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Fertility regulating effects of Withaferin-A and Withanolide-A: a treatment in male albino rats

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Background: Population explosion is creating immense pressure on natural non-renewable resources leading to economic imbalances, environment pollution and health hazards thus human fertility regulation becomes a global concern. However, a wide variety of contraceptives are available for fertility control to both men and women, although, caused some side effects in users. In recent years, use of traditional and alternative medicine has increased worldwide; number of modern drugs has been developed from natural sources, particularly plants, based on their use in traditional medicine.

Objective: Two Withanolide i.e. Withanolide-A and Withaferin-A were administered orally at the three different dose levels for 60 days to in adult male Wistar rats to evaluate effects on reproduction and fertility to develop a safe, orally effective and reversible male contraceptive agent.

Materials & Methods: Withaferin-A and Withanolide-A were separated from Withania somnifera dissolved in DMSO to administered orally. The initial and final body weights of the animals were recorded. Testes, epididymis, seminal vesicles and ventral prostrate were dissected out, freed from adherent tissues and weighed to the nearest milligram. Sperm motility and density were done by routine procedure. To check fertility of animal mating was carried out with all the animals 5 days prior to sacrifice. The mated females could complete the gestation. The number of pups was recorded and litter size and percent fertility was calculated. Serum was separated and stored at 20°C for protein, cholesterol and triglycerides. Serum was analyses for the estimation of testosterone, FSH and LH levels by ELISA Kits. Protein, glycogen, cholesterol, sialic acid ascorbic acid and fructose were estimated in right side of testis and other accessory reproductive organs. Sections of testes were stained with Harris's hematoxylin and eosin to observe under light microscope. Data are expressed as mean ± SE and analyse for statistical significance by using student's t-test. The study was carry out under the supervision of the ethical committee of the Department of Zoology, University of Rajasthan, Jaipur, India and CPCSEA guidelines followed for maintenance and use of the experimental animals.

Results: The weight of testes, epididymites and sex accessory reproductive organs were significantly decreased. Sperm density and motility and fertility of treated male rats reduce significantly. The level of fructose, protein, ascorbic acid and sialic acid contents of reproductive tract were significantly declined after the treatment of both Withanolide. Level of LH, FSH and testosterone were significantly decreased in Withaferin-A and Withanolide-A treated rats. Histological observations showed degenerative changes in germinal epithelium of testes as compared to control rats.

Conclusions: The decreased number of spermatocytes, spermatids and spermatozoa in lumen of seminiferous tubules after the treatment of Withaferin-A and Withanolide-A in rats might be due to suppression of androgen, resulted reduction of fertility potential of rats. The possible mechanism of antispermatogenic and antiandrogenic effects of the Withaferin-A and Withanolide-A treatment are discussed.

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