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MoS_2 nanoparticles induce behavioral alteration and oxidative stress mediated cellular toxicity in the social insect *Oecophylla smaragdina* (Asian weaver ant)

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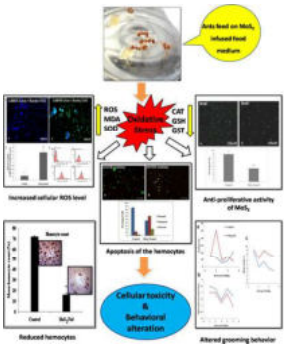
GRAPHICAL ABSTRACT



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ABSTRACT

The study evaluates molybdenum disulfide (MoS_2) nanoparticles (NPs) induced oxidative stress during cellular toxicity in an invertebrate *in vivo* system, the weaver ant. The lethal concentration was checked and LC_{50} was obtained as 50 μg/mL. Feeding assay and the photoluminescence activity confirmed the ingestion of MoS_2 NPs by the organism. Behavioral assays showed altered grooming behavior in the MoS_2 NP fed ants. A drastic decrease in the hemocyte count in the MoS_2 NP fed ants revealed the anti-proliferative role of MoS_2. This was further confirmed by 5-bromo-2′-deoxyuridine (BrdU) labeling assay. MoS_2 NPs induced apoptotic activity was also observed in the hemocytes by acridine orange/ethidium bromide (AO/EB) staining. The level of oxidative stress during cellular toxicity was observed. An increased reactive oxygen species (ROS) level was observed in the MoS_2 NP fed ants when compared to the control group. The increased activity of superoxide dismutase (SOD) and the lipid peroxidation (LPO) product were observed. While, the activities of catalase (CAT) and glutathione-s-transferase (GST) and the glutathione content (GSH) were decreased by MoS_2 NPs. The transcript levels of SODs, CAT and GST were up regulated in the treated group. Our results suggest that MoS_2 NPs induced oxidative stress mediates the cellular toxicity in the foragers of the weaver ant.

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