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Human health risk due to exposure of Ciprofloxacin in drinking water samples of Yamuna River, India

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Abstract

Due to the increased consumption of antibiotics for human and veterinary purposes, antibiotic residues have been frequently detected in aquatic environments. It is believed that antibiotics reach aquatic water bodies through sewage. Sewage treatment plants (STPs) are not designed for the removal of antibiotics and as a result antibiotic residues have been detected in different water matrices including drinking water. Yamuna River is the largest tributary of the River Ganga and a major source of potable water to Delhi. The river is unfortunately the receiving water body for the untreated and partially treated sewage from the city. Only two percent of the total length of the river flows though the city, but it receives 79% of its total pollutant loading there, primarily through sewage and industrial discharges. Ciprofloxacin (CIP) is a fluoroquinolone antibiotic used to treat different types of bacterial infections, including respiratory infections, urinary tract infections, certain types of diarrhea etc. High concentration of CIP has been reported in the effluents of STPs, discharged into River Yamuna. Human health risk estimation of CIP for two sub-populations was carried out using the acceptable daily intake (ADIs) values considering the point of departure (POD) and uncertainty factors (UFs). Hazard quotient (HQ) was calculated as a ratio of environmental concentration and predicted no effect concentration, below which no adverse health effects are expected. Average HQs values of CIP in adult and children were found below 1, the acceptable limit, signifying no potential health risk for both the subgroups. The study will help regulatory agencies like central pollution control board in developing the effluent discharge standard limits of antibiotics including health risk guideline values. Appropriate and strict control measures should be taken by regulatory agencies to eradicate the spread of antibiotic pollution based on the results of health risks of antibiotics exposure.

Biography:

Minashree Kumari has her expertise in risk assessment of emerging contaminants including antibiotics in drinking water samples. She has evaluated the health risk of antibiotics in drinking water samples of River Yamuna, Delhi, India. This study will help the regulatory agencies in developing and implementing strict control measure to reduce the antibiotic pollution. Previously she has worked on disinfection by-products especially trihalomethanes (THMs) in drinking water in which she has monitored, analysed, modelled and assessed the risk for different sub-poulations.

Speaker Publications:

1. Kumari Minashree, Kumar A. (2020); "Human Health risk assessment of antibiotics in binary mixtures for finished drinking water"; Chemosphere/ 240, 124864. Impact Factor: 5.108.
2. Kumari Minashree & Gupta S.K. (2018); "Removal of aromatic and hydrophobic fractions of natural organic matter (NOM) by surfactant modified magnetic nanoadsorbents (MNPs)"; Environmental Science and Pollution Research/ 25(25):25565-25579. DOI: 10.1007/s11356-018-2611-0, (Impact factor: 2.91), June 2018. [Citation: 2]
3. Kumari Minashree & Gupta S.K. (2018); "Age dependent adjustment factor (ADAF) for the estimation of cancer risk through trihalomethanes (THMs) for different age groups- A innovative approach"; Ecotoxicology and Environmental Safety/ 148, 960-968. Elsevier, (Impact factor: 4.527). [Citation: 1]
4. Kumari Minashree, Gupta S.K, & Mishra, B.K. (2015); "Multi-exposure cancer and non-cancer risk assessment of trihalomethanes in drinking water supplies – A case study of Eastern region of India"; Ecotoxicology and Environmental Safety/ 113, 433–438. ISSN: 0147-6513. Elsevier, (Impact factor: 4.527). [Citation: 27]
5. Kumari Minashree & Gupta S.K. (2015); "Modelling of trihalomethanes in drinking water supplies – A case study of Eastern region of India"; Environmental Science and Pollution Research/ 22:12615–12623. ISSN: 0944-1344. Springer (Impact factor: 2.91). [Citation: 16]

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