International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

"An Analytical study on the Fish and Animals dangerous to due substantial Metals"

Dhruv Kishor Vishwakarma[1], Dr. Vijaysinh Uttamrao Sable[2]

[1]Research scholar, Department of Pharmacology, Sunrise university Alwar, Rajasthan, India
[2]Assistant Professor, Department of Pharmacology, Sunrise university Alwar, Rajasthan, India

Abstract

Pb, Hg, Cd, Cr, Cu, Zn, Mn, Ni, Ag, etc. are the main heavy metals. As, Cd, Pb, Hg, and other heavy metals are thought to be the most harmful to humans, animals, fish, and the environment. Heavy metal concentrations that are too high are harmful. They produce bioaccumulation in organisms, harmful effects on biota, and even death in the majority of living things, all of which disrupt ecosystems. All heavy metals have deleterious effects on living organisms through metabolic interference and mutagenesis, despite the fact that some of them are required micronutrients. The body and food chain are both potential sites for hazardous metal bioaccumulation. Thus, persistent toxicity is a characteristic of hazardous metals. Pb and Hg are two examples of the heavy metals that have harmful consequences. Because they are concentrated in mineral organic compounds and cannot be removed from aquatic systems naturally, like organic contaminants, heavy metals are significant pollutants for fish. Fishes exhibit different levels of heavy metals based on their age, stage of development, and other physiological parameters. Fish are one animal species that can be severely impacted by these hazardous contaminants. On several organs, heavy metals can have harmful effects. They can get into water through drainage, the atmosphere, soil erosion, and various human activities. As the concentration of heavy metals increases in the environment, they enter the biogeochemical cycle and become harmful.

Keyword: - Heavy metals, Metabolic, Hazardous, Environment.

Introduction

Heavy metals include substances like arsenic (As), lead (Pb), mercury (Hg), cadmium (Cd), chromium (Cr), thallium (Tl), etc. that are relatively dense and hazardous in small amounts. Certain "trace elements," such as copper (Cu), selenium (Se), and zinc, are also known as heavy metals (Zn). Although they are necessary to keep the body's metabolism running smoothly, greater doses make them poisonous. Food, water, and air all have a tiny amount of potential for introducing heavy metals into our bodies1. Pb, Hg, Cd, Cr, Cu, Zn, manganese (Mn), nickel (Ni), silver (Ag), and other heavy metals are the main ones that environmental science is concerned with. 2. In addition, heavy metals are metallic elements with a relatively high density and are toxic even in small amounts. The overabundance of heavy metals is harmful because they cause ecosystems to become unstable due to bioaccumulation in organisms, have toxic effects on biota, and can even cause death in most living things.

Certain heavy metals develop hazardous soluble molecules as a result, making them poisonous. However, other metals have no biological function or are not required by the body, and they only turn deadly when they take certain forms. Nonetheless, exposure to Pb in any amount might have negative effects. The so-called "lighter metals," like beryllium, can occasionally be poisonous as well. Iron (Fe), for example, is one of many "necessary elements" that may potentially be poisonous. Sometimes, hazardous metals can alter the way that vital components work, causing toxicity by interfering with the metabolic process. Thus, the majority of heavy metals are harmful, but others, like bismuth, are less hazardous (Bi). As and polonium, two metallicoids, might also be poisonous. Moreover, radioactive elements can cause toxicities that are both chemical and radiological. The same is true for metals with anomalous oxidation phases; for instance, Cr (III) is a necessary trace element, whereas Cr (VI) has a carcinogenic effect4. All heavy metals have deleterious effects on living organisms through metabolic interference and mutagenesis, despite the fact that some of them are required micronutrients. Heavy metal toxicity can cause loss of fitness, problems during reproduction that can result in cancer, and ultimately death2. Both insoluble compounds and heavy metals in their metallic forms are said to normally have no harmful effects. Any metal's legends could play a key role in what makes something poisonous. For instance, methyl Hg and tetraethyl Pb are two examples of very hazardous organ metallic forms, whereas cobaltocenium cation is one of the less harmful organ metallic derivatives. The body and food chain are both potential sites for hazardous metal bioaccumulation. Thus, persistent toxicity is a characteristic of hazardous metals. For instance, radioactive heavy metals like radium can mimic calcium (Ca) to be incorporated into bones, but Pb or Hg can potentially provide similar health risks. The kidneys can swiftly excrete barium (Ba) and aluminum (Al), which makes them exceptions.

