Selective serotonin reuptake inhibitors (SSRIs) are used as antidepressant medications, primarily in the treatment of clinical depression. They are among the pharmaceuticals most often prescribed in the industrialized countries. Selective serotonin reuptake inhibitors are compounds with an identical mechanism of action in mammals (inhibit reuptake of serotonin), and they have been found in different aqueous as well as biological samples collected in the environment. In the present study, we tested the toxicities of five SSRIs (citalopram, fluoxetine, fluoxamine, paroxetine, and sertraline) as single substances and of citalopram, fluoxetine, and sertraline in binary mixtures in two standardized bioassays. Test organisms were the freshwater algae Pseudo-kirchneriella subcapitata and the freshwater crustacean Daphnia magna. In algae, test median effect concentrations (EC50s) ranged from 0.027 to 1.6 mg/L, and in daphnids, test EC50s ranged from 0.92 to 20 mg/L, with sertraline being one of the most toxic compounds. The test design and statistical analysis of results from mixture tests were based on isobole analysis. It was demonstrated that the mixture toxicity of the SSRIs in the two bioassays is predictable by the model of concentration addition. Therefore, in risk assessment based on chemical analysis of environmental samples, it is important to include the effect of all SSRIs that are present at low concentrations, and the model of concentration addition may be used to predict the combined effect of the mixture of SSRIs.