

**PLASTIC POLLUTION: A BURNING ISSUE****Dr. S. M. Lahankar<sup>1</sup>, Dr. Nilesh Gore\*<sup>2</sup> and Dr. Ujwala Chavan<sup>3</sup>**Asso. Professor<sup>1</sup>, PG Scholar<sup>2</sup> and PG Scholar<sup>3</sup>  
Department of Agadtantra, Government Ayurvedic College, Osmanabad.**\*Corresponding Author: Dr. Nilesh Gore**

PG Scholar, Department of Agadtantra, Government Ayurvedic College, Osmanabad.

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**ABSTRACT**

Plastic is a material consisting of any of a wide range of synthetic or semi-synthetic organic compound that are malleable and so can be construct into solid objects. For more than 50 years, global population and consumption of plastics have continued day by day. Due to their, ease of manufacture, versatility, light weight, flexibility, moisture resistant, strong and comparatively less expensive product. Plastics are used in multiple product of different scale such as toys, bags, furniture's, piping or plumbing, etc. it is frequently used in developing as well as developed countries, where consumption of plastics in packaging is 42% in India. However, durable and very slow to degrade, plastic materials that are used in the production of so many products, ultimately, become waste with hazardous effect on health of marine animals, birds as well as human from food chain. Our great attraction to plastic with increasing its consumption, discarding, littering and thus polluting the environment also. Now a day use of plastics are banned in India as well as other countries due to plastic contains toxins like BPA (Bisphenol-A), dioxin, benzene, phthalates, formaldehyde, etc which effect on human health, reproductive system, may act carcinogenic, also endocrine disrupting properties, or in extreme case death of infant may occurred. So, presenting study has been conducted for awareness about plastic and its effect on health.

**KEYWORDS:** Plastic, Polymer, Pollution, Hazards, Carcinogenic, BPA.**INTRODUCTION**

Consumption of plastics used in routine life increases as development increases day by day. In present era, pollution due to plastics and products made by plastics are the growing problem throughout the world. Increased use of plastic is due to its ease of manufacturing, versatility, flexibility and less expensive as compared to other products. Statistics of consumption of plastics increased worldwide tremendously. In last decade plastic production exceeds the amount of plastic produced during the entire last century. As about 8300 million metric tons of plastic has been produced as of mid-2017. Among all plastic waste had been generated, only about 9% of plastic recycled, 12% incinerated and 79% accumulated in landfills or the natural environment.<sup>[1]</sup> Tons of plastic waste or debris that can vary in size from smaller to larger containers, fishing net to microscopic plastic pellets or even particles is discarded every year, everywhere, polluting land, river, coasts, beaches, oceans resulting impact on health of both wildlife as well humans.

Plastic pollution is the accumulation of plastic made objects or substance in environment which adversely affects wildlife, wildlife habitats and human beings.<sup>[2]</sup> Based on size plastic pollutants are classified in micro, meso or macro debris. Plastics are cheap and durable,

due to this level of plastic production by humans continuously increasing. Unfortunately, chemical structure of plastic resistant to many natural processes of degradation and due to this they are slow to degrade.<sup>[3]</sup> So, due to high production and low degradation there is high prominence of environmental pollution due to plastic waste. Plastics are not bio degradable ever, but it breaks into smaller fragments, that persists in ocean, absorb the toxins and enters in the food chain through seafoods. Peoples are consuming these toxinated food and complaining toxic symptoms.<sup>[4]</sup> Compounds with high risk to human health that are allowed to contaminate the food mainly through plastic packaging including Bisphenols, Phthalates, non-persistent pesticides, perfluoroalkyl chemicals (PFCs) and perchlorate.<sup>[5]</sup> Also, plastic is commonest waste in marine throughout the world i.e. about 80% of marine litters is plastic. When plastic enters in the marine environment, it breaks into tiny fragments which are interrupting marine ecosystem, disrupting the food chain and accelerating climate change.<sup>[6]</sup> Plastic ingested by marine animals and bioaccumulates in the food chain, which carries various chemical toxins, posing hazardous effect on both wildlife and human consumers of seafood.

