



Research article

Effect of long-term administration of Deca-Durabolin on reproductive organs of male rats

Isam Mohammed Jaber Zabiba

College of Veterinary Medicine, Al-Qasim Green University, Iraq.

Corresponding Author Email: isam.zabiba@yahoo.com

(Received 2/9/2017, Accepted 5/12/2017)

Abstract

The present study was conducted to evaluate the effect of high doses of Deca-Durabolin abusing on reproductive tissue in male rats. Sixteen male rats were randomly divided into control and Deca-Durabolin group injected with 15mg/kg BW. Twice weekly for 10 weeks. Histopathological changes with Haematoxylin & Eosin stain showed the testicular lesion in the caput epididymis shows severe destruction of basement epithelial lining, with severe degeneration, necrotic and hyaline degeneration, tubules with severe loss of sperm, caput epididymal tubules cystic digestion of tubules with degeneration & necrosis of spermatid (severe destruction of epididymal parenchyma), with severe cystic distension of epididymal tubules with severe hyalinization of spermatid resulting in narrowing of tubular tissue, as well as their is proliferation interstitial of fibers connective tissue with slight cellular filtrated together with loss of spermatid in the tubules that appear empty with cystic tubular distention, the epithelial hyperplasia showing of some epididymal duct tubules that show papillary growth in the lumen together with moderate fibrosis in the interstitial tissues, although some epidermis shows empty duct with sperm degeneration, in addition to fibrous connective tissue proliferation in the interstitial tissue, variable degree of tubular destruction together with loss of spermatid and evidence of epididymal tubular distortion, different degree of tubules destruction with loss of spermatid with evidence of epididymal tubules distraction. In conclusion, the present study revealed that the abusing of Deca-Durabolin cause serious pathological changes in reproductive organs, thus affected fertility. Finally, the anabolic steroid hormone has several disadvantages should be not used androgen replacement therapy at the high dose as well as prevent using as muscle building in athletics sports.

Key Words: Abuse, Androgen, Athletes, Deca-Durabolin, Epididymis, Sport, Testosterone.

Introduction

Androgens play pivotal point in the development of male reproductive organs such as prostate, penis, seminal vesicle, ductus deferens, and epididymis. This hormone very important for puberty, fertility, and sexual function in males. Testosterone, steroid hormone secret from Leydig cells that is a main role act with FSH to regulation the spermatogenesis (14). As endogenous testosterone is the main regulator of the hypothalamo–pituitary–testicular axis, that

lead to reduce of luteinizing hormone (LH) and follicle stimulating hormone (FSH) produce diminish of testosterone that regulate spermatogenesis and sperm count . Reproductive damage occur due oxidative stress accompanied by reduction of serum enzyme antioxidant SOD, CAT and GSH concentrations (6). The main effect of androgen anabolic hormone cause disturbance in aromatase enzyme that converts testosterone to estrogen so that



gynecomastia was prominent in male injected testosterone derivatives due to this defect in enzyme (2). On other hand that defect may be enhancement of level of glucocorticoids act via their receptors on testicular Leydig cells to inhibit the testicular response to gonadotropin (6). Anabolic-androgenic steroids (AAS) have two categories natural and synthetic agent that are similar to the male sex hormones. Anabolic-androgenic steroids (ASSs) used in the treatment of different diseases, such as growth retardation, anemia, chronic renal failure, osteoporosis, AIDS-associated wasting syndrome and hypogonadal dysfunction and anemia in mature people (12). Deca-Durabolin is indicated for the treatment of anemia in immature as well as large dose improve athletic achievement (17). Moreover, in recent decades, Deca-Durabolin have wrong use by athletes to increase muscle mass by inducing in protein synthesis (18). Deca-Durabolin considering testosterone derivatives their consumption has become an issue of major attention. When mixed with a suitable diet and an intense training program, Deca-Durabolin has ability to increase hardness, performance and muscle mass in some athletics. They have many opposite effect which can be persistence or potentially fatal. Most side effects are moderate and irreversible as the modification of the male reproductive system, explore in this article (15). Hepatocellular carcinoma commonly due to long-term and heavy use. Exogenous management of Deca-Durabolin induces negative feedback and therefore inhibiting the secretion of both follicular stimulated hormone and luteinizing hormone (10). It is important to determine the effects of wrong

doses of Deca-Durabolin on male reproductive organs during development. Moreover, few reports are available to dissect long-term effects of Deca-Durabolin abuse perversion on reproductive function such as tests, epididymis and prostate.

