

PROTECTIVE EFFECTS OF N-ACETYLCYSTEINE (NAC) AGAINST DI-ETHYL PHTHALATE (DEP)-INDUCED OVARIAN DYSFUNCTION IN FEMALE WISTAR RATS: A MODEL FOR THE INCLUSION OF ANTIOXIDANTS IN LIVESTOCK AND HUMAN DIETS

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Abstract

Di-Ethyl-Phthalate (DEP) is an industrial chemical widely used as a plasticizer to improve the flexibility of plastic products. DEP does not covalently bind with plastics, causing its leaching into feed and water. Exposure of DEP has been reported to have adverse effects on livestock and human reproduction. The aim of this research was to investigate the protective effects of N-acetylcysteine (NAC) in mitigating ovarian dysfunction caused by Di-Ethyl-Phthalate. Assessment of ovarian dysfunction was evaluated by histopathological, biochemical, and hormonal assays. Twenty female adult albino rats were divided into four groups of five rats each. Group A (rats were orally administered with 0.5 ml of olive oil to serve as the control), Group B (rats received 100 mg/kg body weight oral N-acetylcysteine), Group C (administered DEP 500 mg/kg per day body weight suspended in 0.5 ml olive oil, orally), and Group D: (DEP + NAC-treated group) were treated with DEP concomitantly with NAC at the same previous doses for (7) days. The histopathological results of this study revealed that DEP caused degeneration of the granulosa cells, with severe vascularization and mild congestion of the ovarian stroma, while Group D showed improved ovarian connective tissues and interstitial cells. The results of the biochemical assays revealed that DEP slightly increased the lipid peroxidation level and slightly reduced glutathione content (GSH), superoxide dismutase (SOD) activity, and catalase activity, which was ameliorated in Group D. The hormonal assay results showed a slight decrease in the levels of Follicle-Stimulating Hormone (FSH) and Estrogen in Group C, which improved significantly in Group D. Conclusion: Treatment with NAC can protect against DEP-induced ovarian dysfunction by decreasing inflammation and oxidative stress and maintaining optimum hormonal levels. This provides a potential justification for the inclusion of synthetic antioxidants in livestock and human diets to reduce the reproductive side-effects caused by exposure to plastic chemicals.

Keywords: N-acetyl-cysteine; Di-Ethyl Phthalate; Ovaries; Female; Wistar rats