IMPACT OF TOXIC METALS, MINERALS, SOLVENTS, E-WASTE AND PLASTICS LEADING TO ENVIRONMENTAL POLLUTION

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ABSTRACT

The environmental toxic metals and minerals persist in nature as secondary metabolites without disparage for decades and travel thousands of kilometers which promote drastic change in biogeochemical web by accumulation. Even though some of them are essential micronutrients implicate in mutagenesis but they affect gender characteristics of unborn organism by accomplishing elevated concentration levels. Cd and As pretext greatest cancer risk, incisive renal failures, central necrosis, bladder cancer. Certain injuries like hemochromatosis, hyperkalmia, Wilson's disease headed by Fe, K, and Cu toxicity's. Se toxicity eventuates in many regions of the world result in seizers & death. Recently, they sway endemic proportion in many parts of country and procreate millions of environmental refuges being unpredictable genetic changes, chronic degenerative disease, diminish immunity.

Many solvents such as aliphatic, aromatic hydrocarbons and their derivatives include some of the outrageous production in industries are elegant an eminent threat to environment. Several solvents traditionally used as ingredients like catalytic reagents, mixtures, blends & fillers which plays a crucial role in molecular modeling & manufacturing of commercial products. They posses pestilential behavior due to their high flammability, volatility and partial immiscibility which are responsible for undesirable acute health problems across the life course. Their etiquette exposure is ubiquitous in equitably and unequally distributed, which leaves more vulnerable to adverse unliable effects are traced in metabolic parts of biotic components of environment. Imbalance climate change demands huge utility of pesticides for adequate crop cultivation is contributing immune disunion in animals, declining of soil texture and contaminates the water bodies. The perceived deleterious effects of halogenated hydrocarbons, acetonitrile and DMF toxicity are currently on "environmental endocrine disruptor" which induces childhood cancer and functional disorders of endocrine glands.

Plastic pollution materialize in many forms including but not limited to littering, marine debris, plastic particle water pollution, plastic netting and friendly floaters. Halogenated (Cl&F) plastics circulate harmful chemicals into the surrounding soil, which can percolate into ground water and seep into surrounding water bodies. Crumble of plastic leads to release of methane which is a major contributor of green house effect. Polystyrene pieces, bis phenol-A, nurdles are the most common type of plastic pollution to oceans. Marine mammals sometimes become entangled in plastic products such as nets, which can harm or kill them. Plastic pollution can also affect humans in which it may create an eyesore that interferes with enjoinment by the natural environment.

E-waste inception is another pernicious problem which accommodate heavy metals, polymers, glass etc., which tender for release of poisonous gases into air , heavy metals into water & even soil also injuries to health acutely inducement respiratory abnormalities for prolonged periodical throat cancers. Burning E-waste may generate dioxins, furans, polycyclic aromatic hydrocarbons (PAHs), Cathode Ray Tubes (CRT) and Chlorofluorocarbon (CFC's) are discarded from computers, home appliances, audio and video products.

Alternative methods to pollution control are emerging the physiochemical and bioremediation solutions, optimization of mining, using green solvents, strategically recycling E-waste by adopting governed acts.

Key words: Heavy metals, Minerals, Solvents, Plastics, e-waste and Diminish Immunity.

1. INTRODUCTION

Reducing the exposure to toxic environmental agents and other stressors is a critical area of invention for obstrecians, gynecologists and other reproductive health care professionals which are ubiquitous, preconception, prenatal inequitably and unequally distributed more vulnerable to adverse reproductive health effects the other populations. A pollutant is any substance has to be present in the environment air, water and soil, beyond a set or tolerance limit which may be poisonous or toxic and will causes objectionable carcinogenic effects on living organisms via metabolic interference and mutagenesis which impairing the welfare of the environment, reducing the quality of life and may eventually cause death[1].

Heavy metals are significant environmental pollutants, and their toxicity is a problem of increasing significance for ecological, evolutionary, nutritional and environmental reasons. The term ''heavy metals'' refers to any metallic element that has a relatively high density (greater than 4 g/cm^3, or 5 times or more, greater than water) and toxic at low quantity is referred as *'heavy metal'*, e.g., arsenic (As), lead (Pb), mercury (Hg), cadmium (Cd), chromium (Cr), thallium (Tl), etc. Some *'trace elements'* are also known as heavy metals, e.g., copper (Cu), selenium (Se) and zinc (Zn)[2]. Some of them are essential to maintain the body metabolism, but they are poisonous above their threshold levels which can enter the bodies to a small extent via food, respiration, ingestion, skin, drinking water and air[2]. However, some metals are (like Pb) without any biological and are not needed by the body which become poisonous only in specific forms[3].