The environment has been harmed by industrialization's increasing use of concentrations of various metals. Heavy metals like Pb and Hg are extremely harmful, as demonstrated by some historical instances, such as the Hg poisoning of Japanese waterways. The Minamata sickness and Hg toxicity (by methyl Hg) both showed severe neurotoxicity akin to the "Hunter Russell syndrome." In addition to the direct toxicity of heavy metals, it is important to take note of the marked decline in foetal growth and the long-term repercussions. Studies in many animal species are a major source of data for fundamental research. Beyond their toxic thresholds, many heavy metals, including those that are necessary, are poisonous. The body often absorbs heavy metals through the skin, ingestion, and respiration.

The expanding population as well as the earth’s ecology is now at risk due to pollution, which has turned into a significant concern. Rapid industrialization and urbanization have increased the amount of pollutants such radionuclides, radioactive materials, and different kinds of organic and inorganic materials that are released into the environment. Hence, the primary source of metal pollution for aquatic creatures is industrial waste. According to some sources, heavy metals are the main environmental contaminants. Because they are concentrated in mineral organic compounds and cannot be removed from aquatic systems naturally, like organic contaminants, heavy metals are significant pollutants for fish. Through the smelting process, effluents, sewage, and leaching of waste, metal pollutants are intermingled in the aquatic system, severely harming it. The tanning business has increased the amount of contaminants in the water. Because they also have endocrine disruption effects, tannery waste waters continue to have harmful impacts on aquatic creatures. The tanners utilize a lot of chemicals in their processes, which releases harmful compounds into the waterways. The result is a degradation of the agricultural fields as well. The health concerns too many creatures have increased as a result of the uncontrolled release of tannery effluents.

Nutrient contamination from the toxic algae, such as nitrogen, phosphates, and other elements, may cause the death of aquatic species. Chemical contamination has the potential to reduce frog biodiversity and tadpole abundance. The development of marine species can be negatively impacted by oil pollution (as chemical contamination). Both the reproduction and disease susceptibility are impacted. Moreover, it may irritate the gastrointestinal tract and harm the liver, kidneys, and neurological system. The high concentration of sodium chloride (NaCl) in waters may potentially be a contributing factor in aquatic animal deaths. The byproducts from the manufacturing, farming, city septic systems, building, auto shops, labs, hospitals, and other businesses are extremely poisonous. These leftovers, which might include chemicals, heavy metals, radiation, pathogens, and other harmful things, can be in many forms, such as liquid, solid, or sludge. Batteries, old computers, unused paint, and pesticides are examples of goods that can release pollutants. These wastes are harmful to people, animals, and plants if they are buried in the ground or found in stream runoff, groundwater used for drinking water, or flooding. When people or animals eat fish, they may become poisoned because of the hazardous metals like Hg that accumulate in the aquatic system. According to the USA's "Environmental Protection Agency" (EPA),

The handling and disposal of the dangerous materials must be done safely. The heavy metals are more frequently incorporated into fertilizers. Unfortunately, some plants absorb dangerous levels of these metals, which are then consumed by humans and have harmful negative consequences on children.

