ECOLOGICAL AND HUMAN HEALTH RISKS ASSESSMENTS DUE TO HEAVY METALS EXPOSURE BEFORE AND AFTER WASTEWATER TREATMENT USING WINERY WASTE

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A particularly current issue related to the quality of the environment is the presence of heavy metals, considering their persistence and the adverse effects generated on the environmental compartments (water, air, soil), on ecological receptors and implicitly on human health. Wastewater effluents contribute significantly to a variety of pollution problems. The release of raw and improperly treated wastewater into watercourses has both short-term and long-term effects on the environment and human health. The release of large amounts of heavy metals into water bodies can have several negative effects on the ecosystem and human health. The assessment of environmental and human health risks from heavy metal toxicity involves determining the likelihood of an adverse event, taking into account a certain level of exposure. In this context, the main objective of this study is to identify the ecological (Ecological Risk Assessment, ERA) and human health (Human Health Risk Assessment, HHRA) risks posed by lead water pollution, before and after its treatment using winery waste sorbents based on Merlot raw (MR), Merlot biorefined (ME), Sauvignon blanc raw (SbR) and Sauvignon blanc biorefined (SbE). For the ecological risk assessment, 3 ecological receptors were selected, *Mollusca* sp., *Calluna vulgaris* and *Sorex araneus*. The highest value of the hazard quotient (HQ) was obtained for the ecological receptor *Mollusca* sp. both before and after the wastewater treatment with the 4 sorbents (HQ > 1). However, the lowest HQ value was obtained after the wastewater treatment process using SbE sorbent, reaching the value of 2.14, with 97.45% lower than in the case of lead-contaminated wastewater, the adverse effects for this receptor being considered probable. In the case of the other sorbents used in the experiment, MR, ME and SbR, the HQ values exceed 10, before and after wastewater treatment, indicating a high chronic risk for the ecological receptor *Mollusca* sp. The ecological risk assessment for *Calluna vulgaris* and *Sorex araneus* receptors revealed HQ values < 1 after the wastewater treatment process, the adverse effects being unlikely to occur. In the case of human health risk assessment, risk modeling was performed by assessing the exposure of adults and children to different concentrations of lead in lead-contaminated wastewater, before and after treatment with MR, ME, SbR and SbE sorbents. The study showed HQ values > 1 in children for wastewater treated with MR, ME and SbR sorbents, indicating likely adverse effects on human health. In the case of adults, a high chronic risk could be identified even after wastewater treatment with MR and ME sorbents, HQ being > 10. The lowest value of HQ was determined after wastewater treatment with SbE sorbent, in children, reaching 0.65, which indicates unlikely adverse effects on human health. Comparing the 4 sorbents, we can conclude that SbE can be successfully used for the treatment of lead-polluted wastewater with benefits for both the environment and human health.

Keywords: *environmental risk, hazard quotient, lead, pollution, wastewater treatment*

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