Materials and Methods

Ethical approval

The Animal Ethical Committee of Veterinary Medicine College, University of Al-Qadisiyah, Iraq, has approved the present study under permission No: 106 (Nandrolone Decanoate)[®] (C28H44O3) injection solution (50mg/1ml) from Holland company diluted to suitable concentration with Sesame oil.

Experimental design

Sixteen mature male rats of albino strain, weighing 200-300 g B.W. each and 13 -11 weeks old obtained from the Laboratory Animal Colony, Al-Qasim Green University. The rats kept under controlled hygienic conditions in plastic cages with free access to food and water *Ad libitum* for one week before starting the experiment for acclimatization. Experiment and grouping of rats: sixteen male rats were randomly divided into 2 groups, each with 8 animals. The first group was given distilled water/day as a control group while the second group were injected with 15mg/ kg BW. Twice weekly for 10 weeks. At the end of experiment animal were sacrificed rats under Phenobarbital anesthesia sexual organs were kept in 10% formalin solution pending for histopathological examination, (18, 16).

Results

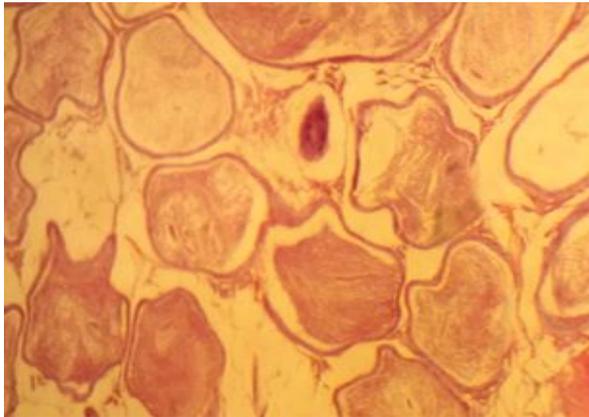


Figure (1): Histopathological section in testis with H&E stain, lesion in the caput epididymis shows severe destruction of basement epithelial lining, with severe degeneration and necrotic and hyaline degeneration, tubules with severe loss of sperm.

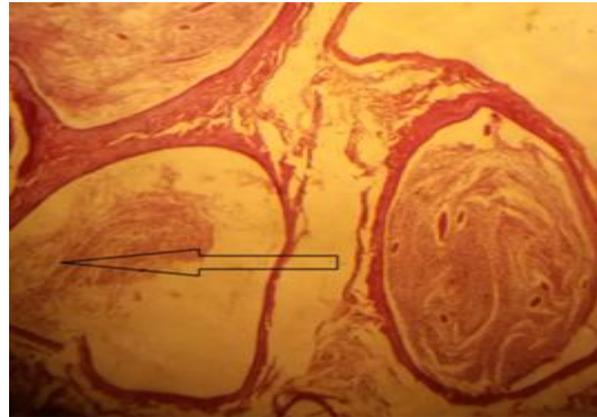


Figure (2): Histopathological section in testis with H&E stain, caput epididymal tubules cystic distension of tubules with degeneration & necrosis of spermated (severe destruction of epididymal parenchyma)

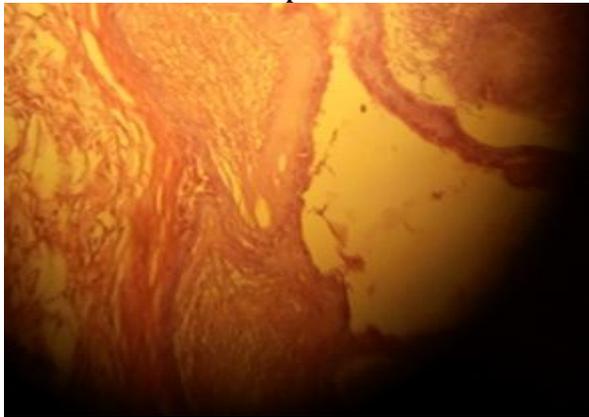
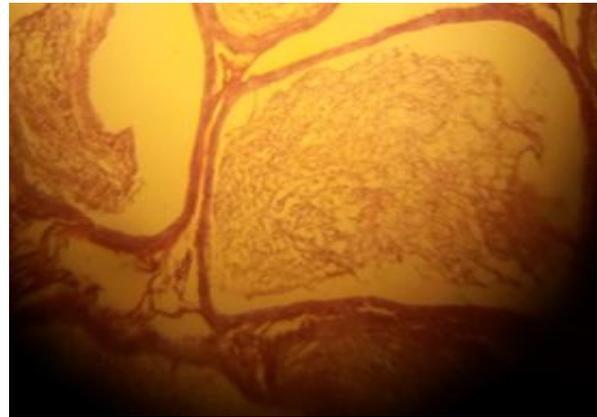


Figure (3): Histopathological section in testis with H&E stain, severe cystic distension of epididymal tubules with severe hyalinization of spermated resulting in narrowing of tubular tissue.