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

Moreover, it is said that heavy metals are the most significant hazardous contaminants for aquatic life. Although very harmful to humans, As, Cd, Pb, and Hg can be tolerated at very low concentrations Although Sn is frequently used as a canning additive, its toxicity is not as great as that of other heavy metals. The presence of metals in different fish species depends on the age and physiological development of the fish. The largest single source of As and Hg for humans is fish. The aquatic systems can be severely contaminated by the heavy metals emitted through domestic, industrial, and other man-made activities. The ecological balance and variety of aquatic animals can be significantly impacted by such contaminations. Fish are frequently used to assess the health of aquatic systems since contaminants in the food chain harm and kill aquatic animals. Thus, one of the main health issues for those who consume seafood is the problem of metal pollution. Cellular level damage has been seen as a result of metal pollution, which may have an impact on the ecological equilibrium. All biological tissues, as well as air, water, and soil, contain the as often. It can be found in great abundance at position 20, in seawater at position 14, and in the human body at position 12. It is a known carcinogen that kills foetuses and causes deformities in a variety of mammal species. Insecticides, herbicides, fungicides, algaecides, wood preservatives, and growth promoters for plants and animals are just a few of the agricultural goods that utilize the majority of as compounds in their manufacturing. Arsenic poisoning is brought on by the atmospheric emissions from smelters, coal-fired power plants, and arsenical herbicide sprays; tainted water from mine tailings, smelter wastes, and natural mineralization; and nutrition, particularly from eating marine biota. In general, trivalent As (arsenites, As+3) is more hazardous than pentavalent As (arsenates, As+5), and inorganic As compounds are more toxic than organic molecules. Inorganic arsenical poisoning has been linked to human cancers of the skin, lung, liver, lymph, nasal passage, kidney, bladder, prostate, and hematopoietic systems. Workers at smelters and those who produce and use arsenical insecticides are particularly at risk for cancer caused by As.

Heavy Metals' Effects on the Environment and Human Health

When heavy metals are taken up and stored in living things more quickly than they are broken down (metabolized) or eliminated, they build up in those things. They enter the water system by waste products from industry and commerce, or even through acid rain that decomposes soil and releases heavy metals into streams, lakes, rivers, and groundwater. Pb, Hg, and Cd1 have been listed as the three heavy metals with the most environmental impact, however other heavy metals can also have a negative impact on the ecosystem. Heavy metal toxicity has reportedly been brought on by a variety of factors, including food chain contamination, high ambient air concentrations close to emission sources, and drinking water pollution (Pb pipes). Given their propensity for bioaccumulation, heavy metals are toxic. Comparing the level of a chemical or toxin in a biological creature over time to the level in the environment is known as "bioaccumulation"1,3. It is crucial to note that many zoos that were formerly found on the outskirts of cities and towns are now surrounded by human activity, including industries and automotive traffic. All of these activities have the potential to produce heavy metal contamination, which could be harmful to the health and welfare of the wild animals kept in these protected areas3. This is a description of the threats to the environment and human health posed by several heavy metal pollutants:

Health and Environmental Hazards from Lead:

Depending on the amount and length of Pb exposure, there might be a variety of impacts. Infants and developing foetuses are more sensitive than adults. The majority of Pb is typically consumed through food, but other sources, such as water in places with Pb pipelines and plumbing solvent water, air close to point of source emissions, soil, dust, and paint flakes in old houses or polluted land, may be more significant. Pb levels in the air are transferred to food by the deposition of metal-containing dust and rain on crops and soil. Batteries, gasoline additives, rolled and extruded goods, alloys, pigments and compounds, wire sheathing, shot, and ammunition are the eight main categories of Pb consumption. Pb in the environment originates from both natural and man-made sources. Drinking water, food, the air, the soil, and dust from old paint are all potential sources of Pb exposure. Pb is one of the non-ferrous metals that is recycled the most, therefore its secondary production has increased gradually. High Pb concentrations may induce harmful consequences in people, which in turn complicate the synthesis of acute or long-term neurological system injury, haemoglobin (Hb), impacts on the kidneys, gastrointestinal tract (GIT), joints, and reproductive system.

