

Article

Silver Nanoparticles Stimulates Spermatogenesis Impairments and Hematological Alterations in Testis and Epididymis of Male Rats

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Abstract: The potential pharmaceutical application of nanoparticles has led to the toxicity within the male reproductive system. In the present study, the effects of silver nanoparticles (Ag-NPs) on hematological parameters, free radical generation, antioxidant system, sperm parameters, and organ histo-morphometry in male rats were investigated. Ag-NPs were produced by the reduction of silver ions, while the formation of which was monitored by UV-visible spectrophotometry. Zeta potential, transmission, and scanning electron microscopies were applied for the characterization of AgNPs. A total of 30 rats were divided into 6 groups and were sub-dermally exposed to Ag-NPs at the dosage of 0 (control), 10, and 50 mg/kg bodyweight (bw) doses for either 7 or 28 days. Ag-NP administration altered hematological indices and caused dose-dependent decreases in sperm motility, velocity, kinematic parameters, concentrations of luteinizing hormone, follicle-stimulating hormone, and testosterone. In the epididymis and testis, the concentrations of malondialdehyde and peroxide increases while superoxide dismutase, catalase, reduced glutathione, and total thiol group decreases. These findings suggest that Ag-NP triggered hormonal imbalance and induce oxidative stress in testis and epididymis; which negatively affect sperm parameters of male rats.

Keywords: antioxidants; epididymis; silver nanoparticles; sperm parameters; hormones; toxicity; testis.

1. Introduction

Nanoparticles (NPs) are particles that are designed and produced with a dimension or size that is ≤ 100 nanometers [1]. Due to their unique physical and chemical properties such as thermal, optical