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TITLE

EFFECTS OF GREEN SILVER NANOPARTICLES IN THE DIGESTIVE GLAND OF BIOMPHALARIA GLABRATA: INSIGHTS INTO THE TOXICITY OF A NEW MOLLUSCICIDE

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ABSTRACT

Green nanoparticles (G-NPs), particularly green silver nanoparticles (G-AgNPs), have numerous biomedical applications, such as their use in controlling vectors, pests, and intermediate hosts. Among their applications in nanomedicine and parasitology, G-AgNPs exhibit molluscicidal activity against gastropods that act as intermediate hosts for medically and veterinary important parasites, causing diseases like schistosomiasis. Schistosomiasis is a neglected parasitic disease caused by the digenean trematode of Schistosoma genus, with the snail Biomphalaria glabrata (Say, 1818) as an intermediate host. In mollusks, the digestive gland is the main organ for the bioaccumulation and metabolism of inorganic NPs; however, knowledge about the effects of G-AgNPs on the digestive gland of freshwater gastropods is still scarce. Therefore, this study aimed to evaluate whether a 7-day exposure to two concentrations of G-AgNPs synthesized with aqueous leaf extract of Croton urucurana induces histopathological changes and inflammatory response in the digestive gland of the neotropical snail B. glabrata. After exposing the snails, the digestive gland was dissected, and included in glycol methacrylate resin, the slides were stained with 1% toluidine blue pH 8.5, and the histopathological biomarkers were analyzed qualitatively, quantitatively, and semi-quantitatively (histopathological alteration index). The results indicated that G-NPs induced several histopathological alterations such as nuclear changes, vacuolization, atrophy, tubular regression, and necrosis in the epithelium of the digestive gland tubules and the formation of granulocytomas. Snails exposed to G-AgNPs and the extract showed a higher histopathological index in comparison with the control group. G-AgNPs also induced inflammatory response in the digestive gland, mainly increased hemocyte infiltration and aggregation. This study contributes to understanding the biodynamics and toxicity of G-NPs in medically important gastropods, and for the development of new materials with molluscicidal potential.

KEYWORDS

Histopathology; Nanomedicine; Nanotoxicology; Schistosomiasis

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