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Ashwagandha protects the arsenic induced testicular toxicity in rats

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Abstract

Arsenic can be found in products of herbicides, fertilizers, pesticides, leather treatment, cotton desiccants, wood preservation, animal feeds as food additives and pharmaceuticals. During past two decennia it has become apparent that arsenic poisoning (As) via groundwater has become a worldwide problem. Some of the documented and most severe cases of arsenic contaminated groundwater have been found in aquifers in Asia e.g. parts of Bangladesh, China, India, Nepal. High levels of arsenic in ground water not only cause significant problems in the provision of safe drinking water, but lately have also raised concern regarding food safety in the case of long-term use of groundwater for irrigation purposes – whereby crops become contaminated due to the accumulation of arsenic. In India, the Gangetic plain area is the most arsenic affected area where arsenic poisoning in underground water is of great concern in terms of health. Long-term exposure to arsenic has been associated with cancer of skin, lungs, urinary-tract, kidneys, liver and reproductive disorders also.

In the present study, Arsenic in the form of Sodium Arsenite was administered to male Charles Foster rats (n = 12) @ 8 mg/kg. b.w/ day for 6 weeks. Control male rats (n = 6) were also taken for the comparative study. Thereafter, ethanolic root extract of *Withania somnifera* (Ashwagandha) was prepared and administered @ 100 mg/kg b.w/ day for 4 weeks to observe the ameliorative effect of it on male reproductive system. Drinking water and feed was provided to the animal *ad libitum.* After each interval, their sperm counts were done, they were sacrificed and their serum was extracted for testosterone hormone assay while their testes were fixed in the neutral formalin for light microscopic study.

The study reveals that after the administration of Sodium Arsenite there is immense decrease in the sperm counts accompanied by an increased incidence of sperm abnormalities. The major sperm abnormalities observed were loss of sperm tails, loss of motility in most of the sperm tails, coiling in sperm tails etc. The hormonal assay also show decrease in the level of testosterone while the testis shows high degree of histopathological degeneration as no stages of spermatogenesis were observed in seminiferous tubules thus denotes infertility in rats.

But, the ethanolic root extract of Ashwagandha on Sodium Arsenite pretreated group show significant changes, as the sperm counts were quiet normal as compared to the control group while there sperm architecture was also restored at much extent. The hormonal assay show normalisation in the level of testosterone level while the light microscopic study of testes also reveals drastic changes as restoration in spermatogenetic stages in seminiferous tubules were observed.

Thus, from the entire study it can be concluded that Ashwagandha plays the vital role to ameliorate the deleterious effect of Sodium Arsenite in male reproductive system of rats.

Keywords: Sodium Arsenite, *Ashwagandha,* Rats, Sperm, Sperm Count, Testosterone.

Biography

Dr. Arun Kumar has completed his Ph.D in 2008 from Patna University, Patna, Bihar, India. He is presently serving as Scientist- I at a premier institute, Mahavir Cancer Institute & Research Centre, Patna, Bihar, India since last 5 years. He has published more than 30 research papers in reputed journals. He has received various awards during his academic career. He has been author & Co-author of 3 international books published in year 2012. He has supervised 46 M.Sc. students for their M.Sc. dissertation work on various topics and co-supervised 2 Ph.D. students.