

STUDY ON THE OCCURRENCE OF ANTIBIOTIC CONTAMINATIONS IN THE AQUATIC ENVIRONMENT, SRI LANKA

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Antibiotics are among the emerging micro contaminants in aquatic environment due to their potential adverse effects on the ecosystem and possibly on human health. Four important antibiotic classes, sulfanomides [sulfadiazine (SDI), sulfamethoxazol (SMX)], penicillin [amoxicillin (AMX), ampicillin (AMP)], tetracycline [oxytetracycline (OTC), tetracycline (TC)] and macrolids [erythromycin (ERM)] which are commonly used in human and veterinary medicine, were studied in detail. Forty sampling sites were selected including hospitals, animal farms, aquaculture sites, veterinary clinics, tributaries, lakes, lagoons, national zoological garden and horton plains for the present study. Three samples of both water and sediment were collected in each location. Sample preparation was based on solid-phase extraction (SPE) and antibiotics were quantified using High Performance Liquid Chromatography (HPLC). Percentage of recoveries obtained for above mentioned antibiotics remained between 85% to 95%. The highest environmental contaminations of AMP (water: 0.019-0.546 ppm, sediments; 0.001-0.004 ppm), AMX (water: 0.0198-0.704 ppm, sediments; 0.001-0.010 ppm) and SMX (water: 0.001-0.034 ppm, sediments; 0.001-0.002 ppm) were detected in hospital effluents while the highest concentrations of OTC (water; 0.001- 0.231 ppm, sediments; 0.001-0.056 ppm), TC (water; 0.001-0.112 ppm, sediments; 0.001-0.067 ppm) and ERM (water; 0.001-0.324 ppm, Sediments; 0.002-0.004 ppm) were recorded in effluents collected from fish farms and shrimp hatcheries. Results of the present study also indicate that among the antibiotics few of them were detected in lower concentrations in Beira lake and river mouths. OTC (water; 0.001-0.021 ppm, sediments; 0.001-0.002 ppm), TC (water; 0.001-0.032 ppm), AMP (water; 0.002-0.010 ppm), AMX (water; 0.001-0.078 ppm) and ERM (water; 0.001-0.005 ppm, Sediments; 0.001-0.005 ppm) were detected in river mouth of Walawe river.. In Beira lake, AMP (water; 0.345 ppm), AMX (water; 0.101ppm), SMX (water; 0.001ppm) and ERM (water; 0.013ppm) were detected. The antibiotic concentrations recorded in most environmental samples have exceeded the maximum permissible level (< 0.001ppm-water and < 0.1ppm- sediments) recommended by World Health Organization. Therefore, results of the present study provide important information on environmental exposure of antibiotics, which can be incorporated into environmental risk assessments of the particular antibiotics in Sri Lanka.

Keywords: Amphicillin (AMP), Amoxicillin (AMX), Sulfadiazine(SDI), Sulfamethoxazole (SMX), Oxytetracycline (OTC), Tetracycline (TC), Solid Phase Extraction (SPE)