Mercury poses environmental and health risks because it is not a component of living things in their normal state. It is poisonous and has no recognized role in physiology or biochemistry. Its chemical and physical features are intricate and uncommon. The main natural sources of Hg include volcanism, evaporation from natural bodies of water, and crustal degassing. Metal mining on a global scale results in indirect atmospheric discharges. Hg is frequently utilized in industrial processes and in a variety of products (e.g., batteries, lamps and thermometers). In the pharmaceutical business and in dentistry, it is utilized as an amalgam for fillings. The majority of the Hg is present as a gaseous element, which is a relatively inert state. The methylated forms of mercury are concentrated in living things, particularly fish, and bioaccumulate by a factor of a million. Both monomethyl and dimethyl mercury are extremely poisonous and can lead to neurotoxicological problems. Inorganic Hg poisoning in humans is linked to prenatal malformations, spontaneous miscarriage, gingivitis, and/or mild psychiatric abnormalities. While exposures during foetal and postnatal development have been linked to abortion, congenital malformations, and alterations in young children's development, monomethyl hg harms the brain and CNS.

Cadmium Environmental and Health Risks:

The toxicological characteristics of Cd are derived from its chemical resemblance to Zn (an essential micronutrient for plants, animals and humans). The Cd that was once absorbed by an organism remains there for a long time (decades in the case of humans), but it is finally expelled. It is created as a necessary by-product of the Zn (or occasionally Pb) refining process because these metals are present in the raw ore naturally. However after being collected, the CD may be recycled very easily. In rechargeable or secondary power sources with high output, long life, low maintenance, and great tolerance to physical and electrical stress, the Cd is primarily employed in Ni/Cd batteries. In high stress situations like maritime and aerospace applications where great safety or reliability are required, coatings made of cadmium offer good corrosion resistance; nevertheless, if damaged, the coating will erode more quickly. Moreover, it is utilized as a pigment, PVC stabilizer, in alloys, and electrical compounds. It can be found as an impurity in a variety of goods, such as detergents, refined petroleum products, and phosphate fertilizers. Humans receive 0.15 g of Cd from air and 1 g of Cd from water on average per day. If exposed to Cd for a prolonged period of time, kidney damage may result. Due to its high exposure, it may result in lung cancer and obstructive pulmonary illness. Both people and animals have been observed to develop bone abnormalities (osteomalacia, osteoporosis). Moreover, it might lead to cardiac dysfunction and elevated blood pressure in animals.

Selenium poses environmental and health risks.

Although humans and other animals require a limited amount of selenium, excessive doses can harm the nervous system and result in weariness and irritation. As it builds up in living tissue and has significant concentrations in fish and other animals, chronic overexposure to it can have a serious negative impact on human health. Loss of hair and fingernails, harm to the kidney and liver, damage to the circulatory system, and more serious harm to the neurological system are all possible side effects.

Antimony (Sb) uses include antimony trioxide, which poses environmental and health risks (a flame retardant). Batteries, colours, ceramics, and glass all contain it. A brief, high-exposure exposure might result in nausea, vomiting, and diarrhoea. Long-term Sb exposure can result in cancer in people.

Chromium's Environmental and Health Risks:

In metal alloys and pigments for paints, cement, paper, rubber, and other materials, the Cr has reportedly been employed. Low levels of Cr can irritate the skin and cause ulcers. Chronic exposure to it can harm the liver and kidneys. The Cr can also harm nerve and circulatory system tissues. It typically accumulates in aquatic animals and can poison fish that are consumed.