The excess quantities of heavy metals are detrimental as these destabilize the ecosystems because of their bioaccumulation in organisms, and elicit toxic effects on biota and even death in most living organisms[4]. The *'lighter metals'*, e.g., beryllium can also be toxic in certain circumstances while a few minerals are less toxic, e.g. bismuth (Bi). Sometimes, the action of essential elements like Fe can be changed by the toxic metals, resulting into toxicity by interfering with the metabolic

process. Metalloids (like As and polonium) and ligands of any metal may be the important factor to cause toxicity. While the organometallic derivatives and forms, e.g., cobaltocenium cation, methyl Hg, and tetraethyl Pb, can be highly toxic which accords neurotoxicity similar to *'Hunter Russell syndrome'*. Beside, both radiological and chemical toxicities can be induced by the radioactive metals. The bioaccumulation of toxic metals can occur in the body and food chain. The metal contaminants are mixed in the aquatic system through smelting process, effluents, sewage and leaching of garbage which cause severe harm to the aquatic system. A large number of chemicals are being used by the tanners during process, and thus discharge the toxic materials into waters. The tannery waste waters continue to cause hazardous effects on the aquatic organisms as they also have endocrine disruption effects. Due to this, the agricultural lands are also degraded. Uncontrolled release of tannery effluents has increased the health risks to different organisms[5].

Our style of living requires a great diversity of minerals and considered to be our nonrenewable heritage from the geological past. Virtually every commodity that is traded depends on a mineral resource for its manufacture. Mineral nutrients are the inorganic elements or molecules that are required in human nutrition include water, sodium, potassium, chloride, calcium, phosphate, sulfate, magnesium, iron, copper, zinc, manganese, iodine, selenium, and molybdenum[6]. Six *macro-minerals* are required by people in gram amounts. Four (Na, K, Ca, and Mg) are cations; two (Cl and P) are accompanying anions. Daily requirements range from 0.3 to 2.0 g. Bone, muscle, heart, and brain function depend on these minerals[7]. Nine *micro-minerals* are required by people in minute amounts: chromium, copper, iodine, iron, fluorine, manganese, molybdenum, selenium (Selsun). In addition to the tar sands, gilsonite, phosphate, oil shale, Coal-bed Methane *(CBM)* and gas leasing categories, locatable and saleable minerals areas are generally classified as either open or closed. Locatable minerals are usually the base and precious metal ores, ferrous metal ores, and certain classes of industrial minerals. Saleable minerals are generally common varieties of construction materials and aggregates, such as sand, gravel, cinders, roadbed, and ballast which commodities sold by sales contract from the federal government[8].

In general, the minerals themselves are not destroyed, but they can be rendered unusable and toxicity results when there is abnormally high concentration by an accidental consumption of a mineral, as with drinking ocean water (sodium toxicity); taking over dosage mineral supplement (available in most drug and health stores); or with overexposure to industrial pollutants, household chemicals, or certain drugs. Mineral toxicity may also apply to toxicity that can be the sequence of certain diseases or injuries. Depending on the mineral, the effects vary and toxicity occurs at different levels of the mineral in the body. The bioavailability of minerals of common feeds is not well characterized, and is affected by intake level, feed type, variations of the same feed, and interactions between mineral, soil fertilization, method of analysis, etc. (NRC, 2001, 2005)[9].

The majority of toxic solvents are organic chemicals represent a group of aliphatic and aromatic organic compounds which are usually lipophilic, flammable and evaporate easily at normal temperature and pressure, giving rise to less or more volatile organic compound (VOC) emissions with hazardous and toxic properties, costly (a few of the petrochemical industry). They are part of the large waste by-products of the chemical processes in laboratory research activities, analytical methodologies, spectrometric observations, measurements of physicochemical properties and industrial manufacturing is considered a very important problem for the health and environmental damage. Organic solvents are widely used in industry for cleaning and degreasing, thinning and dissolving. Aromatic solvents (benzene, toluene, etc), chlorinated and polychlorinated solvents (carbon tetrachloride, chloroform, dichloromethane, etc) and other organic solvents (DMSO, DMF, petroleum ether, diethyl ether, acetone, etc) are used as liquid medium in great quantities in many laboratory synthetic processes, and analytical techniques conventionally. The persistent solvents (non-biodegradable) are difficult to recycle and their disposition is very expensive. Although most of their toxic potential is known and there are safety rules for their use, prolonged and high concentration exposures can cause occupational diseases. They have various effects on human health, whether the exposure is by vapour, mist, or liquid form. Some solvents produce vapours, which are heavier than air may also flash from smoking which flow to floor, or in worst cases to spaces where ignition by a spark from welding or static electricity may light them. Vapors of solvents can also accumulate in confined places and stay there for a long time, presenting risks for health and property. They can enter the body by inhalation (breathing in), by swallowing, and through the skin. The way that solvents may enter the body depends on the volatility and fat-solubility of the solvent, and the resulting ill health effects[10].