Recently, plastic bags are banned in India due to plastic pollution and its impact on health. Due to convenient and

relatively cheap, plastic and its products found all around us. However, “the convenience of plastic products is expensive to the environment and gives hazardous effect on human health”. Several countries globally have been banned the uses of plastic products like carry bags, straw, etc. also have enforced restricted law against use of the plastic products because of their bad impact on health. In recent era, plastic bags are considered as great issue that humans are facing in their contemporary life. India and Bangladesh have only banned the use and sale of polythene bags which basically have thickness of less than 50 microns.<sup>[7]</sup> So, presenting study has been conducted for awareness in the public about plastic, its contents and harmful chemicals present in plastic like BPA, DDT, Dioxin, etc.

### Aim

To study harmful effect of plastic on the health.

### Objectives

1. To study plastic in detail
2. To study chemical toxins in plastic
3. To study harmful effects of plastic on health
4. To study preventing measures related to plastic pollution.

### Methodology

To fulfil aims and objectives presenting study is conducted by following manner:

1. Conceptual study
2. Comparative study
3. Discussion
4. Conclusion

### Plastic

It is a group of synthetic or natural organic material it can be shaped either soft or hardened, including many types of resins, resinoids, polymers, cellulose, derivatives, casein materials and proteins, which are used in place of other material or substitute for plastic products, as glass, woods and metals, in construction and decoration, for making many articles, as coatings and drawn into filaments for weaving. They are often known by trademark namely Bakelite, Vinylite or Lucite.<sup>[7]</sup> Plastic is a material which is produced from by a chemical process and which is used to make many objects.<sup>[8]</sup> Plasticity is the natural property of all materials which may be irreversible without breaking out. Plastics are organic polymers of high molecular mass and often contain other chemical toxins like phthalate, dioxin, formaldehydes, BPA, etc.<sup>[9]</sup> Chemically, plastics are large molecules i.e. polymers, composed of repeated segments called as monomers with carbon backbones. Polymer is made up of many smaller units joined together end to end and create a long chain. It can be classified into thermoplastics i.e. moldable and thermosets which are non-moldable. Plastics can also be classified by their physical properties like density, strength, resistant to moisture and heat, hardness and glass transition temperature, and by chemical properties

like organic chemistry of the polymer organic solvents, oxidation and ionising radiation.<sup>[10]</sup>

### Plastic pollution

It is the accumulation of man-made plastic products in the environment to some extent where they create health related issues for wildlife and their habitats as well as for human beings. Plastic pollutants can be divided based on their sizes into micro, meso or macro debris or waste. Plastic production is increased because they are relatively less expensive and long durable material. Further, chemicals structure of plastic contain polymer which resistant to natural processes of degradation which break plastics into small tiny fragments. Due to above mention cause i.e. high production rate of plastics and slow bio-degradation plastic pollution occurred. It can be affected land, water ways and oceans. It is evaluated that 1.1 to 8.8 million metric tones of plastic waste or debris found in the ocean from coastal communities per year.<sup>[11]</sup> Living organisms especially marine animals may be affected either by mechanical effect like trapped in fishing net or plastic materials or issues related to consumption of plastic waste or through exposure to chemicals present in plastics which interfere with their physiology. Human population can be affected by plastic pollution through food chain and disruption of various hormonal mechanisms.<sup>[12]</sup> When get burned it releases toxic chemicals like hydrochloric acid, sulphur dioxide, dioxin also some heavy metals which causes air pollution and can be dangerous to living organisms.