Most Dangerous Heavy Metals

In collaboration with the U.S. "Environmental Protection Agency" (EPA), the "Agency for Toxic Substances and Disease Registry" (ATSDR) in Atlanta, Georgia (a division of the U.S. Department of Health and Human Services) reported that As, Pb, and Hg are at the first, second, and third positions, respectively, in a "Priority List for 2001" called the "Top 20 Hazardous Substances," while Cd is at the seventh spot. As a result, As, Cd, Pb, and Hg are considered the "elements/heavy metals" that are the most harmful to humans, animals, and the environment. Table 11–9 lists the negative effects/toxicities connected to these four heavy metals. Similar to this, table-29 describes the upper limits (maximum daily dose or exposure) of several elements/heavy metals for both humans and animals.

Table-1

Arsenic, lead, mercury, and cadmium's negative effects and toxins

Heavy Metal	Detrimental Effects/Toxicities
Arsenic (As)	Inorganic As that is water soluble is easily absorbed from the digestive system. Very hazardous forms of As are inorganic. It disrupts the epidermis, irritates the stomach and gut, and reduces the production of RBCs and WBCs. Infertility, abnormalities of the skin, lowered infection resistance, abnormalities of the heart, brain damage, and death can all result from extremely high amounts of inorganic As. As has an acute LD50 (oral) of 10-300 mg/kg.
Lead (Pb)	Both ingesting it and breathing it in allow it to enter the body. To impose a restriction on elemental contaminants, the maximum permitted amounts may be 5 g/L (in bottled water). It can affect the brain or nervous system, anaemia, excessive blood pressure, the kidneys, the reproductive system, and the production of hemoglobin.
Mercury (Hg)	Its environmental predominance may cause a biomagnifications in the food chain. Due to its ease of absorption into the human system, organic Hg, like methyl Hg, is more hazardous than inorganic Hg. Kidney

	damage, nervous system dysfunction, brain damage, DNA and chromosomal damage, allergic reactions, sperm damage, birth deformities, and miscarriages are just a few of the adverse effects of mercury. In tiny animals, the LD50 for mercury is as low as 1 mg/kg.
Cadmium (Cd)	The lungs are more capable of absorbing cadmium than the digestive system. It can harm the immune system, Brain, and kidneys. Moreover, it can lead to reproductive issues and bone fractures. It may result in vomiting, diarrhoea, and stomachaches. Cd's LD50 (oral) in animals is between 63 and 1125 mg/kg.

The buildup and effects of heavy metals

Any substance that, when absorbed into the body, has negative or harmful effects is considered a "poison." It has been reported that a number of metals and their derivatives are hazardous to animals. The most dangerous heavy metals are reportedly As, Cu, Pb, Hg, and Cd. According to popular belief, many hazardous metals harm animals by upsetting their enzyme systems. Several of them compete with other chemicals required for cell upkeep and sustained operation because they attach to certain proteins and enzymes required for cellular activity. As a result, the toxins may potentially cause mineral shortages. Moreover, a number of harmful substances tend to contribute to the creation of the deadly superoxide (O2-), a paramagnetic anion that is thought to be mostly responsible for spontaneous cell death.

Aquaculture is also linked to the severe toxicity and bioaccumulation of certain heavy metals. Such aquacultures will result in a decline in fish quality, which will have a negative impact on the health of the fish-eating populace. In comparison to water, lipids have a thousand times higher solubility for methyl mercury. This methyl mercury is concentrated in the brain, central nervous system, and muscular tissues (CNS). Fish can have mercury concentrations that are 10,000–100,000 times higher than the initial levels seen in the nearby waterways. Hg accumulates quickly, but it purifies slowly. Less polluted shrimps depurate mercury slowly, whereas polluted oysters do so more quickly. Fish also exhibit substantially slower Hg purification. In fish, the methyl Hg has a halflife of roughly 2 years. Yet, such Hg contamination does not have a substantial impact on the overall population's health. Se levels for saltwater fish ranged from 0.37 to 70.01 ppm, whereas Hg levels ranged from 0.35 to 70.02 ppm on average. The levels of Hg in bluefish are more than enough to cause harmful consequences in mammals and birds that consume fish. According to reports, the typical amounts in fish larger than 50 cm fork length are higher than 0.3 ppm. This advises that those who are sensitive, such as pregnant women, children, and others, shouldn't consume such contaminated seafood. It follows that the only significant dietary source of methyl Hg for humans is fish eating. The population that consumes fish on a daily basis may be more impacted by high doses of methyl mercury and other organic contaminants over an extended period of time. High-end fish eaters are similarly significantly exposed to Hg.