The world population is living, working, vacationing, increasingly conglomerating along the coast and standing on the front row of the greatest. Mostly preceedented, micro or macro plastic waste tools like calculators, cell phones, televisions, tape-records, CD & DVD players, helmets, bags, toys, floaters, nets, polystyrene pieces, nurdles, bisphenol A etc tide faced ever. The addition of chemicals is the main reason what these plastics have become so multipurpose however this has a problem associated with it some of chemicals used in plastic production have the potential to be absorbed by the human beings through skin absorption. The amount of plastic manufactured in the first ten years of this century will approach the total produced in the entire last century. A large percentage of plastic produced each year is used to make single use disposable packaging items which will get permanently thrown out and go to the garbage dump million tons within a year. All over the world the statistics are ever rowing staggeringly. Tons and tons of plastic debris (which by definition are waste that very incise from, large containers, fishing nets, microscopic plastic pellets or even particles) is discarded every few last year's an estimated 1 lakh 50 thousand tons of marine plastic debris ended on the shores of Japan and 300 tons a day on Indians coast.

In 2012 it was estimated that there was approximately 165 million tons of plastic pollution in the world's oceans. It is a major concern for the government now plastic pollution occurs in many forms including but not limited to littering to marine debris(man made waste that had released in a lake, sea, ocean or water way). Plastic particle water pollution, plastic netting and

friendly floaters. A simple walk on any beach any where the plastic waste, spectacle is present. Midway beaches covered with large debris and millions of plastic particles in place of sand are suffocating envomed but the slow plastic poising continuously washing the shore. Nurdles are plastic pellets that are slipper in this form, often in cargo ships to be used for the creation of plastic product. A significant amount of nurdles spilled into oceans and has been estimated that globally around 10% of beach literally is of nurdles .Plastics in oceans typically are polystyrene reach in to water from plastics. Polystyrene pieces and nurdles are the most common type of oceanic debris.

The electronic industry is the world's largest and fastest growing manufacturing industry during the last decade; it has assumed the role of providing a forceful leverage to the socio-economic and technological growth of a developing society. The consequence of its consumer oriented growth combined with rapid product obsolescence and technological advances are a new environmental challenge - the growing menace of "Electronics Waste" or "e waste". E-waste can be defined as "Waste Electrical and Electronic Equipment (WEEE)" including all components, sub assemblies and their fractions, personal computers (*A discarded personal computer with a CRT monitor typically weighs 25 kg and consists of metal (43.7%), plastics (23.3%), electronic components (17.3%) and glass (15%)*), Fax machines, High-fidelity systems, Cell phones, Electronic games, Photocopiers, Radios, Televisions, Video recorders, DVD Players, Air-conditioners, heavy metals, plastics, glass, equipments used in Information and Communication Technology (ICT), home appliances, audio and video products and all of their peripherals are popularly known as Electronic waste (E-waste). While WEEE also includes traditionally non-electronic goods such as refrigerators, ovens Electric cooker & heaters, washing machine and Food mixer etc[11].

The discarded and end-of-life E-waste is not hazardous if it is stocked in safe storage or recycled by scientific methods or transported from one place to the other in parts or in totality in the formal sector. The e-waste can, however, be considered hazardous if recycling in the non-formal sector by primitive methods which can damage the environment. Waste electrical and electronic equipment (WEEE) is a diverse waste category, which is more significant and has high toxicity potential. The growth rate of discarded electronic waste is high in India since it has emerged as an Information Technology giant and due to modernization of lifestyle. We are using electronic products for last 60 years however, there is no proper disposal system followed in our country that has lead to enormous amount of e-waste. Sixty-five cities in India generate more than 60% (1, 46,180 tons) of the total e-waste generated in India per year. Ten states generate 70% of the total e-waste generated in India includes Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab. Among top ten cities generating e-waste, Mumbai ranks first followed by Delhi, Bangalore, Chennai, Kolkata, Ahmedabad, Hyderabad, Pune, Surat and Nagpur. In India, increased demand for the key products like PC, TV and Telephones in last 5-10 year has been responsible for the increasing amount of e-waste generation.

The consistent advent of new designs, ''smart'' functions and technology during the last 20 years is causing the rapid obsolescence of many electronic items. Around 500 million computers became obsolete between 1997 and 2007 in the United States alone and 610 million computers had been discarded in Japan by the end of December 2010. In China 5 million new computers and 10 million new televisions have been purchased every year since 2003 (Hicks et al., 2005), and around 1.11 million tons of e-waste is generated every year, mainly from electrical and electronic manufacturing and production processes. Over 130 million computers, monitors and televisions become obsolete annually and that the annual number is growing in the United States (Bushehri, 2010). The current and future global production of E-waste in 2006, the world's production of E-waste was estimated at 20-50 million tonnes per year (UNEP, 2006), representing 1-3% of the global municipal waste production of 1636 million tonnes per year (OECD, 2008). Cobbing (2008) alculated that computers, mobile telephones and television sets would contribute 5.5 million tonnes to the E-waste stream in 2010, rising to 9.8 million tonnes in 2015.

Recycling of e-waste can also distribute hazardous substances into the environment and may affect human health. While there are more than 1000 toxic substances (Puckett and Smith, 2002) associated with e-waste, the more commonly reported substances include: toxic metals (such as barium (Ba), beryllium (Be), cadmium (Cd), cobalt (Co), chromium (Cr), copper (Cu), iron (Fe), lead (Pb), lithium (Li), lanthanum (La), mercury (Hg), manganese (Mn), molybdenum (Mo), nickel (Ni), silver (Ag), hexavalent chromium (Cr(VI)) and persistent organic pollutants (POPs) such as dioxin, brominated flame retardants (BFRs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polybrominated dibenzo-p-dioxins and dibenzofurans (PBDD/Fs), Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) and polyvinyl chloride (PVC)[12].

