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The Impact of Biogenic Silver Nanoparticles on the Enzymatic Antioxidant System of Wistar Rats' Kidney

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Abstract

Nanotechnology is an advanced and promising field that focuses on creating unique nanoparticles with various properties. Among them, silver-based nanoparticles have gained significant attention and are extensively studied. The liver and kidney are particularly vulnerable to AgNPs because they play a crucial role in excreting exogenous substances.

The objective of this research was to comparatively assess the effects of biogenic AgNPs, stabilized in a 50% extract of O. araratum, on the antioxidant system (AOS) of Wistar rats' kidney, considering different exposure durations. The activity of superoxide dismutase (SOD), peroxidase (PO), and the concentration of malondialdehyde (MDA) in the kidney homogenate of experimental animals were measured using colorimetric methods.

The study revealed that regardless of the duration of exposure, there was an increase in SOD activity. However, PO activity was inhibited, leading to elevated levels of hydrogen peroxide, as indicated by the higher concentration of MDA, after 7 days of exposure to stabilized biogenic AgNPs. On the other hand, exposure for 14 days resulted in the normalization of MDA content. Prolonged exposure to AgNPs reduced the destructive effects of rosmarinic acid (RA) and the extract. These outcomes shed light on the diverse properties of biogenic AgNPs responsible for inducing oxidative stress. However, despite this critical mechanism, protective mechanisms are also observed in vivo during long-term exposure.

Keywords: silver nanoparticles, enzymatic antioxidant system,

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