In several organs, the heavy metals may have harmful consequences. They can get into water through drainage, the atmosphere, soil erosion, and various human activities. These substances enter the biogeochemical cycle as the concentration of heavy metals in the environment rises. Several pathways allow heavy metals to enter fish bodies from contaminated water and accumulate in organisms. The organs of fish can have varying concentrations of these elements. Cu and Zn concentrations above recommended levels have been found in sediments close to aquaculture operations. These substances might be fatal to aquatic life and endure in sediments. The heavy metals enter the body by breathing, cutaneous absorption, and intestine absorption. While organ metallic forms of heavy metals are lipophillic and can quickly enter through membranes and even breach the blood-brain barrier, elemental forms of heavy metals are not entirely absorbed (BBB, the defense system of nervous system). After being absorbed into the body, heavy metals can be found in a variety of organs, including glands and the central nervous system (CNS). Certain heavy metals are referred to as "bone seekers," and they accumulate in the skeletal and dental systems. The heavy metals subsequently damage the enzyme system, increase the formation of "free radicals," and compete with the necessary components that form metallo-enzyme complexes to block the absorption of nutritional minerals. In general, all heavy metals poison cells. After competing with the nutritional minerals, they make the body unable to use them, which cause illness. For instance, the Al replaces the Ca in a hair analysis sample, making the latter unavailable for the development of bones, teeth, and muscles (including heart muscle). As a result, these bodily structures deteriorate. Osteoporosis, heart disease, dental caries, periodontal disease, muscle cramps, and colic can all be caused by a reduction in the concentration of calcium. Zn, P (phosphorous), Mn, Fe, and Mg concentrations are decreasing, among other anomalies (magnesium). Zn and Cu are increased by Al (having a double whammy) to secondary hazardous levels.

Some Heavy Metal Studies Toxicity in Fish and Animals

Heavy metal contamination of both humans and animals has been noticed on a daily basis. Every day, we and animals are poisoned by heavy metals like mercury and light metals like aluminum that are found in foods, vaccines, and environmental pollution of the air and water. In our nation, the usage of leaded fuel in automobiles causes the heavy metals to be trapped in the long bones of food animals. There are more13 than just the Pb and Cd. Domestic animals may become hazardous to heavy metals (from contaminated drinking water, for example) by exposure to high ambient air concentrations close to emission sources or through ingestion of contaminated food. Some metals are poisonous because they eventually bioaccumulation in living things. The way that each heavy metal manifests its toxicity varies depending on the amount and length of exposure, the species, the gender, and environmental and dietary factors. Between a brief high-level exposure and a prolonged low-level exposure, there are significant variations. Both the inherent abundance of metals in the earth's crust and human activity are to blame for the environmental degradation caused by heavy metals. Heavy metal pollutants can have deleterious consequences on the body over time, including mutagen city, carcinogenicity, teratogenicity, immunosuppressant, poor health, and impaired reproduction. Animals, both domestic and wild, are employed to evaluate environmental quality and serve as crucial sentinels for overall toxicological risk assessment. Particularly, pets (dogs and cats) who have shared a habitat with people for a long time are necessarily exposed to the same environmental hazards pollutants. There is limited data on domestic animal exposure to contaminants, despite the fact that numerous trials have been conducted to evaluate the exposure of heavy metals in wild animals. The Pb and Cd residues were found in three different species of animals (dairy cow, growing pigs, and laying hens), however they were not significantly raised in the primary food products obtained from the long-term exposed animals with subtoxic dietary amounts of these metals. Although Pb also accumulates in bone, both of these heavy metals are deposited in the liver and kidney. Moderate liver and kidney consumption from Pb-exposed animals had no or no negative health effects. Nonetheless, it's best to avoid eating these organs from animals that have been exposed to Cd.