E-waste disposals impact human health in two ways which include: (a) food chain issues: contamination by toxic substances from disposal and primitive recycling processes that result in byproducts entering the food chain and thus transferring to humans; and (b) direct impact on workers who labour in primitive recycling areas from their occupational exposure to toxic substances. Along with this, numerous researchers have demonstrated a direct impact of backyard recycling on workers. The danger of e-waste toxicity to human health, both in terms of chronic and acute conditions, has become a serious societal problem and has been well demonstrated by case studies in China.

Environmental and Human Health Risks by various toxic agents

Impact of Heavy metals and Minerals: *'Poison'* is defined as any substance, which when absorbed into the body, will cause adverse or deleterious effects. Several toxicogetics and their compounds have been stated to be toxic when they accumulated in living organisms are taken up, and stored faster than they are broken down (metabolized) or excreted. The threatening agents are poisonous since they bioaccumulate. The *'bioaccumulation'* means an increase in the level of a chemical/toxicant in a biological organism over time, compared to chemical/toxicant level in the environment[13]. It is important

to point out here that the most of the zoos which were once located on the outskirts of the cities and towns are now surrounded by human activities can cause adversely affect the health and wellbeing of the wild animals housed in such protected areas. The environmental and health risks caused by various pollutants are described as under[14].

The Hg is not present naturally in living organisms. It is a toxic substance with no known function in biochemistry or physiology. It has complex and unusual chemical and physical properties. The methylated forms of Hg are bioaccumulated over a million fold and concentrated in living beings, especially fish. These forms of Hg (monomethyl Hg and dimethyl Hg) are highly toxic, causing neurotoxicological disorders. Inorganic Hg toxicity is associated with tremors, gingivitis and/or minor psychological changes, together with spontaneous abortion and congenital malformation in humans. Monomethyl Hg causes damage to brain and CNS, while foetal and postnatal exposures have given rise to abortion, congenital malformation and development changes in young children.

The Cd derives its toxicological properties from its chemical similarity to Zn (an essential micronutrient for plants, animals and humans). The Cd once absorbed by an organism, present for many years (over decades for humans), though it is eventually excreted. It is produced as an inevitable bi-product of Zn (or occasionally Pb) refining. As an impurity, Cd is present in several products, including phosphate fertilizers, detergents and refined petroleum products. Average daily intake of Cd for humans is 0.15 µg from air and 1µg from water. The Cd if exposed for long time may cause kidney dysfunction. Its high exposure may cause obstructive pulmonary disease and lung cancer. Bone defects (osteomalacia, osteoporosis) have also been reported in humans and animals. Besides, it can also cause increased blood pressure and myocardial disease in animals.

Exposure of Pb can cause many effects depending on level and duration of Pb. The Pb exposure can be through drinking water, food, air, soil and dust from old paint. The Pb is among the most recycled non-ferrous metals, so its secondary production has grown steadily. The high levels of Pb may result in toxic effects in humans which in turn cause problems in the synthesis of haemoglobin (Hb), effects on kidneys, gastrointestinal tract (GIT), joints and reproductive system, and acute or chronic damage to nervous system[15].

Severe alterations in copper metabolism occur in two genetic diseases, Wilson's disease and Menkes' disease, both of which are rare and occur in about one in 100,000 births. It is essential substance to human life, but chronic exposure to contaminant drinking water with copper can result in the development of anaemia, liver and kidney, nervous system damage (Madsen, et al., 1990; Bent and Bohm, 1995) and stomach and intestinal irritation may occur during Wilson's disease, it affects greatly. This disease was a result of drinking water contaminated from corrosion of water pipes made of copper and industrial wastes. Diarrhoea in small children could be also occurred due to high copper exposure. The adverse health effects caused by drinking water contaminated with copper are abdominal pain, vomiting, headache, nausea, and diarrhoea. Copper in large doses is dangerous to infants and people with certain metabolic disorders. On the other hand, lack of copper intake causes anaemia, growth inhibition, and blood circulation problems (Jennings, et. al., 1996)[16].

Molybdenum (Mo) is an essential dietary nutrient, which is a constituent of several mammalian enzymes including xanthine oxidase, sulfite oxidase and aldehyde oxidase (NRC, 1989). Although molybdenum is an essential mineral, no deficiencies have been reported in humans. Mo is present in very small amounts in human body. Its content can be varied in tissues such as liver, kidney and bone depending on the dietary intake (Grounse, et al., 1983). Molybdenum is considered safe through a wide range of intakes (up to 15 mg per day), but it can interfere with the absorption of copper. Mo is needed to convert purine to uric acid, and excessive intake could, in rare cases, cause gout-like symptoms, such as joint pain and swelling and increase uric acid content in the blood (Koval'skiy, 1961).High levels ingested molybdenum may be associated with potential mineral imbalance by increasing serum ceruloplasmin and urinary extraction of copper. Excretion of sufficient quantities of this element may put humans at risk for the hypochromic microcytic anemia associated with dietary copper deficiency (U.S. EPA, 1985 & 1991)[17, 18].