Figure(4): Histopathological section in testis with H&E stain, The histopathological lesion show proliferation interstitial of fibers C.T with slight cellular infiltrated together with loss of spermated in the tubules that appear empty with cystic tubular distention.

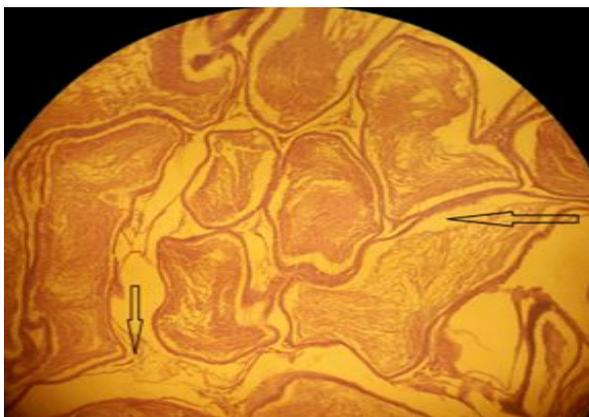
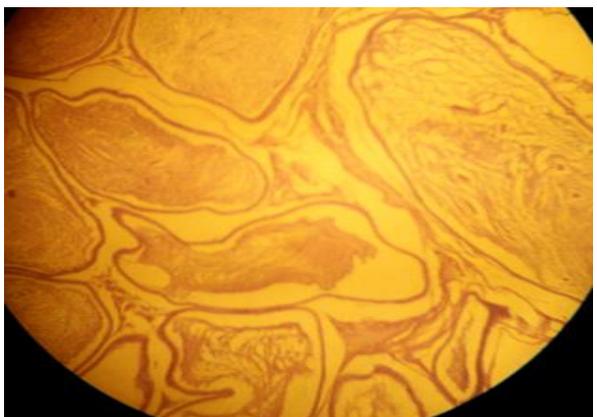


Figure (5): Histopathological section in testis with H&E stain, the section showed epithelial hyperplasia of some epididymal duct tubules that show papillary growth in the lumen together with moderate fibrosis in the interstitial tissues.



Figure(6): Histopathological section in testis with H&E stain, shows some empty epididymal duct with sperm degeneration, in addition to fibrous connective tissue proliferation in the interstitial tissue .

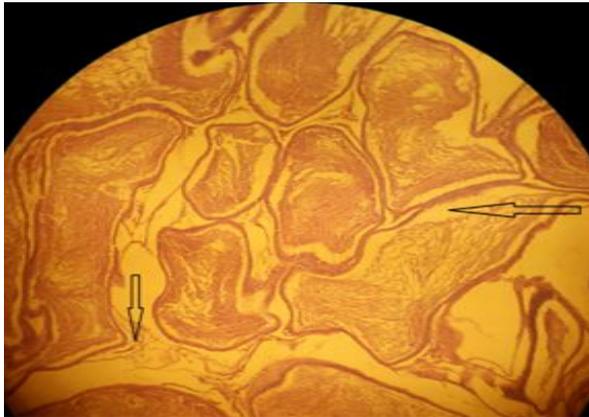


Figure (7): Histopathological section in testis with H&E stain, Variable degree of tubular destruction together with loss of spermatid and evidence of epididymal tubular distortion.

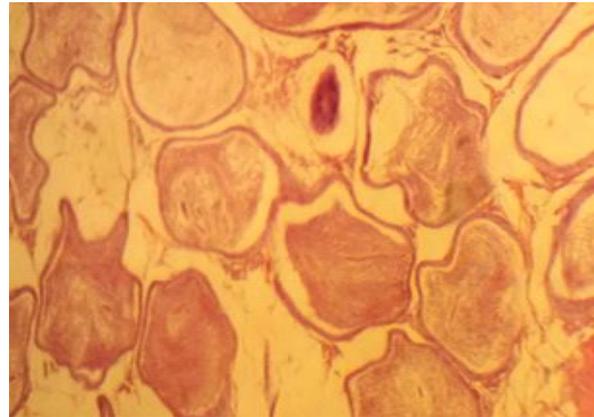


Figure (8): Histopathological section in testis with H&E stain, different degree of tubules destruction with loss of spermatid with evidence of epididymal tubules distraction.