### Types of plastics and its harmful effect

Toxic chemicals release during production of plastic is the important source of the environmental pollution by plastic products. It may be carcinogenic, neurotoxic, hormone disruptors. It comes in wildlife and human population through water, land and sea foods. Some of the common chemicals are as follows:

#### Polyethylene terephthalate

It is used in juice, water, mouthwash, soft drink, peanut butter, detergents, salad dressing and cleaner containers. Molten polymer will adhere to the skin and cause severe burns. In the contact with eyes it may cause mechanical irritation with discomfort, lacrimation, bilateral necrotising sclero-keratitis and blurring of vision. Also, it impacts on respiratory system and leads to difficulty in breathing, pneumonia, severe bronchospasm, pulmonary oedema, sometime seizures may occur.<sup>[13]</sup>

#### DEHP (Diethyl hexyl phthalate)

It is an endocrine disruptor that mimics the female hormone oestrogen. It can cause asthma and allergies in children. It may lead certain types of cancer, also be linked to issues related to liver, kidney, spleen, bone formation and body weight. It can cause stomach irritation, diarrhoea and some structural defect in infant. It can be reduced fertility rate, developmental disorders, asthma and increased allergic reactions. DEHP is present

in plastic products such as wall coverings, table cloths, floor tiles, baby pants, rain wear and some toys.<sup>[14]</sup>

#### **High-density polyethylene (HDPE)**

It is used in sandwich bags, opaque milk, water and juice containers, bleach, detergents, shampoo bottles, garbage bags, etc. It is considered as a safer plastic. There are several side effects of polyethylene in humans. It may cause slight skin irritation, proximal scleroderma, joint involvement, pulmonary manifestation, oesophageal involvement in some people. Also, it may cause asthma and it is found to be toxic to the immune system.

#### **Low- density polyethylene (LDPE)**

It is used in grocery store, dry cleaning, bread and frozen food bags, most plastic wraps and squeezable bottles of honey or mustard. It also considered a safer plastic. It may be toxic to the integumentary system, respiratory system, immune system, skeletal system and muscular system. It may lead to Raynaud phenomenon.<sup>[15]</sup>

#### **Polyvinyl chloride (PVC)**

It is used in clear food and non-food packaging, toys, shampoo bottles, shower curtains, medical tubing, detergents, cooking oil jars and numerous construction products. Direct skin contact with gas or liquid vinyl chloride can cause frost bite injury. Direct ocular exposure to PVC vapour can cause localized burns or irritation of the conjunctiva and cornea. The primary target of PVC, acute exposure is the CNS. It includes sign and symptoms like dizziness, inebriation, fatigue, tingling numbness of the limbs, visual disturbances, coma and death. Vinyl chloride gas inhalation can cause mild respiratory tract irritation, wheezing and chemical bronchitis, hydrocarbon pneumonitis may be a problem in children. It may lower the myocardial threshold to the dysrhythmogenic effects of catecholamines; it might predispose patients to ventricular ectopy and fibrillation. Gastrointestinal symptoms like nausea, vomiting, diarrhoea and epigastric pain may occur due to ingestion of PVC. Chronic exposure can cause permanent liver injury and liver cancer, neurogenic or behavioural symptoms, and change to the skin and bone of the hand.<sup>[16]</sup>

#### **Polypropylene (PP)**

It is used to make yogurt containers, ketchup bottles, straws, rubber made and opaque plastic containers and winter clothing insulation.<sup>[17]</sup> It is bad for the endocrine system. It can cause genetic mutation and tumours. It can mimic the female hormone oestrogen, therefore causing an overload of it in the women body, which causes problems with fertility and conceiving. It can give rise to the allergic reactions.<sup>[18]</sup>

#### **Polystyrene (PS)**

It is mostly used in Styrofoam containers, egg cartons, disposable cups and bowls, plastic cutlery, compact disc cases and takeout food containers. It also presents in second hand cigarette smoke, car exhaust, off gassing of

building materials and possibly in drinking water. Leaches styrene which affect endocrine system, mimics the female hormone oestrogen, and thus has the potential to cause reproductive and developmental problems. Due to long term exposure brain and nervous system affects and adverse effect on RBCs, liver, kidneys and stomach seen in workers. Styrene primarily exhibits its toxicity to humans as a neurotoxin by attacking on the central and peripheral nervous system. The accumulation of these highly lipid – soluble material in the lipid rich tissue of the brain, spinal cord and peripheral nerves is correlated with acute and chronic functional impairment of the nervous system.<sup>[19]</sup>