Selenium toxicity occurs in regions of the world, including some parts of China, where soils contain high levels of selenium. A daily intake of 0.75-5.0 mg selenium may occur in these regions, due to the presence of selenium in foods and water. It accumulates in living tissue can cause fatigue and irritability, hair and fingernail loss, damage to kidney and liver tissue, damage to circulatory tissue, and more severe damage to nervous system. The breath may acquire a garlic odour, as a result of the increased production of dimethylselenide in the body, and its release via the lungs. The antimony (Sb) is used in compound, antimony trioxide (a flame retardant). It is also found in batteries, pigments, and ceramics and glass. Its high exposure for short duration can cause nausea, vomiting and diarrhoea. The long-term exposure of Sb can cause cancer in humans.

The Cr has been reported to be used in metal alloys and pigments for paints, cement, paper, rubber and other materials. The low level Cr can irritate skin and can produce ulcer. Its chronic exposure can produce kidney and liver damage. The Cr can also damage to circulatory and nerve tissues. In quatic animals, it is normally accumulated and can cause toxicity to eating fish. The Ni is needed in small amounts to produce red blood cells (RBCs), but it becomes slightly toxic in excess quantity. Its chronic exposure can cause decrease in body weight, heart and liver damage, and skin irritation. In aquatic animals, the Ni is accumulated but its presence is not magnified along the food chains.An increase in the concentrations of sodium in the bloodstream can result in seizures and death. Increased plasma sodium, which is called hypernatremia. Death has occurred where table salt (sodium chloride) was accidently used, instead of sugar, for feeding infants and when baking soda(sodium bicarbonate) was used during attempted therapy of excessive diarrhoea or vomiting. Although a variety of processed foods contain high levels of sodium chloride, the levels used are not enough to result in sodium toxicity.

Toxico kinetic studies show that absorbed fluoride is distributed into two compartments. Fluoride in blood and soft tissues has short half life of few hours, but that in hard tissues like bone and teeth has long half life of eight years. Accumulation in these two tissues is dose and age dependent. Unlimited accumulation of fluoride in bones is the main cause of the disease, skeletal fluorosis. Fluoride toxicity can be acute due to exposure to a single massive dose, as happens with industrial workers (industrial fluorosis) or chronic (endemic fluorosis) due to continuous ingestion of water and food containing high amounts of fluoride. In both the types, teeth and bone are the primary targets. However, fluoride does not spare soft tissues and causes non-skeletal fluorosis. As mentioned earlier, endemic fluorosis is a serious problem in many parts of India. The characteristic feature of dental fluorosis is dental mottling. The clinical features of skeletal flourosis are; muscular skeletal dysfunction, arthralgia, arthritis, fixed flexion deformities, restricted movement of joints, stiffness of the spine, and sometimes paraplegia. The progression is slow[19]. In more recent years, a variant of skeletal fluorosis - genu valgum or knock nee has been reported from some parts of the world including India, in younger individuals. Its aetiology is not fully understood. Though ingestion of high amounts of fluoride through water and food is the main factor in the causation of endemic fluorosis, other factors- probably dietary, also play a role. Thus, In the US, ingestion of even 8 ppm fluoride containing water, over 15 years did not lead to fluorosis. On the other hand in India levels above 1 ppm are considered unsafe. The role of nutrition status is apparent from the fact that even in the fluorotic regions, the poor and malnourished are the worst affected.

Iodine toxicity can result from an intake of 2.0 mg of iodide per day. The normal concentration of sodium in the blood plasma is 136-145 mM, while levels over 152 mM can result in seizures and death. Iodine toxicity results in impairment of the creation of thyroid hormone, resulting in lower levels of thyroid hormone in the bloodstream. The thyroid gland enlarges, as a consequence, and goiter is produced. This enlargement is also called hyperthyroidism. Goiter is usually caused by iodine deficiency. Iodine toxicity produces ulcers on the skin called "kelp acne" because of it association with eating kelp, an ocean plant which contains high levels of iodine. Iodine toxicity occurs in Japan, where large amounts of seaweed are consumed. Iron toxicity is not uncommon, due to the wide distribution of iron pills. Alethal dose of iron is in the range of 200-250 mg iron/kg body weight. Hence, a child who accidently eats 20 or more iron tablets may die as a result of iron toxicity. Within six hours of ingestion, iron toxicity can result in vomiting, diarrhea, abdominal pain, seizures, and possibly coma. Although symptoms may appear to improve, this improvement can be followed by shock, low blood glucose, liver damage, convulsions, and death within 12-48 hours after toxic levels of iron are ingested.

