns from 17 salt brands originating from 8 different countries. Only one brand was devoid of this while rest of them contained 1 to 10 microplastics per kg of salt [2,3].

Adverse Impacts

Now comes the impact of microplastic originating in marine environment. Researchers have found that excess microplastics cause severe effects in marine ecosystem, leading to disruption in food chain or culture. However, smaller microplastics such as nano plastics can easily overcome biological wall and eventually get deposited in tissues which is commonly referred to as bioaccumulation. It leads to another phenomenon namely reactive oxygen species. This has a serious impact over the lipid metabolism with disastrous affect at molecular level. As for example, the marine species devouring nanosized polystyrene differ in body mass, cholesterol content and other metabolic parameters. The effect of microplastics can be grouped into three major categories, namely growth inhibition, toxicological effects, and genetic disruption.

Inhibited growth

Marine life's growth and development may be hampered by microplastics. Polystyrene, for instance, The growth of the *Arenicola Marina* and other organisms in the sediment can be severely hampered by microplastics. The amount of inhibition is positively associated with the amount of microplastics. The

tripneustes gratilla's ability to feed and grow may be hampered by microplastics, although a deadly effect seems unlikely. The energy reserve and nutrient content of *Sebastes schlegelii* are both impeded by polystyrene microplastics. It was shown that once bivalve *molluscs* were subjected to larger plastic particles, their protein and lipid content maintained the same, but their total energy store dropped as the proportion of exposed microplastics grew. *Mytilus galloprovincialis*'s body balance will be interrupted by the polyethylene microplastics, which will induce it to utilize more energy and grow more slowly [3,4].

Impact on reproductive system

The reproductive health of marine creatures can be harmed by microplastics. The *crassostrea gigas* drastically reduced both the quantity of egg cells produced and the amount of sperm motility when exposed to polystyrene microplastics. This indicates that the *crassostrea gigas* reproduction would be severely hampered by microplastics. A series of immune reactions will be triggered after the microplastics infiltrate the biological tissues and organs of the marine fisheries. For instance, polyvinyl chloride (PVC) and polyethylene (PE) microplastics with particle sizes of 40 to 150m might result in immunotoxicity by oxidizing the white blood cells of *sparus aurata* and *dicentrarchus labrax* [4,5].

Genetic transformation

Marine life may suffer genetic harm because of microplastics. According to studies, polycyclic aromatic hydrocarbons (PAHs) that are absorbed by microplastics can harm mussels' genetic profile and cause *M. galloprovincialis* in becoming immunotoxic, neurotoxic, and genotoxic [5].

Concluding Remarks

Microplastics are escalating with rising anthropogenic activities. It is no exaggeration that plastics play an inevitable part in several spheres of industry, such as, packaging, storage etc. Because of their ease accessibility, they are used everywhere. However, this is coming up with a price as microplastics are becoming abundant in many aquatic bodies, like, rivers and oceans etc. Waste disposal at seas is a common practice without any further treatment. This aggravates the flora and fauna. Since it is not possible to eradicate the issue, there should be measures to stop the menacing abundance of it in aquatic system. There should be avoidance of goods with excessive packaging. Use of glass containers should be practiced instead of plastics. Singe use of plastics should be banned. The violators should be penalized. Continuous monitoring system should be deployed so as to check the rising concentration of it. There should be stringent measures to regulate the plastic industry by govt as well as nodal agencies. Only a strategic and synergistic long-term plan with all plausible stakeholders can reduce this growing issue.

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