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Evaluation of Protective Effects of Caffeic Acid against Arsenic-Induced Oxidative Damage in Testis of Mice

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Background: The currently approved treatment for arsenic toxicity is chelation therapy to reduce the burden of the toxic effects of arsenic, but the safety and efficacy of the various chelating agents may be questioned. The aim of this work was to study the alleviative role of caffeic acid, a dietary non-flavonoid phenolic acid, versus arsenite-provoked alterations in testicular oxidative status indices.

Methods: In this experimental study, 24 mice were divided into four groups. Group 1 served as control. Mice in group 2 received water containing 200 ppm sodium arsenite. Group 3 animals received caffeic acid (60 mg/kg body weight, i.p.) during arsenite treatment. Mice in group 4 only received caffeic acid. At the end of the experiment (21 days), tissue sampling was done and the levels of some oxidative-stress related biomarkers were measured in testicular tissue.

Results: The results revealed significant decrease in testicular glutathione peroxidase, superoxide dismutase and ferric reducing antioxidant power (FRAP) in arsenite-treated animals relative to controls. Significant increment in testicular malondialdehyde was also detected in arsenite-exposed group. Other measured indices including reduced glutathione and protein carbonyls did not show significant alteration in arsenite-treated animals relative to controls. Concurrent administration of caffeic acid with arsenite notably alleviated altered biomarkers to the levels that were not significantly different from those in control group.

Conclusion: Taken together, caffeic acid notably restored testicular oxidative stress indices of mice intoxicated with arsenite and it can be suggested as a promising alleviative compound to mitigate testicular toxicity caused by arsenic exposure. The antioxidant and chelating properties may be proposed as the principle components important for the testicular securing influences of caffeic acid.

Keywords: Sodium arsenite, Oxidative stress, Caffeic Acid, Testis