Nitrite poisoning occurs during a reaction with the iron atom of haemoglobin, an iron-containing protein that resides within the red blood cells. This protein is responsible for the transport of nearly all of the oxygen from the lungs to various tissues and organs of the body. Poisoning by nitrite, or nitrate after its conversion to nitrite, results in the inability of haemoglobin to carry oxygen throughout the body, identified by a bluish skin colour. Adverse symptoms occur when over 30% of the haemoglobin has been converted to methemoglobin, and these symptoms include cardiac arrhythmias, headache, nausea and vomiting, and in severe cases, seizures, infants are especially susceptible to poisoning by nitrite. An excessive level of potassium in the bloodstream is in the range of 3.5-5.0 mM, while levels of 6.3-8.0 m (severe hyperkalemia) can result in cardiac arrhythmias or even death due to cardiac arrest. Potassium ispotentially quite toxic, however toxicity or death due to potassium poisoning is usually prevented because of the vomiting reflex. The body's regulatory mechanisms can easily be overwhelmed, however, when potassium chloride is injected intravenously, and high doses of injected potassium can result in death.

Calcium and phosphate are closely related nutrients. Calcium toxicity is rare, but overconsumption of calcium supplements may lead to deposits of calciumphosphate in the soft tissues of the body. Phosphate toxicity can occur with overuse of laxatives or enemas that contain phosphate. Severe phosphate toxicity can result in hypocalcemia, and in various symptoms resulting from low plasma calcium levels. Moderate phosphate toxicity, occurring over a period of months, can result in the deposit of calcium phosphate crystals in various tissues of the body. Zinc toxicity is rare but can occur in metal workers who are exposed to fumes containing zinc. Excessive dietary supplements of zinc can result in nausea, vomiting, and diarrhea, and copper deficiency because zinc inhibits the absorption of copper. Manganese toxicity occurs in manganese mine workers, where men breathe air containing dust bearing manganes at a concentration of 5-250 mg/cubic meter. It has been documented in Chile, India, Japan, Mexico, and elsewhere. Symptoms of manganese poisoning can occur within several months or years of exposure and include a mental disorder resembling schizophrenia, as well as hyperirritability, violent acts, hallucinations, and difficulty in walking.

Impact of Solvents: Historically, in industry numerous chemical or technical processes rely on specific properties of organic solvents which may cause substantial exposure to these substances in the work force. Solvents can penetrate the body by inhalation (breathing in), by swallowing, and through the skin and enter the blood circulation damage to the liver, kidneys, heart, blood vessels, bone marrow and the nervous system (e.g. Chronic Toxic Encephalopathy). The acute neurotoxin potentials of most solvents were known for a long time. An acute intoxication (or just contact) with one sort of chemical (stimulus) causes physical illness (skin eruptions, headache, feelings of oppression, nausea, sweating, palpitations, tremor, hyperventilation. While invalidating diseases such as organic encephalopathy (or organic psycho-syndrome, OPS), depression, psychosis, sleep apnoea, multiple sclerosis, dementia, arkinson’s disease, and amyotrophic lateral sclerosis were considered as chronic or delayed effects of long-term solvent exposure.

Simultaneous alcohol consumption seems to have an additive neurotoxic effect and Organic psycho-syndromes with concentration and memory difficulties, diminished psychomotor speed, decreased mental flexibility, mood changes, changes in personality, diffuse pain, and sleeping difficulties. Long term exposure to solvents like benzene and carbon monoxide can lead to deleterious effects on blood parameters, thyroid and respiratory functions. One liter of solvent can contaminate 100 million liters of drinking water. Endocrinal disrupter is an exogenous mixture that interferes with production, release, transport, metabolism, binding, action, elimination of natural hormones in the body and subsequent change in endocrine functions. Further, hepatic microsomal enzyme system responsible for endogenous steroidal metabolism can be affected by organic solvents. The perceived deleterious effects of halogenated hydrocarbons, acetonitrile and DMF toxicity are currently on "environmental endocrine disruptor" which induces childhood cancer and functional disorders of endocrine glands.

Color vision loss can be very important, especially in paint mixers and printers. Blue-yellow dyschromatopsia has been reported in exposures to solvent mixtures. Knowledge about the impact of solvents like perchloroethylene, toluene, carbon disulfide and styrene, carbon disulfide, acrylamide, n-hexane, methyl n-butyl keton, ethylene oxide exposure on toxic central nervous system effects. Exposure to solvents may play a role in the number of sleep apnoeas[20]. Stoddard solvent is a distillation fraction of crude petroleum which is colorless, flammable liquid that is insoluble in water. It is a multipurpose solvent used in industry primarily as a dry-cleaning solvent and a metal degreaser. Stoddard solvent is also used industrially as a thinning agent for paints, coatings, and waxes, and as a solvent for printing inks, photocopier toners, adhesives, rubber products, waxes, polishes, and pesticides. Epidemiologic studies of painters and dry-cleaning workers exposed to mixed petroleum products have consistently found elevated cancer risks and increased incidences of respiratory tract, bladder, and kidney cancer. Exposure to high levels of Stoddard solvent can result in CNS depression, respiratory tract irritation and neurologic effects. It is fat soluble, can probably cross the placenta and enters breast milk cause the tumor formation[21]. Toluene produces reversible effects on the liver, kidneys, and nervous system.

