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Toxicological assessment of Acetaminophen, Ibuprofen and Furosemide pharmaceuticals on aquatic organisms

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Acetaminophen, ibuprofen and furosemide effect are inside of 140 pharmaceutical products detected in water resources. The main route of entry to aquatic environments of these compounds is from municipal wastewater to concentrations under 3 µg/L. Recalcitrance to biodegradation in wastewater treatment plant and their chemical properties (solubility, coefficient octanol-water) favored the presence and potential toxicological effect on organisms of aquatic environments. Therefore, the aim of this work was to assessment of theses pharmaceutical products on freshwater organism *Daphnia magna* and *Selenastrum capricornutum*, as well as marine organisms such us *Artemia salina* and *Arbacia spatuligera*. The methodology was based on acute/chronic bioassays on *D. magna* (24-48 hours -LC_{50}, reproductive effects), *S. capricornutum* (72 hours-LC_{50}), *A. salina* (48 hours-LC_{50}) and *A. spatuligera* (reproductive effects). Pharmaceutical concentrations were tested in values from 1.0 to 260.0 mg/L for acetaminophen and ibuprofen, while concentrations from 1.0 to 64.0 mg/L for furosemide. Results demonstrate the acute toxicity from acetaminophen reached values between 0.26 mg/L for *S. capricornutum* and 21.40 mg/L *D. magna*. Furosemide showed acute toxicity of 37.01 mg/L for *A. salina* and 62.31 mg/L for *D. magna*. Finally, ibuprofen reached acute toxicity values under 0.01 mg/L and 78.11 mg/L for *S. capricornutum* and *D. magna* respectively. Chronic effects related with reproduction on *D. magna* showed values of media effective concentration (CE_{50}) of 15 mg/L for furosemide and 5 mg/L for ibuprofen. Therefore, toxicity effects on aquatic organisms of these pharmaceutical products depend on tropic level evaluated, being primary producers (*S. capricornutum*) more sensible than primary consumers (*D. magna*). Marine organisms (*A. salina*) are more resistant than freshwater organism (*D. magna*). Pharmaceutical products as acetaminophen, ibuprofen evidenced more toxicity than diuretics drug. Reproductive effects on *A. spatuligera* evidence that ibuprofen and acetaminophen (CE_{50}: 0.001 and 0.003 mg/L), respectively is more toxic that furosemide (CE_{50}: 0.36 mg/L).

Biography

Soledad Chamorro has her expertise in Toxicology Evaluation (lethal, sublethal, chronic and metabolic) trough bio-indicators and biomarkers as algae, microcrustacean and fish.

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