Discussion

Anabolic androgenic steroids (AASs), these synthetic, effect widely abused that cause great changes in most reproductive organs (9). deca-durabolin cause reversible reaction of spermatogenesis, testicular atrophy, infertility, and erectile dysfunction that defect may be persistence for long duration of time or may be converted to azoospermia. Synthetic androgens persistent administration cause gynecomastia and acne. (8), reported that rats receive 5mg sustanon/kg B.W. tests appear high number of vacuoles with few multinucleated giant cells while at high dose 10mg/kg B.W treated rats reveal huge number of multinucleated cells and minor vacuoles as well as thin layer germinal layer are seen, apoptotic nuclei are seen in some multinucleated cells (17), showed that definition total testosterone level in the serum of the control and injection group of nandrolone decanoate showed a significant decrease in testosterone that will inhibit both GnRH productions by the hypothalamus and LH production by the pituitary gland and therefore inhibit testicular testosterone production furthermore limit the Sertoli cell number in administer rats that lead to decrease in the number of Spermatogonia and testicular atrophy. High disadvantage doses of nandrolone decanoate has adverse result on number of Leydig cells, sperm cell and testosterone condensation of immature rats as well as mature rats.

However, the number of Sertoli cell, testis size and seminiferous diameter changes (13). Long term used anabolic androgenic steroids in rats elevate structural changes in the prostate include changes in the weight, volume and epithelium height of the prostate ventral lobe and a predominance of collagen fibers. The histopathological change detect in testosterone treated rats appear tissue tests degeneration and necrosis of spermatogoneal cells lining seminiferous tubules with forming of spermatid giant cells and interstitial edema and loss of Leydig cells as well as marked decrease in testicular weight, FSH and marked decrease of Leydig cell count with significant increase in caspase-3 expression between anabolic steroid treated rats and the other studied groups (4). Our result also was concord with (5)., reported that anabolic steroid hormone in treated rats treated with high dose of hormone reveal there is head of epididymis., showed severe inference of basement epithelial lining with massive degeneration and necrotic and hyaline degeneration, tubules severe loss of spermatid, some animal appear intensified demolition of epidermal parenchyma, epithelial hyperplasia of some epididymis duct tubules that detect papillary growth in the lumen, together with fibrosis in the interstitial tissues (11), confirmed that rat receive nandralone appear disturbance of the somniferous epithelium with broad spaces



between the cellular components and the testicular atrophy with shrinkage and reduction of diameter of somniferous tubules and there is of high number of vacuoles repeatedly associated with degenerating germ cells. methandrostenolone, and nandrolone deaconate administrated male rats cause decrease in the length of the testis accompanied by a decrease in the weight of the testis and disturbance may collaborate to

cessation of mitosis and meiosis (1, 3, 19). The present study revealed that the abusing of deca-durabolin cause serious pathological changes in all reproductive organs, thus affected the fertility. finally the anabolic steroid hormone have several disadvantages should be not used androgen replacement therapy at high dose as well as prevent using as muscle building in athletics sports.

