For years people felt that they could keep their bodies free of dangerous chemicals by taking simple precautions like, eating organic & fresh food and by using natural cleansers like tulsi, neem, etc. However, today we know that they are wrong. Whenever tests are conducted to check for chemicals in people, plenty of chemicals are always detected. It does not matter whether they are old or young, newly born or even fetal, nor what their history is, chemicals are always found and pollution of our bodies is a universal fact.

Where do these chemicals come from? Today, chemicals are used in a seemingly endless array of industrial applications, agricultural practices and consumer products, including baby toys, air fresheners, detergents, clothes, furniture, etc. and last but not the least, as drugs/pharmaceuticals, commonly known as medicines.

And how do they get into our bodies? Through our food, tap & bottled water, indoor & outdoor air and many of the things we touch or put on our skin.

Over the past few years a lot of concern has been expressed over the presence of contaminants like pesticides, arsenic, fluoride and other chemicals in drinking water. To the list has been added the latest concern – the widespread presence of pharmaceuticals in drinking water.

The topic first gained notice in Europe in the early 1990s when scientists first found a cholesterol-lowering drug in groundwater. Pharmaceuticals include chemicals like medicines, cosmetics, personal care products, as well as antibiotics and growth hormones used for animals. According to a WHO report, pharmaceuticals have been detected and confirmed in all components of the water cycle in Europe and have been raised as a concern by organizations such as the Rhine Water Works and wastewater treatment companies.

This information is not new to scientists in the field of water. Research conducted in many parts of the USA also point to a similar situation and a broad range of chemicals is found in surface waters especially downstream of urban areas. As per CBS News, pharmaceuticals have been detected in lakes, rivers, reservoirs and streams throughout the world. Studies have detected pharmaceuticals in waters throughout Asia, Australia, Canada and Europe – even in Swiss lakes and the North Sea.

Scientists are becoming increasingly concerned over the presence of prescription and over-the-counter drugs in water and their potential health impacts. It is now known that we are exposed to other people’s drugs through our drinking water. The concern is also that people are ingesting mixtures of more than one drug (that were never meant to be taken) together, which makes matters even worse by causing drug interactions and side effects.

How do drugs get into the water? People take medicines and their bodies do not absorb all the medication, as about 90% of oral drugs pass through humans unchanged and get flushed down the pots. Animals also take medicines. Pets are treated for all types of illnesses and cattle are given hormones. Cattle are also given ear implants that provide a slow release of trenbolone, an anabolic steroid used by some bodybuilders, which causes cattle to bulk up, but not all the trenbolone is metabolized.

Other veterinary drugs also play a role. Pets are now treated for arthritis, cancer, heart disease, diabetes, allergies, dementia, and even obesity – sometimes with the same drugs as humans. The unabsorbed quantities get passed through.

Thus, many of these drugs enter the environment through human and animal waste. Moreover, when cleaning our medicine box, what do we do with the expired medicines or the medicines that we no longer need? We either flush them down into the sewer or toss them into the dustbin. Gone and Forgotten!

Forgotten yes, but not really gone as these ultimately end up in the domestic wastewater or garbage of the city. Although this is a very convenient action, it results in the contamination of the water resources and thereby our drinking water supplies. Other sources include indiscriminate disposal practices by pharmaceutical industries, hospitals and medical facilities.

It is well known that most of the cities do not have Sewage Treatment Plants and even if present, the water treatment facilities are not designed for the removal of the pharmaceutical residues. Moreover, much of the contamination of water is from non-point sources, like surface runoffs, seepage through soils, etc. The control of which is not being practiced.

Treated/untreated wastewater and surface runoffs carrying the excreted pharmaceuticals reach the rivers, reservoirs and other water bodies from where the water goes back to the water supply systems and is brought back to the consumers. Some drugs, including widely used cholesterol fighters, tranquilisers, etc, resist drinking water and waste water treatment processes.

As of today, there are no Sewage Treatment or Drinking Water Treatment...
The fact remains that pharmaceuticals are meant to be prescribed to people who need them and not to be delivered to everyone in their drinking water.

