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Plastic, Pollution and Human Health

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ABSTRACT

Asthma, kidney and liver faliures, heart disorders, various types of cancer, infertility, oestoporesis, genetic disordersoxidastive stress, inflammation, rheumatoid arthritis, stroke, auto immune conditions, are just a few names taken in the long list of diseases caused by plastics. Somewhere down the line, there was lack of knowledge regarding these drastic effects of plastics and related additives on environment and human health and it was used extensively not knowing its effects on right from new born babies to adults. The general health and well-being of the entire world population is at stake due to the adverse effect of plastic. We need to alter many ways to ward off or reduce its negative impact. The present paper focuses on the health issues caused by plastics, its additives and components, so that our focus turns to take proper measures to reduce negative impacts of plastic on world human health.

Key Words - *BPA, Phathalates, Cd, Hg Sn, Cr Metabolism, Carcinogenic, Biodegradation, Genotoxicity, Fertility, Neuro Development.*

INTRODUCTION

With the invention of plastic, the world rejoiced its existence and utilities. Every aspect of our day to day lives has now, the touch of plastic. Baby feeders, baby nappies, toys with attractive colours and super smooth finish, implants, syringes, tubes, medicines, acrylic fibres, foams, insulators, glues, clothes, containers to store food materials ,water bottles, electrical and electronic items, industrially useful materials and objects and many innovative ideas worked fantastically with plastic, Cloth bags became a thing of past and polybags are in vouge along with numerous articles which are plastic based and the common man is totally unaware of Little did the mankind realise that it has paved way for a far reaching drastic impact on environment and on human health. This paper discusses some of the major health implications due to pollution created by plastic.

EFFECT ON HUMAN HEALTH

Virgin plastics are not useful for commercial, industrial or domestic uses, There are many properties which are lacking in it, say toughness, flexibility, smoothness, in flammability, appeal, colorings, it may degrade in the environment when exposed to light, humidity and much more as per the need of the situation and condition. Additives are needed to be added to bring about these desired properties in the plastics. Most of these additives, although enhance the desired quality of the plastic, they enhance health risks simultaneously. Not only the additive, but the monomer blocks are also harmful to the human health.

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The potentially toxic substances may enter the human system by some of the following ways-

(i) Consumption of food materials grown on land or water poisoned with plastic leeching or contaminated with toxins formed after thermal and biodegradation of plastic

(ii) Consumption of aquatic food from the water bodies contaminated with plastic - this includes consumption of both freshwater and marine food materials.

(iii) Consumption of food and beverages of various pH from plastic containers or consuming food and beverages stored in various plastic containers, even if it seemingly benign olive oil.

(iv) Using plastic toys, clothes, pads, sheets, syringes, tubes, plastic materials for various other requirements,

(v) Exposure to dust of plastic degradation material, while working in that area or by getting exposed otherwise like breathing near the burning plastic trash.

(vi) Exposure to plastic toxins through dermal contact..

In this paper some of the toxic effects of plastic components are enumerated.

PLASTIC TOXINS AND THEIR EFFECT ON HEALTH

BPA or Bisphenol A- It is usually used in food and beverage containers and also in baby bottles. Production of the chemical BPA is one of the highest volume in the world. BPA needs six hours to pass through the body and approximately 95% of the sample size was reported to be containing it in urine, which is alarming. This is so because it easily leaches into water from the bottles.

EFFECT ON HEALTH - BPA is a very powerful endocrine disintegrator, it destroyes the endocrine system and human endocrine system can't function properly after that. BPA may even mimic a hormone or block a receptor to disrupt proper functioning of Endocrine system, as a result of which following functions of our body are adversely affected –

(i) Metabolism

(ii) Tissue development and function

(iii) Sleep pattern

(iv) General mood

(v) Heart Rate

(vi) Digestion

(vii) Body temperature regulation

(viii) Fertility and reproduction

(ix) Sexual life

(x) Bone density decrease

(xi) Addison's disease

(xii) Various forms of cancer

(xiii) Abnormal blood pressures

(iv) Cushing syndrome

(xv) Obesity

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(xvi) Dementia

In short, the endocrine system affects every cell of the body and their functions and BPA is capable of disrupting this system.