References

- 1-Al-Aubody Nehaya M. Mohammad A. Al-Diwan. Effect of Sustanon® 250 on Body Weight Gain, Total Serum, Muscle Protein and Reproductive Efficiency in Male and Female Rats American Journal of Research Communication (2014); 2(9):49-57.
- 2-Al-Zamely, H AND Al-Maraby, N .Effect of aqueous green tea extract on male Wistar rats reproductive hormones level. Al-Qadisiyah J. of Vet. Med. Sci. (2014); 13(1), 98-201.
- 3-Clark AS and Fast AS, Comparison of the effects of 17 alpha methyl testosterone, methandrostenolone, and nandrolone deaconate on the sexual behavior of castrated male rats. Behav Neurosci (1996) 110: 1478–1486.
- 4-Hala M. El-hanbuli1, Ahmed F. Abo-Sief and Taymour Mostafa. Protective effect of silymarin on the testes of rats treated with anabolic androgenic steroid: A biochemical, histological, histochemical and immunohistochemical study. Journal of Histology & Histopathology, (2017); 4 (10) 1-7.
- 5-Jassim A, Hayder AN Al-Zamely, Abbas G. Hamad. Study of the testicular damage induced by dianabol and its effect on morphological and histological changes in albino male rats. IOSR Journal of Agriculture and Veterinary Science (2015) 8 (8), PP 24-32.
- 6-Jabber A, Hussein, J. (2016).serum and liver Subcellular oxidants and antioxidant concentrations in silymarin trated male rats. Iraqi Journal of Veterinary Sciences (2015); 30(1):9-14.
- 7-Jawad K. Faris Rawaa. S. Abbas Suhad J. Hadi Gusson. A. Al-Neamah Wid. A. Mohammad Nadia. J. Ibrahim Hamza. H. Kzar. Effects of grape seed oil (*Vitis vinifera*) on fertility of male local rabbits. Al-Qadisiyah J. of Vet. Med. Sci. (2016); 15 (2), 76-80.
- 8-Khder H. Rasul and Falah M. Aziz. The Effect of Sustanon (Testosterone Derivatives) Taken by Athletes on the Testis of Rat. Jordan Journal of Biological Sciences (2012) 2(5):113-119.
- 9-Melnik B, Jansen .T, Grabbe. S, “Abuse of anabolic-androgenic steroids and bodybuilding acne: an underestimated health problem “Journal of the German Society of Dermatology, (2007) 2 (3), 110-7.
- 10-Maïmoun, L., Guillaume, S., Lefebvre, P., Philibert, P., Bertet, H., Picot, M. C., & Mariano-Goulart, D. Role of sclerostin and dickkopf-1 in the dramatic alteration in bone mass acquisition in adolescents and young women with recent anorexia nervosa. *The Journal of Clinical Endocrinology & Metabolism*, (2014) 99(4), E582-E590.
- 11-Noorafshan A, Karbalay-Doust S, Ardekani FM High doses of Nandrolone Decvonoate reduce volume of the testis and length of somniferous tubules in rats. APIMS (2008).; 113: 122-5.
- 12-Shokri S, Hemadi M, Bayat G, Bahmanzadeh M, Jafari-Anarkooli I, Mashkani B. Combination of running exercise and high dose of anabolic androgenic steroid, nandrolonedecanoate, increases protamine deficiency and DNA damage in rat spermatozoa. *Andrology*. (2014); 46:184–190. [PubMed]
- 13-Parrilla-Carrero J, Figueroa O, Lugo A, Garcia-Sosa R, Brito-Vargas P, Cruz B. The anabolic steroids testosterone propionate and nandrolone, but not 17alpha-methyltestosterone, induce conditioned place preference in adult mice. *Drug Alcohol Depend*. (2009); 100: 122–127.
- 14-Samplaski, M. K., Loai, Y., Wong, K., Lo, K. C., Grober, E. D., & Jarvi, K. A. Testosterone use in the male infertility population: prescribing patterns and effects on semen and hormonal parameters. *Fertility and sterility*, (2014) 101(1), 64-69.
- 15- Shokri, S., Aitken, R. J., Abdolvahabi, M., Abolhasani, F., Ghasemi, F. M., Kashani, I., & Barbarestani, M. Exercise and supraphysiological dose of nandrolone deconate increase apoptosis in spermatogenic cells. *Basic & clinical pharmacology & toxicology*, (2010) 106(4), 324-330.
- 16-Purkayastha S, Mahanta R. Effect of Nandrolone Decanoate on Serum FSH, LH and Testosterone Concentration in Male Albino Mice. *WJALSS*. (2012) 2: 123–127.



- 17-Tahtamouni L, Mustafa NH, Hassan EM, Ahmad IM, Yasin SR, Abdalla MY. Nandrolone Decanoate Administration to Male Rats Induces Oxidative Stress, Seminiferous Tubules Abnormalities, and Sperm DNA Fragmentation. *JJBS*. (2010) 3:165–174.
- 18-Tan RS & Scally MC. Anabolic steroid-induced hypogonadism – towards a unified hypothesis of anabolic steroid action. *Medical Hypotheses* (2009) 72 723–728.
- 19-Torres-Calleja J, González-Unzaga M, DeCelis-Carrillo R, CalzadaSa´nchez L & Pedron N. Effect of androgenic anabolic steroids on sperm quality and serum hormones levels in adult male bodybuilders. *Life Sciences* (2001) 68 1769–1774.