Impact of Plastics: Plastic can also pick up contaminants that are present in water, particularly those that are hydrophobic (repel or unable to mix with water). This includes POPs (persistent organic pollutants), PCBs (polychlorinated biphenyls), PAHs (polyaromatic hydrocarbons), (polybrominated diphenyl esters) PBDEs and (tetrabromobisphenol A) TBBPA as well as organo-chlorine pesticides, such as DDT (dichlorodiphenyltrichloroethane). Some are highly toxic and have a wide range of chronic effects, including endocrine disruption, mutation and cancer (Rios *et al.*, 2007)[22].

PAHs are formed during the incomplete combustion of coal, oil, gas, garbage and other organic substances. PAHs over long periods, they have developed lung cancer from inhalation, stomach cancer from ingesting PAHs in food, and skin cancer from skin contact. Human health effects from chronic or long-term exposure to PAHs may include decreased immune function, cataracts, kidney and liver damage, breathing problems, asthma-like symptoms, and lung function abnormalities, and repeated contact with skin may induce skin inflammation. PAHs show an increased risk of predominantly skin and lung cancers but also bladder and gastrointestinal cancers (Toxipedia, 2011). PBDEs (from personal-care products, textiles and pesticides, and flame retardants) and TBBPA have hormone-disrupting effects; in particular on oestrogen and thyroid hormones, and that exposure to PBDEs impairs development of the reproductive and nervous system. Pesticides such as DDT are toxic to a wide range of animals, particularly birds. DDT and DDE have been linked to diabetes, developmental and reproductive toxicity and cancer in humans. Although some of the more toxic pesticides, such as DDT, have been banned, they are still persistent in the environment. Major sources of the plastic responsible for entanglement are abandoned or lost fishing nets and pots (also known as 'ghost fishing'), plastic packing loops, six-pack carriers and plastic rope (Derraik, 2002; Gregory, 2009). Ghost fishing can trap and kill fish, which can reduce catches for fisheries

Polymers are composed of repeating subunits, or 'monomers', and some of the major plastics (for example, PVC and polystyrene) have been found to release toxic monomers linked to cancer and reproductive problems. Bisphenol A (BPA (CH3)2C(C6H4OH)2 comes from thermal paper and printer ink) is a colourless solid causes various impacts on their reproductive systems, increases in body weight and, increases in prostrate cancer, breast cancer, sperm count decreases, miscarriage, obesity (Oehlmann *et al.*, 2009). Zarfl & Matthies (2010) estimated the fluxes of PCBs, PBDEs and perfluorooctanaic acid (PFOA) to the Arctic via plastic debris on the main ocean currents[23]. Grocery bags are made from high-density polyethylene; Impacts on human health are perhaps the most serious of the effects associated with emissions, to death. Loss of livelihood is another major social impact connected to the use of plastic grocery bags; In Newfoundland, 100,000 marine mammals are killed each year by ingesting plastic (Brown, 2003). Toxic emissions produced during the extraction of materials for the production of plastic grocery bags, their manufacturing, and their transportation contribute to green house effect, acid rain, smog formation. Crumble of plastic leads to release of methane which is a major contributor of green house effect.

Plastic debris, laced with chemicals and often ingested by marine animals, can injure or poison wildlife. Floating plastic waste, which can survive for thousands of years in water, serves as mini transportation devices for invasive species, disrupting habitats. Plastic buried deep in landfills can leach harmful chemicals that spread into groundwater. Polystyrene pieces, bisphenol A, nurdles are the most common type of plastic pollution to oceans. Marine mammals sometimes become entangled in plastic products such as nets, which can harm or kill them. Plastic pollution can also affect humans in which it may create an eyesore that interferes with enjoinment by the natural environment. The burning of plastic grain bags releases chemicals into the air that we all breathe, causing serious lung damage.

Impact of e-waste: E-waste equipments are made up of a number of components, some containing toxic substances which can have an adverse impact on human health and the environment if not handled properly. Often these hazards arise due to the improper recycling and disposal processes used. Cathode Ray Tubes (CRT) has high content of carcinogens such as lead, barium, phosphor and other heavy metals. However, breaking, recycling or disposing off CRTs in an uncontrolled environment without the necessary safety precautions can result in harmful side effects for the workers and release toxins into the air, soil and groundwater[24].

Mercury is found in the fluorescent lamps that provide backlighting in LCDs, in some alkaline batteries and mercury wetted switches it will leach out when certain electronic devices are destroyed and causes damage to the nervous system, circulatory system, kidneys and learning disabilities in children. Lead has been found to leach from broken lead-containing glass, CRT screens, batteries, printed wiring boards which causes damage to the nervous system, circulatory system, kidneys cause's learning disabilities in children. Arsenic, Lead, Cadmium, Nickel, Yttrium and Europium are used on the interior of a CRT screen (electron gun, fluorescent layer & Getters) and cause cancer, effects on the immune system, reproductive system, nervous system, endocrine system and other health effects.

