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Protective role of Gramine and N-acetylcysteine against tramadol induced testicular toxicity in rats

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Testicular dysfunction poses a significant health concern, necessitating effective prevention strategies to mitigate its adverse effects. One potential cause of testicular toxicity is the misuse of libido-enhancing drugs, such as tramadol. To investigate protective approaches, this study involved thirty-six adult male Sprague-Dawley rats, divided into five groups. All groups received tramadol hydrochloride at a dose of 75 mg/kg via intraperitoneal injection. Selected groups additionally received oral treatments of Gramine and N-acetylcysteine (NAC) as protective agents over a specified period. Following treatment, comprehensive assessments were conducted. Serum biochemical and hormonal markers measured included nitric oxide, total cholesterol, lactate dehydrogenase (LDH), testosterone, follicle-stimulating hormone (FSH), luteinizing hormone (LH), and androgen-binding protein (ABP). Testicular tissues were collected to evaluate sperm parameters: count, motility, and viability and tissue markers such as total protein, cholesterol, and albumin. Oxidative stress indicators, including superoxide dismutase (SOD), glutathione (GSH), and lipid peroxidation (LPO), were also analysed. Histological examinations assessed structural changes within the testes. Results demonstrated that high dose Gramine aided in restoring hormone levels, while NAC significantly (P<0.001) improved hormonal balance. The combined administration of Gramine and NAC yielded the most notable improvements in sperm quality and testicular tissue markers. Additionally, antioxidant defences were effectively normalised. These findings suggest that the combined use of Gramine and NAC holds promise as a therapeutic strategy to counteract tramadol-induced testicular damage.

Keywords: Adiponection receptor, Libido enhancer drug, N-Acetylcysteine, Oxidative stress, Testicular dysfunction