

Spatial Distribution and Risk Assessment of Pharmaceuticals in Surface Water from the Sirsa River, India.

**DR. AROHI DIXIT, PHD¹, DR. BINOY SARKAR² AND DR.
SANTANU MUKHERJEE³**

¹Galgotias College of Engineering & Technology, GREATOR
NOIDA, INDIA

²University of South Australia.

³Shoolini University of Biotechnology and Management
Sciences, Solan, Himachal, India

Presenting Author: arohi.dixit@gmail.com

A huge production of pharmaceuticals and thus their release into the water bodies has increased their accumulation and the associated risks to the surroundings. In this study, four pharmaceutical compounds [ciprofloxacin (CIP), norfloxacin (NOR), cetrizine (CTZ) and escitalopram (ESC)] were studied for their distribution and health risks in the Sirsa river water of the Baddi Barotiwala Nalagarh (BBN) Industrial Development Area in Himachal Pradesh, India. A high-level ecological risk with risk quotient (RQ) >1 was observed for, algae from all the four compounds; *Daphnia* from CTZ; and fishes from CTZ and ESC. The overall risk to ecological receptors was high for CIP and CTZ. Health risk (RQ >1) were observed in samples collected from the river locations that were either receiving water from municipal drains, or situated near landfill and pharmaceutical factories. The highest average hazard quotient (HQ) value among the studied compounds for different age groups (0–6, 7–17 and >17) years was observed for ESC. High concentrations of the studied pharmaceuticals were observed in industrial zone of the region and CETP discharge area due to high discharge and high residual pharmaceuticals in this river. However, the calculated risk values solely could not confirm the status of water as safe or unsafe because the values of predicted no-effect concentration (PNEC) would depend on various other environmental factors. Hence, further investigation is needed to monitor the river water quality of the BBN region. Also, the high concentration of compounds at discharge locations warrants strict implementation of pollution control regulations.