Another dangerous process is the recycling of components containing hazardous compounds such as halogenated chlorides and bromides used as flame-retardants in plastics, which form persistent dioxins and furans on combustion at low temperatures (600-800 degrees centigrade). Condensers, transformers, cooling units, insulation foams and cable insulations are halogenated products like CFC (Chlorofluorocarbon), PCB (polychlorinated biphenyls), PVC (polyvinyl chloride). At high temperature processing of these materials may release chlorine, which is converted to dioxins and furans[23]. Combustion of halogenated substances may cause toxic emissions, acutely poisonous and injurious to health on a long-term perspective. Copper, which is present in printed circuit boards and cables act as a catalyst for dioxin formation when flame-retardants are incinerated [25].

Source/Generation of toxins

The speedy of *Human population ratio, increased consumption intake levels and activities* has been proved as a versatile boon to produce environmental tools through *Agriculture* (farming), *Urbanization* (city septic systems, constructions, automotive garages, laboratories, hospitals etc) and *Industrialization.* These conventional come outs has led to increased disposal of pollutants and their by-products may be in different forms like liquid, solid or sludge containing various types of organic and inorganic substances such as chemicals, batteries, used computer equipment, leftover paints or pesticides, heavy metals, radio nuclides, radiation, polymers, e-waste and pathogens or other highly toxic materials are released into the environment. They are largely found in dispersed form in rock formations and increased the anthropogenic contribution in biosphere. They also have largest availability in earth crust, soil or saline soil, aquatic ecosystem and to a relatively smaller proportion in atmosphere as particulate or vapours. If these wastes are buried in the ground, or accumulate in water loggings or present in the stream runoff, in ground water for drinking water, or in flood waters, they are toxic to humans, animals, wildlife as well as plants.

Environmental Protection Acts and controlling paths

Constitution of India has a number of provisions demacrating the responsibility of the central and state government towards 'Environmental Protection'. The state's responsibility has been laid down under article 48-A which reads as follows, "the state shall endeavor to protect and improve the environment and safeguard the forests and wildlife of the country". Environmental protection has been made a fundamental duty of every citizen of this country under article 51-A(g) which read as "it shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wild life and to have compassion for living creatures". Article 21 read as, "no person shall be deprived of his life or personal liberty except according to procedure established by law".

Various statues / legislations are enacted in India exclusively for Environment Protections are,

(a) The Water (Prevention and Control of Pollution) Act, 1974
(b) The Air (Prevention and Control of Pollution) Act, 1981
(c) The Environmental Protection Act, 1986
(d) The Forest Conservation Act, 1980
(e) The Wild Life Protection Act, 1972
(f) The Public Liability Insurance Act, 1991, etc

Role of individuals, groups and public in pollution control

They are several channels like pressure groups, leaders appeal, watch dogs and adversary council which to be exposure of the trends in the use of waste management including governed safeguarding acts, enforcement of environmental legislation, laws and implementation, standard and classical remediation technologies (*IT, GIS, Green technology, pollution free adsorbents and equipments, eco-friendly work methods, introducing natural & renewable tools like Watershed Sensitivity, Creates localized 'Hot-spots, Packed beds Hygienic work techniques and replacement of pollution resistance appliance*), physiochemical and bioremediation solutions, optimization of over mining, eco-friendly characteristics of green solvents, strategically recycling of high amount of polymer & e-waste and awareness of adequate intake levels & over consumption of essential nutrients, not using supplements, relying on food and water acquired from a low toxic region, negative effects of the contaminants, the ecological effects, human health risks. Specially knowledge about the interrelationship which exists among and between, (a) water, air and land and (b) human beings, other living creatures, plants, micro-organisms and property. There

are more than 10,000 NGO's in India ranging from National Agencies to local groups. The Ministry of Environment and Forests (MOEF) is increasingly extending support to NGO activity and routing many of its own programme through them. They are creating awareness among people on current environmental issues and their solutions. Being involved in the protection of human right to have a clean environment. Conducting participatory rural appraisal.Transferring information through news letter, brochures, articles, audiovisuals, etc. Helping the village administrative officials in the preparation, application and execution of projects on environmental protection.

CONCLUSIONS

The result of the microscopic intensive observation acknowledge about the persistence, exposure and involvement of both natural and anthropogenic environmental carcinogenic building blocks viz., Heavy metals, Minerals, Volatile Organic Compounds (VOC's), Polymers (plastics) and E-waste (Waste electrical and electronic equipments- WEEE's) are most toxic to all human beings, animals, fishes and environment. The excess of their threshold levels and intake accumulation of various body parts (brain, thought, intestines, stomach, liver, kidneys, heart, blood vessels, bone marrow and the nervous system etc) via food, respiration, ingestion, skin, drinking water and air causes invalidating diseases through their toxic behavioral mobility and emissions. Though some of them are essential for animals, plants and several other organisms which can enter into biogeochemical cycle via drainage, atmosphere (dust and gases), soil erosion and all human activities (use of consumer products) by different ways, leading to serious problems and ill-effects on different organs were known for a long time.

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