Microplastic Hazards on Water Quality and Human Health

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ABSTRACT

Plastic is a man-made polymer and can be surplus after one year of covering. Plastic uses for various purposes as it is light weight, transparent and cheap in price so in country widely uses as a packing material. By the degradation of plastic, microplastic is formed which enters into the sea environment through primary and secondary sources. The microplastic presence lower the quality of water and its impacts are on the activities of marine fauna as well as on human health. For the counting and presence of microplastic we selected Clifton, Beach Karachi and after collecting the samples we applied three methods on it and observed different types of microplastic at beach which increased with the seasons and other environmental factors. With the help of local people and higher authorities we can decrease the amount of microplastic in marine environment.

INTRODUCTION

By plastic or larger pollutants micro cracking microplastic produces and then it enter into the sea by wave or wind actions. Plastic debris is called “Microplastic”. Microplastic is less than 0.1 mm in diameter. These are the types of pollutants, fibers and granules are also included in microplastic. Usually microplastic cannot see by naked eye. About 92% of the marine pollutants are microplastic. Microplastic is entering on daily basis in marine environment. Fishing and recreational purposes, run off, agricultural industries, aquaculture, tourism and sea transports are the main sources. 80% of the sea shore pollution consists of microplastic. It enters into the sea on daily basis. Microplastic is entering on daily basis in marine environment. Directly or indirectly which affect aquatic animals. About 690 species are facing problems due to microplastic.

The Microplastic present in the ocean affects the marine ecosystem as the fish migrate due to the contamination of water, their food web become affected. When microplastic reacts with the other chemicals present in the environment, they can cause toxicity which damage the pathogens, biodiversity, blockage of the marine biota intestine, feeding, life cycle and their reproduction rate. It can transfer from prey to predator by species-specific method.

Microplastic directly ingested by human cause complications in reproduction, resulted transferring into the fetus through placenta, obesity and packaging contains microplastic particles which lead to nervous system damage, cancer and hair loss. The direct consumption of microplastic through human effects the immunity system.

MATERIALS AND METHODS

To understand the abundance of microplastic at Karachi’s beach, a novel research was conducted. Clifton is the famous beach front of Karachi which is frequented by citizen throughout the year. The beach was selected for research on quantification of microplastic because of increasing solid waste pollution in the area. For the study, Clifton beach located between Bilawal House to Do Darya was selected and ten stations located with approximate 1 km distance for microplastic sampling .The study was conducted in a twelve months period, from June 2017 to May 2018 and Station and month wise data with their averages were presented with the help of graphs.

Samples of sand were collected from each station and kept in separate plastic bags. These sand samples were brought to the laboratory and immediately analyzed for microplastic using various separation techniques. The

microplastic after separation from sand samples were examined in microscope. Microplastic pieces in each sample were counted to determine their quantity and types in each sample.

RESULTS

The analysis of microplastic and its forms were recorded with the help of three methods, which are direct counting, separating funnel and shaking method. Total four forms of MP had been identified through this research. Samples of microplastic by using three methods were identified and categorized as metalized film wrapper, miscellaneous microplastics, black and white threads. Metalized film wrappers were a kind of plastic which produced by beetle nuts and "gutka". This is more frequently observed material than any other kind of microplastic. Black and white threads are mainly originated from fishing nets and plastic woven bags.

The results showing the distribution of elements in different seasons, the quantity of microplastic were high in summer season due to cohort of people on the targeted area just because of higher temperature and summer vacations, but gradually the amount of plastic decreased in winter season due to low tides, wave actions and lack of tourism.

CONCLUSION

It is recommended, Government should take immediate steps to completely ban the usage of plastic, cosmetic products, plastic bags, tires, clothing, cigarette buds etc. Research and awareness programs should also conduct to minimize microplastic level at beaches. With the help of research, analyze the occurrence and likewise the effects of microplastic through organisms used as sentinel species and apply new and improvised monitoring tools. Analyze the effect such as mortality, indisposition, and/or reproduction which are caused by microplastic break down by the marine biota and estimate what is the influence and impact of the different methods and types of microplastic in marine organisms. A research study require which should understand the capacity and reason of transportation mechanism of plastic, especially the microplastic elements through the food chain (marine) with trophic conjunction, and also the estimation of the related impact of these processes by judging the ecosystem and population. Enhance the knowledge and understanding about the issues such as origin, path, fate, and behavior of microplastic in certain behaviors such as in the water, analyzing the significances of fragmentation and bio-incrustation. Augment the knowledge of the impacts which result from the effects resulting from the absorption of additives in microplastic with the passage of time and their bioavailability, and with special focus on related toxicological impact and the tenacity of time to understand the microplastic in the environment.

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