Through the use of inductively coupled plasma spectroscopy of hair and bone, cellular and surface ultra structural features of skin and hair, and behavioral studies on toxicity, it was possible to identify the toxicity of some heavy metals (such as Pb, Hg, and Se) and the absence of some crucial trace elements (such as Cr) in some wild species from north-east India. Significant amounts of the elemental levels indicating their toxicity or inadequacy were discovered. Studies using electron microscopes on the cellular and ultra structural composition of skin and hair showed some elements' particular harmful and deficient effects. The behavioral investigations revealed a number of signs connected to certain elemental problems, including loss of appetite, constipation, salivation, photophobia, a propensity to circle, etc. By examining soil and water samples collected from the animals' home ranges and by examining the behavior of the animals with regard to mobility, migration, and the order of their movements, it was feasible to determine the potential sources of toxicity and elemental deficiency.

Every regime's fish diversity is very important for evaluating that zone with regard to the environment and pollution, as well as for providing the information needed for fisheries. Many fish could also serve as bioindicators of environmental pollutants. In order to preserve the fish diversity in various rivers, there is now a pressing need to use logical fishing techniques and modern technologies. Fishery policies should include management practices targeted at conserving freshwater fish. To ensure the in situ conservation of indigenous fish species that are endangered or severely endangered, bloodstock maintenance centers and hatcheries should be established. Yet, as fish are frequently affected by environmental pollutants such heavy metals, protecting the fish from these pollutants is crucial for the conservation of fish diversity. Diverse researchers have carried out a number of investigations in this area. The heavy metals, such as As, Cd, Cu, Cr, Fe, Pb, Mn, Hg, Ni, Zn, and tin (Sn), are significant contaminants that have a severe harmful effect on fish. According to studies done on many fish, heavy metals can change how tissues and blood Carpio work biochemically and physiologically. Beryllium and its compounds, crystalline forms of silica, organic and inorganic as compounds, Cd and Ni compounds, and inorganic and organic as compounds have all been implicated as chemical carcinogens that cause fish cancer

While research on the spotted

When the high concentration (2 mM) of sodium arsenite (NaAsO) affected snakehead fish (Channa punctatus, Bloch), it was reported that these fishes died within 2.5 hours. Chromosome DNA of liver cells was broken, suggesting that NaAsO may have caused apoptosis, which led to the death of those cells. Health risks from the contaminated marine species utilised as sea food include neurological and reproductive issues in both humans and animals. Aquatic creatures may become poisonous from the chemicals found in industrial effluents and products from ships and boats, such as heavy metals. For aquatic ecotoxicology, petroleum products are the most important contaminants. In experimental animals, crude oil and its compounds can also produce a variety of harmful symptoms. The petroleum hydrocarbons may serve as a catalyst for the production of free radicals in fish. The research also showed that heavy metals are one of many contaminants that cause coastal contamination.

There have been reports of fish illness epidemics being brought on by nutrient contamination. Hg-tainted water can make fish behave abnormally, grow and mature more slowly, reproduce less, and even die. Fish illnesses, malformations, and fatalities can all be attributed to persistent organic pollutants6. The body's cells are unable to transfer glucose due to the high hazardous levels of Hg (greater than 0.05 ppm in a male weighing roughly 180 pounds), which lowers the amount of energy available to the body. In animals, this can result in convulsions, anorexia, tremors, swollen gums, and behavioral issues8. According to a case study, 300 ppm of mercury killed a human victim. The fish's skin displayed the Term "burn." According to estimates, moms who eat swordfish, shark, and tuna seafood will cause methyl Hg toxicity in pregnancy in over 60,000 fetuses.