Plants specifically designed to remove pharmaceuticals in drinking water. Evidence has also shown that chlorine dosing to disinfect water can actually make some compounds more harmful.

The concentration of most of these chemicals measured in surface waters and ground water can be very low, in parts per trillion and therefore far below the recommended prescription dosage. However, evidence is mounting that these pharmaceuticals are entering the food chain and reaching the humans. At this time little is known about the effects of pharmaceuticals in drinking water and their presence does not necessarily mean it is harmful to humans. The fact remains that pharmaceuticals are meant to be prescribed to people who need them and not to be delivered to everyone in their drinking water.

Research has shown that small amounts of medications have had adverse effects on human cells and contaminated waters have damaged wildlife, especially fish. There’s growing concern in the scientific community, meanwhile, that certain drugs or combinations of drugs may harm humans over decades because water, unlike most specific foods, is consumed in sizable amounts every day. No one knows what long-term effects can happen due to years of exposure to these drugs. However, some experts say medications may pose a unique danger because, unlike most pollutants, they were crafted to act on the human body.

“These are chemicals that are designed to have very specific effects at very low concentrations. That’s what pharmaceuticals do. So when they get out to the environment, it should not be a shock to people that they have effects,” says zoologist John Sumpter at Brunel University in London, who has studied trace shock to people that they have effects,”

Antibiotics in the environment raise a potential concern because disease-causing bacteria exposed to low levels of antibiotics over extended periods of time may lead to resistant strains that cannot be treated easily. Scientists are also concerned that exposure to a combination of these chemicals and pharmaceuticals may disrupt human hormone systems, may cause lower sperm counts, increased rate of cancers and increased incidence of hyperactivity.

Cattle, for example, are given ear implants that provide a slow release of trenbolone, an anabolic steroid used by some bodybuilders, which causes cattle to bulk up. But not all the trenbolone circulating in a steer is metabolized. A German study showed 10 percent of the steroid passed right through the animals.

Ask the pharmaceutical industry whether the contamination of water supplies is a problem, and officials will tell you no. "Based on what we now know, I would say we find there’s little or no risk from pharmaceuticals in the environment to human health," said microbiologist Thomas White, a consultant for the Pharmaceutical Research and Manufacturers of America.

But at a conference last summer, Mary Buzby, director of environmental technology for drug maker Merck & Co. Inc., said: "There’s no doubt about it, pharmaceuticals are being detected in the environment and there is genuine concern that these compounds, in the small concentrations that they’re at, could be causing impacts to human health or to aquatic organisms."

Water sampled downstream of a Nebraska feedlot had steroid levels four times as high as the water taken upstream. Male fathead minnows living in that downstream area had low testosterone levels and small heads.

Other veterinary drugs also play a role. Pets are now treated for arthritis, cancer, heart disease, diabetes, allergies, dementia, and even obesity – sometimes with the same drugs as humans.

There are no standards or monitoring requirements for pharmaceuticals in drinking water or treated wastewater. It is proposed to address this issue in the plan of work of the next rolling revision of WHO guidelines for Drinking Water Quality.

Prevention is always the best strategy for reducing contamination. Individuals can minimize overuse and misuse of pharmaceuticals and return unused medicines to chemists who in turn may send them to the respective manufacturer for proper disposal. Mass awareness may be created for not using the toilet or city sewer system as a disposal method for unused medicines or other chemical waste. The pharmaceutical industries also need to produce more environment friendly chemicals and increase point of use treatment.

Less than 2% of all water consumed is ingested by humans. However, with increase in population the total requirement of water for drinking purposes is constantly increasing. In areas where groundwater quality is not affected, disinfection may be sufficient, but where ground water is unfit or where surface water bodies are used for drinking water supplies, elaborate purification systems are required.

Point-of-use systems are most cost effective and environmentally friendly. Certified home filtering systems and water treatment systems can act as a final stage of contaminant removal and can further purify water for drinking. It is generally cost prohibitive for utilities to use systems such as nano-filtration, long contact activated carbon and ROs. Appropriate reverse osmosis units at the end point could be one solution.

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