Effects of leuprolide acetate on the ultrastructure of germ cells in adult male mice

Mohammad Ghasemi F. (Ph.D.)[1], Soleimani Rad J. (Ph.D.)[2], Ghanbari A.A. (Ph.D.)[3], Tabatabaei Nabavi P. (B.Sc.)[4]

1- Department of Anatomy, Faculty of Medicine, Gilan University of Medical Sciences, Gilan, Iran.
2- Applied Drug Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.
3- Department of Anatomy, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran.
4- Cellular & Molecular Research Center, Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran.

Abstract

Introduction: Gonadotropin hormones control spermatogenesis and any alteration in their level can influence the process and subsequently the number of germ cells. Gonadotropin-releasing hormone (GnRH) agonists suppress the pituitary-gonadal axis. The objective of this study was to investigate the ultrastructural and histological alterations in spermatogenic and spermiogenic cells following administration of a single dose of leuprolide acetate, an analogue of gonadotropin-releasing hormones.

Materials & Methods: This study was done on 24 adult male 8-old week mice were used. The animals were divided in to 3 groups. The control group received no drugs but to the animals in the second and third groups 0.2*ml* of carboxymethyl cellulose and 7.6*mg/kg* of leuprolide acetate were administered respectively. All the animals were dissected five weeks after the administrations and their testes were processed for the study of germ cells and morphometric studies of seminiferous tubule parameters using transmission electron (TEM) and light microscopes (LM). The results from the five groups were compared morphologically and the data were statistically analyzed by ANOVA tests.

Results: The ultrastructural study revealed that most alterations were in spermiogenic cells. The nuclei and acrosomes had been deformed in most spermatids. In some developing spermatids, there were acrosomal vesicles inside the nucleus and ectoplasmic specialization had been partially deleted in some areas. The flagella were deformed in elongated spermatids and their fibrous sheaths were discontinuous. In light microscopy, the maturity of spermatogenetic cells, based on Johnson's testicular biopsy score, in the control, sham and experimental groups were 8.1±0.53, 8.04±0.82 and 7.01±0.57 respectively and maturation had been significantly reduced in the third group ($p<0.01$). In addition, all histometric parameters in seminiferous tubules had been decreased compared to the sham and control groups ($p< 0.01$).

Conclusion: Administration of a single dose of leuprolide acetate during a spermatogenetic cycle in mice is associated with adverse effects on spermatogenesis and it is mostly associated with alterations in spermiogenesis or transformation of round spermatids into elongated spermatids.

Key Words: Spermatogenesis, GnRH, Spermiogenesis, Leuprolide acetate, Mouse, Electron microscope, Germ cell, Male infertility.

Corresponding Author: Dr. Fahimeh Mohammad Ghasemi, Department of Anatomy, Faculty of Medicine, Gilan University Complex, Tehran Road, Rasht, Iran.
E-mail: parsahistolab@gmail.com