The tannery effluent contains the Cr, which is known to have a number of negative impacts. These health risks depend on the degree of Cr oxidation. More poisonous than the trivalent form is the hexavalent version. Freshwater fish, Labeo rohita, were exposed to sublethal concentrations of Cr (1/10th of LC50/96 hr) and the resulting haematological changes were seen after 7 and 30 days, respectively. The drop in haematological indicators revealed that Cr exposure caused the exposed fishes to become anaemic.

In a study, the faeces of caged zoo mammals were examined as a bioindicator of heavy metal contamination. Cd levels in mammals in the zoo in Bikaner, Rajasthan, ranged from 2.460.08 (Axis axis) to 0.410.03 (Macaca mulatta) ppm. The ranges for Cr, Cu, and Zn were respectively 91.682.28 (Oryctolagus cuniculus) and 1.360.36 (M. mulatta), 22.822.18 (Panthera pardus) and 6.150.45 (Boselaphus tragocamelus), and 35.61.35 (Canis aureus) and 8.150.45 (B. tragocamelus) ppm. Analysis of the feed, water, and dirt in cages that were exposed to particle air pollutants revealed that the air pollution was the main reason for the elevated amounts of these heavy metals due to the area's substantial traffic density

Conclusion

The most dangerous heavy metals for all humans, animals, fish, and the environment are As, Cd, Pb, and Hg. Heavy metal poisoning is caused by high amounts in the environment. Even though some heavy metals are necessary for animals, plants, and several other species, all heavy metals cause metabolic disruption and mutagenesis, which are two ways in which they manifest their hazardous effects. All people are severely toxicated by Pb and Hg. Fish are not an exception and may also be heavily metal-polluted, which can cause major issues and negative impacts. In several organs, the heavy metals may have harmful consequences. They can get into water through drainage, the atmosphere, soil erosion, and various human activities. Increasing levels of heavy metals in the environment cause these substances to enter the biogeochemical cycle, which makes animals hazardous, including fish.

Reference

1. Heavy Metals by Lenntech B.V., online at www.lenntech.co/periodic.periodic-chart.htm (2012)
2. Gupta V., "Mammalian Feces as Bio-Indicator of Heavy Metal Pollution in Bikaner Zoological Park, Rajasthan, India," Res (2013)
3. Effect of Tannery Effluent, Chromium on Hematological Parameters in a Fresh Water Fish, Labeo Rohita (Hamilton), Res. J. Animal, Veterinary and Fisheries Sci., 1(6), 1–5.
4. Animal Reactions to Water Pollution, accessible via the Google website (2013)
5. Fish Cancer by Environmental Pollutants, 1st Edn., Narendra Publishing House, Delhi, India, Pandey Govind, Madhuri S., and Shrivastav A.B. (2014)
6. Davis University of California, Case Study: Elemental Toxicity in Animals, UC Davis ChemWiki, University of California, accessible at www.google.com (2010)
7. Elemental Impurities, Pharmacopeial Forum, 36(1), accessed from Google.com (2010)
8. Canine Toxicovigilance, accessible at the Google website (2013)
9. Dodd G., Chronic Heavy Metal Poisoning: A Quiet Killer for Pets, www.Region.nethome/HolisticVetPetCare.com (2013)

10. Eck P. and Wilson L., Toxic Metal in Human Health and Disease, Phoenix, AZ: Eck Institute of Applied Nutrition and Bioenergetics Ltd. (1989)
11. Metal Poisoning by Jordan P. Hall D. Small Business Innovations, www.sbinnovations.com (2013)
12. Variety of Fish Fauna from Downstream Zone of River Mahisagar, Gujarat State, India, Res. J. Animal, Veterinary and Fisheries Sci., 1(3), 14–15. 15. Gohil M.N. and Mankodi P.C. (2013).