PLASTICISERS AND PHTHALATES-

These are added, primarily to PVC, to make it more flexible and are used for a wide range of utility items ranging from toys, floorings, clothes to medical tubes, IV bags**.** Di(2-ethylhexyl) phthalate (DEHP), used to soften polyvinyl chloride (PVC) plastic and it has following adverse health effects on human beings -

(i) liver damage,

(ii) Kidney damage

(iii) Lungs damage

(iv) Reproductive system disorders

(v) Adverse effect on neurodevelopment

(vi) Poor social communication

(vii) Lowering of IQ

(viii) Problems with hyperactivity and attention

FLAME RETARDANTS IN PLASTICS

These are added to plastic as fire safety measures and contain bromine. Flame retardants have following health hazards-

(i) Damaging kidneys

(ii) Damaging liver

(iii) Damaging lungs

(iv) Damaging reproductive system

HEALTH IMPACTS OF METAL ADDITIVES IN PLASTICS

Hg-

(i) Penetrates cell memberanes easily and disrupts cell functions

(ii) Carcinogenic

(iii) Damages kidney and brain

(iv) Causes shyness, irritability and memeory problems

(v) Alters vision and speech

Cd- It gets deposited in bones and lungs. It gets deposited in proximal tubules of kidney. Human body is unable to get rid of it. It mainly causes –

(i) Bone damage

(ii) Kidney damage

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(iii) Lung damage

Cr+6- The hexavalent chromium is the most toxic of all other chromium species. It basically causes following health issues –

(i) Causes dermal allergy

(ii) Ulcers in nose, stomach and small intestine

(iii) Anaemia

(iv) Damages sperm and reproductive system

(v) Affects liver, kidney cardiovascular and nervous systems

(vi) Damages DNA

Sb-It is usually added as a flame retardant, Its health effects are-

(i) Genotoxicity

(ii) Respiratory effects

(iii) Gastrointestinal effects

(iv) Dermal effects

(v) Effect on Reproductive system

(vi) Carcinogenicity, especially lung cancer.

Pb - It is used as a softener in plastics and makes the plastic flexible. It also stabilises the plastic from heat. It affects health in following ways –

(i) Affects kidney function

(ii) Neurological disorders

(iii) Affects gastrointestinal functions like constipation, lack of appetite

(iv) Brain damage

(v) Affects balance, .behaviour and coordination.

(vi) Fever and fatigue

Sn-Tin coating is also used in plastics. It is also used in paint and plastic industry. Acute health effects of tin are:

(i) Breathlessness

(ii) Urination problems

(iii) Severs sweating, sickness and dizziness

(iv) Stomachaches

(v) Eye and skin allergies

In addition to the above listed chemicals, following compounds and compounds resembling them, which are used in plastics are carcinogenic, mutagenic, allergy causatives or organ functions disruptors-

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(i) 1,3- butadiene

(ii) 1,4-dichlorobenzene

(iii) 4,4'-methylenedianiline

(iv) 4,4'-methylenediphenyl diisocyanate

(v) Acrylonitrile

(vi) Benzyl butyl phthalate (BBP)

(vii) Acrylamide

(viii) Ethylene oxide

(ix) Maleic anhydride

(x) Methyl methacrylate

(xi) m-phenylenediamine

(xii) Hexamethylene tetramine

(xiii) p-phenylenediamine

CONCLUSION

Several PoTSs (e.g. toxic metals, BFRs, POPs and PAHs) are released by the application of various recycling techniques and by seemingly harmless biodegradation methods and are causing havoc with health and immunity system of human beings, domestic and wild lives. It has been observed that when microbes degrade the plastics new molecules are formed, new surfaces are exposed and it ensues further levels of pollution and newer cycles of toxicity. This implies that at least biodegradation is not at all an answer to reduction of toxicity of plastics. The issue needs a better perspective to deal with to ensure safer world with plastic.

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