The national oceanographic and atmospheric administration said that plastic waste kills about 1 lac marine animals and millions of birds and fishes and cattle's yearly. In the waters, especially plastic bags can be mistaken as food and consumed by various marine animals. When plastic ingestion occurs, it blocks the digestive tract, gets lodged in animal's windpipes cutting air flow causing suffocation or fills the stomach, resulting in mal nutrition, starvation and death. Certainly, it is found that plastic waste accumulates in the animal's gut and give a false sense of fullness, resulting starvation of animal and finally death. Smaller the pieces of plastic are more dangerous to living organisms.

#### **Preventive measures and awareness**

The starting point of all greater good does remain education and information. 5 June is celebrated as world environment day per year to increase awareness and government action on the growing issue of plastic pollution. In 2018, India is the host to this year's world environment day and the theme is 'Beat plastic pollution' with focus on single use or disposable plastic products. The minister of environment, forest and climate change of India said that, people to take care of their Green Social Responsibility and urged them to take Green Goods Deeds in everyday life. Plastic pollution is prevented by increasing use of non-plastic or degradable products and reduce usage of plastic products. The ministry of drinking water and sanitation, Government of India, has requested various governmental departments to avoid the use of plastic bottles to provide drinking water during governmental meetings, etc. and to instead decide for providing drinking water that do not generate plastic waste. To increase awareness of plastic waste and reduction in single use of plastic bags, water bottles or many other plastic products conceptions of more and more programmes related to plastics. To promote a more sustainable lifestyle and educate people about the prevalence of plastic pollution worldwide. Being educated on the situation and aware of the consequences ultimately leads us towards better choices in term of consumption and waste management of plastic at an individual level. Instantaneous prompt eradication of plastics in its current form, rate of production and consumption is not really feasible, yet constant pressure is impacting industry and politicians to think green to

have environmentally responsible, approach, production, prevention plans and legislations.

## DISCUSSION

The plastic waste is considered as one of the most burning issue that humans are facing in their contemporary life. Due to accumulation of plastics into the environment, wildlife and their habitat as well as human population facing problem related to health. Since, plastic products are non-degradable, they break into small fragments, ingesting marine animal or birds, along with chemical toxins present in plastics and come into food chain. Humans consuming these contaminated sea foods and affected by severe health problems. The prevalence rate of plastic waste increased every day in developed and developing countries. Plastic contains chemical toxins like BPA (Bisphenol-A), dioxin, formaldehyde, phthalates, benzene, etc. which may alter reproductive hormones, also act as an endocrine disruptor, may lead to carcinogenic, certain health issue related to nervous and digestive system, and in extreme case death of infant may occur. Recently Government of India banned use of plastics above 50 microns due to increased rate of plastic waste and harmful effects on both wildlife and human health. So, educating and awaking people related to plastic debris and its impact, promote and conduct awareness programmes worldwide. By increasing use of substitute for plastic products and reducing its use it can be prevented. Also, by applying strict law for environmental health.

## CONCLUSION

Plastic pollution is having a negative impact on our ocean, wildlife and human health. Rapid growth in global plastic production since last decade. It is important to note that plastic is a unique material with many benefits as it is cheap, versatile, lightweight and resistant to moisture. This make it a valuable material for many functions. It can also provide environmental benefits through certain supply chains that it plays a critical role in maintaining food safety, quantity and preventing waste or debris. But, nowadays, production of plastic increased, it is non-biodegradable and breaks into fragments, which ingested by marine animals altering mechanism of digestive system and meets wildlife and its habitats as well as human through food chain resulting some health-related issues. This makes the improvement of plastic waste management system across the world critical to addressing plastic pollution. For prevention of plastic waste or pollution good substitute are used. Also, educational and awareness programme can be arranged by government, provide strict law enforcement related to use of plastic products in routine life. Now, it is a challenge to the humans to “save the earth” from various types of pollution.

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